CASE: EM 2024-0002
OWNER: KOPRIVA, Rebecca
APN: 127-200-06
APLCT: Erik E. Olsborg, VP
AGENT:
ADDRESS: 6170 S Hwy 1, Elk

Major Towns & Places
Major Roads
Coastal Zone Boundary
Highways

0 2,750 5,500 Feet
0 0.5 1 Miles

N
W E
S

1:63,360

LOCATION

THIS MAP AND DATA ARE PROVIDED WITHOUT WARRANTY OF ANY KIND.
DO NOT USE THIS MAP TO DETERMINE LEGAL PROPERTY BOUNDARIES

CASE: EM 2024-0002
OWNER: KOPRIVA, Rebecca
APN: 127-200-06
APLCT: Erik E. Olsborg, VP
AGENT:
ADDRESS: 6170 S Hwy 1, Elk

Major Towns & Places
Highways (2017)
Public Roads
Private Roads
Driveways/Unnamed Roads

0 270 540 Feet
0 0.05 0.1 Miles

N W E S

1:6,000

AERIAL IMAGERY

CASE: EM 2024-0002
OWNER: KOPRIVA, Rebecca
APN: 127-200-06
APLCT: Erik E. Olsborg, VP
AGENT:
ADDRESS: 6170 S Hwy 1, Elk

Highways (2017)
Public Roads
Driveways/Unnamed Roads

0 12.5 25 Feet
0 0.0025 0.005 Miles

N
W E
S

1:324.95

AERIAL IMAGERY

COUNTY OF MENDOCINO DEPT OF PLANNING & BUILDING SERVICES 120 WEST FIR STREET FORT BRAGG, CA 95437 Telephone: 707-964-5379	Case No(s) EM 2024-02 CDF No(s) Date Filed 8/13/24 Fee $2263- Receipt No. 63321 Received by RDF Office Use Only

EMERGENCY PERMIT APPLICATION FORM

Name of Applicant	Name of Owner(s)	Name of Agent
Erik E. Olsborg, VP Brunsing Associates, Inc	Rebecca Kopriva	
Mailing Address 5468 Skylane Blvd, Suite 201 Santa Rosa, CA 95403	**Mailing Address** 21 Florida Ave Berkeley, CA 94707	**Mailing Address**
Telephone Number 707-838-3027	**Telephone Number** 202-744-2808	**Telephone Number**

Project Description:

Cut slope stabilization at the edge of her property, 6170 South Hughway 1, Elk, CA above the State Parks access road to Greenwood State Beach. The cut slope, owned by the State of California,is unravelling. This erosion is causing Ms. Kopriva to periodically lose portions of her property. California will not do anything to protect her property.

Driving Directions

The site is located on the SW (N/S/E/W) side of Highway 1 (name road)

approximately 300 Feet (XXXXXX) NW (N/S/E/W) of its intersection with

Greenwood-Philo Road (provide nearest major intersection).

Assessor's Parcel Number(s)

127-200-06

Parcel Size	Street Address of Project
0.26 ☐ Square Feet ☒ Acres	6170 South Highway 1, Elk, California **Please note: Before submittal, please verify correct street address with the Planning Division in Ukiah.**

EMERGENCY PERMIT
APPLICATION QUESTIONNAIRE

The purpose of this questionnaire is to relate information concerning your application to the Planning & Building Services Department and other agencies who will be reviewing your project proposal. The more detail that is provided, the easier it will be to promptly process your application. Please answer all questions. For questions which do not pertain to your project, please indicate "Not Applicable" or "N/A".

1. **NATURE OF THE EMERGENCY NARRATIVE** (use additional pages if necessary).

a) Describe the nature, cause and location of the emergency.

The California State Parks access road to Greenwood Beach runs below the Kopriva Property. The access road has an unstable cut slope, owned by the State of California, that is much steeper that allowed by code. The overly-steep cut slope, which is comprised of weak soils, is eroding her property. She does not want to lose more of her land to the erosion.

b) Describe the remedial protective or preventive work required to deal with the emergency.

Under previously granted Emergency Permit, EM_2023-0002 dated June 20, 2023, we planned to stabilize Ms. Kopriva's slope by constructing a concrete grade beam, supported by deep drilled piers. The pier and grade beam structure would be at the edge of her property near the top of the State access road cut slope. Alternatively, we are considering a slope stabilization using ultra-fine cement grout injection, as described in our August 8, 2024 geotechnical investigation report.

c) Describe the circumstances during the emergency that justify the course(s) of action taken, including the probable consequences of failing to take action.

Ms. Kopriva would like the State to build a retaining wall to support the overly-steep cut slope. After a few meetings/phone calls, it became apparent that getting the State to do anything is not going to happen. The State will do nothing more than clean up the debris that lands on their road. So, she is willing to protect her property, at her own expense. The previously-permitted pier-supported grade beam was not built after the permit was granted, due to financial constraints. As a result, a few feet of additional erosion occurred in one portion of her property. Ms. Kopriva is now ready to proceed to protect her property. If nothing is done, further erosion will occur.

d) Describe any secondary improvements such as wells, septic systems, grading, vegetation removal, roads, etc. that are necessary to deal with the emergency.

N/A

2. Are there existing structures on the property? ☒ Yes ☐ No

If yes, describe below and identify the use of each structure on the plot plan.

Existing house, shed driveway and parking area.

3. Is any grading or road construction planned? ☐ Yes ☒ No

Estimate the amount of grading in cubic yards _____ c.y. If greater than 50 cubic yards or if greater than 2 feet of cut or 1 foot of fill will result, please provide a grading plan.

Describe the terrain to be traversed (e.g., steep, moderate slope, flat, etc.).

4. Will vegetation be removed on areas other than the building sites and roads? ☐ Yes ☒ No
If yes, explain:

5. Project Height. Maximum height of structure(s): all below ground ~~feet~~

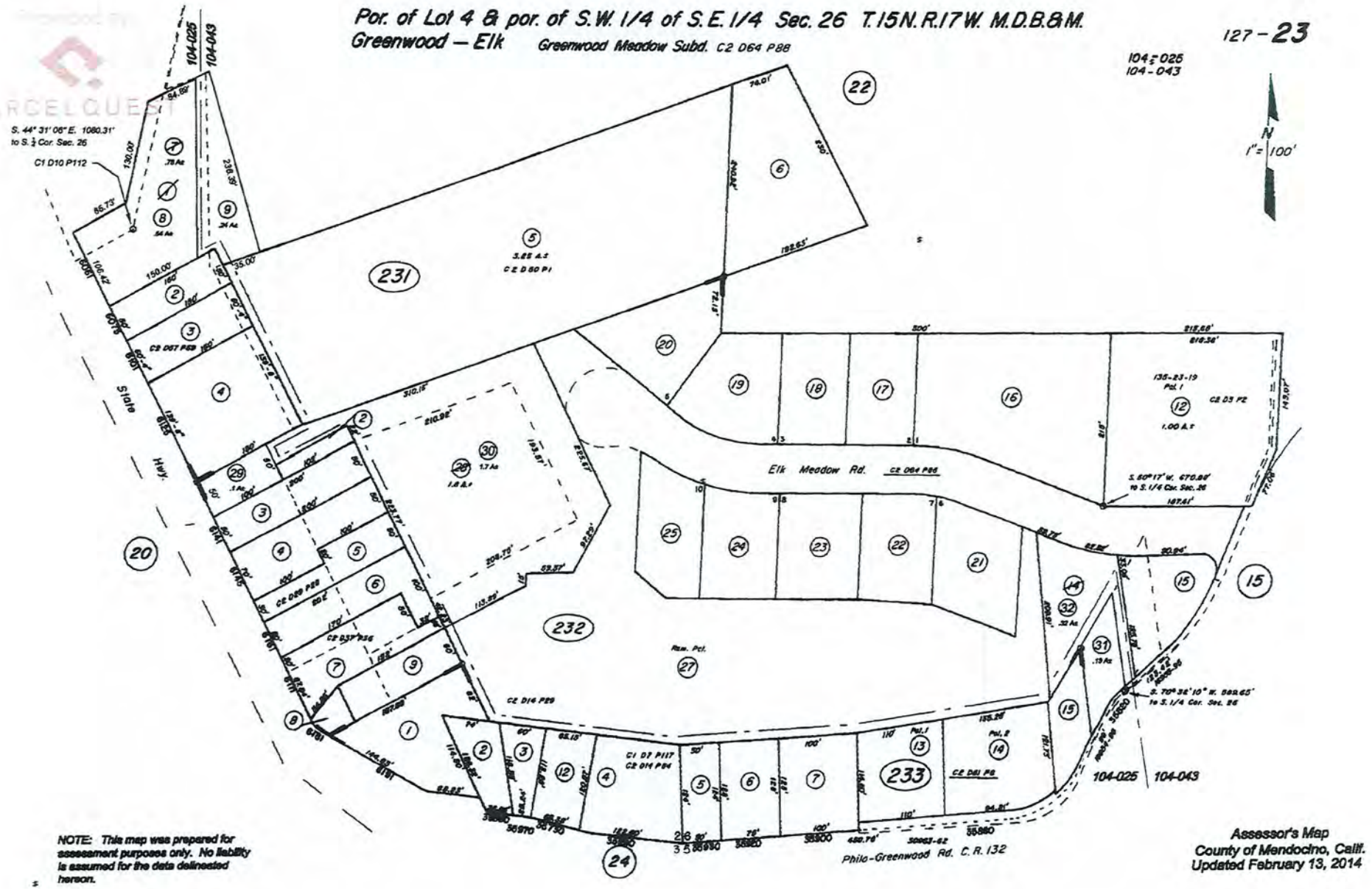
6. Describe all exterior materials and colors of all proposed structures that are visible beyond the boundaries of the subject parcel.

N/A

7. Are there any water courses, anadromous fish streams, ponds, lakes, sand dunes, rookeries, marine mammal haul-out areas, wetlands, riparian areas, pygmy vegetation, rare or endangered plants, animals or habitat which support rare and endangered species located on the project site or within 100 feet of the project site?

No, see attached biological report by Wynn Coastal Planning and Biology.

LOCATION MAP



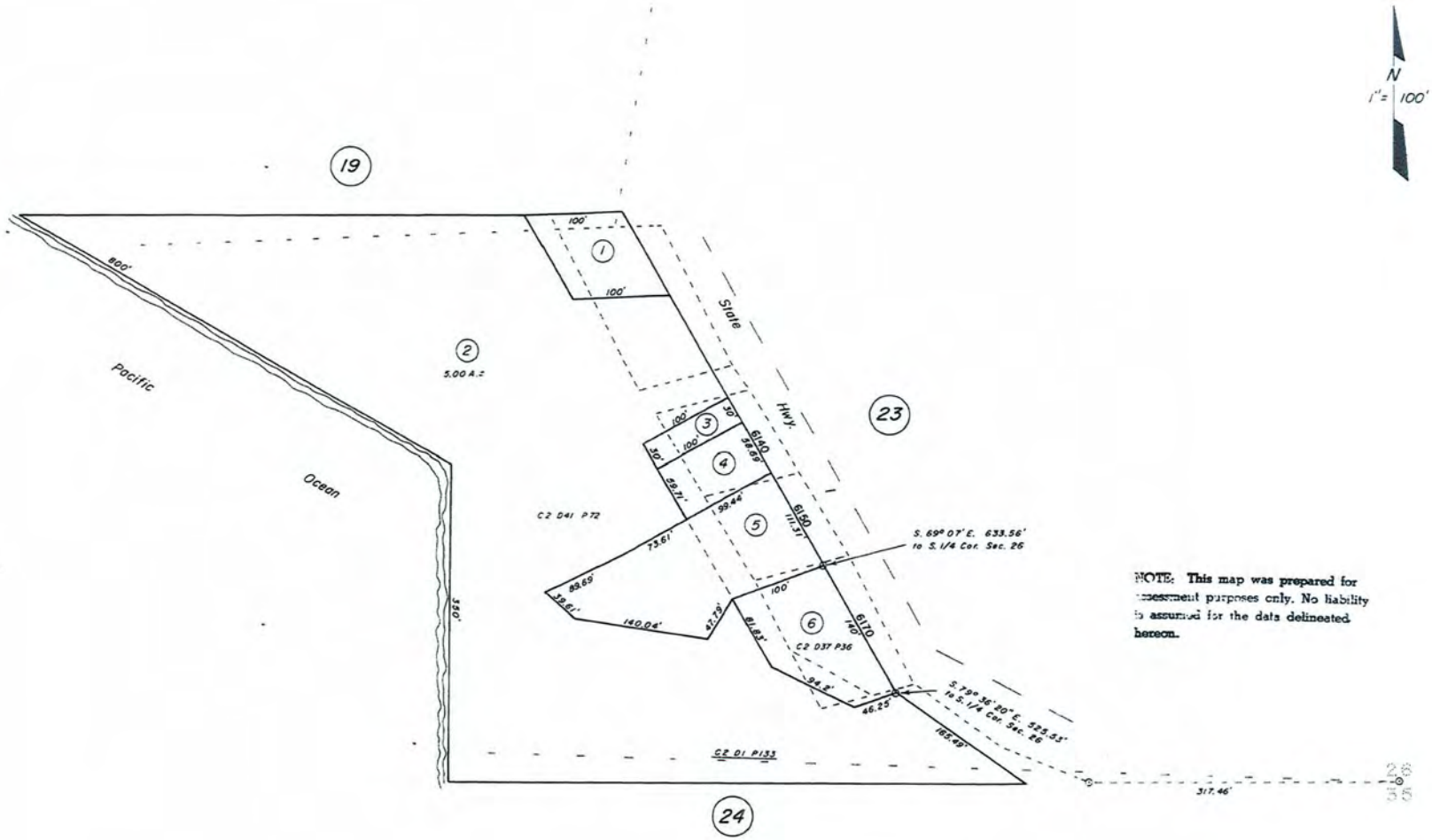
NOTE: This map was prepared for assessment purposes only. No liability is assumed for the data delineated hereon.

Assessor's Map
County of Mendocino, Calif.
Updated February 13, 2014

Por. of Lot 4 Sec. 26 T. 15 N. R. 17 W. M.D.B.&M.
Greenwood – Elk

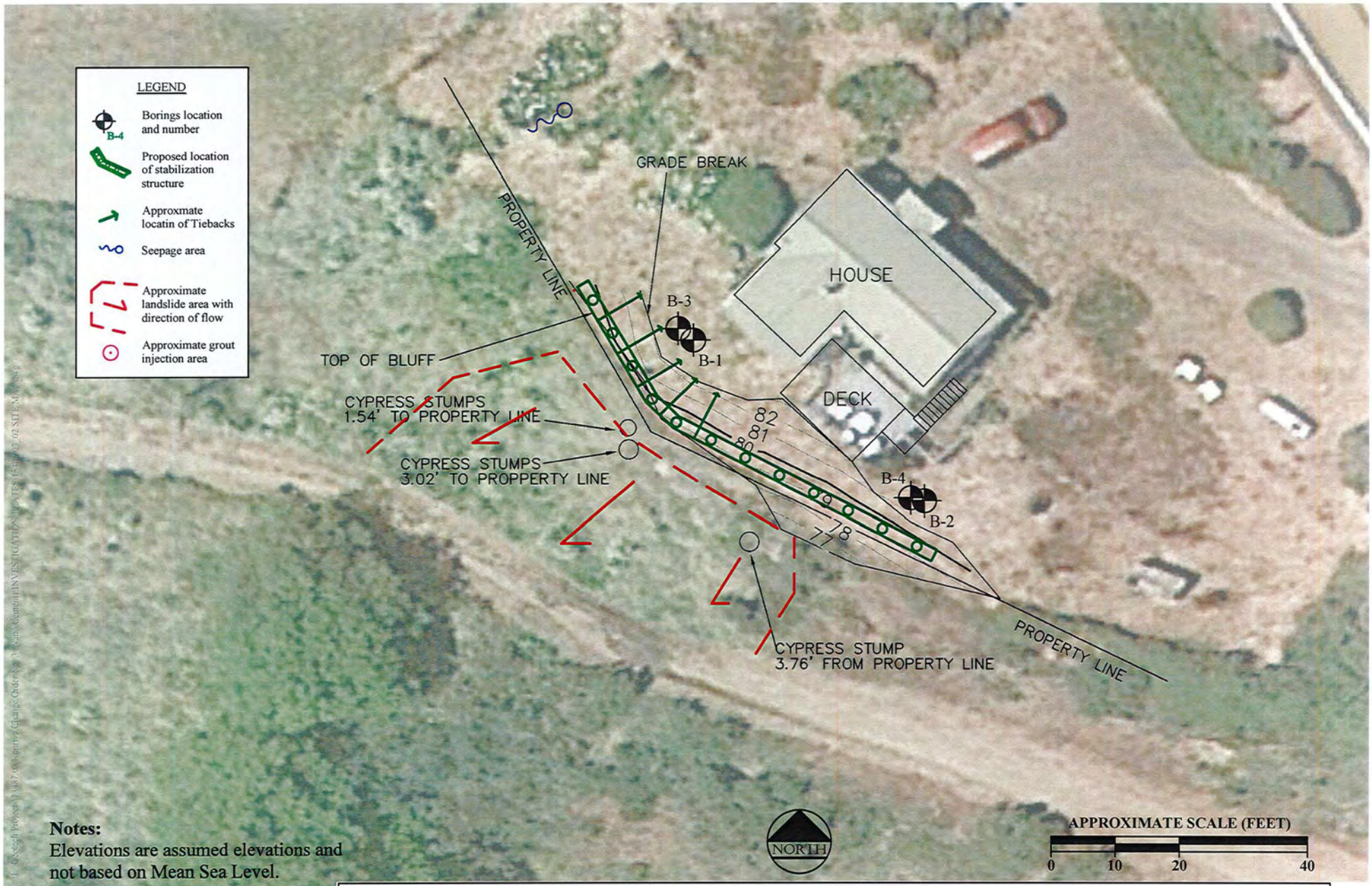
104-025

127 - 20



NOTE: This map was prepared for assessment purposes only. No liability is assumed for the data delineated hereon.

Assessor's Map
County of Mendocino, Calif.
REVISED 6-18-84



Notes:
Elevations are assumed elevations and not based on Mean Sea Level.

REFERENCE: Base map, Google Earth Image, 6/2/2021. Overlay by Mendocino Surveyors, Inc., 12/16/2021.

Brunsing Associates, Inc.
5468 Skylane Blvd., Suite 201
Santa Rosa, California 95403
Tel: (707) 528-6108

Job No.: 13487.03
Appr.: KAC
Date: 08/08/24

SITE MAP
KOPRIVA SLOPE STABILIZATION
6170 South Highway 1
Elk, California

PLATE
2a

Brunsing Associates, Inc.

GEOTECHNICAL INVESTIGATION

KOPRIVA SLOPE STABILIZATION
6170 SOUTH HIGHWAY 1
ELK, CALIFORNIA

Project Number 13487.03

August 8, 2024

Engineers and Geologists

GEOTECHNICAL INVESTIGATION

KOPRIVA SLOPE STABILIZATION
6170 SOUTH HIGHWAY 1
ELK, CALIFORNIA

Project Number 13487.03

prepared for

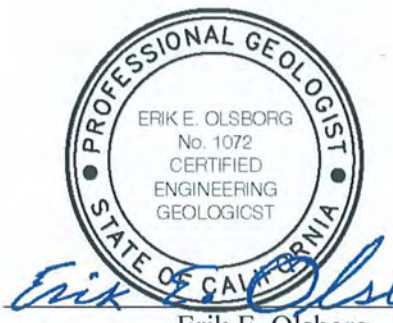
Rebecca Kopriva
21 Florida Avenue
Berkeley, CA 94707

prepared by

Brunsing Associates, Inc.

5468 Skylane Blvd. Suite 201
Santa Rosa, CA 95403
(707) 528-6108

August 8, 2024



Erik E. Olsborg
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Keith A. Colorado
Geotechnical Engineer - 2894
kcolorado@brunsing.com

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1.0 INTRODUCTION

This report presents the results of the geotechnical investigation that Brunsing Associates, Inc. (BAI) has performed for the slope stabilization downslope of the Kopriva residence at 6170 Highway 1, Elk, Mendocino County, California. The approximate location of the site is shown on the Vicinity Fault Map, Plate 1.

The Kopriva property overlooks Greenwood State Beach. An approximately 20-foot-high cut slope below (southwest of) the property is owned by the State of California. The cut slope is on the uphill side of the dirt access road to the beach. There have been ongoing erosional issues regarding the cut slope. There is concern that the erosion can migrate uphill and eventually threaten the house. The area of concern is shown on the Site Map, Plates 2a and 2b.

The purpose of our investigation was to evaluate the site soil and bedrock conditions and the geologic hazards at the site in order to provide recommendations for erosion mitigation to protect the existing property. Our approach to providing the geotechnical guidelines for the design of the project utilized our knowledge of the soil, bedrock and geologic conditions in the site vicinity and experience with similar projects. Field exploration for this investigation was directed toward confirming anticipated soil, bedrock, and geologic conditions, in order to provide the basis for our conclusions and recommendations.

The scope of our services, as outlined in our Professional Services Agreement dated January 7, 2022, Change/Extra Service Order dated January 25, 2022, and Change Order No. 3 dated October 27, 2023, consisted of field reconnaissance, subsurface exploration, engineering and geologic analyses, the preparation of this report and plan preparation by our structural engineering subconsultant.

2.0 INVESTIGATION AND LABORATORY TESTING

2.1 Research

As part of our investigation, we reviewed published geotechnical literature, including geologic, fault and seismic hazard maps for the site and vicinity. A list of selected published references reviewed for this investigation is presented in Appendix A.

2.2 Field Reconnaissance

BAI's engineering geologist performed an initial reconnaissance of the site and vicinity on January 20, 2022. He marked the test boring locations, marked for underground service alert, observed drill rig access conditions and constraints, and photographed the area.

2.3 Subsurface Exploration

The subsurface exploration consisted of drilling, logging, and sampling four test borings, B-1 through B-4, with a light portable drill rig on March 15, 2022 and November 3, 2023. The

approximate locations of the test borings are shown on Plate 2a and 2b. The borings varied from about 6.0 to 12.8 feet in depth.

Our staff geologist logged the borings and obtained relatively undisturbed soil and bedrock samples using a 3.0-inch (CA), 2.5-inch (CM) and 2.0 (SPT) outside diameter, modified California split-barrel samplers driven by a 70-pound drop hammer falling 30-inches per blow. The sampler barrels contained interior liners for retaining the soil and bedrock materials. Blows required to drive the CA, CM and SPT samplers were converted to Standard Penetration Test (SPT) blow counts for correlation with empirical test data, using a conversion factor of 0.32, 0.4 and 0.5, respectively. SPT blow counts provide a relative measure of soil and bedrock consistency and strength and are utilized in our engineering analyses. Blow counts are presented on the boring logs alongside the sample locations.

The logs of test borings showing the various soil and bedrock materials encountered and the depths at which samples were obtained are presented on Plates 3 through 6. The soils are classified in accordance with the Unified Soil Classification System outlined on Plate 7. The soil and bedrock descriptive properties are presented on Plates 8 and 9, respectively.

2.4 Laboratory Testing

Soil and bedrock samples obtained during our subsurface exploration were transported to our laboratory and examined to confirm field classifications. Laboratory tests were performed on selected samples to estimate their pertinent geotechnical engineering characteristics. Laboratory testing consisted of moisture content, density, grain size and unconsolidated-undrained triaxial compression tests.

The test results are presented opposite the samples tested on the boring logs. A key to test data is provided on Plate 7. Grain size test results are presented on Plate 10. Triaxial compression test data test results are presented on Plate 11.

3.0 SITE CONDITIONS

The existing residence is situated on the west-southwest side of Highway 1. The subject residence and parking area are approximately 10 feet lower in elevation than the adjacent Highway 1. The two-story residence is built into the slope, the upper story is level with the driveway while the lower story has a retaining wall on the upslope side and the downslope side extending to the ground surface. There is also a detached garage northeast of the residence and west-southwest of Highway 1.

The two-story house resides on a gently sloping terrace that ends at a cut slope. The cut slope descends very steeply, approximately 1.2 horizontal to one vertical (1.2H:1V), for approximately 20 feet in height as shown on Drone Photograph A, Plate 12. At the base of the cut slope is the access road to Greenwood State Beach. The State beach access road cuts across the bluff downslope of the subject property. The top of the cut slope is at or near the downslope edge of the subject property line.

Highway 1 is the top of the ocean bluff in the property vicinity. Greenwood Beach is at the toe of bluff downslope of the subject property. The bluff toe (beach) is approximately 290 feet southwest of the residence. According to the Google Earth aerial photograph dated June 2, 2021, the beach elevation at the bluff toe is approximately 20 feet above Mean Sea Level. The slope gradient of the bluff from the access road in the property vicinity down to the beach is approximately 3.5H:1V.

The bluff is densely vegetated with trees and brush. A seepage area was observed in the northwesterly corner of the property, uphill of the road cut. No other water was observed in the site vicinity during our investigation.

A mowed area is located between the existing residence/deck and the cut slope. Brush, weeds, nasturtiums, and pampas grass cover the cut slope below the property. Several large stumps are present on the cut slope; historical photos suggest those trees were removed sometime between 2011 and 2013.

4.0 SITE GEOLOGY AND SOILS

The site bedrock consists of sedimentary bedrock of the Cretaceous-Tertiary Franciscan Complex coastal belt, comprised of orange-tan clayey sandstone. The bedrock is closely fractured, moderate in hardness, and deeply weathered. The orange-tan clayey/silty sandstone was encountered at between five and 12 feet below the ground surface. Practical drilling refusal for the light, portable drill rig was encountered in the moderately hard sandstone in boring B-2 at 6.5 feet, B-3 at 10.1 feet and B-4 at 6.1 feet.

The bedrock is overlain by 5 to 12 feet of Pleistocene terrace deposits consisting of brown-black and orange, silty and clayey sands with occasional rock fragments. The sands are loose to medium dense. The upper 3.5 to 4 feet of the terrace deposits consist of dark to light brown, loose to very loose, silty sand with occasional rock fragments.

No deep-seated landslides were observed within or adjacent to the Kopriva property. Severe erosion is occurring on the beach access road cut slope below the Kopriva property as shown on Plate 12. The upper portion of the erosion area, just below the Kopriva property shows leaning tree stumps and small, bare scarps where the ground has dropped downslope. The stumps are from trees removed by the State of California prior to 2013. The hillside below the Kopriva property is mapped as a "debris slide slope" on California Division of Mines and Geology Open File Report 84-12 SF (OFR 84-12 SF). A debris slide slope" is defined as "a geomorphic feature characterized by steep…, usually well vegetated slopes that have been sculpted by numerous debris slide events; vegetated soils and colluvium above shallow soil/bedrock interface may be disrupted by active debris slides…".

No evidence of faulting was observed in the site vicinity. A near-parallel pair of "lineament's" are shown approximately 250 and 1000 feet northeast of the Kopriva property on OFR84-12 SF. Olsborg, while performing geologic investigations on other Elk projects and in consultation with OFR 84-12 SF author, Michael W. Manson, retired geologist (oral communication February 2016) reclassified the two "lineaments" as potentially active Faults. Olsborg unofficially named the two faults, the Elk Fault (nearest the Kopriva property) and the St. Anthony's Fault, as shown on

Plate 1. The active, San Andreas Fault is located offshore, approximately three miles to the southwest.

5.0 CONCLUSIONS

The access road cut slope, downslope of the property, is in violation of current excavation and grading code, section 18.70.090 - Cuts. Cut slopes shall be no steeper than 2H:1V and not create a hazard to public or private property. Our client has requested that State Parks and Recreation Department construct a retaining wall at this location to support the steep cut slope. Short of legal action, State Parks is not inclined to construct a retaining wall. Instead, their apparent policy is to periodically clean up slough soils in order to just keep the road open. In order to avoid lengthy and costly litigation, our client is willing to stabilize the slope on her own property at her own expense.

The cut slope erosion should be mitigated as soon as possible before the unstable area further enlarges and causes more damage to the property. Eventually, erosion could enlarge further upslope and affect the residence. Therefore, a stabilization structure to protect the residence should be constructed along the property line just above the erosion area, as shown on Plates 2a and 2b. The stabilization structure would be intended to halt uphill migration of the downslope erosion. The stabilization structure, consisting of drilled piers connected by a concrete grade beam or injected grout, will be entirely below the ground surface when completed.

6.0 ALTERNATIVE ANALYSIS

6.1 Subsurface Soldier Pile and Grade Beam (Approved under Mendocino County Permit No. EM_2023-0002)

The subsurface soldier pile would consist of a row of drilled piers connected at the top with a concrete grade beam, location shown on Plate 2a. The grade beam would be constructed at, or a few inches under the existing ground surface, as shown on Plate 13. To supplement the stabilization structure, native vegetation could be planted on the slopes to help slow down current erosion; however this would need to be approved by the State Parks. Vines could be planted to cover the grade beam extending downslope and to cover the piers if or when they are eventually exposed. To help maintain the vines, a drip irrigation system could be used. If properly maintained, the stabilization structure should protect our client's property, with little or no visual impact for the next 75 years.

6.2 Retaining Wall

A retaining wall could be constructed on State Parks property to support their overly steep cut slope. Such a wall would require an access agreement as well as a maintenance agreement for our client to construct the wall. State Parks has shown no interest in allowing such a wall to be built, regardless of who pays for it. Furthermore, the external retaining wall would be undesirable and likely un-permittable from a visual resources perspective.

6.3 Move Stabilization Structure Closer to the House

Moving the stabilization structure closer to the house would delay the eventual exposure of the structure due to continuing erosion of the cut slope. However, our client would lose more of her land that she is trying to protect. This would defeat the purpose of the stabilization structure.

6.4 Relocate the Residence

Relocating the residence closer to Highway 1 would substantially reduce the value of our client's property. Moving the residence would require large modifications to the residence since it is designed using the natural slope. The downslope side is two stories, while the uphill side is one story. The move would likely impact her driveway and parking area, plus reduce available room for a possible future addition (not intended at this time). Moving the residence would result in continued loss of her land to erosion.

6.5 Grading the Cut Slope

Grading the State-owned cut slope to a more-stable slope angle is not practical. Even if permission were obtained, the result would be the loss of our client's land, which is what this project is trying to prevent.

6.6 Surface Stabilization System

A surface stabilization system, such as geogrids, would require substantial grading work on the State-owned cut slope. The earthwork would involve excavating the cut slope and moving the excavated soils to a staging area elsewhere on the State property. The removed soil would then be brought back and placed and compacted between the geogrids. This operation would require shutting down the access road during "good" weather, when most visitors would be using the access road. Such an operation would need to be approved by the State Parks and most likely not be permittable.

6.7 Ultra-Fine Grout Injection (Preferred)

Injecting ultra-fine cement grout into the terrace sands and deeply weathered bedrock near the slope edge should stabilize the slope. The grout injection will "harden" the cut slope soils and greatly reduce their erosion potential. This procedure is environmentally the least damaging of all "hard" solutions. The grout injection does not discolor the slope soils, nor does it form a hard, artificial surface. Furthermore, the injection process uses hand-held, portable equipment that results in very little ground disturbance outside of the work area. When the work is completed, the injection site can be cleared and re-vegetated.

7.0 RECOMMENDATIONS

7.1 Subsurface Soldier Pile and Grade Beam

7.1.1 Drilled Piers

To provide lateral support and protection from erosion, a row of drilled cast-in-place concrete piers connected at the top by a grade beam should be constructed along the property line above the cut slope, as shown on Plates 2a and 13. The drilled piers and grade beam will need tiebacks along a portion of the stabilization structure as determined by the structural engineer. The row of drilled piers and connecting grade beam should be at least 70 feet in length. The grade beam should be at least 24-inches wide and at least 4 feet in depth. Drilled piers should penetrate through the overlying weak soil and penetrate the underlying sandstone. Drilled piers should be at least 18 inches in diameter and at least 20 feet deep below the existing ground surface. Piers encountering auger refusal in hard bedrock, as verified by BAI, should be cored (for full diameter) at least 7 feet into the hard bedrock. Pier diameter and length should be designed by a structural engineer based on our recommendations.

Spacing for the piers should be no closer than 2.5 pier diameters, center to center. Support for the piers may be gained from skin friction resistance within supporting bedrock equal to 400 psf of pier surface area for dead plus long-term live downward loads. For the total downward load design, including wind or seismic forces, increase downward capacity by one-third. Uplift frictional capacity for piers should be limited to 2/3 of the allowable downward capacity.

When final pier depths have been achieved, as verified by BAI, the bottoms of the pier holes should be thoroughly cleaned of loose material. BAI should observe the drilling and final clean out of the pier holes, prior to the placement of reinforcing steel and concrete.

If groundwater is encountered during construction, the pier holes should be dewatered prior to placement of reinforcing steel and concrete. Alternatively, if more than six inches of groundwater has entered the pier hole, concrete can be tremied into place with and adequate head to displace water or slurry. Concrete should not be placed by freefall in such a manner as to hit the sidewalls of the excavation.

No caving was encountered in our test borings. However, if piers are drilled during the wet/rainy season, caving could occur. The driller should be prepared to case pier holes where caving occurs. If used, the casing would need to be withdrawn from the pier holes as the pier concrete is placed. Difficult drilling conditions could be encountered within hard bedrock. The drilling contractor should be prepared to use rock-coring equipment.

As the erosion continues the space between the drilled piers may become exposed. This exposed soil and/or bedrock between the drilled piers will need to be shotcreted or provided with some other barrier to keep the soil or bedrock between the piers from eroding.

7.1.2 Lateral Loads

Resistance to lateral loads can be obtained using passive earth pressure of 400 psf per foot of depth within supporting bedrock. Passive pressures can be projected over two pier diameters. In addition to the structure loads, the piers should be designed to resist creep forces equal to 50 pounds per cubic foot (pcf) equivalent fluid pressure (triangular distribution) over a depth of 10 feet below ground surface. Passive pressures should be neglected within the weak terrace deposits. The stabilization structure should also be designed to resist an active lateral earth pressure, triangular distribution, varying from 0 (zero) psf at the top of the structure to 50H psf at the bottom of the retaining portion of the structure, as shown on Retaining Wall Lateral Earth Pressures, Plate 14.

In addition to static loads, the retaining structure should also be designed to resist potential seismic loads, in accordance with California Building Code requirements. For seismic loads, a pressure increment equivalent to a triangular distribution is recommended, varying from 0 (zero) pounds per square foot (psf) at the top of the wall to 27H psf at the bottom of the retaining portion, where "H" is the height of the retaining portion of the structure (resultant dynamic thrust act at 0.33H above the bottom of the retaining portion of the structure).

7.1.3 Tie-Back Anchors

Tiebacks are in-situ, laterally installed (directionally-drilled) reinforcing elements embedded with grout in boreholes. The grout shall be pressure grouted and achieve at least 75 pounds per square inch. Post grout may require higher pressure grouting. Tiebacks consist of high-strength steel cables that are post-tensioned onto steel base plates, placed into the grade beam system, after installation of the cables within a sleeve in the laterally drilled borehole.

For design one row of tiebacks will be needed in a portion of the wall. As the erosion continues to move, another row of tiebacks may be needed at a low depth. The center-to-center spacing for the tiebacks should match center-to-center spacing of the drilled piers, with each tieback inclined at about 15 degrees downward (from horizontal). The tiebacks should be at least 55 feet long (total length) with at least 15 feet of unbonded length, and a bore diameter of at least 6 inches. The tiebacks should be designed to resist a minimum load of at least 25,000-pound force (25 kips). Tiebacks can be attached to the grade beam or the piers. Tieback testing should conform to the requirements of the structural engineer and all tiebacks should be proof tested to 150 percent of their design load with at least one performance tested to 150 percent of design load.

Design provisions for corrosion protection of the tiebacks is required. For design of the tiebacks by the structural engineer, the following average, ultimate (no geotechnical factor of safety) bedrock parameter valves will be subject to further confirmation during final design:

Average friction resistance of sandstone, "f" = 2,000 psf (pressure grout)
Average unit weight of sandstone, "γ" 125 pcf

7.2 Grout Injection

The slope soils can be "hardened" by the injection of ultra-fine cement, location shown on Plate 2b. The grouting objective is to permeate the fractured sandstone and overlying terrace deposits with ultra-fine cement grout, as shown on Plate 15. Due to the low permeability of the fine grained sand and silts, the rate of injection is anticipated to be particularly low when injecting close to the slope face and near surface due to the required allowable pressure of grout injection. Fine grained sands and silts typically exhibit a permeability ranging from $5x10^{-4}$ to $1x10^{-6}$ cm/sec.

The grouting contractor should plan on close spaced injection points and injecting at multiple locations simultaneously in order to obtain a reasonable production rate.

In-fill grouting may be required in order to fully grout the area shown on Plate 2b and cross section on Plate 15. Drilling grout injection holes will require sufficient torque and thrust to penetrate several feet into fractured soft bedrock.

7.3 Seismic Design Criteria

Structures should be designed and constructed to resist the effects of strong ground shaking (on the order of Modified Mercalli Intensity IX) in accordance with current building codes. The California Building Code (CBC) 2022 edition indicates that the site classification for the property is Site Class C. The following seismic design parameters are appropriate for the site:

Table 1: Seismic Design Parameters

Site Class	=	C
Mapped Spectral Response Acceleration at 0.2 sec	S_S =	1.931g
Mapped Spectral Response Acceleration at 1.0 sec	S_1 =	0.794g
Modified Spectral Response Acceleration at 0.2 sec	S_{MS} =	2.317g
Modified Spectral Response Acceleration at 1.0 sec	S_{M1} =	1.112g
Design Spectral Response Acceleration at 0.2 sec	S_{DS} =	1.544
Design Spectral Response Acceleration at 1.0 sec	S_{D1} =	0.741g
Site Coefficient	F_a =	1.2
Site Coefficient	F_v =	1.4
Long-period Transition	T_L =	12
Seismic Design Category	=	E

8.0 ADDITIONAL SERVICES

Prior to construction, BAI should review the final grading and structural plans, and geotechnical related specifications for conformance with our recommendations.

During construction, BAI should be retained to provide periodic observations, together with field and laboratory testing, during site preparation, placement and compaction of fills, and foundation

construction. Foundation excavations should be reviewed by BAI while the excavation operations are being performed.

9.0 LIMITATIONS

This geotechnical investigation was performed in accordance with the usual and current standards of the profession, as they relate to this and similar localities. No other warranty, expressed or implied, is provided as to the conclusions and professional advice presented in this report. Our conclusions are based upon reasonable geological and engineering interpretation of available data.

The observations made, are considered to be representative of the site; however, soil, bedrock and geologic conditions may vary significantly between test borings and across the site. As in most projects, conditions revealed during construction excavation may be at variance with preliminary findings. If this occurs, the changed conditions must be evaluated by BAI, and revised recommendations be provided as required.

This report is issued with the understanding that it is the responsibility of the Owner, or his/her representative, to ensure that the information and recommendations contained herein are brought to the attention of all other design professionals for the project, and incorporated into the plans, and that the Contractor and Subcontractors implement such recommendations in the field. The safety of others is the responsibility of the Contractor. The Contractor should notify the owner and BAI if he/she considers any of the recommended actions presented herein to be unsafe or otherwise impractical.

Changes in the condition of a site can occur with the passage of time, whether they are due to natural events or to human activities on this, or adjacent sites. In addition, changes in applicable or appropriate codes and standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, this report may become invalidated wholly or partially by changes outside of our control. Therefore, this report is subject to review and revision as changed conditions are identified.

PLATES

REFERENCE:
Elk and Mallo Pass Creek Quadrangle
7.5-Minute Series, USGS, 2018

Latitude: 39.128174
Longitude: -123.716216

NORTH

APPROXIMATE SCALE (FEET)
0 1000 2000 4000

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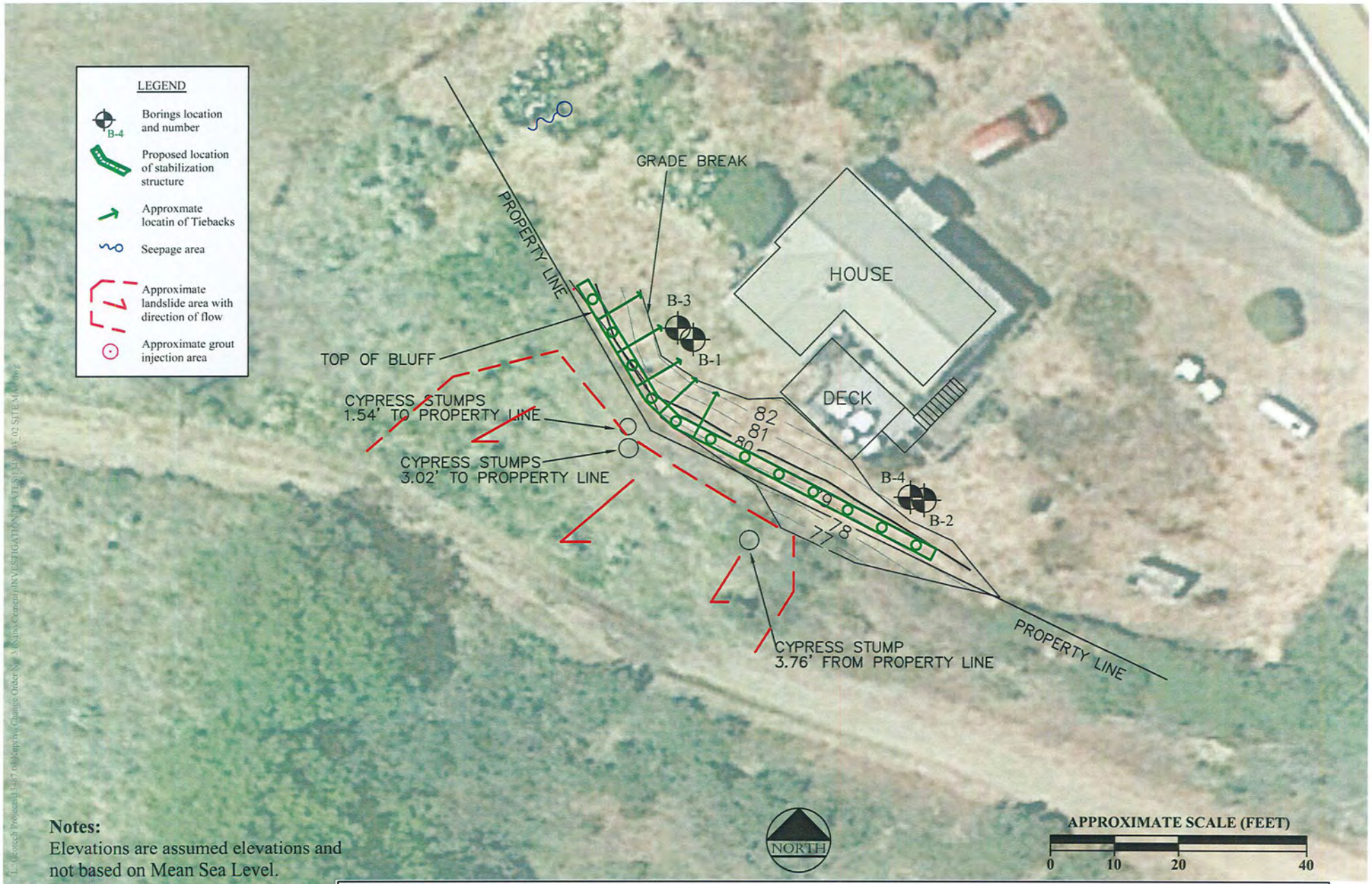
VICINITY FAULT MAP

KOPRIVA SLOPE STABILIZATION
6170 South Highway 1
Elk, California

PLATE
1

L:\Geotech Projects\13487.03 Kopriva Change Order No. 3 (Nano Cement)\INVESTIGATION\PLATES\13487.03_01 VICINITY MAP.dwg
8/8/2024 8:56:57 AM save date
8/8/2024 8:57:33 AM plot date



Notes:
Elevations are assumed elevations and not based on Mean Sea Level.

REFERENCE: Base map, Google Earth Image, 6/2/2021. Overlay by Mendocino Surveyors, Inc., 12/16/2021.

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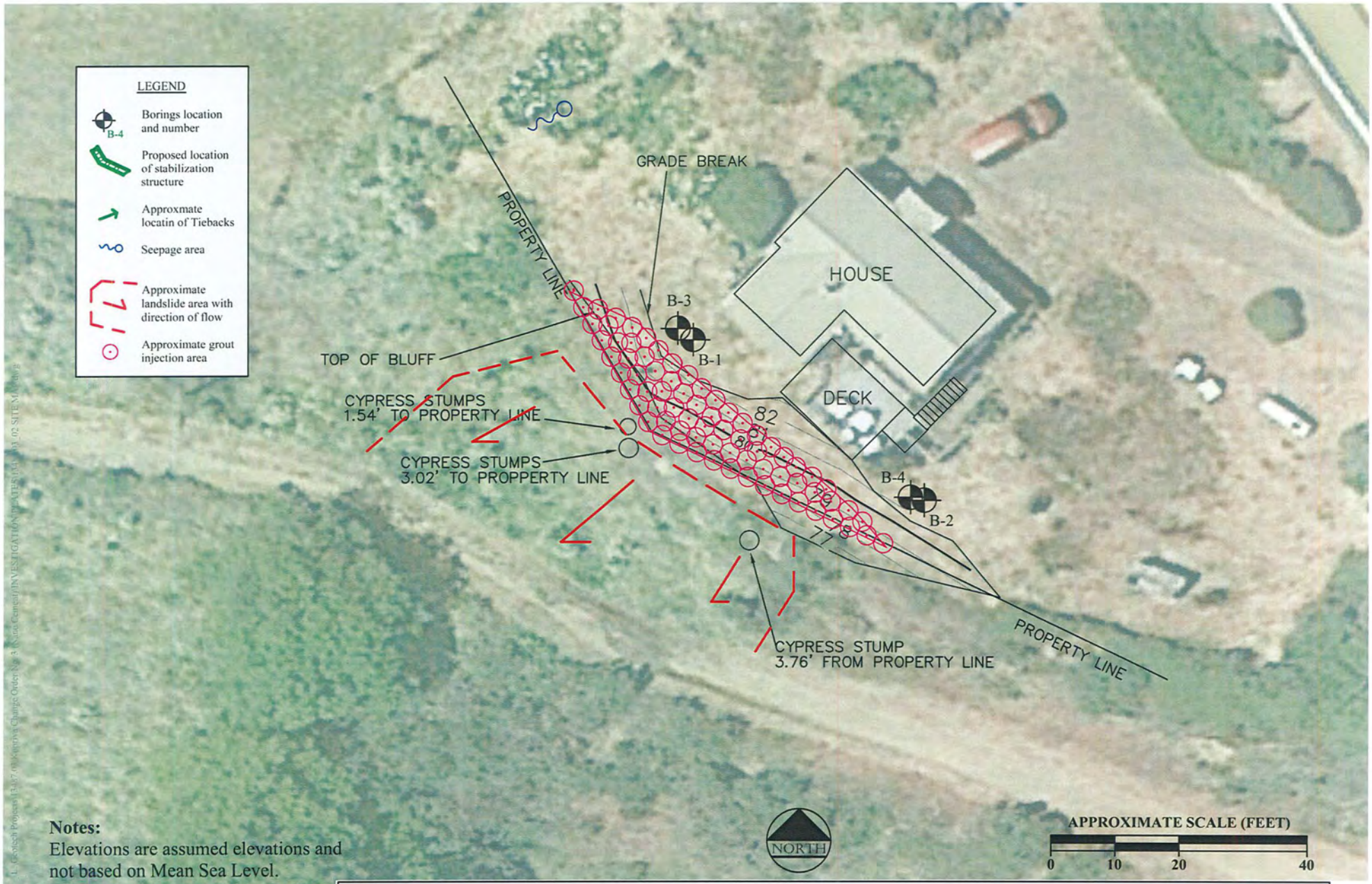
SITE MAP
KOPRIVA SLOPE STABILIZATION
6170 South Highway 1
Elk, California

PLATE
2a



Notes:
Elevations are assumed elevations and not based on Mean Sea Level.

REFERENCE: Base map, Google Earth Image, 6/2/2021. Overlay by Mendocino Surveyors, Inc., 12/16/2021.

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SITE MAP
KOPRIVA SLOPE STABILIZATION
6170 South Highway 1
Elk, California

PLATE
2b

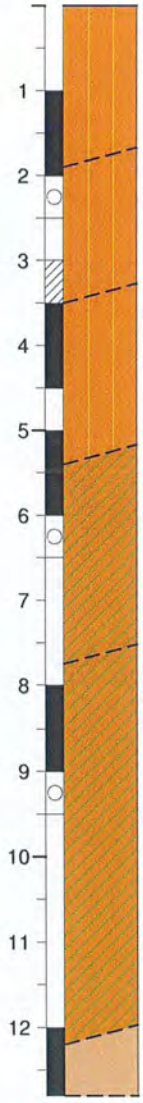
Log of Boring B-1

Equipment: Light Portable Drill Rig (Little Beaver)

Date: 3/15/22 **Logged By:** DJS

Elevation: 82 feet *** **Latitude:** 39.128216 **Longitude:** -123.716248

Laboratory Tests	Sampler Type*	Moisture Content (%)	Dry Density (pcf)	Blows/foot	Depth (ft.) Sample
		11.6	67		
	CM			8 **	
Tx 960 (576)		17.1	101		
	CM			9 **	
	CM			8 **	
Tx 1263 (1008)		21.7	94		
	CM			11 **	
	CM			11/3" **	



DARK BROWN SILTY SAND (SM)
loose, dry
with rock fragments

LIGHT BROWN SILTY SAND (SM)
loose, dry

BROWN-BLACK SILTY SAND (SM)
loose, moist
with rock fragments

ORANGE CLAYEY SAND (SC)
loose, moist
with rock fragments

ORANGE AND BLACK CLAYEY SAND (SC)
medium dense, moist
with rock fragments

ORANGE-TAN CLAYEY SANDSTONE
closely fractured, moderately hard, deeply weathered

Notes:
1. No water encountered
2. No caving
3. Backfilled with cuttings

Latitude/Longitude estimated from Google Earth.
* See Soil Classification Chart & Key to Test Data
** Equivalent "Standard Penetration" Blow Counts.
*** Elevations interpolated from Plate 2.

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LOG OF BORING B-1
KOPRIVA SLOPE STABILIZATION
6170 South Highway 1
Elk, California

PLATE 3
SHEET 1 of 1

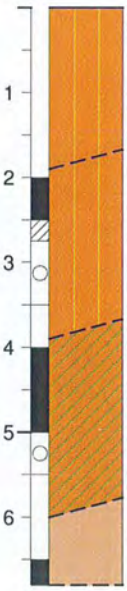
Log of Boring B-2

Equipment: Light Portable Drill Rig (Little Beaver)

Date: 3/15/22 **Logged By:** DJS

Elevation: 82 feet *** **Latitude:** 39.128147 **Longitude:** -123.71612

Laboratory Tests	Sampler Type*	Moisture Content (%)	Dry Density (pcf)	Blows/foot	Depth (ft.) Sample
					1
		20.6	84		2
	CM			4 **	3
					4
Tx 2240 (576)		16.9	103		
	CM			10 **	5
					6
	CM			20/3" **	



DARK BROWN SILTY SAND (SM)
loose, dry

DARK BROWN SILTY SAND (SM)
very loose, dry
contains light brown sandstone fragments

ORANGE CLAYEY SAND (SC)
medium dense, moist

ORANGE-TAN SILTY SANDSTONE
closely fractured, moderately hard, deeply weathered

Notes:
1. No water encountered
2. No caving
3. Practical drilling refusal at 6.5 feet

Latitude/Longitude estimated from Google Earth.
* See Soil Classification Chart & Key to Test Data
** Equivalent "Standard Penetration" Blow Counts.
*** Elevations interpolated from Plate 2.

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LOG OF BORING B-2
KOPRIVA SLOPE STABILIZATION
6170 South Highway 1
Elk, California

PLATE 4
SHEET 1 of 1

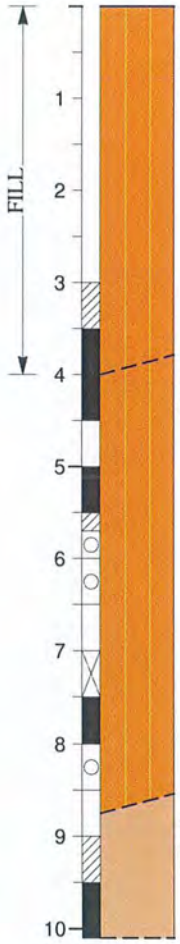
Log of Boring B-3

Equipment: Little Beaver MDL-5B, 4-inch solid stem flight auger

Date: 11/3/23 **Logged By:** JNK

Elevation: 82 feet *** **Latitude:** 39.128222 **Longitude:** -123.716255

Laboratory Tests	Sampler Type*	Moisture Content (%)	Dry Density (pcf)	Blows/foot	Depth (ft.) Sample
					1
					2
					3
	CA	11.9	97	11 **	4
					5
23% Passing #200 76% Passing #4	CA	16.8	96	6 **	6
					7
	CA	20.4	100	16 **	8
					9
	CA			16/5" **	
	SPT			25/2"	10



DARK BROWN SILTY SAND (SM)
loose, dry to moist
debris fine grained

LIGHT BROWN SILTY SAND (SM) with gravel
moist, medium dense

ORANGE-BROWN SANDSTONE
crushed to intense fracturing, friable to low hardness, deeply to moderately weathered

Notes:
1. No free water encountered
2. No caving
3. Practical drilling refusal at 10.1 feet

Latitude/Longitude estimated from Google Earth.
* See Soil Classification Chart & Key to Test Data
** Equivalent "Standard Penetration" Blow Counts.
*** Elevations interpolated from Plate 2.

Scale: 1" = 2'

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LOG OF BORING B-3
KOPRIVA SLOPE STABILIZATION
6170 South Highway 1
Elk, California

PLATE 5
SHEET 1 of 1

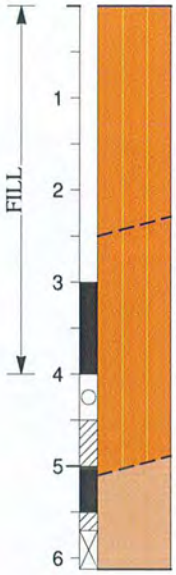
Log of Boring B-4

Equipment: Little Beaver MDL-5B, 4-inch solid stem flight auger

Date: 11/3/23 **Logged By:** JNK

Elevation: 82 feet *** **Latitude:** 39.128152 **Longitude:** -123.716124

Laboratory Tests	Sample	Sampler Type*	Moisture Content (%)	Dry Density (pcf)	Blows/foot	Depth (ft.)
21% Passing #200 75% Passing #4	CA	CA	11.4	96	8 **	1 2 3 4
		CA SPT			22/8" ** 25/5"	5 6



DARK BROWN SILTY SAND (SM)
loose, dry to moist
with debris

LIGHT BROWN SILTY SAND (SM) with gravel
medium dense, moist
bedrock fragments

ORANGE-TAN SANDSTONE
crushed to intense fracturing, friable to low hardness, deeply to moderately weathered

Notes:
1. No free water encountered
2. No caving
3. Practical drilling refusal at 6.1 feet

Latitude/Longitude estimated from Google Earth.
* See Soil Classification Chart & Key to Test Data
** Equivalent "Standard Penetration" Blow Counts.
*** Elevations interpolated from Plate 2.

Scale: 1" = 2'

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LOG OF BORING B-4
KOPRIVA SLOPE STABILIZATION
6170 South Highway 1
Elk, California

PLATE 6
SHEET 1 of 1

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			SYMBOLS: GRAPHIC	SYMBOLS: LETTER	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS — MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVELS AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (Less than 5% fines)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (Greater than 12% fines)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS — 50% OR MORE OF COARSE FRACTION PASSING THROUGH NO. 4 SIEVE	CLEAN SANDS (Less than 5% fines)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (Greater than 12% fines)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE-GRAINED SOILS — MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMOUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

KEY TO TEST DATA

LL - Liquid Limit
PI - Plasticity Index
Consol - Consolidation
EI - Expansion Index
■ Sample Retained
SA - Sieve Analysis
▨ Sample Recovered, Not Retained
⊠ Bulk Sample
○ Sample Not Recovered
CA - California Modified Split Barrel Sampler 3.0-inch O.D.
CM - California Modified Split Barrel Sampler 2.5-inch O.D.
SPT - California Split Barrel Sampler 2.0-inch O.D.
SH - Shelby Tube
RC - Rock Coring
Recovery - Percent Core Recovered
RQD - Rock Quality Designation (length of core pieces >= 4-inches / core length)

Shear Strength, psf ↓ ↓ **Confining Pressure, psf**

Tx	1564 (1440)	- Unconsolidated Undrained Triaxial
TxCU	1564 (1440)	- Consolidated Undrained Triaxial
DS	2020 (1440)	- Consolidated Drained Direct Shear
FVS	520	- Field Vane Shear
UC	1500	- Unconfined Compression
PP	1500	- Field Pocket Penetrometer
Sat		- Sample saturated prior to test

▽ Initial Groundwater Level Reading
▼ Second Groundwater Level Reading

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SOIL CLASSIFICATION CHART & KEY TO TEST DATA
KOPRIVA SLOPE STABILIZATION
6170 South Highway 1
Elk, California

PLATE 7

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	Standard Penetration Test Blow Count (blows per foot)
Very loose	4 or less
Loose	5 to 10
Medium dense	11 to 30
Dense	31 to 50
Very dense	More than 50

CONSISTENCY OF FINE-GRAINED SOILS

Consistency	Identification Procedure	Approximate Shear Strength (psf)
Very soft	Easily penetrated several inches with fist	Less than 250
Soft	Easily penetrated several inches with thumb	250 to 500
Medium stiff	Penetrated several inches by thumb with moderate effort	500 to 1000
Stiff	Readily indented by thumb, but penetrated only with great effort	1000 to 2000
Very stiff	Readily indented by thumb nail	2000 to 4000
Hard	indented with difficulty by thumb nail	More than 4000

NATURAL MOISTURE CONTENT

Dry	No noticeable moisture content. Requires considerable moisture to obtain optimum moisture content* for compaction.
Damp	Contains some moisture, but is on the dry side of optimum.
Moist	Near optimum moisture content for compaction.
Wet	Requires drying to obtain optimum moisture content for compaction.
Saturated	Near or below the water table, from capillarity, or from perched or ponded water. All void spaces filled with water.

* Optimum moisture content as determined in accordance with ASTM Test Method D1557, latest edition.

Where laboratory test data are not available, the above field classifications provide a general indication of material properties; the classifications may require modification based upon laboratory tests.

Generalized Graphic Bedrock Symbols


Claystone


Siltstone

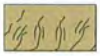

Tuff (Volcanic Ash)


Shale


Chert

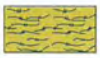

Andesite


Sandstone


Serpentine


Basalt


Conglomerate


Greenstone


Schist

Stratification

Bedding of Sedimentary Rocks	Thickness of Beds
Massive	No apparent bedding
Very thick bedded	Greater than 4 feet
Thick bedded	2 feet to 4 feet
Thin bedded	2 inches to 2 feet
Very thin bedded	0.5 inches to 2 inches
Laminated	0.125 inches to 0.5 inches
Thinly laminated	less than 0.125 inches

Fracturing

Fracturing Intensity	Fracture Spacing
Little	Greater than 4 feet
Occasional	1 foot to 4 feet
Moderate	6 inches to 1 foot
Close	1 inch to 6 inches
Intense	0.5 inches to 1 inch
Crushed	less than 0.5 inches

Strength

Soft	Plastic or very low strength.
Friable	Crumbles by hand.
Low hardness	Crumbles under light hammer blows.
Moderate hardness	Crumbles under a few heavy hammer blows.
Hard	Breaks into large pieces under heavy, ringing hammer blows.
Very hard	Resists heavy, ringing hammer blows and will yield with difficulty only dust and small flying fragments.

Weathering

Deep	Moderate to complete mineral decomposition, extensive disintegration, deep and thorough discoloration, many extensively coated fractures.
Moderate	Slight decomposition of minerals, little disintegration, moderate discoloration, moderately coated fractures.
Little	No megascopic decomposition of minerals, slight to no effect on cementation, slight and intermittent, or localized discoloration, few stains on fracture surfaces.
Fresh	Unaffected by weathering agents, no disintegration or discoloration, fractures usually less numerous than joints.

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BEDROCK DESCRIPTIVE PROPERTIES
KOPRIVA SLOPE STABILIZATION
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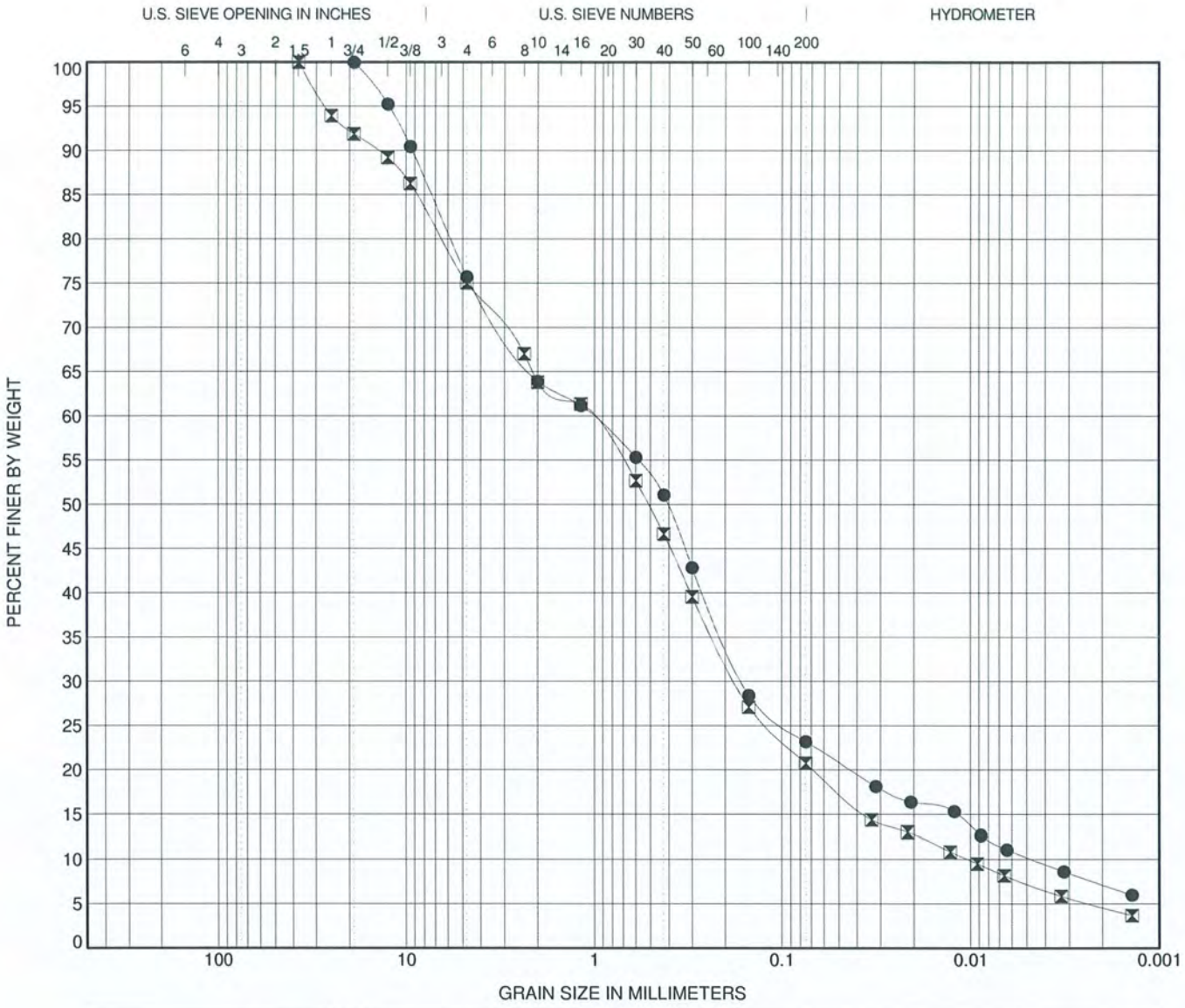
PLATE 9



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	B-3	6.0 ft	LIGHT BROWN SILTY SAND (SM) with gravel				5.42	218.23
⊠	B-4	4.0 ft	LIGHT BROWN SILTY SAND (SM) with gravel				2.82	102.27

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-3	6.0 ft	19	1.027	0.162	0.005	24.3	52.5	13.0	10.2
⊠	B-4	4.0 ft	37.5	1.06	0.176	0.01	24.9	54.3	13.5	7.2

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GRAIN SIZE DISTRIBUTION
KOPRIVA SLOPE STABILIZATION
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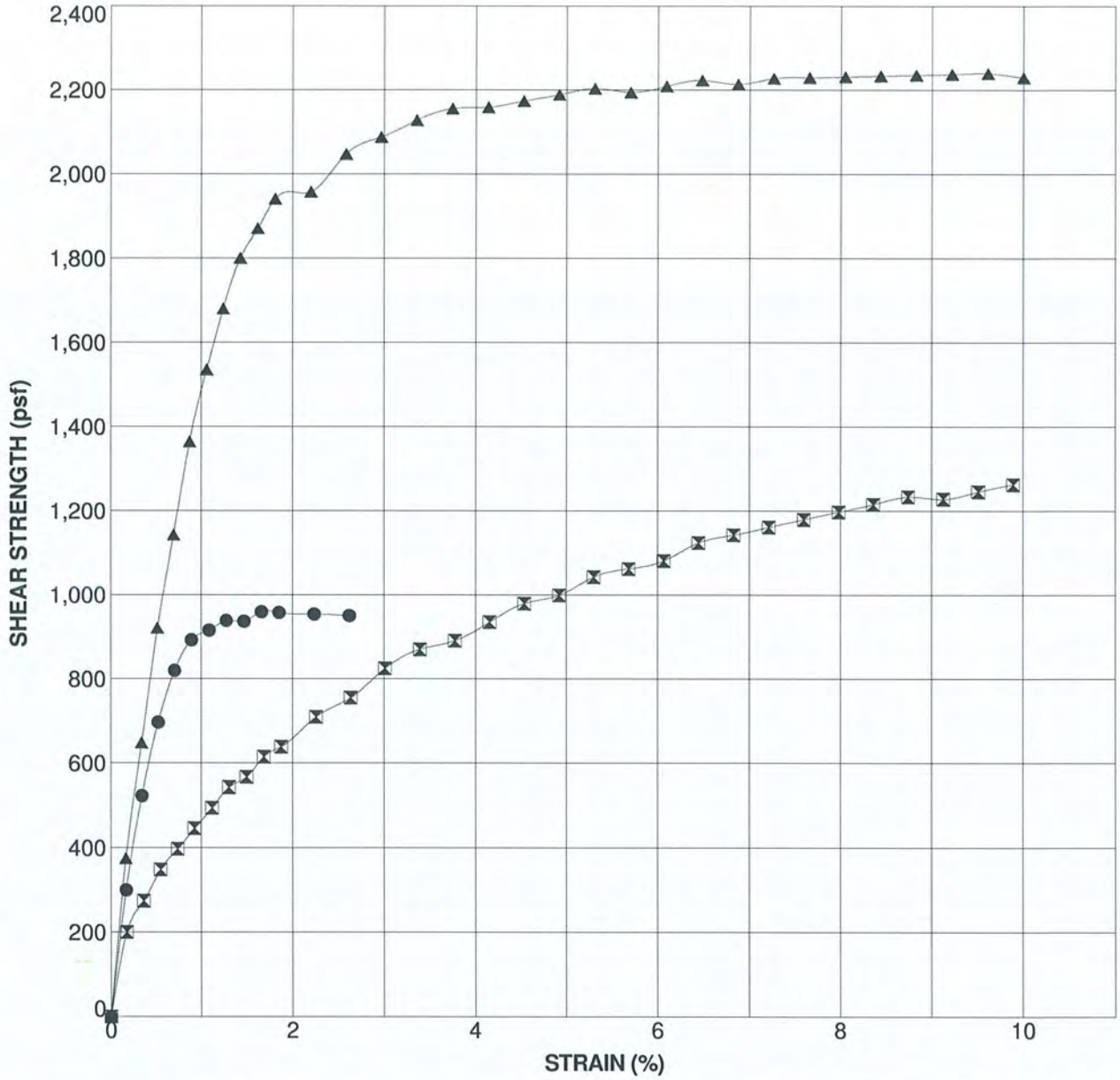
PLATE 10



Sample Source	Classification	Confining Pressure (psf)	Ultimate Strength (psf)	Strain (%)	Dry Density (pcf)	Moisture Content (%)
● B-1 at 3.5 ft	BROWN-BLACK SILTY SAND (SM)	576	960	1.7	101	17.1
⊠ B-1 at 8 ft	ORANGE AND BLACK CLAYEY SAND (SC)	1008	1263	9.9	94	21.7
▲ B-2 at 4.5 ft	ORANGE CLAYEY SAND (SC)	576	2240	9.6	103	16.9

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST RESULTS

KOPRIVA SLOPE STABILIZATION
6170 South Highway 1
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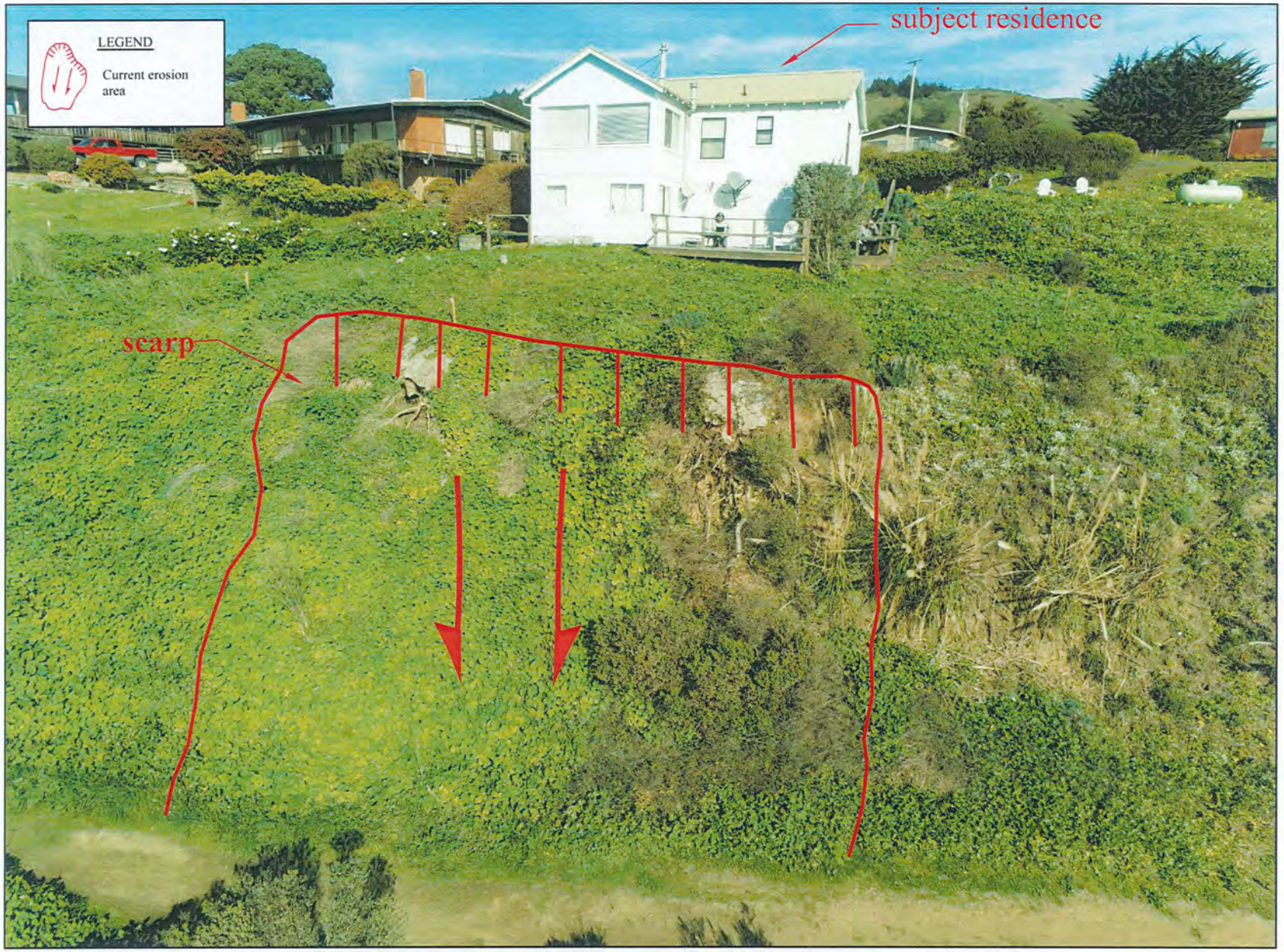
PLATE 11



REFERENCE: BAI photo library, 2022

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DRONE PHOTOGRAPH A
KOPRIVA SLOPE STABILIZATION
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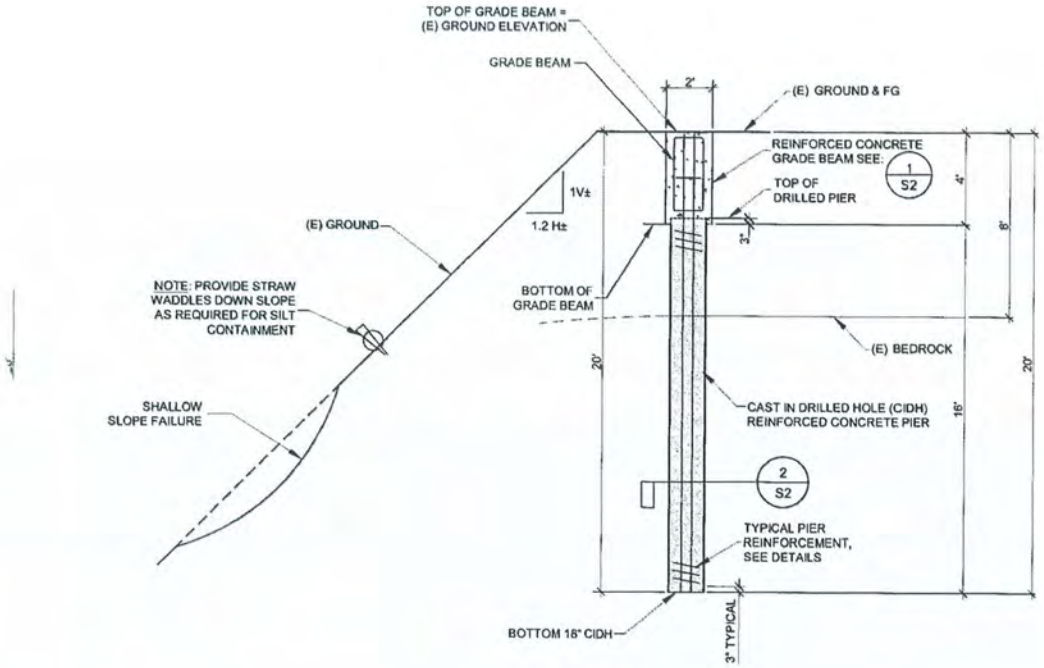
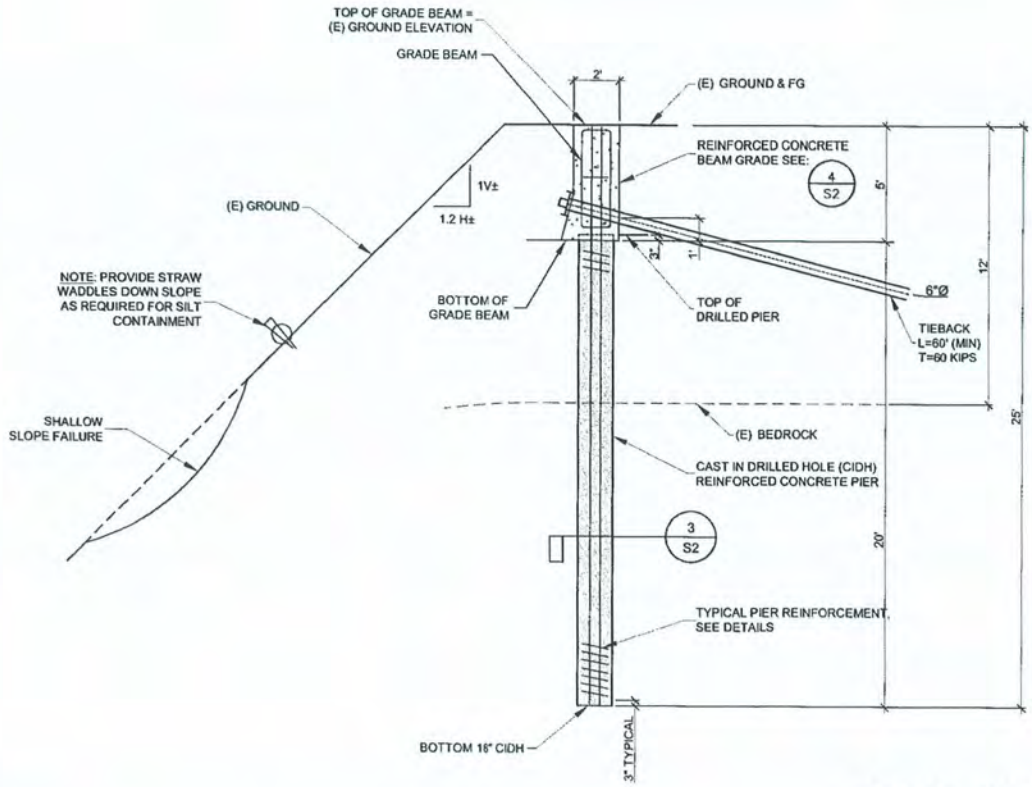
PLATE
12





REFERENCE:
Elevation, Plan & Cross Sections, sheet S1, prepared by Duncan Engineering, Inc. dated 09/14/2022

APPROXIMATE SCALE (FEET)
0 4 8 16

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SOLDIER PILE CROSS SECTIONS
KOPRIVA SLOPE STABILIZATION
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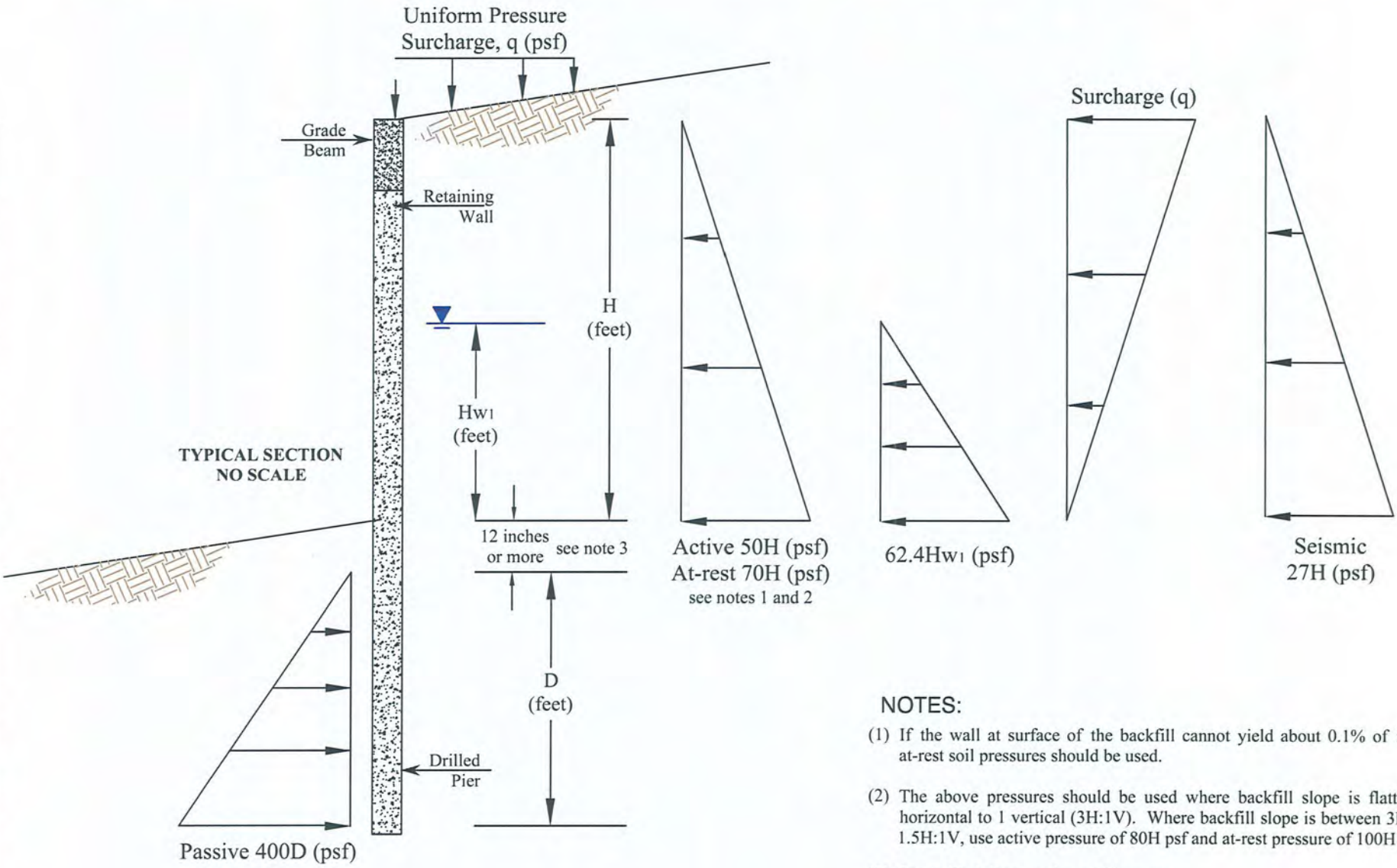
PLATE
13



NOTES:

(1) If the wall at surface of the backfill cannot yield about 0.1% of its' height, at-rest soil pressures should be used.

(2) The above pressures should be used where backfill slope is flatter than 3 horizontal to 1 vertical (3H:1V). Where backfill slope is between 3H:1V and 1.5H:1V, use active pressure of 80H psf and at-rest pressure of 100H psf.

(3) See Drilled Piers section of this report.

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RETAINING WALL LATERAL EARTH PRESSURES
KOPRIVA SLOPE STABILIZATION
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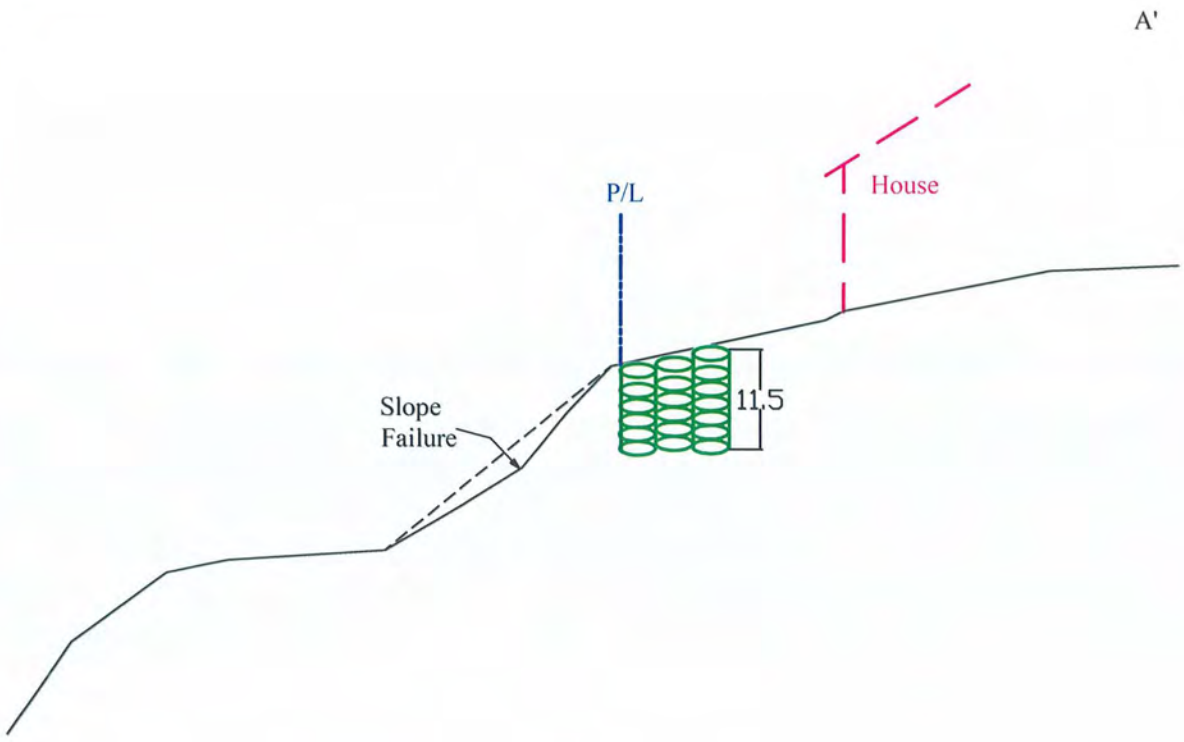
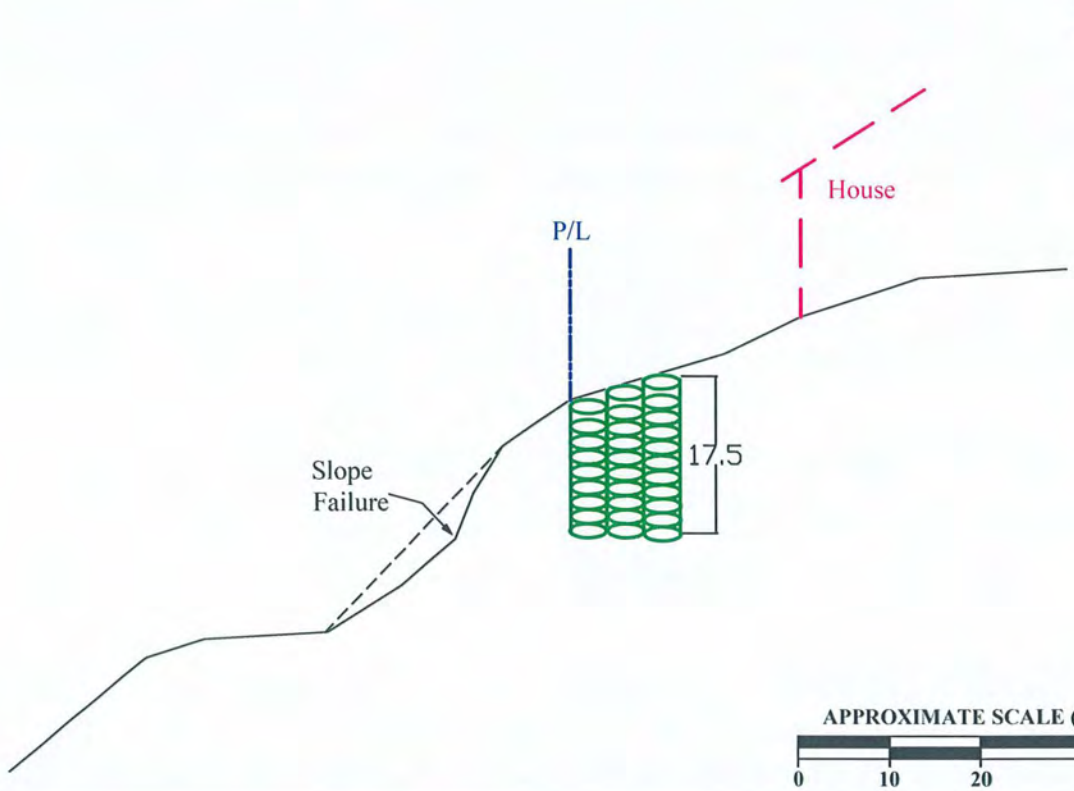
Elk, California

PLATE 14





APPROXIMATE SCALE (FEET)

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Brunsing Associates, Inc.
5468 Skylane Blvd., Suite 201
Santa Rosa, California 95403
Tel: (707) 528-6108

Job No.: 13487.03
Appr.: EEO
Date: 08/08/24

GROUTING CROSS SECTIONS

KOPRIVA SLOPE STABILIZATION
6170 South Highway 1
Elk, California

PLATE
15

APPENDIX A

References

- Brunsing Associates, Inc., 2001, Geotechnical Investigation Proposed Spa Remodel Greenwood Pier Inn, Elk, Mendocino County, California, dated May 14.
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- Untitled Plot Map, Elk, January 16, 1899, delivered to the "Hall of Maps".
- Update to the Sea-level Rise Guidance Document, 2013, Coastal and Ocean Working Group of the California Climate Action Team.

DISTRIBUTION

Two Copies

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September 30, 2022

Brunsing Associates, Inc.
Attn: Erik Olsborg
5468 Skylane Blvd, Suite 201
Santa Rosa, CA 95403

RE: Biological Scoping Survey Letter
Lands of Kopriva
6170 S. Hwy. 1
Elk, CA 95432
APN: 127-200-06

Dear Mr. Olsborg,

Thank you for the opportunity to assist you with your natural resource needs for your client's property at 6170 S. Hwy. 1, Elk, CA. Wynn Coastal Planning & Biology (WCPB) conducted a Biological Scoping Survey within 100ft of the subject parcel. The Biological Scoping Survey addresses potential Environmentally Sensitive Habitat Areas (ESHAs) within 100ft of the proposed project that could be identified at the time of the site visit. No ESHAs were observed during the survey.

It is the professional opinion of the biologists at WCPB the proposed project will not significantly impact any special status resources. The ecological condition of the parcel is already altered due to human disturbance and special status animals are highly unlikely to utilize the property as habitat. No ESHAs were identified in the study area and potential sensitive species that have the potential to move into the study area such as birds, bats, and/or amphibians will be addressed with mitigation measures recommended in the report.

Please let us know if you have any questions or comments.

Sincerely,

Nicole D.B. Herrera

Nicole D.B. Herrera
Biologist
Wynn Coastal Planning & Biology

Encl: BACE-Kopriva Biological Scoping Survey; Appendix A – USDA NRCS - Custom Soil Resource Report; Appendix B – USFWS National Wetlands Inventory Map

CC: file

Biological Scoping Survey

Investigators: Nicole Herrera (B.A. Environmental Studies, Gonzaga University) & Asa B Spade (B.S. Environmental Science: Landscape Ecosystems, Humboldt State)
Property Address: 6170 S. Hwy. 1, Elk, CA
APN: 127-200-06
Survey Date: August 25, 2022
Study Area Size: ~2.15 acres
Parcel Size: ~0.26 acres

Site Description:

The subject parcel is located at 6170 S. Hwy. 1, Elk, CA (**Figure 1**). The parcel is in the town of Elk, west of Highway One, and within the Coastal Zone. The parcel can be accessed via CA-1 and is surrounded by residential development and California State Parks land. The study area is sloped in a southwestern direction with the elevation ranging from approximately 75-150 feet above sea level. Existing development on the parcel includes a single-family residence with associated development and a shed. The residence is currently used as a vacation rental.

Proposed Development:

The proposed development according to the project Engineering Geologist is to install a stabilization structure with the intent to halt uphill migration of the downslope erosion. **Figure 2** depicts the location of the proposed development on the property.

Methodology:

Prior to visiting the site, Wynn Coastal Planning & Biology (WCPB) biologists compiled a list of sensitive and natural species of plants, animals, and communities occurring within the 9 quads centered on the project site (**Table 2**). This list was used to identify species and communities with the greatest potential for occurring at the project site, but the survey was not strictly limited to this list of potential rare and sensitive species. Maps were also created using the California Natural Diversity Database (CNDDB) for records within one mile of the study area (**Figure 3** and **Figure 4**). A U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) soil map (**Appendix A**) and a USFWS National Wetlands Inventory (NWI) map (**Appendix B**) were generated.

On August 25, 2022, WCPB biologists visited the site for a total of 2.5 person hours to examine the plant communities and vegetation on, and within 100ft of, the subject parcel. The focus of the study area was to determine if, and to what extent, special status plant communities, plants, wetlands, and/or special status wildlife habitat that could be considered Environmentally Sensitive Habitat Area (ESHA) occur within 100ft of the proposed development. The survey was limited to areas that were safely and legally accessible.

Survey Results:

Two types of soil have been mapped by the Natural Resource Conservation Service in the study area: Dystropepts, 30-75% slopes and Windyhollow loam, 0-5% slopes. Dystropepts, 30-75% slopes, is found on marine terraces and is formed in material derived from sandstone and shale. Permeability is extremely variable. Windyhollow loam, 0-5% slopes, is found on marine terraces and is formed in alluvium derived from mixed rock sources. Permeability is moderately slow. Windyhollow loam, 0-5% slopes, is listed as a hydric soil type due to the inclusion of Flumeville soils, which make up approximately 4% of the soil unit. According to the NRCS mapping results, one soil type within the study area met hydric soils criteria (USDA Natural Resource Conservation Service, 2001; **Appendix A**). It should be noted that when a given soil is listed on the National Hydric Soils List as a hydric soil, that does not necessarily mean a wetland is present. Soil complexes are mapped at a coarse resolution and contain a number of components, any one of which may or may not be hydric, and may or may not be present in the particular mapped location. The NWI map

was consulted (**Appendix B**) and showed no mapped wetlands within the study area. Ground surveys confirmed that no wetland features are present in the project area.

Plant communities and vegetation observed within the study area consisted of coyote brush – poison oak scrub, landscaping and non-native plants, mowed lawn, and a couple red alder trees. The majority of the parcel and the adjacent residential properties were vegetated by landscaping and non-native plants (**Figure 5**). Dominant non-native species in this community included garden nasturtium (*Tropaeolum majus*), English ivy (*Hedera helix*), and iceplant (*Carpobrotus edulis*). Other species observed in the landscaping vegetation included wild radish (*Raphanus sativus*), calla lily (*Zantedeschia aethiopica*), poison hemlock (*Conium maculatum*), naked ladies (*Amaryllis belladonna*), red claws (*Escallonia rubra*), Mediterranean spurge (*Euphorbia characias*), shrub balsam (*Impatiens sodenii*), and nettle-leaved goosefoot (*Chenopodiastrum murale*).

A lawn/non-native grassland was present just behind the residence (**Figure 6**) and on the adjacent property to the north. The lawn was dominated by common velvet grass (*Holcus lanatus*) and wild oats (*Avena barbata*). Other species present in the grassland include prostate cap weed (*Arctotheca prostrata*), wild radish, Italian rye grass (*Festuca perennis*), veldt grass (*Ehrharta erecta*), California brome grass (*Bromus sitchensis* var*. carinatus*), foxtail barley (*Hordeum murinum*), hairy cats ears (*Hypochaeris radicata*), scarlet pimpernel (*Lysimachia arvensis*), petty spurge (*Euphorbia peplus*), groundsel (*Senecio vulgaris*), borage (*Borago officinalis*), and feverfew (*Tanacetum parthenium*).

Coyote brush – poison oak scrub (**Figure 7**) was observed just off property to the east, south, and west. This community was dominated by coyote brush (*Baccharis pilularis*) and poison oak (*Toxicodendron diversilobum*). Other species present included California blackberry, wild radish, Italian thistle (*Carduus pycnocephalus*), wild oats, pampas grass (*Cortaderia jubata*), garden nasturtium, California bee plant (*Scrophularia californica*), thimbleberry (*Rubus parviflorus*), hardy fuchsia (*Fuchsia magellanica*), purple western morning glory (*Calystegia purpurata ssp. purpurata*), rough hedgenettle (*Stachys rigida*), English plantain (*Plantago lanceolata*), and tall flatsedge (*Cyperus eragrostis*). A couple red alder (*Alnus rubra*) trees were present just west of the study area between the coyote brush scrub.

Special status plants and plant communities with recorded CNDDB occurrences within a 0.25 mile of the study area were further analyzed to rule out the possibility of their presence in the study area. Two special status plants are currently recorded in the CNDDB database within a 0.25 mile of the parcel: short leaved evax (*Hesperevax sparsiflora* var*. brevifolia*) and Mendocino coast paintbrush (*Castilleja mendocinensis*). Mendocino coast paintbrush is a low growing perennial herb with bright orange-red flowers that is endemic to the coastlines of Mendocino and Humboldt County. Mendocino coast paintbrush is hemiparasitic and WCPB biologist often observe it associated with seaside daisy (*Erigeron glaucus*) which likely serves as a host plant. Short leaved evax is an inconspicuous low growing annual herb with bluish green leaves. Both Mendocino coast paintbrush and short leaved evax usually grow in northern coastal bluff scrub and coastal bluffs. Since the appropriate habitat was not observed in the study area neither Mendocino coast paintbrush nor short leaved evax are likely to occur in the study area.

Special status animals with recorded CNDDB occurrences within a 0.25 mile of the study area were further analyzed to rule out the possibility of their presence in the study area. The Sonoma tree vole has been recorded within a 0.25 mile of the parcel. This Species of Special Concern spends almost the entirety of its life in the canopy of old-growth forests and is found from Sonoma County north to the South Fork of the Smith River in Del Norte County. Preferred habitat is considered mesic old-growth Douglas fir (*Pseudotsuga menziesii)* forest; however, Sonoma tree voles are known to utilize other conifer trees including grand fir (*Abies grandis*), Sitka spruce (*Picea sitchensis*), Monterey pine (*Pinus radiata*), or Bishop pine (*P. muricata*) needles for food and nesting, and have been observed in relatively young forests and even within planted conifer trees adjacent to natural areas. No coniferous trees were observed in the study area and therefore, no further surveys are recommended.

Recommendations:

It is the professional opinion of WCPB biologists that based on the current information the project as proposed will not result in a significant negative impact to any special status resources. In the surveyors' experience, special status plants typically occur in relatively uncommon and specialized niche habitats. For example, special status plants are observed on or near bluff tops, pygmy type vegetation, wetlands and perimeter of wetlands, and within certain special status plant communities. Surveyors also search for common indicator species that are often associated with special status plant and/or species of concern. Due to the habitat already being altered with landscaping and non-native plants around the project area the likelihood of special status plants and animals being present is low.

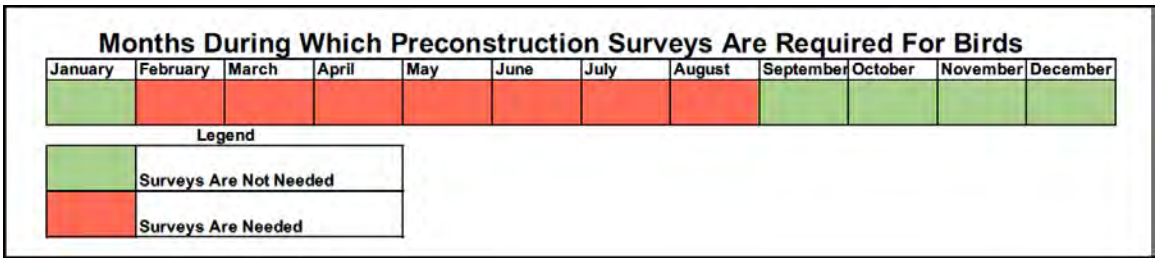
The following mitigation measures are recommended to minimize impacts from development to animals that may be seasonally or temporarily present within the study area.

1.1. Potential Impact to Nesting Birds

Construction in the study area has the potential to disturb birds during the nesting season. Removal of vegetation and construction activity near trees and vegetated areas has the potential to disturb birds' nesting process.

1.1.1. Avoidance Measure: Seasonal Avoidance

No nesting bird surveys are recommended if activity occurs in the **non-breeding season** (September to January). If development is to occur during the **breeding season** (February to August), a pre-construction survey is recommended within the 14 days prior to the onset of construction to ensure that no nesting birds will be disturbed during development.



1.1.2. Avoidance Measure: Nest Avoidance

If active special status bird nests are observed, no ground disturbance activities shall occur within a 100-foot exclusion zone. These exclusion zones may vary depending on species, habitat and level of disturbance. The exclusion zone shall remain in place around the active nest until all young are no longer dependent upon the nest. A biologist should monitor the nest site weekly during the breeding season to ensure the buffer is sufficient to protect the nest site from potential disturbance.

1.1.3. Avoidance Measure: Construction activities only during daylight hours

Construction should occur during daylight hours to limit disturbing construction noise and minimize artificial lights.

1.2. Potential Impact to Special Status Amphibians

Construction activities will involve walking across areas where amphibians may be traveling. Staging of materials and removal of construction debris could also disturb special status amphibians that may be hiding underneath these materials. To minimize impacts to amphibians, the following avoidance measures should be followed.

1.2.1. Avoidance Measure: Contractor education

Within two weeks prior to construction activities, project contractors will be trained by a qualified biologist in the identification of the frogs and salamanders that occur along the Mendocino County coast. Workers will be trained to differentiate between special status and common species and

instructed on actions and communications required to be conducted in the event that special status amphibians are observed during construction.

1.2.2. Avoidance Measure: Pre-construction search

During ground disturbing activities, construction crews will begin each day with a visual search around the staging and impact area to detect the presence of amphibians.

1.2.3. Avoidance Measure: Careful debris removal

During construction and debris removal, any wood stockpiles should be moved carefully by hand in order to avoid accidental crushing or other damage to amphibians.

1.2.4. Avoidance Measure: No construction during rain event

If a rain event occurs during the ground disturbance period, all ground disturbing activities will cease for a period of 48 hours, starting after the rain stops.

Prior to resuming construction activities, trained construction crew member(s) will examine the site for the presence of special status amphibians.

If no special status amphibians are found during inspections, ground-disturbing activities may resume.

If a special status amphibian is detected, construction crews will stop all ground disturbing work and will contact the California Department of Fish and Wildlife (CDFW) or a qualified biologist. Clearance from CDFW will then be needed prior to reinitiating work. CDFW will need to be consulted and will need to be in agreement with protective measures needed for any potential special status amphibians.

Discussion:

A stabilization structure is proposed along the western property line with the intent to halt uphill migration of the downslope erosion. The parcel is surrounded by residential development, Highway One, and California State Parks land. A trail leading down to Greenwood Creek State Beach is just downslope of the erosion area. The ecological conditions of the lot are degraded with non-native grasses and forbs dominating the vegetation in the surrounding project area. Proposed development is not expected to impact special status resources and mitigation measures recommended in this report address special status animals that have the potential to be seasonally or temporally present.

Biologist Biographies:

Asa B Spade graduated from Humboldt State University with a Bachelor of Science majoring in Environmental Science, with a concentration in Landscape Ecosystems as well as a minor in Botany. Since that time, he has been working in the natural resources field, first with Mendocino County Environmental Health and later with California State Parks and the Department of Fish and Game. He has been trained in Army Corps wetland delineation by the Coastal Training Program at Elkhorn Slough and in Advanced Wetland Delineation by the Wetland Science and Coastal Training Program. He has been trained in the environmental compliance process for wetland projects in San Francisco bay and outer coastal areas. In 2011 Asa completed training to survey for California red-legged frog held by Elkhorn Slough Coastal Program. In 2015 he attended a Townsend's big eared bat basal hollow habitat assessment and survey methods workshop taught by Michael Baker, Leila Harris, and Adam Hutchins. Asa has trained with the Carex Working Group in identifying grasses and sedges of Northern California as well as a CNPS sedge workshop taught by CA Fish and Wildlife staff biologist Gordon Leppig. In 2019, he completed a training for burrowing owls taught by Dr. Lynne Trulio through the Elkhorn Slough Coastal Training Program and completed foothill yellow legged frog training taught by David Cook and Jeff Alvarez. Asa conducted field work for the Classification and Mapping of Mendocino Cypress Woodland and Related Vegetation using CNPS/CDFW Rapid Assessment/Relevé protocol. In 2021 Asa completed training by Jeff Alverez and Jeff Wilcox on the eradication of bullfrogs within the range of California red-legged and foothill yellow legged frog. He is on the Fish and Wildlife Service approved list for Point Arena mountain beaver surveys and has done surveys for Behren's silverspot butterfly, Northern spotted owl, Sonoma tree vole, foothill yellow-legged frog and the California red-legged frog. He has contributed natural resources expertise to more than 200 coastal development projects in Mendocino County.

Nicole Herrera graduated from Gonzaga University with a Bachelor's Degree in Environmental Studies and a minor in Biology. After graduating, she worked as an intern for The Nature Conservancy conducting vegetation monitoring for the endangered golden-cheeked warbler. She served as an AmeriCorps member for the Watershed Stewards Program which aims to conserve, restore, and enhance anadromous watersheds for future generations. She worked as a fisheries technician conducting salmonid monitoring and habitat restoration for various agencies, including the California Department of Fish and Wildlife, Pacific States Marine Fisheries Commission, and the Bureau of Land Management. She also has experience planning and implementing northern spotted owl, Sonoma tree vole, and amphibian surveys. She has been trained in U.S. Army Corps of Engineers wetland delineation by the Wetland Training Institute, Inc. She is on the U.S. Fish and Wildlife Service's approved list for Point Arena mountain beaver and Behren's silverspot butterfly surveys. She completed the Bullfrog Control in California Field Workshop 2021 led by Jeff Alvarez and Jeff Wilcox held at a UC Berkeley Field Station.

Figure 1. Location of project area in relation to Elk, California.

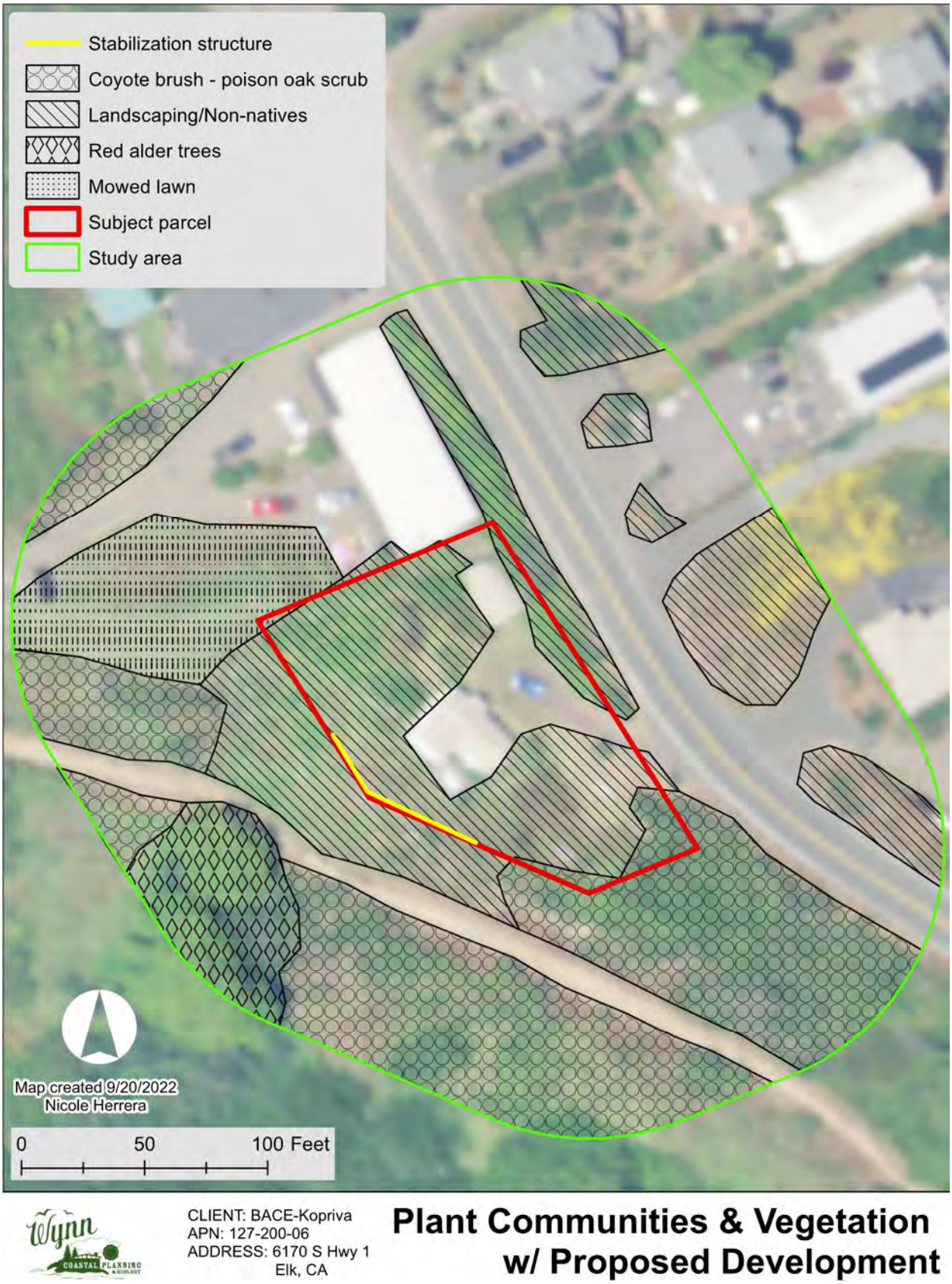


Figure 2. Map plant communities and vegetation with the proposed stabilization structure.

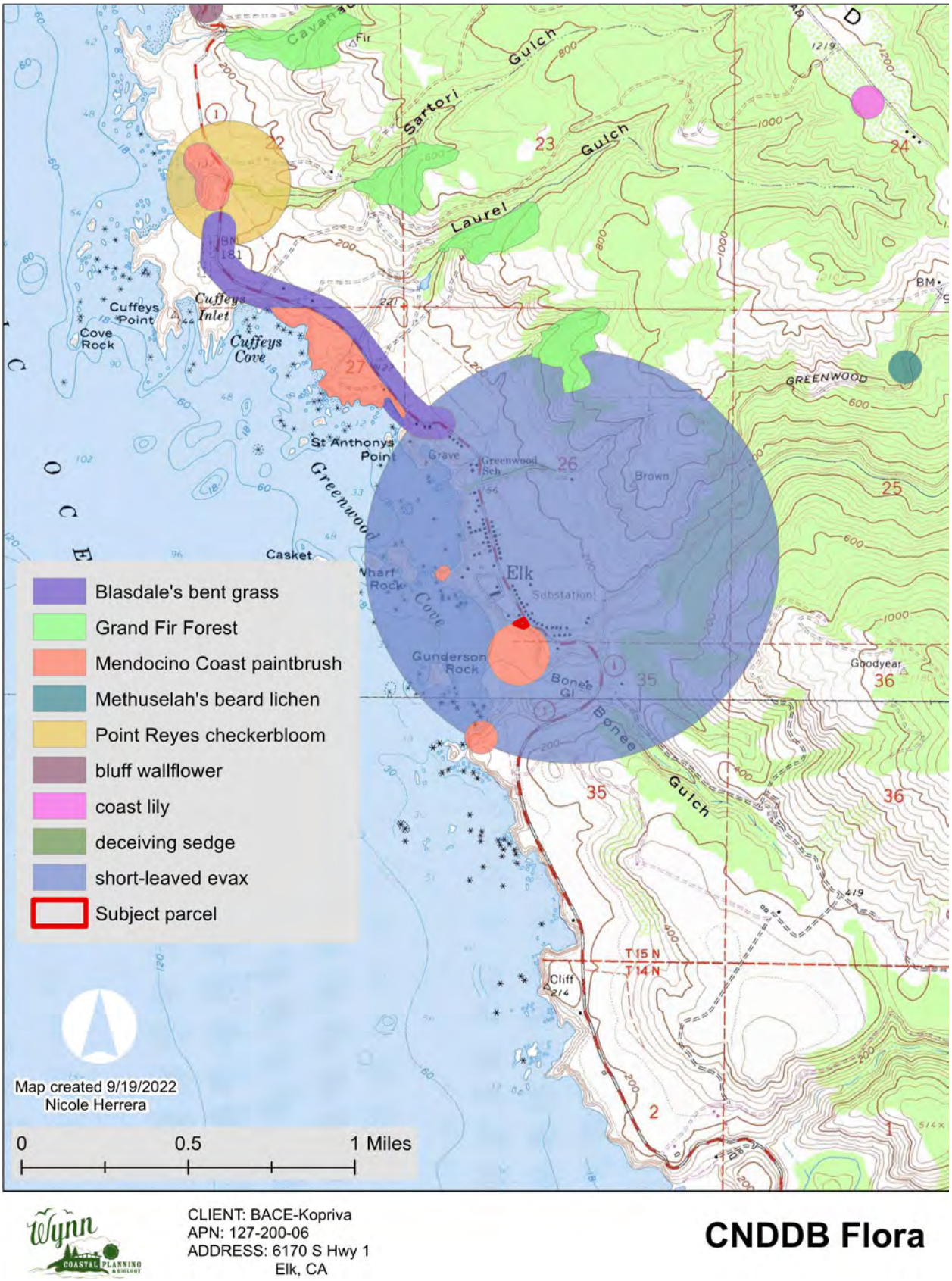


Figure 3. Special status flora reported to CDFW in the proximity of the study area and recorded in the CNDDB database.

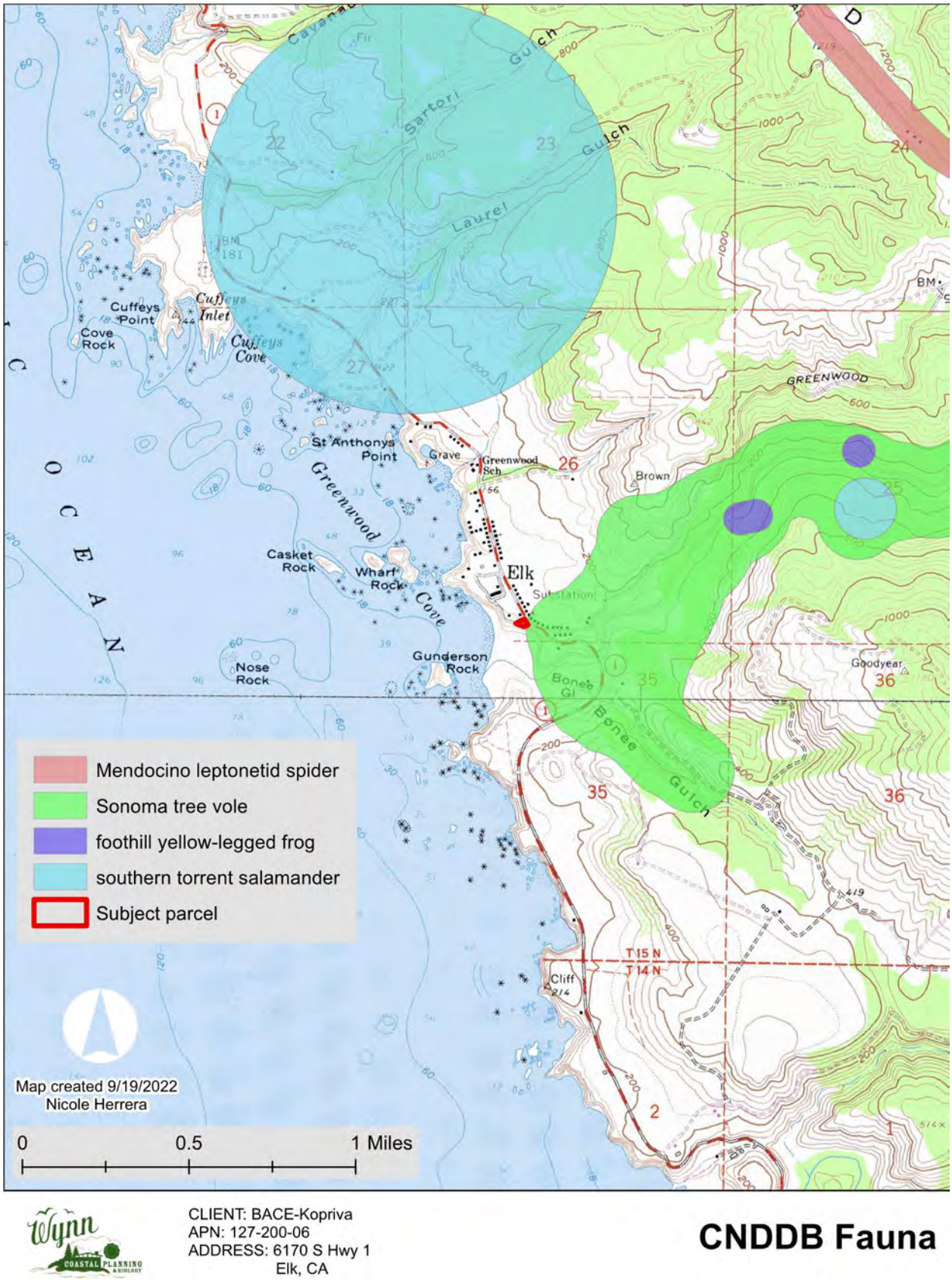


Figure 4. Special status fauna reported to CDFW in the proximity of the study area and recorded in the CNDDB database.

Figure 5. Non-native plants dominating eroding hillslope beneath residence.

Figure 6. Non-native grassland behind residence.

Figure 7. Coyote brush-poison oak scrub.

Table 1. Nine-quad search of special status flora, fauna, and communities centered on the Elk quad.

Element Type	Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CRPR
Animals - Amphibians	Ascaphus truei	Pacific tailed frog	None	None	SSC	-
Animals - Amphibians	Rana aurora	northern red-legged frog	None	None	SSC	-
Animals - Amphibians	Rana boylii	foothill yellow-legged frog	None	Endangered	SSC	-
Animals - Amphibians	Rana draytonii	California red-legged frog	Threatened	None	SSC	-
Animals - Amphibians	Rhyacotriton variegatus	southern torrent salamander	None	None	SSC	-
Animals - Amphibians	Taricha rivularis	red-bellied newt	None	None	SSC	-
Animals - Arachnids	Calileptoneta wapiti	Mendocino leptonetid spider	None	None	-	-
Animals - Birds	Elanus leucurus	white-tailed kite	None	None	FP	-
Animals - Birds	Brachyramphus marmoratus	marbled murrelet	Threatened	Endangered	-	-
Animals - Birds	Fratercula cirrhata	tufted puffin	None	None	SSC	-
Animals - Birds	Ardea herodias	great blue heron	None	None	-	-
Animals - Birds	Progne subis	purple martin	None	None	SSC	-
Animals - Birds	Hydrobates homochroa	ashy storm-petrel	None	None	SSC	-
Animals - Birds	Agelaius tricolor	tricolored blackbird	None	Threatened	SSC	-
Animals - Birds	Pandion haliaetus	osprey	None	None	WL	-
Animals - Birds	Pelecanus occidentalis californicus	California brown pelican	Delisted	Delisted	FP	-
Animals - Birds	Nannopterum auritum	double-crested cormorant	None	None	WL	-
Animals - Birds	Strix occidentalis caurina	Northern Spotted Owl	Threatened	Threatened	-	-
Animals - Fish	Hesperoleucus venustus navarroensis	northern coastal roach	None	None	SSC	-
Animals - Fish	Entosphenus tridentatus	Pacific lamprey	None	None	SSC	-
Animals - Fish	Oncorhynchus kisutch pop. 4	coho salmon - central Calif coast ESU	Endangered	Endangered	-	-
Animals - Fish	Oncorhynchus mykiss irideus pop. 16	steelhead - northern California DPS	Threatened	None	-	-
Animals - Fish	Oncorhynchus tshawytscha pop. 17	chinook salmon - California coastal ESU	Threatened	None	-	-
Animals - Insects	Bombus caliginosus	obscure bumble bee	None	None	-	-
Animals - Insects	Bombus occidentalis	western bumble bee	None	None	-	-
Animals - Insects	Atractelmis wawona	Wawona riffle beetle	None	None	-	-
Animals - Insects	Plebejus anna lotis	lotis blue butterfly	Endangered	None	-	-
Animals - Insects	Danaus plexippus plexippus pop. 1	monarch - California overwintering population	Candidate	None	-	-
Animals - Insects	Speyeria zerene behrensii	Behren's silverspot butterfly	Endangered	None	-	-
Animals - Mammals	Aplodontia rufa nigra	Point Arena mountain beaver	Endangered	None	SSC	-
Animals - Mammals	Arborimus pomo	Sonoma tree vole	None	None	SSC	-
Animals - Mammals	Erethizon dorsatum	North American porcupine	None	None	-	-
Animals - Mammals	Corynorhinus townsendii	Townsend's big-eared bat	None	None	SSC	-
Animals - Mammals	Lasiurus cinereus	hoary bat	None	None	-	-
Animals - Mammals	Myotis yumanensis	Yuma myotis	None	None	-	-
Animals - Mollusks	Haliotis kamtschatkana	pinto abalone	None	None	-	-
Animals - Mollusks	Helminthoglypta arrosa pomoensis	Pomo bronze shoulderband	None	None	-	-
Animals - Mollusks	Margaritifera falcata	western pearlshell	None	None	-	-
Animals - Reptiles	Emys marmorata	western pond turtle	None	None	SSC	-
Community - Terrestrial	Coastal and Valley Freshwater Marsh	Coastal and Valley Freshwater Marsh	None	None	-	-
Community - Terrestrial	Coastal Brackish Marsh	Coastal Brackish Marsh	None	None	-	-
Community - Terrestrial	Grand Fir Forest	Grand Fir Forest	None	None	-	-
Community - Terrestrial	Mendocino Pygmy Cypress Forest	Mendocino Pygmy Cypress Forest	None	None	-	-
Community - Terrestrial	Northern Coastal Salt Marsh	Northern Coastal Salt Marsh	None	None	-	-
Community - Terrestrial	Sphagnum Bog	Sphagnum Bog	None	None	-	-
Plants - Bryophytes	Buxbaumia viridis	green shield-moss	None	None	-	2B.2
Plants - Lichens	Usnea longissima	Methuselah's beard lichen	None	None	-	4.2
Plants - Lichens	Ramalina thrausta	angel's hair lichen	None	None	-	2B.1
Plants - Vascular	Angelica lucida	sea-watch	None	None	-	4.2
Plants - Vascular	Erigeron supplex	supple daisy	None	None	-	1B.2
Plants - Vascular	Hesperevax sparsiflora var. brevifolia	short-leaved evax	None	None	-	1B.2
Plants - Vascular	Lasthenia californica ssp. bakeri	Baker's goldfields	None	None	-	1B.2
Plants - Vascular	Lasthenia californica ssp. macrantha	perennial goldfields	None	None	-	1B.2
Plants - Vascular	Microseris borealis	northern microseris	None	None	-	2B.1
Plants - Vascular	Packera bolanderi var. bolanderi	seacoast ragwort	None	None	-	2B.2
Plants - Vascular	Erysimum concinnum	bluff wallflower	None	None	-	1B.2
Plants - Vascular	Streptanthus glandulosus ssp. hoffmanii	Hoffman's bristly jewelflower	None	None	-	1B.3
Plants - Vascular	Campanula californica	swamp harebell	None	None	-	1B.2
Plants - Vascular	Calystegia purpurata ssp. saxicola	coastal bluff morning-glory	None	None	-	1B.2
Plants - Vascular	Cuscuta pacifica var. papillata	Mendocino dodder	None	None	-	1B.2
Plants - Vascular	Cornus unalaschkensis	bunchberry	None	None	-	2B.2
Plants - Vascular	Hesperocyparis macrocarpa	Monterey cypress	None	None	-	1B.2
Plants - Vascular	Hesperocyparis pygmaea	pygmy cypress	None	None	-	1B.2

Plants - Vascular	Carex californica	California sedge	None	None	-	2B.2
Plants - Vascular	Carex livida	livid sedge	None	None	-	2A
Plants - Vascular	Carex lyngbyei	Lyngbye's sedge	None	None	-	2B.2
Plants - Vascular	Carex saliniformis	deceiving sedge	None	None	-	1B.2
Plants - Vascular	Rhynchospora alba	white beaked-rush	None	None	-	2B.2
Plants - Vascular	Arctostaphylos nummularia ssp. mendocinoensis	pygmy manzanita	None	None	-	1B.2
Plants - Vascular	Astragalus agnicidus	Humboldt County milk-vetch	None	Endangered	-	1B.1
Plants - Vascular	Hosackia gracilis	harlequin lotus	None	None	-	4.2
Plants - Vascular	Lathyrus palustris	marsh pea	None	None	-	2B.2
Plants - Vascular	Trifolium buckwestiorum	Santa Cruz clover	None	None	-	1B.1
Plants - Vascular	Trifolium trichocalyx	Monterey clover	Endangered	Endangered	-	1B.1
Plants - Vascular	Phacelia insularis var. continentis	North Coast phacelia	None	None	-	1B.2
Plants - Vascular	Juncus supiniformis	hair-leaved rush	None	None	-	2B.2
Plants - Vascular	Erythronium revolutum	coast fawn lily	None	None	-	2B.2
Plants - Vascular	Lilium maritimum	coast lily	None	None	-	1B.1
Plants - Vascular	Lilium rubescens	redwood lily	None	None	-	4.2
Plants - Vascular	Lycopodium clavatum	running-pine	None	None	-	4.1
Plants - Vascular	Sidalcea calycosa ssp. rhizomata	Point Reyes checkerbloom	None	None	-	1B.2
Plants - Vascular	Sidalcea malachroides	maple-leaved checkerbloom	None	None	-	4.2
Plants - Vascular	Sidalcea malviflora ssp. patula	Siskiyou checkerbloom	None	None	-	1B.2
Plants - Vascular	Sidalcea malviflora ssp. purpurea	purple-stemmed checkerbloom	None	None	-	1B.2
Plants - Vascular	Veratrum fimbriatum	fringed false-hellebore	None	None	-	4.3
Plants - Vascular	Pityopus californicus	California pinefoot	None	None	-	4.2
Plants - Vascular	Abronia umbellata var. breviflora	pink sand-verbena	None	None	-	1B.1
Plants - Vascular	Cypripedium montanum	mountain lady's-slipper	None	None	-	4.2
Plants - Vascular	Piperia candida	white-flowered rein orchid	None	None	-	1B.2
Plants - Vascular	Castilleja ambigua var. humboldtiensis	Humboldt Bay owl's-clover	None	None	-	1B.2
Plants - Vascular	Castilleja litoralis	Oregon coast paintbrush	None	None	-	2B.2
Plants - Vascular	Castilleja mendocinensis	Mendocino Coast paintbrush	None	None	-	1B.2
Plants - Vascular	Cordylanthus tenuis ssp. brunneus	serpentine bird's-beak	None	None	-	4.3
Plants - Vascular	Kopsiopsis hookeri	small groundcone	None	None	-	2B.3
Plants - Vascular	Pinus contorta ssp. bolanderi	Bolander's beach pine	None	None	-	1B.2
Plants - Vascular	Agrostis blasdalei	Blasdale's bent grass	None	None	-	1B.2
Plants - Vascular	Calamagrostis bolanderi	Bolander's reed grass	None	None	-	4.2
Plants - Vascular	Calamagrostis crassiglumis	Thurber's reed grass	None	None	-	2B.1
Plants - Vascular	Pleuropogon hooverianus	North Coast semaphore grass	None	Threatened	-	1B.1
Plants - Vascular	Pleuropogon refractus	nodding semaphore grass	None	None	-	4.2
Plants - Vascular	Gilia capitata ssp. pacifica	Pacific gilia	None	None	-	1B.2
Plants - Vascular	Gilia millefoliata	dark-eyed gilia	None	None	-	1B.2
Plants - Vascular	Leptosiphon acicularis	bristly leptosiphon	None	None	-	4.2
Plants - Vascular	Chorizanthe howellii	Howell's spineflower	Endangered	Threatened	-	1B.2
Plants - Vascular	Coptis laciniata	Oregon goldthread	None	None	-	4.2
Plants - Vascular	Ceanothus gloriosus var. exaltatus	glory brush	None	None	-	4.3
Plants - Vascular	Ceanothus gloriosus var. gloriosus	Point Reyes ceanothus	None	None	-	4.3
Plants - Vascular	Sanguisorba officinalis	great burnet	None	None	-	2B.2
Plants - Vascular	Darlingtonia californica	California pitcherplant	None	None	-	4.2
Plants - Vascular	Chrysosplenium glechomifolium	Pacific golden saxifrage	None	None	-	4.3
Plants - Vascular	Mitellastra caulescens	leafy-stemmed mitrewort	None	None	-	4.2

United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Mendocino County, Western Part, California

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:896 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 40 80 160 240

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

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MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Mendocino County, Western Part, California
Survey Area Data: Version 16, Sep 6, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 7, 2022—May 31, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
139	Dystropepts, 30 to 75 percent slopes	2.1	63.2%
225	Windyhollow loam, 0 to 5 percent slopes	1.2	36.8%
Totals for Area of Interest		**3.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Mendocino County, Western Part, California

139—Dystropepts, 30 to 75 percent slopes

Map Unit Setting

National map unit symbol: hmlk
Elevation: 10 to 1,500 feet
Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 250 to 330 days
Farmland classification: Not prime farmland

Map Unit Composition

Dystropepts and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dystropepts

Setting

Landform: Marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and shale

Properties and qualities

Slope: 30 to 75 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Minor Components

Rock outcrop

Percent of map unit: 10 percent
Landform: Marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Hydric soil rating: No

Vizcaino

Percent of map unit: 8 percent
Landform: Marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Hydric soil rating: No

Abalobadiah

Percent of map unit: 7 percent
Landform: Marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Hydric soil rating: No

225—Windyhollow loam, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: hmq4
Elevation: 0 to 980 feet
Mean annual precipitation: 40 inches
Mean annual air temperature: 54 degrees F
Frost-free period: 250 to 330 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Windyhollow and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windyhollow

Setting

Landform: Marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 16 inches: loam
Bt1 - 16 to 24 inches: clay loam
Bt2 - 24 to 43 inches: gravelly clay loam
Bt3 - 43 to 61 inches: clay loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 30 to 48 inches
Frequency of flooding: None

Custom Soil Resource Report

Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C
Ecological site: R004BY059CA - Loamy Terrace (Perennial Grass)
Hydric soil rating: No

Minor Components

Flumeville

Percent of map unit: 4 percent
Landform: Marine terraces
Hydric soil rating: Yes

Biaggi

Percent of map unit: 4 percent
Hydric soil rating: No

Mallopass

Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed, steeper slopes

Percent of map unit: 3 percent
Hydric soil rating: No

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U.S. Fish and Wildlife Service
National Wetlands Inventory

BACE-Kopriva NWI Map

September 20, 2022

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

WYNN COASTAL PLANNING & BIOLOGY

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper