APPENDIX A

FEDERAL EMERGENCY MANAGEMENT AGENCY

LETTER OF MAP REVISION FLOODWAY DETERMINATION DOCUMENT

U.S. Department of Homeland Security

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION FLOODWAY DETERMINATION DOCUMENT (REMOVAL)

COMMUNITY AND MAP PANEL INFORMATION

COMMUNITY	**MARIN COUNTY, CALIFORNIA (Unincorporated Areas)**
	COMMUNITY NO.: 060173
AFFECTED MAP PANEL	**NUMBER: 06041C0233D**
	DATE: 5/4/2009

FLOODING SOURCE: LAGUNITAS CREEK

LEGAL PROPERTY DESCRIPTION

A parcel of land, as described in the Quitclaim Deed recorded as Document No. 2019-0047097, in the Office of the Recorder, Marin County, California

The portion of property is more particularly described by the following metes and bounds:

APPROXIMATE LATITUDE & LONGITUDE OF PROPERTY:38.068018, -122.799964
SOURCE OF LAT & LONG: LOMA LOGIC **DATUM: NAD 83**

DETERMINATION

LOT	BLOCK/ SECTION	SUBDIVISION	STREET	**OUTCOME** WHAT IS REMOVED FROM THE SFHA	FLOOD ZONE	1% ANNUAL CHANCE FLOOD ELEVATION (NAVD 88)	LOWEST ADJACENT GRADE ELEVATION (NAVD 88)	LOWEST LOT ELEVATION (NAVD 88)
--	--	--	100 Commodore Webster Drive	Portion of Property	X (shaded)	--	--	23.5 feet

Special Flood Hazard Area (SFHA) - The SFHA is an area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood).

ADDITIONAL CONSIDERATIONS (Please refer to the appropriate section on Attachment 1 for the additional considerations listed below.)

LEGAL PROPERTY DESCRIPTION
INADVERTENT INCLUSION FLOODWAY 1
PORTIONS REMAIN IN THE SFHA
SUPERSEDES PREVIOUS DETERMINATION
STATE LOCAL CONSIDERATIONS

This document provides the Federal Emergency Management Agency's determination regarding a request for a Letter of Map Revision for the property described above. Using the information submitted and the effective National Flood Insurance Program (NFIP) map, we have determined that the described portion(s) of the
property(ies) is/are not located in the NFIP regulatory floodway or the SFHA, an area inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood). This document revises the effective NFIP map to remove the subject property from the NFIP regulatory floodway and the SFHA located on the effective NFIP map; therefore, the Federal mandatory flood insurance requirement does not apply. However, the lender has the option to continue the flood insurance requirement to protect its financial risk on the loan.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at (877) 336-2627 (877-FEMA MAP) or by letter addressed to the Federal Emergency Management Agency, LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426.

Patrick “Rick” F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

LETTER OF MAP REVISION FLOODWAY DETERMINATION DOCUMENT (REMOVAL)

ATTACHMENT 1 (ADDITIONAL CONSIDERATIONS)

LEGAL PROPERTY DESCRIPTION (CONTINUED)

BEGINNING AT THE FOUND 3/4" IRON PIPE & TAG LS 7112 ON WESTERN LINE, 0.25' FROM THE NORTHERNMOST POINT OF THE BOUNDARY BETWEEN THE PROPERTY AND 1ST STREET OF POINT REYES STATION, CALIFORNIA: THENCE (1) South 49°48'00" East, 384.47 feet to the BEGINNING POINT of the Portion of the Parcel Above 23.5 Feet in Elevation; THENCE (2) South 63°50'44" East, 52.46 feet; THENCE (3) North 68°58'51" East, 19.38 feet; THENCE (4) North 78°48'04" East, 6.93 feet; THENCE (5) North 66°52'14" East, 16.67 feet; THENCE (6) North 57°50'53" East, 17.94 feet; THENCE (7) North 58°35'08" East, 12.76 feet; THENCE (8) North 43°20'47" East, 6.80 feet; THENCE (9) North 45°05'20" East, 16.62 feet; THENCE (10) North 55°02'01" East, 5.51 feet; THENCE (11) North 51°35'35" East, 10.33 feet; THENCE (12) North 52°33'28" East, 18.65 feet; THENCE (13) North 47°18'34" East, 10.55 feet; THENCE (14) North 50°04'35" East, 15.40 feet; THENCE (15) North 49°12'03" East, 14.41 feet; THENCE (16) North 45°17'00" East, 18.15 feet; THENCE (17) North 43°33'22" East, 12.63 feet; THENCE (18) North 51°40'31" East, 5.57 feet; THENCE (19) North 52°19'23" East, 19.03 feet; THENCE (20) North 56°26'54" East, 13.82 feet; THENCE (21) North 59°50'16" East, 19.29 feet; THENCE (22) North 63°39'50" East, 12.98 feet; THENCE (23) North 62°30'24" East, 12.39 feet; THENCE (24) North 70°29'47" East, 11.01 feet; THENCE (25) North 79°10'42" East, 13.62 feet; THENCE (26) North 79°16'52" East, 12.35 feet; THENCE (27) North 78°04'02" East, 13.59 feet; THENCE (28) North 76°29'09" East, 14.18 feet; THENCE (29) North 75°21'49" East, 13.21 feet; THENCE (30) North 74°48'42" East, 14.27 feet; THENCE (31) North 71°47'25" East, 13.24 feet; THENCE (32) North 71°40'02" East, 6.74 feet; THENCE (33) North 70°33'31" East, 10.04 feet; THENCE (34) North 71°41'57" East, 18.96 feet; THENCE (35) North 73°46'22" East, 13.96 feet; THENCE (36) North 62°44'34" East, 13.88 feet; THENCE (37) North 51°23'53" East, 15.58 feet; THENCE (38) North 38°55'50" East, 14.85 feet; THENCE (39) North 71°28'11" East, 8.85 feet; THENCE (40) North 54°42'47" East, 17.69 feet; THENCE (41) North 76°42'03" East, 14.70 feet; THENCE (42) South 71°02'20" East, 11.47 feet; THENCE (43) South 88°43'47" East, 12.97 feet; THENCE (44) South 77°23'08" East, 7.44 feet; THENCE (45) South 54°42'23" East, 11.41 feet; THENCE (46) North 68°02'38" East, 17.17 feet; THENCE (47) North 75°10'15" East, 10.46 feet; THENCE (48) South 0°57'02" East, 19.02 feet; THENCE (49) South 46°12'15" East, 6.70 feet; THENCE (50) North 79°02'17" East, 13.08 feet; THENCE (51) North 80°04'59" East, 21.01 feet; THENCE (52) South 78°15'58" East, 16.33 feet; THENCE (53) South 76°23'16" East, 11.34 feet; THENCE (54) South 79°32'12" East, 5.76 feet; THENCE (55) South 67°20'23" East, 16.41 feet; THENCE (56) South 65°23'03" East, 18.18 feet; THENCE (57) South 83°11'39" East, 17.94 feet; THENCE (58) South 73°01'08" East, 7.43 feet; THENCE (59) South 88°02'57" East, 14.20 feet; THENCE (60) North 79°28'42" East, 6.80 feet; THENCE (61) North 87°46'03" East, 17.51 feet; THENCE (62) North 77°16'39" East, 14.62 feet; THENCE (63) North 77°36'25" East, 5.22 feet; THENCE (64) North 80°27'21" East, 13.20 feet; THENCE (65) North 83°46'21" East, 10.93 feet; THENCE (66) South 89°02'07" East, 14.58 feet; THENCE (67) South 81°34'30" East, 16.15 feet; THENCE (68) South 66°07'42" East, 5.26 feet; THENCE (69) South 68°26'30" East, 7.12 feet; THENCE (70) South 67°18'34" East, 16.52 feet; THENCE (71) South 60°47'05" East, 13.70 feet; THENCE (72) South 71°41'15" East, 14.42 feet; THENCE (73) North 60°37'27" East, 4.77 feet; THENCE (74) North 55°57'09" East, 9.89 feet; THENCE (75) North 66°46'57" East, 20.80 feet; THENCE (76) North 64°11'52" East, 6.00 feet; THENCE (77) North 57°19'27" East, 17.36 feet; THENCE (78) North 42°36'48" East, 20.05 feet; THENCE (79) North 42°07'08" East, 13.86 feet; THENCE (80) North 41°24'17" East, 16.40 feet; THENCE (81) North 39°09'03" East, 4.30 feet; THENCE (82) North 33°55'17" East, 11.27 feet; THENCE (83) North 33°20'14" East, 15.14 feet; THENCE (84) North 34°52'05" East, 13.48 feet; THENCE (85) North 33°29'33" East, 16.81 feet; THENCE (86) North 18°14'28" East, 10.65 feet; THENCE (87) North 10°55'55" East, 4.70 feet; THENCE (88) North 21°11'02" East, 15.35 feet; THENCE (89) North 1°33'10" East, 13.08 feet; THENCE (90) North 16°59'58" East, 13.77 feet; THENCE (91) North 33°59'13" East, 10.36 feet; THENCE (92) North 34°23'23" East, 7.25 feet; THENCE (93) North 38°31'38" East, 17.65 feet; THENCE (94) North 38°14'02" East, 12.07 feet; THENCE (95) North 34°08'51" East, 14.05 feet; THENCE (96) North 30°43'17" East, 11.93 feet; THENCE (97) North 29°19'39" East, 12.93 feet; THENCE (98) North 22°07'45"

This attachment provides additional information regarding this request. If you have any questions about this attachment, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at (877) 336-2627 (877-FEMA MAP) or by letter addressed to the Federal Emergency Management Agency, LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
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ATTACHMENT 1 (ADDITIONAL CONSIDERATIONS)

East, 7.45 feet; THENCE (99) North 11°25'33" East, 16.67 feet; THENCE (100) North 6°38'56" West, 3.39 feet; THENCE (101) North 2°17'33" East, 9.84 feet; THENCE (102) North 28°31'06" East, 4.06 feet; THENCE (103) North 37°31'45" East, 11.12 feet; THENCE (104) North 20°23'40" East, 16.13 feet; THENCE (105) North 19°21'23" East, 13.70 feet; THENCE (106) North 6°35'23" East, 10.99 feet; THENCE (107) North 8°05'12" West, 20.09 feet; THENCE (108) North 4°31'00" West, 16.48 feet; THENCE (109) North 0°59'12" West, 12.23 feet; THENCE (110) North 5°34'36" West, 12.16 feet; THENCE (111) North 18°26'03" East, 4.73 feet; THENCE (112) North 5°41'35" West, 13.98 feet; THENCE (113) North 0°44'12" West, 8.77 feet; THENCE (114) North 3°15'04" West, 17.37 feet; THENCE (115) North 7°04'11" East, 4.08 feet; THENCE (116) North 4°29'32" East, 14.61 feet; THENCE (117) North 0°12'42" East, 17.01 feet; THENCE (118) North 5°31'02" East, 12.57 feet; THENCE (119) North 25°34'37" East, 9.99 feet; THENCE (120) North 29°27'20" East, 14.38 feet; THENCE (121) North 34°25'31" East, 4.29 feet; THENCE (122) North 26°59'24" East, 11.62 feet; THENCE (123) North 15°15'57" West, 15.36 feet; THENCE (124) North 16°48'14" East, 10.19 feet; THENCE (125) North 20°15'51" East, 6.07 feet; THENCE (126) North 6°47'25" East, 20.03 feet; THENCE (127) North 2°42'44" West, 4.50 feet; THENCE (128) North 6°00'07" West, 12.92 feet; THENCE (129) North 4°58'56" West, 21.55 feet; THENCE (130) North 8°06'10" East, 13.63 feet; THENCE (131) North 0°26'03" East, 8.63 feet; THENCE (132) North 6°15'18" East, 17.90 feet; THENCE (133) North 12°56'36" East, 14.70 feet; THENCE (134) North 9°12'26" East, 11.21 feet; THENCE (135) North 3°06'11" East, 15.74 feet; THENCE (136) North 10°51'01" East, 4.26 feet; THENCE (137) North 8°12'29" West, 15.46 feet; THENCE (138) North 0°10'11" East, 11.87 feet; THENCE (139) North 4°06'45" West, 23.44 feet; THENCE (140) North 15°21'10" West, 15.72 feet; THENCE (141) North 6°44'10" West, 14.29 feet; THENCE (142) North 16°47'28" West, 16.37 feet; THENCE (143) North 10°34'04" West, 9.11 feet; THENCE (144) North 6°41'41" West, 6.91 feet; THENCE (145) North 3°47'08" West, 13.60 feet; THENCE (146) North 1°46'50" West, 11.13 feet; THENCE (147) North 3°21'53" West, 12.86 feet; THENCE (148) North 1°20'14" West, 11.57 feet; THENCE (149) North 0°06'18" West, 17.76 feet; THENCE (150) North 13°25'16" East, 13.46 feet; THENCE (151) North 7°58'17" East, 7.05 feet; THENCE (152) North 4°37'55" West, 13.21 feet; THENCE (153) North 7°59'23" West, 20.90 feet; THENCE (154) North 12°09'13" West, 17.25 feet; THENCE (155) North 19°01'05" West, 8.28 feet; THENCE (156) North 15°18'42" West, 21.34 feet; THENCE (157) North 15°30'36" West, 18.87 feet; THENCE (158) North 25°55'28" West, 11.88 feet; THENCE (159) North 22°36'47" West, 12.07 feet; THENCE (160) North 23°32'47" West, 6.18 feet; THENCE (161) South 89°29'28" West, 59.79 feet; THENCE (162) South 0°07'46" East, 0.28 feet to the beginning of a curve concave northwesterly, said curve has a radius of 1,067.00 feet; THENCE (163) southwesterly along said curve through a central angle of 61°11'11" an arc distance of 1,139.45 feet; THENCE (164) South 61°03'29" West, 496.08 feet to return to the POINT OF BEGINNING.

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LETTER OF MAP REVISION FLOODWAY DETERMINATION DOCUMENT (REMOVAL)

ATTACHMENT 1 (ADDITIONAL CONSIDERATIONS)

INADVERTENT INCLUSION IN THE FLOODWAY 1 (PORTIONS OF THE PROPERTY REMAIN IN THE FLOODWAY) (This Additional Consideration applies to the preceding 1 Property.)
A portion of this property is located within the National Flood Insurance Program (NFIP) regulatory floodway for the flooding source indicated on the Determination Document, while the subject of this determination is not. The NFIP regulatory floodway is the area that must remain unobstructed in order to prevent unacceptable increases in base flood elevations. Therefore, no construction may take place in an NFIP regulatory floodway that may cause an increase in the base flood elevation, and any future construction or substantial improvement on the property remains subject to Federal, State/Commonwealth, and local regulations for floodplain management. The NFIP regulatory floodway is provided to the community as a tool to regulate floodplain development. Therefore, the NFIP regulatory floodway modification described in the Determination Document, while acceptable to the Federal Emergency Management Agency (FEMA), must also be acceptable to the community and adopted by appropriate community action, as specified in Paragraph 60.3(d) of the NFIP regulations. Any proposed revision to the NFIP regulatory floodway must be submitted to FEMA by community officials. The community should contact either the Regional Director (for those communities in Regions I-IV, and VI-X), or the Regional Engineer (for those communities in Region V) for guidance on the data which must be submitted for a revision to the NFIP regulatory floodway. Contact information for each regional office can be obtained by calling the FEMA Mapping and Insurance eXchange toll free at (877) 336-2627 (877-FEMA MAP) or from our web site at http://www.fema.gov/about/regoff.htm.

PORTIONS OF THE PROPERTY REMAIN IN THE SFHA (This Additional Consideration applies to the preceding 1 Property.)
Portions of this property, but not the subject of the Determination/Comment document, may remain in the Special Flood Hazard Area. Therefore, any future construction or substantial improvement on the property remains subject to Federal, State/Commonwealth, and local regulations for floodplain management.

SUPERSEDES OUR PREVIOUS DETERMINATION (This Additional Consideration applies to all properties in the LOMR-FW DETERMINATION DOCUMENT (REMOVAL))
This Determination Document supersedes our previous determination dated 4/14/2023, for the subject property.

STATE AND LOCAL CONSIDERATIONS (This Additional Consideration applies to all properties in the LOMR-FW DETERMINATION DOCUMENT (REMOVAL))
Please note that this document does not override or supersede any State or local procedural or substantive provisions which may apply to floodplain management requirements associated with amendments to State or local floodplain zoning ordinances, maps, or State or local procedures adopted under the National Flood Insurance Program.

This attachment provides additional information regarding this request. If you have any questions about this attachment, please contact the FEMA Mapping and Insurance eXchange (FMIX) toll free at (877) 336-2627 (877-FEMA MAP) or by letter addressed to the Federal Emergency Management Agency, LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426.

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APPENDIX B

BIOLOGICAL SITE ASSESSMENT REPORT, IPAC RESOURCE LIST, AND CALIFORNIA NATIVE PLANT SOCIETY PLANT LIST

BIOLOGICAL SITE ASSESSMENT REPORT

U.S. COAST GUARD HOUSING FACILITY REDEVELOPMENT PROJECT
POINT REYES STATION, MARIN COUNTY, CALIFORNIA

Prepared for:

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Hayward, CA 94541

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Association of West Marin
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017612.0001 4889-7799-7397.2 WRA #30271
March 2023

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EXECUTIVE SUMMARY

This report details the regulatory background, methods, results, and recommendations of a Biological Site Assessment (BSA) for the proposed redevelopment of the former U.S. Coast Guard (USCG) housing site property located at 101 Commodore Webster Drive, Point Reyes Station, Marin County, California (Study Area; APNs #119-240-73, 119-236-10) (Figure A-1, Appendix A). The assessment and survey are required by the County of Marin for a proposed affordable housing project, which will rehabilitate facilities and features that currently exist on the property, some of which were formerly used by the USCG. WRA, Inc. performed the assessment and surveys on behalf of the Applicant, the Community Land Trust Association of West Marin (CLAM) and Eden Housing, Inc. (Eden), on several site visits throughout 2021. Following the surveys, WRA helped the client to develop a Project that avoids and/or minimizes potential impacts to sensitive natural resources to the maximum extent feasible.

During the site visits, WRA identified several Environmentally Sensitive Habitat Areas (ESHA), including aquatic and terrestrial within the Study Area. The Project Area (Project Area is defined on Page iii, below) itself does not contain ESHAs. The Project Area does contains existing nonconforming structures/uses that are located within aquatic and terrestrial ESHA buffers. Therefore, avoidance of ESHA buffers is not feasible to complete the project. The development of the project will variably repair existing nonconforming structures, replace structures within the ESHA buffers with water quality enhancement features, or remove existing nonconforming structures/uses where possible, and restore those areas with native vegetation. A reduced buffer analysis was performed in this report where necessary development is proposed within ESHA buffers. Best management practices and avoidance measures are included as part of the project and provided herein to ensure that wetlands, streams, and riparian habitats (aquatic resources collectively), and sensitive terrestrial resources (e.g., upland native grassland) within the Project are protected. The work which will occur within ESHA buffers is expected to result in a net environmental improvement over existing conditions, by reducing improving water quality, eliminating on-site invasive species, and increasing native vegetation cover. A complete listing of sensitive natural resources or potential ESHA within the Project Area is included in Section 5.0 below. The report was updated in December 2022 to address the County of Marin Community Development Agency and California Coastal Commission (CCC) comments on the BSA report and Coastal Permit and Use Permit. Updated text is shown in bold.

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LIST OF PREPARERS

Matt Richmond – Principal-in-Charge
Scott Yarger – Associate Plant Biologist
Jason Yakich – Associate Wildlife Biologist
Michael Rochelle – GIS Analyst

DEFINITIONS

Study Area: The area throughout which the assessment was performed; the area composing the former USCG property at 101 Commodore Webster Drive (APN 119-240-73 and 119-236-10), totaling 33.59 acres.

Project Area: The area encompassing the proposed residential redevelopment project (grading limit); the area evaluated for potential impacts to sensitive biological resources, totaling 8.15 acres.

LIST OF ABBREVIATIONS & ACRONYMS

BIOS	Biogeographic Information and Observation System
BSA	Biological Site Assessment
CCA	California Coastal Act
CCC	California Coastal Commission
CCH	Consortium of California Herbaria
CCR	California Code of Regulations
CDFG	California Department of Fish and Game (now CDFW)
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
CLAM	Community Land Trust Association of West Marin
CNDDB	California Natural Diversity Database
CNPPA	California Native Plant Protection Act
CNPS	California Native Plant Society
County	County of Marin
Corps	U.S. Army Corps of Engineers
CRLF	California Red-legged Frog
CSRL	California Soils Resources Lab
CWA	Clean Water Act
Eden	Eden Housing, Inc.
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
ESA	(Federal) Endangered Species Act
ESHA	Environmentally Sensitive Habitat Area
LCP	Marin County Amended Local Coastal Program
LCP-IP	Marin County Amended Local Coastal Program Implementation Plan
LUP	Land Use Plan
MBTA	Migratory Bird Treaty Act
NMFS	National Marine Fisheries Service
NRCS	Natural Resource Conservation Service
NWI	National Wetland Inventory
OHWM	Ordinary High Water Mark
Rank	California Rare Plant Ranks
RWQCB	Regional Water Quality Control Board
SCA	Stream Conservation Area
SSC	Species of Special Concern
SFP	State Fully Protected Species
SWRCB	State Water Resource Control Board
TOB	Top of Bank
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

USGS	U.S. Geological Survey
WBWG	Western Bat Working Group
WCA	Wetland Conservation Area
WRA	WRA, Inc.
WUI	Wildland Urban Interface

1.0 INTRODUCTION

On January 20, April 4, and June 4, 2021 WRA, Inc. (WRA) performed an assessment of biological resources at the site of the former U.S. Coast Guard (USCG) housing facility at 101 Commodore Webster Drive, Point Reyes Station, Marin County, California (APNs #119-240-73, and 119-236-10; hereafter Study Area) (Figure A-1, Appendix A).

1.1 Overview and Purpose

The purpose of this study was to gather the information necessary to complete a review of biological resources under the California Environmental Quality Act (CEQA) and the requirements of the Marin County Community Development Agency, Planning Division.

A biological site assessment (BSA) provides general information on the presence, or potential presence, of sensitive species and habitats. These survey(s) contain the results of a focused protocol-level survey for listed plant species in the Study Area; however, protocol-level surveys for wildlife may or may not be included as part of the survey. This survey is not a formal wetland delineation; in instances where such a delineation may be required for project approval by local, state, or federal agencies, results would be reported herein, but may be presented elsewhere in separate reports. This survey is based on information available at the time of the study and on-site conditions that were observed on the date(s) the site was visited.

This report describes the results of the site visit, which assessed the Study Area for (1) the presence of sensitive land cover types, (2) the potential for land cover types on the site to support special-status plant and wildlife species, and (3) the presence of any other sensitive natural resources protected by local, state, or federal laws and regulations. Special-status species observed during the site assessment were documented and their presence is discussed herein. Specific findings on the habitat suitability or presence of special-status species or sensitive habitats may require that protocol-level surveys or other studies be conducted; recommendations for additional studies are provided, if necessary. WRA completed a draft BSA report associated with the initial Coastal Permit and Use Permit application submitted by the Project Applicant (defined below) in August 2022. This revised report addresses comments received from the County of Marin Community Development Agency, Planning Division, in a letter dated September 16, 2022, and comments received from the CCC in a letter dated September 14, 2022.

1.2 Project Description

The Community Land Trust Association of West Marin (CLAM), its partner, Eden Housing (Eden) (‘Applicant’, collectively) are seeking approval of the USCG Housing Facility Redevelopment Project (Project) which proposes to rehabilitate 36 existing townhomes to affordable housing, redevelop a former barracks building into 15 additional units of affordable housing, and convert an office and maintenance building into 3 units of affordable housing.

During the site visits, WRA identified several Environmentally Sensitive Habitat Areas (ESHA), including aquatic and terrestrial ESHAs. The Project Area contains existing nonconforming structures/uses that are located within aquatic and terrestrial ESHA buffers, and the development of the project will variably repair existing nonconforming structures, repair structures within the reduced ESHA buffers, or remove existing nonconforming structures/uses where possible. A reduced buffer analysis was performed in this report where development is proposed within ESHA buffers. Best management practices and avoidance measures are included as part of the project and provided herein to ensure that wetlands, streams, and riparian habitats (aquatic resources collectively), and sensitive terrestrial resources (e.g. upland native grassland) within the Project are protected. The work which will occur within ESHA buffers is expected to create a net environmental improvement over existing conditions, by improving water quality, elimination of on-site invasive species, and increasing native vegetation cover. A complete listing of sensitive natural resources or potential ESHA within the Project Area is included in Section 5.0 below.

The affordable housing project includes the rehabilitation of 36 townhomes and adaptive reuse of Building 50 into 15 affordable housing units; the rehab of Building 100A into 3 affordable housing units, and the conversion and expansion of Building 1 into property management and resident services office space; the construction of a new playground at the center of the site; and the development of an on-site wastewater treatment system. Building 100C will be minimally updated, with no change in use as a mechanical shop and storage. The Project also proposes the removal of certain features such as a playground, and habitat restoration in those areas which would improve site drainage.

The existing hardscape areas around Building 1, including the small parking area, tennis court and other paved surfaces, will be removed and replaced with pervious surface or improved and repurposed to allow for better pedestrian flow, use and drainage.

The Project will remove 36 mature trees, all of which are non-native ornamental species, and none of which are on the Marin County Local Coastal Program-Implementation Plan (LCP-IP) list of Heritage or Protected Trees. Trees that will be removed are predominantly eucalyptus (*Eucalyptus grandis, E. globulus, E. g. 'compacta', E. nicholii, E. viminalis,* etc.), dead trees, and other ornamental trees which will be in the direct line of construction. Ten (10) of the aforementioned non-native eucalyptus trees to be removed, and one Leyland cypress (*Cupressus x leylandii*) to be removed are located within aquatic ESHA buffers, and are therefore subject to coastal development permitting requirements.

Based on section 24.04.625 (d) of the Marin County Municipal Code, grading is prohibited during the rainy season defined as October 15 through April 15 without an exception requested and granted. All grading and excavation will be conducted between April 16 and October 14.

As all major grading and excavation work will occur between April 16 and October 14, it is expected that initial grubbing and grading (including tree removal and initial grading) may occur during the nesting bird season, defined as: February 1 through August 31. To avoid impacts to nesting birds, WRA recommends that all vegetation removal (including tree trimming, if relevant) be performed from September 1 to January 31, outside of the general nesting bird season. If such timing is not feasible, a pre-construction nesting bird survey by a qualified biologist will be performed no more than 14 days prior to the initiation of tree removal. The survey should cover the tree removal areas and surrounding areas (as accessible) within 250 feet. If active bird nests are found during the survey, an appropriate no-disturbance buffer will be established by the qualified biologist. Once it is determined that the young have fledged (left the nest) or the nest otherwise becomes inactive (e.g., due to predation), the buffer may be lifted and work may be initiated within the buffer. This will result in no impact to nesting birds in the Project Area.

2.0 REGULATORY BACKGROUND

This report is intended to facilitate conformance of the proposed Project with the standards outlined in the Marin County Code and General Plan. In addition to the requirements of Marin County, the proposed Project may also be subject to several federal and state regulations designed to protect sensitive natural resources. Full analysis of these requirements in the context of the Project are addressed herein.

2.1 Federal and State Regulatory Setting

2.1.1 Sensitive Land Cover Types

Land cover types are herein defined as those areas of a particular vegetation type, soil or bedrock formation, aquatic features, and/or other distinct phenomenon. Typically, land cover types have identifiable boundaries that can be delineated based on changes in plant assemblages, soil or rock types, soil surface or near-surface hydroperiod, anthropogenic or natural disturbance, topography, elevation, etc. Many land cover types are not considered sensitive or otherwise protected under the environmental regulations discussed here. However, these land cover types typically provide essential ecological and biological functions for plants and wildlife, including, frequently, special-status species. Those land cover types that are considered or protected under one or more environmental regulations are discussed below.

<u>Waters of the United States</u>: The United States Army Corps of Engineers (Corps) regulates "Waters of the United States" under Section 404 of the Clean Water Act (CWA). Waters of the United States are defined in the Code of Federal Regulations (CFR) as waters susceptible to use in commerce, including interstate waters and wetlands, all other waters (intrastate waterbodies, including wetlands), and their tributaries (33 CFR 328.3). Potential wetland areas, according to the three criteria used to delineate wetlands as defined in the Corps Wetlands Delineation Manual (Environmental Laboratory 1987), are identified by the presence of (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology. Areas that are inundated at a sufficient depth and for a sufficient duration to exclude growth of hydrophytic vegetation are subject to Section 404 jurisdiction as "other waters" and are often characterized by an ordinary high water mark (OHWM). Other waters, for example, generally include lakes, rivers, and streams. The placement of fill material into Waters of the United States generally requires an individual or nationwide permit from the Corps under Section 404 of the CWA.

<u>Waters of the State</u>: The term "Waters of the State" is defined by the Porter-Cologne Act as "any surface water or groundwater, including saline waters, within the boundaries of the state." The Regional Water Quality Control Board (RWQCB) protects all waters in its regulatory scope and has special responsibility for wetlands, riparian areas, and headwaters. These waterbodies have high resource value, are vulnerable to filling, and are not systematically protected by other programs. RWQCB jurisdiction includes "isolated" wetlands and waters that may not be regulated by the Corps under Section 404. Waters of the State are regulated by the RWQCB under the State Water Quality Certification Program which regulates discharges of fill and dredged material under Section 401 of the CWA and the Porter-Cologne Water Quality Control Act. Projects that require a Corps permit, or fall under other federal jurisdiction, and have the potential to impact Waters of the State, are required to comply with the terms of the Water Quality Certification determination. If a project does not require a federal permit, but does involve dredge or fill activities that may result in a discharge to Waters of the State, the RWQCB has the option to regulate the dredge and fill activities under its state authority in the form of Waste Discharge Requirements.

Streams, Lakes, and Riparian Habitat: Streams and lakes, as habitat for fish and wildlife species, are subject to jurisdiction by CDFW under Sections 1600-1616 of California Fish and Game Code (CFGC). Alterations to or work within or adjacent to streambeds or lakes generally require a 1602 Lake and Streambed Alteration Agreement. The term "stream", which includes creeks and rivers, is defined in the California Code of Regulations (CCR) as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life [including] watercourses having a surface or subsurface flow that supports or has supported riparian vegetation" (14 CCR 1.72). In addition, the term "stream" can include ephemeral streams, dry washes, watercourses with subsurface flows, canals, aqueducts, irrigation ditches, and other means of water conveyance if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife (CDFG 1994). "Riparian" is defined as "on, or pertaining to, the banks of a stream." Riparian vegetation is defined as "vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself" (CDFG 1994). Removal of riparian vegetation also requires a Section 1602 Lake and Streambed Alteration Agreement from CDFW.

Sensitive Natural Communities: Sensitive natural communities not discussed above include habitats that fulfill special functions or have special values. Natural communities considered sensitive are those identified in local or regional plans, policies, regulations, or by the CDFW. CDFW ranks sensitive communities as "threatened" or "very threatened" (CDFG 2010, CDFW 2018a) and keeps records of their occurrences in its California Natural Diversity Database (CNDDB; CDFW 2022a). CNDDB vegetation alliances are ranked 1 through 5 based on NatureServe's (2018) methodology, with those alliances ranked globally (G) or statewide (S) as 1 through 3 considered sensitive. Impacts to sensitive natural communities identified in local or regional plans, policies, or regulations or those identified by the CDFW or U.S. Fish and Wildlife Service (USFWS) must be considered and evaluated under CEQA (CCR Title 14, Div. 6, Chap. 3, Appendix G).

2.1.2 Special-status Species

Plants: Special-status plants include taxa that have been listed as endangered or threatened, or are formal candidates for such listing, under the federal Endangered Species Act (ESA) and/or California Endangered Species Act (CESA). The California Native Plant Protection Act (CNPPA) lists 64 "rare" or "endangered" and prevents "take", with few exceptions, of these species. Plant species on the California Native Plant Society (CNPS) Rare and Endangered Plant Inventory (Inventory) with California Rare Plant Ranks (Rank) of 1, 2, and 3 are also considered special-status plant species and must be considered under CEQA. Rank 4 species are typically only afforded protection under CEQA when such species are particularly unique to the locale (e.g., range limit, low abundance/low frequency, limited habitat) or are otherwise considered locally rare. A description of the CNPS Ranks is provided in Appendices B and C.

Wildlife: As with plants, special-status wildlife includes species/taxa that have been listed or are formal candidates for such under ESA and/or CESA. The federal Bald and Golden Eagle Protection Act provides relatively broad protections to both of North America's eagle species (bald [*Haliaeetus leucocephalus*] and golden eagle [*Aquila chrysaetos*)] that in some regards are similar to those provided by ESA. The CFGC designates some species as Fully Protected (SFP), which indicates that take of that species cannot be authorized through a state permit. Additionally, CDFW Species of Special Concern (species that face extirpation in California if current population and habitat trends continue) are given special consideration under CEQA, and are therefore considered special-status species. In addition to regulations for special-status species, most native birds in the United States, including non-status species, have baseline legal protections under the Migratory Bird Treaty Act of 1918 (MBTA) and CFGC, i.e., sections 3503, 3503.5 and 3513. Under these laws/codes, the intentional harm or collection of adult birds as well as the intentional collection or destruction of active nests, eggs, and young is illegal. For bat species, the Western Bat Working Group (WBWG) designates conservation status for species of bats, and those with a high or medium-high priority are typically given special consideration under CEQA.

Critical Habitat, Essential Fish Habitat, and Wildlife Corridors: Critical habitat is a term defined in the ESA as a specific and formally-designated geographic area that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. The ESA requires federal agencies to consult with the USFWS to conserve listed species on their lands and to ensure that any activities or projects they fund, authorize, or carry out will not jeopardize the survival of a threatened or endangered species. In consultation for those species with critical habitat, federal agencies must also ensure that their activities or projects do not adversely modify critical habitat to the point that it will no longer aid in the species' recovery. Note that designated critical habitat areas that are currently unoccupied by the species but which are deemed necessary for the species' recovery are also protected by the prohibition against adverse modification.

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) provides for conservation and management of fishery resources in the U.S. This Act establishes a national program intended to prevent overfishing, rebuild overfished stocks, ensure conservation, and facilitate long-term protection through the establishment of Essential Fish Habitat (EFH). EFH consists of aquatic areas that contain habitat essential to the long-term survival and health of fisheries, which may include the water column, certain bottom types, vegetation (e.g. eelgrass (*Zostera* spp.)), or complex structures such as oyster beds. Any federal agency that authorizes, funds, or undertakes action that may adversely affect EFH is required to consult with NMFS.

Movement and migratory corridors for native wildlife (including aquatic corridors) as well as wildlife nursery sites are given special consideration under CEQA.

2.2 Marin County Regulatory Setting

In Marin County, a sensitive resource includes "jurisdictional wetlands, occurrences of special-status species, occurrences of sensitive natural communities, wildlife nurseries and nesting areas, and wildlife movement corridors. The County development review process typically requires a site assessment by qualified professionals to confirm whether any sensitive resources could be affected . . ." Furthermore, The California Coastal Act (CCA) defines environmentally sensitive habitat area (ESHA) under Section 30107.5 and protected under section 30240 and include wetlands, rivers, streams and lakes, and riparian areas. For the purposes of this report, WRA has taken into consideration any areas that may meet the definition of any ESHA defined by the CCA, listed in the *Statewide Interpretive Guidelines for Identifying and Mapping Wetlands and Other Wet Environmentally Sensitive Habitat Areas* ("California Coastal Commission guidelines", CCC 1981), or the Marin County Amended Local Coastal Program (LCP) Land Use Plan (LUP) (Marin County 2016).

The CCA defines an ESHA as follows:

> *"Environmentally sensitive habitat area" means any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an*

> *ecosystem and which could be easily disturbed or degraded by human activities and developments. "*

The CCC Guidelines discuss the various definitions for specific types of ESHAs, including wetlands, streams and riparian areas. Many of these definitions are synonymous with the definitions described above. Additional definitions are provided below.

Coastal Act Wetlands

The Coastal Act defines wetlands as:

> "*Wetland means land within the coastal zone which may be covered periodically or permanently with shallow water and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens".*

(Public Resources Code § 30121)

CCC Administrative Regulations (Section 13577 (b)) provide a more explicit definition:

> *"Wetlands are lands where the water table is at, near, or above the land surface long enough to promote the formation of hydric soils or to support the growth of hydrophytes, and shall also include those types of wetlands where vegetation is lacking and soil is poorly developed or absent as a result of frequent or drastic fluctuations of surface water levels, wave action, water flow, turbidity or high concentrations of salt or other substance in the substrate. Such wetlands can be recognized by the presence of surface water or saturated substrate at some time during each year and their location within, or adjacent to, vegetated wetlands or deepwater habitats."*

The Coastal Act defines the upland limit of wetlands as:

> *(1) the boundary between land with predominantly hydrophytic cover and land with predominantly mesophytic or xerophytic cover; (2) the boundary between soil that is predominantly hydric and soil that is predominantly non-hydric; or (3) in the case of wetlands without vegetation or soil, the boundary between land that is flooded or saturated at some time each year and land that is not."*

Coastal Act Streams and Rivers: The Marin County LCP provides special protections for USGS blue-line streams, and establishes buffers to protect streams from the impacts of adjacent uses including development impacts from construction and post-construction activities within the LCP Unit II Area. Stream buffers are defined by the LCP as: "the area covered by riparian vegetation on both sides of the stream and the area 50 feet landward from the edge of the riparian vegetation." The LCP states that the buffer shall be the wider of the following on both sides of the stream: (a) the area 50 feet landward from the other edge of the riparian vegetation; or (b) the area 100 feet landward from the top of the stream banks; or (c) as recommended by the biological assessment."

Coastal Act Riparian Habitats: While riparian vegetation is not defined specifically in the California Coastal Act, it is defined by the LCP as the stream itself and the riparian vegetation growing adjacent to it. Common plant genera associated with this vegetation type in Unit II of the Coastal Zone within Marin

County include maple (*Acer* spp.), alder (*Alnus* spp.), ash (*Fraxinus* ssp.), and willow (*Salix* spp.). For the purposes of determination of status under the Coastal Act, we define riparian habitat as "vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself" (CDFG 1994). This definition is synonymous with the CDFW definition described above.

Coastal Act Terrestrial ESHA: The Marin County LCP/LUP defines terrestrial (non-aquatic) ESHA as habitats of plant and animal species listed under the Federal or California Endangered Species Act and existing populations of the plants listed as 1B or 2 by the California Native Plant Society; coastal dunes; groves of trees that provide colonial nesting and roosting habitat for butterflies or other wildlife; and riparian vegetation that is not associated with watercourse. Buffers for terrestrial ESHA shall be 50 feet Buffers for terrestrial ESHA shall be 50 feet, a width that may be adjusted by the County as appropriate to protect the habitat value of the resource, but in no case shall be less than 25 feet.

Marin County Stream Conservation Areas: In Marin County, a Stream Conservation Area (SCA) is designated along perennial, intermittent, and some ephemeral streams. The SCA consists of the watercourse itself between the tops of the banks and a strip of land extending laterally outward from the top of both banks equaling 100 feet from TOB or 50 feet from edge of riparian, whichever is greater. With regard to ephemeral streams, such streams are subject to the SCA policies if it (a) supports riparian vegetation for a length of 100 feet or more, and/or (b) supports special status species and/or a sensitive natural community type, such as native grasslands, regardless of the extent of riparian vegetation associated with the stream. For those ephemeral streams that do not meet these criteria, a minimum 20-foot development setback shall be required. Development activities that may occur within a SCA are closely regulated by the County and require consideration of impacts of proposed developments on species and habitats during the environmental review process.

Marin County Wetland Conservation Areas: In Marin County, a Wetland Conservation Area (WCA) is designated around all Corps jurisdictional wetlands. The WCA consists of the wetland itself and a strip of land extending laterally outward from the wetland for a distance of 100 feet or as deemed appropriate by a qualified biologist to avoid impacts and protect the wetland. Development activities that may occur within a WCA are closely regulated by the County and require consideration of impacts of proposed developments on species and habitats during the environmental review process.

Marin County Protected and Heritage Trees : The Marin County Local Coastal Plan – Implementation Plan defines "protected" and "heritage" which are comprised of native tree species including but not limited to: native oaks (*Quercus* spp.), willows (*Salix* spp.), Sargent cypress (*Hesperocyparis sargentii* [*Cupressus* s.]), and madrone (*Arbutus menziesii*) with a minimum diameter at breast height (DBH; measured 4.5 feet above grade) of six inches, and most other native tree species, including but not limited to Douglas fir (*Pseudotsuga menziesii*) and California bay (*Umbellularia californica*) with a minimum DBH of 10 inches. Heritage trees are defined as native oaks, willows, Sargent cypress, and madrone with a minimum DBH of 18 inches, and most other native tree species with a minimum DBH of 30 inches[1]. Removal of protected and/or heritage trees as defined above are subject to coastal development permitting requirements.

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[1] Marin LCP Protected and Heritage Tree list treats the same species and sizes of trees as Protected and Heritage Trees.

3.0 ENVIRONMENTAL SETTING

The approximately 33.59-acre Study Area is set across two parcels including the former USCG housing facility and one additional parcel. It is located in western Marin County, on the southeastern edge of the unincorporated community of Point Reyes Station. Detailed descriptions of the local setting are below.

3.1 Topography and Soils

The overall topography of the Study Area is flat in previously developed areas, transitioning to a moderately-steep hill slope in the northwest portion of the Study Area, and undulating to flat topography associated with the Lagunitas Creek stream terrace. Elevations within the Study Area range from approximately 6 to 81 feet above sea level.

According to the *Soil Survey of Marin County* (USDA 1985), the Study Area is underlain by five soil mapping units: Blucher-Cole complex, 2 to 5 percent slopes; Cortina gravelly sandy loam, 0 to 5 percent slopes; Olompali loam, 2 to 9 percent slopes; Saurin-Bonnydoon complex, 2 to 15 percent slopes; and Xerothents, fill. The Study Area's soil mapping units are described below.

Blucher-Cole complex, 2 to 5 percent slopes. This soil mapping unit is very deep, and somewhat poorly drained silt loam to clay loam formed in alluvium from various types of rock. It consists of approximately 40 percent Blucher silt loam, and 30 percent Cole clay loam (USDA 1985). This map unit is located in basins and on alluvial fans at elevations between 0 and 500 feet above sea level. The native vegetation is typically dominated by annual grasses and forbs (USDA 1985).

Cortina gravelly sandy loam, 0 to 5 percent slopes. This soil mapping unit is very deep, and somewhat excessively drained gravelly sandy loam formed in alluvium derived from various kinds of rock. The mapping unit is located on valley floors and along streams at elevations between 25 and 300 feet above sea level. It consists of approximately 40 percent Blucher silt loam, and 30 percent Cole clay loam (USDA 1985). The native vegetation is typically dominated by annual grasses and forbs (USDA 1985).

Olompali loam, 2 to 9 percent slopes. This soil mapping unit is deep, and somewhat poorly drained loam formed in alluvium derived from various kinds of rock. The mapping unit is located on coastal terraces at elevations between 50 and 800 feet above sea level. This soil mapping unit consists predominantly of Olompali loam with limited inclusions of various other soils at upper ends of slopes, and along drainageways (USDA 1985). The native vegetation is typically dominated by annual grasses, forbs, and rushes (USDA 1985).

Saurin-Bonnydoon complex, 2 to 15 percent slopes. This soil mapping unit is moderately deep, and well drained clay loam to gravelly loam formed in material derived from sandstone and shale. The mapping unit is located on rolling uplands with complex slopes at elevations between 50 and 1,500 feet above sea level. This soil mapping unit consists of 50 percent Saurin clay loam, and 30 percent gravelly loam with inclusions of various other soil types (USDA 1985). The native vegetation is mainly annual grasses, forbs, and scattered brush (USDA 1985).

Xerothents, fill. This mapping unit consists of soil material that has been moved mechanically and mixed. Most of this unit is in urban areas that have been developed previously. Varying amounts of rock, concrete, asphalt and other material are typically present within this mapping unit (USDA 1985).

3.2 Climate and Hydrology

The Study Area is located within the coastal fog belt of Marin County where summer temperatures are buffeted by fog and fog drip contributes to annual rainfall totals. Winter “tule” fog is common in the Study Area, and summer “coastal” fog emerges with increased interior temperatures. The average annual maximum temperature at the Point Reyes Lighthouse Station (CA047027), located approximately 13 miles west-southwest (WSW) of the Study Area, is 56.7 degrees Fahrenheit, while the average monthly minimum temperature is 48.1 degrees Fahrenheit. Predominantly, precipitation falls as rainfall with a monthly average of 17.05 inches. Precipitation bearing weather systems are predominantly from the west and south with the majority of rain falls between November and March (WRCC 2022).

The local watershed is Tomales Bay (HUC 12: 180500050304). Lagunitas Creek, a perennial stream, is located along the eastern border of the Study Area and is the prominent aquatic feature in the Study Area vicinity. Precipitation, overland sheet flow, rare flooding from Lagunitas Creek, and a rising-lowering shallow water table are the primary hydrologic sources. Local hydrology drains to the south into Lagunitas Creek and on towards Tomales Bay to the west.

3.3 Land Cover and Land Use

The Study Area consists of a former USCG housing facility, and undeveloped areas consisting of a perennial stream, Lagunitas Creek, adjacent floodplain/riparian habitat, and ungrazed grasslands. Historic aerial imagery (NETR 2022) indicates that the site was developed by the USCG some time between 1971 and 1983. The site, which has been vacant for several years, has recently been used by local fire departments for training and wildfire emergency staging.

This re-development project is located on the southeastern edge of the unincorporated town of Point Reyes Station. Regional land uses include rural residential, livestock grazing, and protected open space (Google Earth 2022).

4.0 ASSESSMENT METHODS

Prior to the site visit, WRA biologists reviewed the following literature and performed database searches to assess the potential for sensitive natural communities (e.g., wetlands) and special-status species (e.g., endangered plants):

- *Soil Survey of Marin County, California* (USDA 1985)
- Inverness 7.5-minute quadrangle (USGS 2022)
- Contemporary aerial photographs (Google Earth 2022)
- Historical aerial photographs (NETR 2022)
- National Wetlands Inventory (NWI, USFWS 2022a)
- California Natural Diversity Database (CNDDB, CDFW 2022a)
- CDFW Biogeographic Information and Observation System (BIOS) (CDFW 2022b)
- California Native Plant Society Electronic Inventory (CNPS 2022a)
- Consortium of California Herbaria (CCH 2021)

- CDFW Publication, *California Bird Species of Special Concern in California* (Shuford and Gardali 2008)
- CDFW and University of California Press publication *California Amphibian and Reptile Species of Special Concern* (Thomson et al. 2016)
- *The Marin County Breeding Bird Atlas* (Shuford 1993)
- *A Field Guide to Western Reptiles and Amphibians* (Stebbins 2003)
- *eBird* Online Database (eBird 2022)
- *Marin Flora* (Howell et al. 2007)
- *A Manual of California Vegetation, 2nd Edition* (Sawyer et al. 2009)
- *A Manual of California Vegetation Online* (CNPS 2022b)
- *Preliminary Descriptions of the Terrestrial Natural Communities* (Holland 1986)
- *California Natural Community List* (CDFW 2018a)

Database searches for special-status species (i.e., CNDDB, CNPS) focused on the Inverness, Drakes Bay, Tomales, Point Reyes NE, Petaluma, San Geronimo, Bolinas, and Double Point USGS 7.5-minute quadrangles for special-status plants. Appendix A contains observations of special-status species documented within a five-mile radius of the Study Area.

Following the remote assessment, a botanist with 40-hour Corps wetland delineation and wildlife biologist training traversed the entire Study Area on foot to document: (1) land cover types (e.g., terrestrial communities, aquatic resources), (2) if and what type of aquatic natural communities (e.g., wetlands) are present, (3) existing conditions and to determine if such provide suitable habitat for any special-status plant or wildlife species, and (4) if special-status species are present[2]. Site visits were conducted on several dates throughout 2021, including January 20, April 4, and June 4.

4.1 Land Cover Types

4.1.1 Terrestrial Land Cover Types

Terrestrial land cover types were mapped across the Study Area and evaluated to determine if such areas have the potential to support special-status plants or wildlife. In most instances, communities are delineated based on distinct shifts in plant assemblage (vegetation), and follow the *California Natural Community List* (CDFW 2018a), *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986), *A Manual of California Vegetation, Online Edition* (CNPS 2022b). In some cases, it may be necessary to identify variants of community types or to describe non-vegetated areas that are not described in the literature; should an undescribed variant be used, it will be noted in the description. Vegetation alliances (natural communities) with a CDFW Rank of 1 through 3 (globally critically imperiled (S1/G1), imperiled (S2/G2), or vulnerable (S3/G3), were evaluated as sensitive as part of this evaluation.[3]

4.1.2 Aquatic Resources

Aquatic resources include Waters of the U.S., Waters of the State, and Streams, Lakes, and Riparian Habitat as defined in the CWA, Porter-Cologne Act, and CFGC, respectively. Marin County mandates

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[2] Due to the timing of the assessment, it may or may not constitute protocol-level species surveys; see Section 4.2 if the site assessment would constitute a formal or protocol-level species survey.

[3] Ranking of CDFW List of Vegetation Alliances is based on NatureServe Rankings (NatureServe 2018)

setbacks from these aquatic resources, and therefore requires mapping of the outward extent of such features.

This site assessment does not constitute a formal wetland delineation; however, the surveys looked for superficial indicators of wetlands such as hydrophytic vegetation (i.e., plant communities dominated by wetland species), evidence of inundation or flowing water, saturated soils and seepage, and topographic depressions/swales. If sample points were taken, WRA followed the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Corps 2008).

If streams potentially jurisdictional under the CWA and/or the CFGC are noted on a site, they are delineated using a mix of surveyed topography data, high resolution aerial photographs, and a sub-meter GPS unit. The ordinary high water mark would be used to determine the extent of potential Section 404 jurisdiction, while the top-of-bank would be used to determine the extent of CFGC Section 1602 and 401. Streams with associated woody vegetation were assessed to determine if these areas would be considered riparian habitat by the CDFW following *A Field Guide to Lake and Streambed Alteration Agreements, Section 1600-1607, California Fish and Game Code* (CDFG 1994). Finally, all streams were assessed to determine if they meet the criteria of an SCA per the Marin CWP.

4.2 Special-status Species

4.2.1 General Assessment

Potential occurrence of special-status species in the Study Area was evaluated by first determining which special-status species occur in the greater vicinity through a literature and database review. Database searches for known occurrences of special-status species focused on the 7.5-minute USGS quadrangles mentioned above for special-status species.

A preliminary site visit was made on January 20, 2021 to evaluate the presence of suitable habitat for special-status species. Suitable habitat conditions are based on physical and biological conditions of the site, as well as the professional expertise of the investigating biologists. The potential for each special-status species to occur in the Study Area was then determined according to the following criteria:

- <u>No Potential</u>. Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).
- <u>Unlikely</u>. Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.
- <u>Moderate Potential</u>. Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.
- <u>High Potential</u>. All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.

- Present. Species is observed on the site or has been recorded (i.e. CNDDB, other reports) on the site in the recent past.

If a more thorough assessment was warranted, a targeted or protocol-level assessment or survey was conducted or recommended as a future study. Additional targeted protocol-level surveys for special-status plants were conducted on April 4, and June 4, 2021. Methods for the assessments are described below. If a special-status species was observed during the site visit, its presence was recorded and discussed below in Section 5.2.

4.2.2 Special-status Plants

A general botanical assessment was performed on January 20, 2021, and a follow up protocol-level rare plant survey was conducted on April 4, and June 4. The assessments consisted of traversing the entirety of the Study Area on foot and identifying all observed plant species to the taxonomic level necessary to determine whether or not they were sensitive. Habitat elements required or associated with certain species or species groups were searched for and noted. Such habitat elements include, but are not limited to: plant assemblages and vegetation structure; soil texture, parent material, and hydroperiod; surface and subsurface hydroperiods; topography, aspect, slope, and elevation; site management, including vegetation management; distance to documented occurrences of special-status plants; etc.

To determine the presence or absence of special-status plant species, focused surveys were conducted within the Study Area on April 4, and June 4, 2021. The surveys correspond to the period sufficient to observe and identify those special-status plants determined to have the potential to occur. The field surveys were conducted by a WRA botanist familiar with the flora of Marin and surrounding counties. The surveys were performed in accordance with guidance described by resource experts and agencies (CNPS 2001, CDFW 2018c, USFWS 1996). Plants were identified using *The Jepson Manual, 2nd Edition* (Baldwin et. al. 2012) and Jepson Flora Project (eFlora 2022), to the taxonomic level necessary to determine whether or not they were sensitive. Plant names follow those of Jepson Flora Project (eFlora 2021), unless otherwise noted.

4.2.3 Special-status Wildlife

A general wildlife assessment was performed on January 20, 2021. This assessment consisted of traversing the entirety of the Study Area as well as substantial portions of the Subject Property. Habitat elements required or associated with certain species (e.g., northern spotted owl) or species groups (e.g., bats, anadromous fish) were searched for and noted. Such habitat elements include, but are not limited to: plant assemblages and vegetation structure; stream depth, width, hydro-period, slope, and bed-and-bank structure; rock outcrops, caves, cliffs, overhangs, and substrate texture and rock content; history of site alteration and contemporary disturbances; etc.

4.2.4 Critical Habitat, Essential Fish Habitat, and Wildlife Corridors

Prior to the site visit the USFWS Critical Habitat Mapper (USFWS 2022b) and the NMFS Essential Fish Habitat Mapper (NMFS 2022) were queried to determine if critical habitat for any species or EFH, respectively, occurs within the Study Area. To account for potential impacts to wildlife movement/migratory corridors, biologists reviewed maps from the California Essential Connectivity Project (CalTrans 2010), habitat connectivity data available through the CDFW Biogeographic Information and Observation System (BIOS) (CDFW 2022b). Additionally, aerial imagery (Google 2022) for the local area was referenced to assess if local core habitat areas were present within, or connected to the Study Area. This assessment was refined based on observations of on-site physical and/or biological conditions.

5.0 ASSESSMENT RESULTS

5.1 Land Cover Types

WRA observed nine land cover types and aquatic resources within the Study Area with only developed/landscaped, and non-native annual grassland occurring in the Project Area (Appendix A, Figure 4). The Project Area has been intentionally sited to avoid direct impacts to all sensitive terrestrial land cover types, and aquatic resources. All terrestrial land cover types and aquatic resources observed in the Study Area are described in detail below.

5.1.1 Terrestrial Land Cover Types

The Study Area contains four terrestrial land cover types, including: developed/landscaped areas, non-native annual grassland, purple needlegrass grassland, and California bay forest. Of these terrestrial land cover types, only purple needlegrass grassland classifies as a terrestrial ESHA. Terrestrial land cover types in the Study Area are described in detail below.

<u>Developed/Landscaped Area (no vegetation alliance). No Rank</u>. The Study Area contains approximately 9.66 acres of previously developed/landscaped areas. Within the Study Area, developed/landscaped portions are composed of the former USCG barracks, buildings, associated infrastructure (e.g. roads, parking lots, and sidewalks), and ornamental trees and shrubs. The topography of the developed/landscaped area has been altered from its original form, graded to accommodate development. The vegetation is highly altered, consisting of non-native ornamental trees and shrubs, and disturbance tolerant herbs. Species include Deodar cedar (*Cedrus deodara*), Monterey pine (*Pinus radiata*), Mexican fan palm (*Washingtonia robusta*), slim oat (*Avena barbata*), English lawn daisy (*Bellis perennis*), and bristly ox-tongue (*Helminthotheca echioides*). This community is not considered sensitive by Marin County, CDFW, or any other regulatory entity.

<u>Non-native annual grassland (various vegetation alliances; xeric, non-wetland). No Rank.</u> The Study Area contains approximately 7.77 acres of xeric (non-wetland) non-native annual grassland composed of several alliances of annual and perennial non-native grasses. Vegetative cover within this community is typically dominated by dense non-native invasive grasses and forbs including slim oat (*Avana barbata*), ripgut brome (*Bromus diandrus*), reed fescue (*Festuca arundinacea*), and purple false brome (*Brachypodium distachyon*). This community borders and intergrades with adjacent stands of native purple needlegrass grassland on slopes, and it borders mesic grassland, and seasonal wetlands on low-lying flats and depressions. Commonly observed forbs within non-native annual grassland included coastal heron's bill (*Erodium cicutarium*), sheep sorrel (*Rumex acetosella*), lupine (*Lupinus bicolor*), and hairy cat's ear (*Hypochaeris radicata*). This community is not considered sensitive by Marin County, CDFW, or any other regulatory entity.

Purple needlegrass grassland (Needlegrass – melic grass grassland (*Stipa* [*Nassella*] spp. – *Melica* spp. Herbaceous Alliance) G4, S4. The Study Area contains approximately 0.61 acre of purple needlegrass grassland. This vegetation community occupies portions of the uppermost slope in the northern portion of the Study Area, as well as a small area in the southern portion of the Study Area. This community within the Study Area occurs in upland (xeric) areas on slopes. This alliance was mapped following CNPS (2022b) in areas containing purple needlegrass (*Stipa pulchra*) with greater than 10 percent relative cover. Within the Study Area, this community contains 10 to 40 percent relative cover of purple needlegrass. Other species observed include slim oat, purple false brome, California oatgrass (*Danthonia californica*), lupine, blue eyed grass (*Sisyrinchium bellum*), and flax (*Linum bienne*). Although purple needlegrass grassland was recently lumped by CDFW into the needlegrass – melic grassland alliance which is considered apparently secure globally, and in California (i.e. G4, S4), purple needlegrass grassland within the Study Area fits within the membership rules of the *Stipa* [*Nassella*] *pulchra* – *Bromus* spp. Association, which is considered sensitive by CDFW (CDFW 2018a). Therefore, this community is considered a terrestrial ESHA subject to a 50-foot, or minimum (reduced) 25-foot development setback. A reduced buffer analysis would be required when adjusting the buffer to less than 50 feet. However, the Project avoids all terrestrial ESHA by more than 50 feet. Thus, no reduced buffer analysis is required or provided for terrestrial ESHAs.

California bay forest (*Umbellularia californica* Forest Alliance) G4, S3. The Study Area contains approximately 1.13 acres of California bay forest in the northern portion of the Study Area. California bay is a native, evergreen broadleaf tree which is common and widespread throughout Marin County (Howell et al. 2007). This alliance was mapped following CNPS (2019b) as containing California bay greater than 50 percent relative cover in the tree canopy. Within the Study Area, this community borders the arroyo willow thicket riparian community, on upland slopes above the riparian zone. The canopy is dominated California bay, with inclusions of non-native invasive blue gum eucalyptus (*Eucalyptus globulus*), and coast live oak (*Quercus agrifolia*). The understory is sparsely dominated by forget me not (*Myosotis latifolia*), lady fern (*Athyrium filix-femina* var. *cyclosorum*), and poison oak (*Toxicodendron diversilobum*). California bay forest is reported by the CDFW with a rarity ranking of G4, S3 (CNPS 2022b), indicating that it is globally secure but vulnerable within California. However, this community is widespread and abundant in Marin County. Due to its locally common distribution, presence of non-native invasive blue gum eucalyptus (*Eucalyptus globulus*), and likely presence of sudden oak death (*Phytophthora ramorum*), as evidenced by dead and dying coast live oak within this community, this community is not considered sensitive locally, nor does it classify as a terrestrial ESHA.

5.1.2 Aquatic Resources

The Study Area contains five aquatic land cover types described in detail below, including: arroyo willow thicket (riparian), perennial stream, ephemeral ditch, CCC seasonal wetland (one or more parameter), and Corps seasonal wetland (three parameter). All aquatic land cover types, besides ephemeral ditch, are considered aquatic ESHAs.

Arroyo willow thicket (riparian) (*Salix lasiolepis* Shrubland Alliance), G4, S4, CDFW Jurisdiction, Aquatic ESHA, SCA. The Study Area contains approximately 11.44 acres of arroyo willow (*Salix lasiolepis*) thicket associated with the stream and floodplain of Lagunitas Creek, a perennial stream located along the eastern border of the Study Area. This alliance was mapped following CNPS (2022b) as containing arroyo willow greater than 50 percent relative cover in the tree canopy. The canopy is dominated arroyo willow with inclusions of red willow (*Salix laevigata*), red alder (*Alnus rubra*), Oregon ash (*Fraxinus latifolia*), and box elder (*Acer negundo*). The understory is typically dominated by dense cover of California blackberry (*Rubus ursinus*). Arroyo willow thicket is reported by the CDFW with a rarity ranking of G4, S4 (CNPS 2022b), indicating that it is globally secure and secure within California. However, this community is considered riparian vegetation under the jurisdiction of CDFW per Section Sections 1600-1616 of the CFGC. Arroyo willow thicket classifies as an aquatic ESHA subject to a minimum 50-foot development setback.

<u>Perennial stream, Corps, RWQCB, CDFW Jurisdiction, Aquatic ESHA, SCA.</u> The Study Area contains approximately 1.61 acre of perennial stream (Lagunitas Creek). Lagunitas Creek is located mostly outside of the Study Area, but small portions of its western side enter the eastern boundary of the Study Area. Lagunitas Creek in the vicinity of the Study Area is approximately 30 to 60 feet wide between OHWMs, and the stream contained flowing water during the site visits. Lagunitas Creek is bordered by a riparian arroyo willow thicket, and non-native annual grassland described above. Areas mapped as perennial stream are considered jurisdictional under Section 404 of the CWA, the Porter-Cologne Act, and Section 1600-1616 of the CFGC. Areas mapped as perennial stream classify as an aquatic ESHA subject to a buffer which is the wider of the following: (a) 50 feet landward from the outer edge of the riparian vegetation; or (b) the area 100 feet landward from the top of the stream banks; or (c) as recommended by the biological assessment. Since the riparian vegetation extends beyond 50 feet from the top of the stream banks on the Project side, the applicable ESHA buffer is 50 feet landward of the outer edge of riparian vegetation.

<u>Ephemeral ditch, Corps, RWQCB Jurisdiction, non-ESHA.</u> The Study Area contains approximately 0.01 acre of potentially Corps, and RWQCB jurisdictional ephemeral ditch. One ditch is located within the riparian woodland in the north of the site along an historic dirt road. The other ephemeral ditch which is closer to the Project Area originates from a culvert, located in the southern portion of the Study Area, south of the entry road. The ephemeral ditch is approximately 30 feet in length and approximately 2 to 4 feet wide between top of bank (TOB). The ephemeral ditch likely flows only during periods of above average precipitation. This feature flows into an adjacent CCC seasonal wetland (one parameter). Although this feature appears to be manmade, it may be considered jurisdictional under Sections 401 and 404 of the CWA, the Porter-Cologne Water Quality Control Act. However, ephemeral drainages do not meet the definition of ‘stream’ per the LCP-IP, which only includes intermittent and perennial streams. Therefore, the ephemeral ditch is not considered an ESHA, nor does it qualify as an SCA as it is an ephemeral drainage feature, lacking riparian vegetation. Therefore, ephemeral ditch features are subject to a 20 -foot ephemeral drainage setback per development standards.

<u>CCC seasonal wetland (one parameter, mesic grassland), CCC Jurisdiction, Aquatic ESHA.</u> The Study Area contains approximately 0.67 acre of grassland areas dominated by hydrophytic (facultative) grasses, meeting one wetland parameter (hydrophytic vegetation dominance test). CCC seasonal wetlands are located in low lying concave areas in the Lagunitas Creek floodplain, and in one location on the hillslope in the northwest portion of the Study Area, where a slightly mesic area is located. The two CCC seasonal wetlands located in the low-lying concave areas are bordered by more mesic seasonal wetland areas which met three wetland parameters. Areas mapped as CCC seasonal wetland are dominated by facultative grasses including common velvetgrass (*Holcus lanatus*), Italian ryegrass (*Festuca perennis*), and beardless wild rye (*Elymus triticoides*). These areas were investigated for indicators of hydrology and hydric soils, and hydric soils were characteristically absent; indicators of hydrology were occasionally

present. Areas mapped as CCC seasonal wetland are not jurisdictional to the Corps or RWQCB, but are considered jurisdictional to the CCC, and are considered aquatic ESHA requiring a 100 foot buffer, or minimum 50-foot development setback. Reduction of the wetland buffer to less than 100 feet requires a buffer adjustment analysis (provided in section 6.1.2, below) and cannot be reduced to a width of less than 50 feet from the edge of wetland vegetation. CCC seasonal wetlands do not qualify as WCAs as they lack more than two wetland parameters.

Seasonal wetland, Corps, RWQCB Jurisdiction, Aquatic ESHA, WCA. The Study Area contains approximately 0.69 acre of seasonal wetland, meeting three wetland parameters (hydrophytic vegetation, hydric soils, and hydrology). Seasonal wetlands within the Study Area are located in low-lying flat to concave areas in the Lagunitas Creek floodplain, and along the hillslope in the northwest portion of the site in a seep location. Dominant vegetation within seasonal wetlands included Mexican rush (*Juncus mexicanus*), Italian ryegrass, common velvetgrass, and barley (*Hordeum marinum* ssp. *gussoneanum*), with subdominance by brown headed rush (*Juncus phaeocephalus*), waxy mannagrass (*Glyceria declinata*), and tall cyperus (*Cyperus eragrostis*). Areas mapped as seasonal wetland, also contained indicators of wetland hydrology (including saturation, high water table) and hydric soils (including redox dark surface, or depleted matrix). Areas mapped as seasonal wetland are likely considered jurisdictional under Sections 401 and 404 of the CWA, the Porter-Cologne Water Quality Control Act, and would therefore classify as an aquatic ESHA, requiring a 100 foot buffer, or minimum 50-foot development setback. Reduction of the wetland buffer to less than 100 feet requires a buffer adjustment analysis (provided in section 6.1.2, below) and cannot be reduced to a width of less than 50 feet from the edge of wetland vegetation.

5.2 Special-status Species

5.2.1 Special-status Plant Species

Based upon a review of the resource databases listed in Section 4.0, 112 special-status plant species have been documented in the vicinity of the Study Area. Twenty-five of these plants have the potential to occur in the Study Area; however only one of these plants, congested-headed hayfield tarplant is considered to have potential to occur in the Project Area. The remaining 87 special-status plants documented from the greater vicinity are unlikely or have no potential to occur for one or more of the following:

- Hydrologic conditions (e.g., tidal) necessary to support the special-status plant species are not present in the Study Area
- Edaphic (soil) conditions (e.g., volcanic tuff, serpentine) necessary to support the special-status plant species are not present in the Study Area
- Topographic conditions (e.g., north-facing slope, montane) necessary to support the special-status plant species are not present in the Study Area
- Unique pH conditions (e.g., alkali scalds, acidic bogs) necessary to support the special-status plant species are not present in the Study Area
- Associated natural communities (e.g., interior chaparral, tidal marsh) necessary to support the special-status plant species are not present in the Study Area
- The Study Area is geographically isolated (e.g. below elevation, coastal environ) from the documented range of the special-status plant species

- Land use history and contemporary management (e.g., previous development of Coast Guard housing site) has degraded the localized habitat necessary to support the special-status plant species

Focused surveys for special-status plants determined to have a potential to occur in the Study Area were conducted on January 20, April 9, and June 4, 2021, and no special-status plants were identified in the Study Area or Project Area. The surveys correspond to the period sufficient to observe and identify those special-status plants determined to have the potential to occur. Therefore, special-status plants are considered absent from the Study Area and Project Area. The following species were initially determined to have potential to occur in the Study Area:

- Sonoma alopecurus (*Alopecurus aequalis* var. *sonomensis*), FE, Rank 1B.1
- Bent-flowered fiddleneck (*Amsinckia lunaris*), Rank 1B.2
- Swamp harebell (*Campanula californica*), Rank 1B.2
- Buxbaum's sedge (*Carex buxbaumii*), Rank 4.2
- Bristle-stalked sedge (*Carex leptalea*), Rank 2B.2
- Johnny-nip (*Castilleja ambigua* var. *ambigua*), Rank 4.2
- Western leatherwood (*Dirca occidentalis*), Rank 1B.2
- California bottle-brush grass (*Elymus californicus*), Rank 4.3
- Supple daisy (*Erigeron supplex*), Rank 1B.2
- Marin checker lily (*Fritillaria lanceolata* var. *tristulis*), Rank 1B.1
- Fragrant fritillary (*Fritillaria liliacea*), Rank 1B.2
- Congested-headed hayfield tarplant (*Hemizonia congesta* ssp. *congesta*), Rank 1B.2
- Short-leaved evax (*Hesperevax sparsiflora* var. *brevifolia*), Rank 1B.2
- Point Reyes horkelia (*Horkelia marinensis*), Rank 1B.2
- Thin-lobed horkelia (*Horkelia tenuiloba*), Rank 1B.2
- Harlequin lotus (*Hosackia gracilis*), Rank 4.2
- Coast iris (*Iris longipetala*), Rank 4.2
- Bristly leptosiphon (*Leptosiphon acicularis*), Rank 4.2
- Coast lily (*Lilium maritimum*), Rank 1B.1
- Point Reyes meadowfoam (*Limnanthes douglasii* ssp. *sulphurea*), SE, Rank 1B.2
- Marsh microseris (*Microseris paludosa*), Rank 1B.2
- Gairdner's yampah (*Perideridia gairdneri* ssp. *gairdneri*), Rank 4.2
- North Coast semaphore grass (*Pleuropogon hooverianus*), ST, Rank 1B.2
- Nodding semaphore grass (*Pleuropogon refractus*), Rank 4.2
- Two-fork clover (*Trifolium amoenum*), FE, Rank 1B

5.2.2 Special-status Wildlife Species

A total of 47 special-status wildlife species have been documented in the vicinity of the Study Area (CDFW 2022a, other sources). Fifteen of these species are considered present or have the potential to occur in the Study Area. The remaining 32 species are unlikely or have no potential to occur due to one or more of the following reasons:

- Aquatic habitats (e.g., marine waters, estuaries, vernal pools) necessary to support the special-status wildlife species are not present in the Study Area
- Vegetation habitats (e.g., coast redwood forest, coastal prairie) that provide nesting and/or foraging resources necessary support the special-status wildlife species are not present in the Study Area
- Physical structures and vegetation (e.g., mines, old-growth native coniferous trees) necessary to provide nesting, cover, and/or foraging habitat to support the special-status wildlife species are not present in the Study Area
- Host plants (e.g., violets [*Viola*]) necessary to provide larval and nectar resources for the special-status wildlife species are not present in the Study Area
- The Study Area is outside (e.g., north of, west of) of the special-status wildlife species documented nesting range.

The following special-status wildlife species are considered present or have the potential to occur in the Study Area.

Listed species

California red-legged frog (*Rana draytonii*). Federal Threatened, CDFW Species of Special Concern. Moderate Potential (Presence Unknown). The California red-legged frog (CRLF is the only native “pond frog” with a historic range throughout much of California. It is primarily aquatic; suitable breeding habitat is characterized by deep and still or slow-moving water associated with emergent marsh and/or overhanging/flooded riparian vegetation (USFWS 2010). Such habitats must typically hold water for a minimum of 20 weeks for successful reproduction to occur, and include ponds (perennial and temporary), backwaters in streams/creeks, marshes, lagoons, and dune ponds. Breeding typically occurs from November through April. Dependent upon local conditions, individuals may complete the entire life cycle in a particular habitat patch (e.g., a perennial pond suitable for all life stages), or utilize multiple habitat types. In aquatic features that dry down seasonally, CRLFs often undergo aestivation (a period of inactivity) during the dry months, over-summering in small mammal burrows, moist leaf litter, incised stream channels, or large cracks in the bottom of dried ponds (Thomson et al. 2016). During terrestrial dispersals and movements, frogs can travel greater than 1 mile over a variety of topographic and habitat types (Bulger et al. 2003). Upland movements habitats are variable and typically include riparian corridors, grasslands, and oak savannas.

As per documented occurrences in CNDDB (CDFW 2022a), CRLF is present in the vicinity of the Study Area. The nearest documented aquatic breeding occurrence is located approximately 0.2 mile to the south, and there are six additional occurrence locations within 1 mile (CDFW 2022a). CRLF breeding within the Study Area is unlikely overall, given the lack of ponds or isolated, deeper stream channels. However, there is potential for the species to occur in non-breeding aquatic habitat (e.g., inundated riparian side channels and backwaters) within and adjacent to the Study Area, and also to use uplands and other portions of the Study Area for movement and dispersal. Aestivation in suitable refugia (e.g., burrows) also has some potential to occur there.

Listed salmonids. Present (Lagunitas Creek only). As per Leidy et al. (2005) and CDFW (2022a), the following listed salmonid species are considered present in waters of Lagunitas Creek, including the limited portions of the stream within the Study Area:

- Steelhead (*Oncorhynchus mykiss irideus*) - Central California Coast DPS. Federal Threatened
- Coho salmon (*O. kisutch*) - Central California Coast ESU. Federal Endangered, State Endangered

Though natural history details differ between the two species, both spend the majority of their life cycle in the ocean but spawn and rear perennial to near-perennial freshwater streams with cool to clear water, high dissolved oxygen levels and strong flows. The reach of the creek within (and adjacent to) the Study Area provides in- and out-migration habitat and may also provide some degree of rearing support (e.g., within pools) depending on hydrological conditions in a given year. Lagunitas Creek is also designated as critical habitat for both species (see below).

California freshwater shrimp (*Syncaris pacifica*). Federal Endangered, State Endangered. Present (Laugnitas Creek only). The California freshwater shrimp is endemic to Marin, Sonoma, and Napa Counties. This species occurs in perennial streams, namely low-elevation and low-gradient stream reaches where the banks are structurally diverse, containing undercuts, exposed roots, overhanging woody debris, and/or overhanging vegetation. Lagunitas Creek is known to be occupied, and as per CDFW (2022a), surveys in 1998-1999 found the species “to Point Reyes Station” from an upstream location. Presence and abundance within the focal reach of the stream presumably varies dependent on current hydrological and other habitat conditions.

Other species

American badger (*Taxidea taxus*). CDFW Species of Special Concern. Moderate Potential (Remnant burrows observed). The American badger is a large, semi-fossorial member of the Mustelidae (weasel family). It is found uncommonly within the region in drier open stages of most scrub, forest, and herbaceous habitats where friable soils and prey populations are present. Badgers are typically solitary and nocturnal, digging burrows to provide refuge during daylight hours. Burrow entrances are usually elliptical (rather than round), and each burrow generally has only one entrance. Young are born in the spring and independent by the end of summer. Badgers are carnivores, preying on a variety of fossorial mammals (especially ground squirrels) and occasionally other vertebrates and their eggs. Home ranges for this species to be large, depending on the habitat available; population density averages one badger per square mile in prime open country (Long 1973).

Several remnant burrow entrances appearing to have been made by badgers were observed on the June 4, 2021 site visit. All of these were located in the open grassland area in the northern portion of the Study Area, and exhibited large holes and an elliptical shape, often with claw marks on the lateral sides of the entrances. None of the burrows examined appeared recently constructed or in active use by badgers. When present, soil throw piles were desiccated (not fresh), and the burrows featured cobwebs across the entrances, collapsed tunnels, or were in an otherwise clear state of degraded integrity. Though development is in close proximity, the area remains suitable for use by badgers under existing conditions (including the non-occupied status of buildings). Badger use of the area likely varies across years, and individuals have the potential to be present in the future.

Special-status bats. Moderate Potential. The following special-status bat species have CNDDB occurrences in the vicinity (CDFW 2021a) and the potential to be present within the Study Area:

- Pallid bat (*Antrozous pallidus*). CDFW Species of Special Concern, WBWG High Priority

- Townsend's big-eared bat (*Corynorhinus townsendii*). CDFW Species of Special Concern, WBWG High Priority

Within the Study Area both species are most likely to use building interiors for roosting, including maternity (breeding) roosting if conditions are favorable. Suitable substrates would include false ceilings, attics, or simply undisturbed/secluded spaces that retain warmth and have ingress/egress points accessible to bats. Other non-special-status bat species also have the potential to roost within these areas.

Grasshopper sparrow (*Ammodramus savannarum*). CDFW Species of Special Concern. Moderate Potential. The grasshopper sparrow is a summer resident in California, breeding in open grassland and prairie-like habitats with short- to moderate-height vegetation, and often scattered shrubs (Shuford and Gardali 2008). Both perennial and annual (non-native) grasslands are used. Nests are placed on the ground and well concealed, often adjacent to grass clumps (Shuford and Gardali 2008). Grasshopper sparrows are secretive and generally detected by voice. Insects comprise the majority of the diet. Though limited in contiguous size, areas of grassland within the Study Area may support breeding by this species, which is known from the vicinity (eBird 2022, Shuford 1993). The likelihood of presence may depend on the current condition (height, density) of on-site herbaceous vegetation.

White-tailed kite (*Elanus leucurus*). CDFW Fully Protected Species. Moderate Potential. White-tailed kite is resident in open to semi-open habitats throughout the lower elevations of California, including grasslands, savannahs, woodlands, agricultural areas, and wetlands. Vegetative structure and prey availability seem to be more important habitat elements than associations with specific plants or vegetative communities (Dunk 1995). Nesting occurs in trees, which are highly variable in size, structure, and immediate surroundings, ranging from shrubs to trees greater than 150 feet tall (Dunk 1995). This species preys upon a variety of small mammals, as well as other vertebrates and invertebrates. Although not observed during site visits, the Study Area and surrounds provide suitable year-round habitat for this species and it may be present in the future.

San Francisco (saltmarsh) common yellowthroat (*Geothlypis trichas sinuos*). CDFW Species of Special Concern. Moderate Potential. This local subspecies of the common yellowthroat is found in freshwater marshes, coastal swales, riparian thickets, brackish marshes, and saltwater marshes. The breeding range extends from Tomales Bay in the north, Carquinez Strait to the east, and Santa Cruz County to the south. This species requires thick, continuous cover such as tall grasses, tule patches, or riparian vegetation down to the water surface for foraging and prefers willows for nesting (Shuford and Gardali 2008). Riparian vegetation with a dense understory may support year-round use by this species, including nesting.

Bryant's savannah sparrow (*Passerculus sandwichensis alaudinus*). CDFW Species of Special Concern. Moderate Potential. This subspecies of the common and widespread savannah sparrow is a year-round resident of the coastal California fog belt. It typically occupies upper tidally-influenced habitats, often found where wetland communities merge into grassland. Nesting occurs in vegetation on or near the ground, including along roads, levees, and canals (Shuford and Gardali 2008). Like most sparrows, Bryant's consumes primarily invertebrates and vegetable matter (e.g., seeds). Though limited in contiguous size, areas of grassland within the Study Area may support breeding by this species, which is known from the vicinity (eBird 2022, Shuford 1993). Similar to grasshopper sparrow (above), the likelihood of presence may depend on the current condition (height, density) of on-site herbaceous vegetation.

(Brewster's) Yellow warbler (*Setophaga petechia brewsteri*). CDFW Species of Special Concern. Moderate Potential. The yellow warbler is a neotropical migrant bird that is widespread in North America, but has declined throughout much of its California breeding range. The Brewster's (*brewsteri*) subspecies is a summer resident and represents the vast majority of yellow warblers that breed in California. West of the Central Valley, typical yellow warbler breeding habitat consists of dense riparian vegetation along watercourses, including wet meadows, with willow growth especially being favored (Shuford and Gardali 2008). Insects comprise the majority of the diet. This species has the potential to nest in riparian woodland along Lagunitas Creek.

Western pond turtle (*Emys marmarota*). CDFW Species of Special Concern. High Potential (Lagunitas Creek). The western pond turtle is the only freshwater turtle native to most of California. This species is highly aquatic, typically inhabiting perennial waters including lakes, ponds/reservoirs, rivers, streams, and canals that provide submerged cover and suitable exposed basking structures such as rocks, logs and mats of emergent vegetation. Nesting usually occurs in spring to early summer, with eggs hatching in the fall; nests are excavated in upland areas with friable soil, usually on unshaded slopes within approximately 300 feet of water (Thomson et al. 2016). Hatchlings require shallow water with relatively dense emergent and aquatic vegetation to provide forage, usually aquatic invertebrates (Thomson et al. 2016). Lagunitas Creek provides perennial aquatic habitat for western pond turtle, and this species is presumably present there at least intermittently. Upland nesting within the Project Area is unlikely given its distance from the stream (approximately 220 feet at the nearest location and mostly greater), the presence of dense herbaceous vegetation between the stream and the Project Area, and the developed/disturbed nature of the portion of the Project Area facing the stream.

Tomales roach (*Lavinia symmetricus* ssp. "2"). CDFW Species of Special Concern. High Potential (Lagunitas Creek only). This local subspecies of the more widespread California roach (*L. symmetricus*), a native minnow, occurs in tributary streams of Tomales Bay. Occupied habitats are varied and include small, intermittent reaches, isolated pools (including those with low oxygen levels), cold, well-aerated streams, and even modified (e.g., channelized) stream environments. This species is likely present in the reach of Lagunitas Creek within the Study Area; abundance presumably varies based on current hydrological and other habitat conditions.

Monarch butterfly (*Danaus plexippus*). Federal Candidate, winter roosts protected by CDFW. Moderate Potential (winter roosting). Monarch butterfly winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico. Roosts are located in wind-protected tree groves, with nectar and water sources nearby, and are often on south-, southwest-, or west-facing slopes which may provide more favorable temperature regimes and wind protection (Leong et al. 2004). Monarch butterflies typically arrive in mid-October to overwintering sites along the California coast and remain until late February or March (Jepsen et al. 2015). There is no record of monarch roosting within or near the Study Area; the nearest such site in CNDDB is located greater than 8 miles to the west on the Point Reyes peninsula (CDFW 2022a), and the Western Monarch Thanksgiving Count does not include the Study Area or adjacent areas (Xerces Society 2022). However, mature eucalyptus trees (commonly used by wintering monarchs) are present within the Study Area, including some trees in stands and rough rows, which have some potential to be used by wintering monarchs.

Non-status nesting birds. Present/High Potential. Native birds with baseline protections under the MBTA and CFGC may use a variety of on-site habitats and substrates for nesting; the diversity of such species is presumably highest within the riparian woodland. However, other on-site vegetation (trees, shrubs, landscaping) is also likely used to some degree, as are the exteriors of buildings (under eaves, in crevice-like substrates, etc.). Though netting was installed under the eaves of most buildings during WRA's site visits, presumably to preclude bird nesting in the covered areas, active nests belonging to cliff swallows (*Petrochelidon pyrrhonota*) were observed on one building lacking the exclusion netting, and apparent barn swallow (*Hirundo rustica*) nests were also observed on light fixtures.

5.2.3 Critical Habitat, Essential Fish Habitat, and Wildlife Corridors

The Study Area does not contain any designated critical habitat for USFWS-listed species, but the reach of Lagunitas Creek within and adjacent to the Study Area is designated critical habitat for steelhead and coho salmon (USFWS 2022a, NMFS 2022a). This portion of Lagunitas Creek is also mapped as Essential Fish Habitat for salmonids (NMFS 2022b).

As per CalTrans (2010) and CDFW (2022b), the Study Area is not within a mapped wildlife corridor, but is a very small component of a substantially larger "natural landscape block" which includes most of western Marin County. At a more local scale, Lagunitas Creek and associated riparian woodland provide noteworthy aquatic and terrestrial movement corridors, connecting southern Tomales Bay (and ultimately for some species, the ocean) with interior areas to the east. The remainder of the Study Area is already developed or otherwise bounded by development to the west and north, limiting any corridor functions.

5.2.4 Marin County Protected and Heritage Trees

Per the client's arborist survey (Urban Forestry Associates 2022), the project will remove 36 mature trees, all of which are non-native ornamental species. Trees that will be removed are include several eucalyptus species, dead trees, and other ornamental trees, which will be in the direct line of construction. None of the trees slated for removal are on the LCP-IP protected and heritage tree list. However, trees to be removed regardless of species within ESHA buffers are considered 'major vegetation' removal and are therefore subject to coastal development permitting requirements.

6.0 PROJECT ANALYSIS AND RECOMMENDATIONS

6.1 Land Cover Types

6.1.1 Terrestrial Land Cover Types

The Study Area contains four terrestrial land cover types, developed/landscaped, non-native annual grassland, California bay forest, and purple needlegrass grassland. Of the four terrestrial land cover types, only purple needlegrass grassland, a native grassland vegetation community, is considered a terrestrial

ESHA. The Proposed Project has been intentionally designed to avoid direct impacts to all ESHAs, including terrestrial and aquatic resources, and purple needlegrass grassland will be avoided by the maximum 50 foot terrestrial ESHA buffer. Therefore, no impacts to terrestrial ESHA are anticipated, and no avoidance and minimization measures are recommended.

6.1.2 Aquatic Resources

The Study Area contains five sensitive aquatic resources including perennial stream, ephemeral ditch, riparian arroyo willow thicket, Corps seasonal wetland (three parameter), and CCC seasonal wetland (one parameter); all but ephemeral ditch are considered aquatic ESHAs. The perennial stream and associated riparian arroyo willow thicket also qualify as an SCA, and Corps seasonal wetlands qualify as WCA per the Marin Countywide Plan. The applicable setback from the perennial stream and associated riparian vegetation is 50 feet from the edge of the riparian vegetation, equaling the reduced ESHA buffer. The appropriate setback applicable to Corps seasonal wetlands is 100 feet or as deemed appropriate by a qualified biologist to avoid impacts and protect the wetland. Analysis provided below describes how a reduced ESHA buffer of 50 feet from aquatic ESHAs will sufficiently protect stream, riparian, and wetlands within the Study Area. Therefore, the reduced 50-foot buffer is deemed appropriate as the WCA buffer.

The Project has been designed to avoid direct impacts to aquatic ESHAs, and to avoid impacts within ESHA buffers to the maximum extent feasible. However, due to the previously developed nature of the Project Area, which includes existing non-conforming structures and uses within minimum ESHA buffers, work can not be avoided within the minimum ESHA buffers. Work on existing non-conforming structures includes upgrades to the building envelope and compliance with Wildland Urban Interface (WUI) codes.

Areas where the Project Area overlap aquatic ESHA boundaries are shown on Figure 4. The perennial stream, Lagunitas Creek, is located far from the Project Area on the eastern and southern border of the Study Area, and perennial stream will be avoided by much greater than the maximum aquatic ESHA buffer. All seasonal wetlands, including Corps, and CCC seasonal wetlands will be avoided by at least the minimum 50-foot aquatic ESHA buffer. The only areas where work will occur within minimum aquatic ESHA buffers include within the riparian ESHA buffer. The work which will occur within the minimum riparian and ephemeral ditch buffers is expected to create a net environmental improvement over existing conditions, by reducing impervious surfaces, and installation of new stormwater treatment facilities, elimination of on-site invasive species (e.g. *Eucalyptus* spp.), and increasing native vegetation cover. Work within ESHA buffers include the following categories:

- Work to remove existing hardscape (e.g. tennis court) to pervious soil, grading and new native vegetation, creating a water quality improvement by reducing impervious surface runoff, and increasing native vegetation cover compared to existing conditions.
- Work to replace existing hardscape (e.g. parking lot) with stormwater basins creating a water quality improvement compared to existing conditions.
- Work to repair existing hardscape (e.g. parking lot).
- Renovation of Building 206, and 100C, removal of concrete pad for landscaping, and new gravel around perimeter of building for fire safety, creating a water quality improvement by reducing impervious surface runoff.
- Removal of non-native trees (classified as 'major vegetation' removal).

Within the wetland buffers, a minor additional 23 square feet of paving is proposed, while 4,849 square feet of stormwater management features are proposed, which are anticipated to improve water quality within the surrounding ESHA areas. Within the coastal stream riparian buffer, a large area of 8,823 square feet of existing paving will be removed, and 1,707 square feet of stormwater management features are proposed, which are anticipated to improve water quality within the surrounding ESHA areas. Tables 1 and 2, below provide square footage estimates for the amount of lot coverage removed, converted, and new lot coverage proposed within the wetland ESHA buffer, and coastal stream riparian buffer areas, respectively.

Table 1. Lot Coverage Estimates within Minimum 50’ Wetland ESHA Buffer

Type	Area (square feet)				
	Existing to Remain	Removed	Proposed	New Total	Change
Building	1,863	0	0	1,863	0
Paving	1,280	0	23	1,303	23
Total Lot Coverage	3,143	0	23	3,166	23
Stormwater Management	0	0	4,849	4,849	4,849

Table 2. Lot Coverage Estimates within Minimum 50’ Coastal Stream and Riparian ESHA Buffer

Type	Area (square feet)				
	Existing to Remain	Removed	Proposed	New Total	Change
Building	1,866	0	0	1,866	0
Paving	5,343	8,823	0	5,343	-8,823
Total Lot Coverage	7,209	8,823	0	7,209	-8,823
Stormwater Management	0	0	1,707	1,707	1,707

Per the LCP guidelines, aquatic ESHAs may be adjusted according to Measures C-BIO-19, “Wetland Buffer Adjustments and Exceptions”, and C-BIO-25, “Stream Buffer Adjustments and Exceptions”.

A buffer adjustment to less than 100 feet may be considered only if it conforms with zoning and:

a. It is proposed on a legal lot of record located entirely within the buffer; or
b. It is demonstrated that permitted development cannot be feasibly accommodated entirely outside the required buffer; or
c. It is demonstrated that the permitted development outside the buffer would have greater impact on the wetland and the continuance of its habitat than development within the buffer; or
d. The wetland was constructed out of dry land for the treatment, conveyance or storage of water, its construction was authorized by a coastal permit (or pre-dated coastal permit requirements), it has no habitat value, and it does not affect natural wetlands.

Per the aforementioned guidelines, due to the previously developed nature of the site, with existing non-conforming uses and/or structures within ESHA buffers, project activities within ESHA buffers are unavoidable. However, the Project will avoid direct impacts to any ESHA itself, and within ESHA buffers, Project work will result in a net environmental benefit by reducing impervious hardscape, improving water quality, and increasing native vegetation.

In addition, a reduced aquatic ESHA buffer shall require measures that create a net environmental improvement over existing conditions. Appropriate measures may include but are not limited to:

a. Retrofitting existing improvements or implementing new measures to reduce the rate or volume of stormwater run-off and improve the quality of stormwater run-off (e.g., use of permeable "hardscape" materials and landscape or site features designed to capture, absorb and filter stormwater; etc.);
b. Elimination of on-site invasive species;
c. Increasing native vegetation cover (e.g., expand continuous vegetation cover, reduce turf areas, provide native groundcover, shrubs and trees; etc.);
d. Reduction in water consumption for irrigation (e.g., use of drought-tolerant landscaping or high efficiency irrigation systems, etc.); and
e. Other measures that reduce overall similar site-related environmental impacts.

Projects that propose construction with a buffer of less than 100 feet from an aquatic ESHA must provide information that indicates a lesser buffer distance will not have a significant adverse impact on the habitat, and incorporate appropriate measures a through e described above. Table 3 below describes how each of the recommended appropriate measures to reduce aquatic ESHA buffers are met.

Table 3. Aquatic ESHA Reduced Buffer Zone Justification

Measures Considered to Reduce Aquatic ESHA Buffer Areas	
Zoning Code	Assessment
a. Retrofitting existing improvements or implementing new	As described above, the project improvements within the minimum ESHA buffers are expected to provide a net

measures to reduce the rate or volume of stormwater run-off and improve the quality of stormwater run-off (e.g., use of permeable "hardscape" materials and landscape or site features designed to capture, absorb and filter stormwater; etc.);	environmental benefit, by reducing impervious hardscape, and improving water quality. Based on the estimated lot coverage totals provided in the above tables, 8,800 square feet of paving within aquatic ESHA buffers will be removed, and a total of 6,556 square feet of stormwater management features are proposed. The net decrease in paved lot coverage, and increase in stormwater management features represents a net environmental improvement over existing conditions with regards to water quality.
b. Elimination of on-site invasive species;	The Project will remove 36 mature trees, all of which are non-native ornamental species, and none of which are on the Marin County Local Coastal Program-Implementation Plan (LCP-IP) list of Heritage or Protected Trees. Trees that will be removed are predominantly eucalyptus, dead trees, and other non-native trees. Ten (10) of the aforementioned non-native eucalyptus trees to be removed, and one Leyland cypress (*Cupressus x leylandii*) to be removed are located within aquatic ESHA buffers. Removal of these non-native, and in the case of blue gum eucalyptus, invasive trees within the ESHA buffer will provide an environmental benefit.
c. Increasing native vegetation cover (e.g., expand continuous vegetation cover, reduce turf areas, provide native groundcover, shrubs and trees; etc.);	Landscape Plans provided by Bay Tree Design (2022), provide for a significant increase in native vegetation cover including approximately 8,999 square feet of irrigated wildflower and grass seed mix, native erosion control mix, and ground cover comprising all California native species within the minimum 50-foot Coastal Stream and Riparian ESHA buffer an. An additional approximately 2,224 square feet of irrigated wildflower and grass seed mix will be utilized in the minimum 50-foot wetland ESHA buffer. Part of the aforementioned vegetation cover will replace areas of hardscape including: removing the existing tennis court and regrading in this area to make the landforms appear more natural; removing the concrete drive behind Building 100C and replacing that with native erosion control; removing the playground in the ESHA and relocating it to another area of the site outside of the ESHA zones.

	The current playground includes - concrete curbs, mulch, stairs, retaining walls, play structures and benches. This is all proposed to be replaced with planting. The project will also remove a concrete pad near building 206 to replace with planting.
d. Reduction in water consumption for irrigation (e.g., use of drought-tolerant landscaping or high efficiency irrigation systems, etc.); and	Per Bay Tree Design (Lisa Howard, pers. comm.) the site plans require tertiary waste water treatment, where all plants are watered daily in order to consume the dispersed water, therefore, water clean water irrigation and reduction was not determined to be a concern.
e. Other measures that reduce overall similar site-related environmental impacts.	Additional measures will be employed to reduce overall site related impacts, including the use of erosion control measures and other BMPs and through supervision of construction activities by a biological monitor during initial ground disturbance work within minimum ESHA buffers. To minimize potential increased human activity in the riparian corridor of Lagunitas Creek, signage shall be installed along the edge of the riparian arroyo willow thicket that identifies the riparian habitat as an ESHA and reads "Environmentally Sensitive Habitat: Do Not Enter".

To avoid and minimize potential impacts to ESHAs, grading should occur during the dry season (defined in the Marin County Municipal Code as April 16 through October 14) and should be suspended during unseasonable rainfalls of greater than one-half inch over a 24-hour period. If rainfall is in the forecast, standard erosion control measures (e.g., straw waddles, bales, silt fencing) should be deployed on the development's edge paralleling downslope ESHAs. Construction personnel should be informed of the location of the site's sensitive resources with high-visibility flagging or staking prior to construction, supervision of construction activities by a biological monitor during initial ground disturbance work within reduced ESHA buffers is recommended. No materials or equipment shall be lain down in or near the aquatic resources, and spill prevention materials shall be deployed for all construction equipment. "Environmentally Sensitive Habitat do not enter" along the riparian corridor of the Lagunitas Creek.

Based on the information provided above in Table 1, and the Project proposed BMPs which include erosion control measures in areas of vegetation removal and soil disturbance, and supervision of construction activities by a biological monitor during initial ground disturbance work within reduced ESHA buffers, the Project is not likely to significantly impact terrestrial or aquatic ESHAs, compared to existing conditions.

6.2 Special-status Species

6.2.1 Special-status Plants

Based upon a review of the resource databases listed in Section 4.0, 112 special-status plant species have been documented in the vicinity of the Study Area. Twenty-five of these plants have the potential to occur in the Study Area; however only one of these plants, congested-headed hayfield tarplant is considered to have potential to occur in the Project Area.

Focused surveys for special-status plants determined to have a potential to occur in the Study Area were conducted on January 20, April 9, and June 4, 2021, and no special-status plants were identified in the Study Area or Project Area. The surveys correspond to the period sufficient to observe and identify those special-status plants determined to have the potential to occur. Therefore, special-status plants are considered absent from the Study Area and Project Area. Descriptions of special-status plant species initially assessed to have potential to occur in the Study Area are provided in Appendix C.

6.2.2 Special-status Wildlife

The Study Area has the potential to support 15 special-status wildlife species, as well as non-status birds protected under the MBTA and CFGC. The following measures are recommended to avoid or otherwise minimize potential impacts to these species; refinement of these measures may be warranted dependent on specifics of the proposed project.

Listed Species

<u>California red-legged frog.</u> Any injury or mortality to CRLFs, including eggs and larvae (if such are present) would constitute “take” under the ESA and also presumably be considered a significant impact under CEQA. The Project Area is largely restricted to already-developed or otherwise disturbed areas, and avoids all aquatic features within the Study Area including the ephemeral ditch (potential non-breeding aquatic habitat for CRLF). As such, the potential for take of CRLF is limited to incidental harm of individuals that may be present within the Study Area, e.g., during dispersal or movement periods. Avoidance and minimization measures would depend on final project specifics; typical measures for this species in the present circumstances include:

- Limiting initial ground disturbance to the dry season, approximately April 16 through October 14, and potentially precluding work (dependent on site conditions) during or immediately following rain events (0.25 inch of rain falling within a 24-hour period);
- Installing an exclusion fence around project activity areas (e.g., building sites, laydown areas);
- A biological sensitivity training for construction staff, including the potential presence of CRLF, identification of the species under field conditions, legal status of the species and the ramifications for take, and the need to stop-work if CRLF is observed in or around the project activity areas;
- And, potentially, the presence of a biological monitor (with stop-work authority) during initial ground-disturbing activities to avoid take.

If there is reasonable concern that these measures will not preclude the potential for take of CRLF during project implementation, consultation with the USFWS may be required.

<u>Listed salmonids, California freshwater shrimp:</u> Steelhead, coho salmon, and California freshwater shrimp all are all considered present in Lagunitas Creek. The Project Area entirely avoids the creek (including perennial to intermittent side channels/features) and directly adjacent riparian woodland/vegetation, effectively precluding any potential for direct impacts or harm to these species. Additional BMPs described above will avoid ground disturbance and reduce/eliminate potential sediment inputs. Note however that the ESA includes protections to habitat elements of listed species, and as such incidental impacts to the waters of the stream (e.g., sediment releases during construction) could constitute ESA violations. If this avoidance of such impacts is somehow not feasible, consultation with NMFS/USFWS and CDFW would presumably be required.

Other species

<u>Bat species</u>: Two special-status bats have the potential to occur within the Study Area (pallid bat, Townsend's big-eared bat), including roosting within buildings. Building demolition during the bat maternity season (generally, April through August) could impact bat breeding and potentially result in the take of bats. To avoid impacts to special-status bats, a bat habitat assessment and survey effort (the latter if needed) should be performed by a qualified biologist prior to building demolition to determine if bats are present in the buildings. If no suitable roosting habitat for bats is found, then no further study is warranted. If special-status bat species or bat maternity roosts are detected, then demolition of occupied buildings should be avoided until the end of the maternity roosting season. If this avoidance is not feasible, appropriate species- and roost-specific mitigation measures should be developed in consultation with CDFW. Depending on specifics (bat species, roost size, and others), removal of an occupied bat roost may also warrant additional review under CEQA.

<u>American badger</u>: Remnant badger burrows were observed within the Study Area's open grassland, outside of the Project Area. Although all such burrows appeared degraded or otherwise unoccupied, badgers have some potential to be present within the Study Area in the future. Prior to ground-breaking activities, a qualified biologist should review the Study Area to determine if new badger burrows have been constructed and/or older (remnant) burrows appear to be re-occupied. If such burrows are present, the biologist will determine if young are present in the burrows, and if so, ground-breaking activities will only be allowed within 150 feet until young have are independent (spring through summer). The Project Area is largely restricted to already-developed or otherwise disturbed areas, and therefore is not anticipated to result in any potentially significant impacts to local badger habitat.

<u>Western pond turtle and Tomales roach:</u> While both of these species have the potential to be present within Lagunitas Creek, western pond turtle is unlikely to occur in the Project Area, and Tomales roach is entirely aquatic with no potential for occurrence there. As such, no impacts to these species are anticipated as a result of project implementation and no associated measures are warranted.

<u>Monarch butterfly:</u> Although monarch winter roosting is not known from the Study Area or its immediate vicinity, mature eucalyptus trees with some favorable characteristics for roosting are present within the Study Area, and proposed for removal. As such, WRA recommends that a survey effort for roosting monarchs within the Study Area be performed; this effort should occur during the focal portion of the winter roosting period in November or December when the likelihood of roosting is highest. If a communal winter roost is identified during the assessment/survey, CDFW should be consulted regarding measures to avoid or otherwise minimize impacts to the roost.

All bird species (including non-special-status): In addition to the two special-status bird species discussed above (white-tailed kite, yellow warbler), non-status bird species with baseline protections under the MBTA and CFGC may use vegetation within the Study Area for nesting. WRA recommends that tree/vegetation removal and initial ground disturbance occur from August 16 to January 31, outside of the general bird nesting season. If tree/vegetation removal during this time is not feasible, a pre-construction nesting bird survey should be performed by a qualified biologist no more than 14 days prior to the initiation of tree removal or ground disturbance is recommended. The survey should cover the Project Area (including tree removal areas) and surrounding areas within 500 feet. If active bird nests are found during the survey, an appropriate no-disturbance buffer should be established by the qualified biologist. Once it is determined that the young have fledged (left the nest) or the nest otherwise becomes inactive (e.g., due to predation), the buffer may be lifted and work may be initiated within the buffer.

6.2.3 Wildlife Movement

As stated in Section 5.2.3, the Study Area is not within a mapped wildlife corridor. At a local level, Lagunitas Creek and associated riparian woodland provide noteworthy corridor functions, but these land covers will be avoided by the proposed project. The Project Area is largely restricted to already-developed or otherwise disturbed areas, and project implementation is not anticipated to result in any potentially significant impacts to wildlife movement. As such, no measures related to wildlife movement are warranted.

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Appendix A

Figures

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Sources: National Geographic, WRA | Prepared By: mrochelle, 8/18/2022

Figure 1. Study Area Regional Location Map

Point Reyes Station U.S. Coast Guard
Housing Site Redevelopment
Marin County, California

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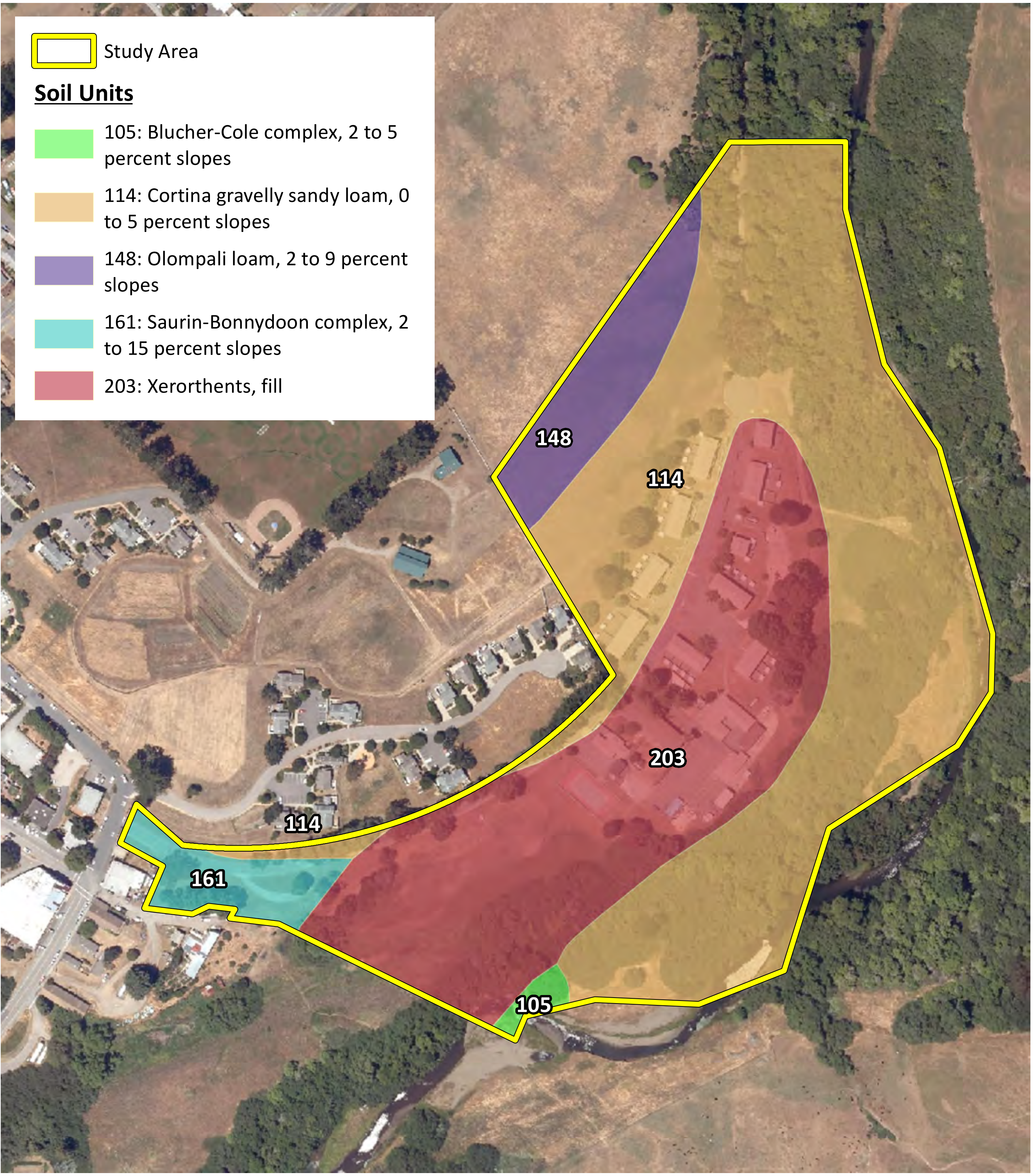

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Sources: USDA NRCS SURGGO Soils, 2018 Marin County Aerial, WRA | Prepared By: mrochelle, 8/18/2022

Figure 2. Soils Map

Point Reyes Station U.S. Coast Guard
Housing Site Redevelopment
Marin County, California

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Figure 3.
Land Cover Types

Point Reyes Station U.S. Coast Guard
Housing Site Redevelopment
Marin County, California

☐ Study Area - 33.59

Sensitive Land Cover

🟦 CCC Seasonal Wetland - 0.67 ac.

🟩 Corps Seasonal Wetland - 0.69 ac.

⬜ Ephemeral Ditch - 0.01 ac.

🟦 Perennial Stream - 1.61 ac.

🟪 Purple Needlegrass Grassland - 0.61 ac.

🟧 Arroyo Willow Thicket - 11.44 ac.

Non-Sensitive Land Cover

🟫 California Bay Forest - 1.13 ac.

⬜ Developed/Landscaped - 9.66 ac.

⬜ Non-Native Annual Grassland - 7.77 ac.

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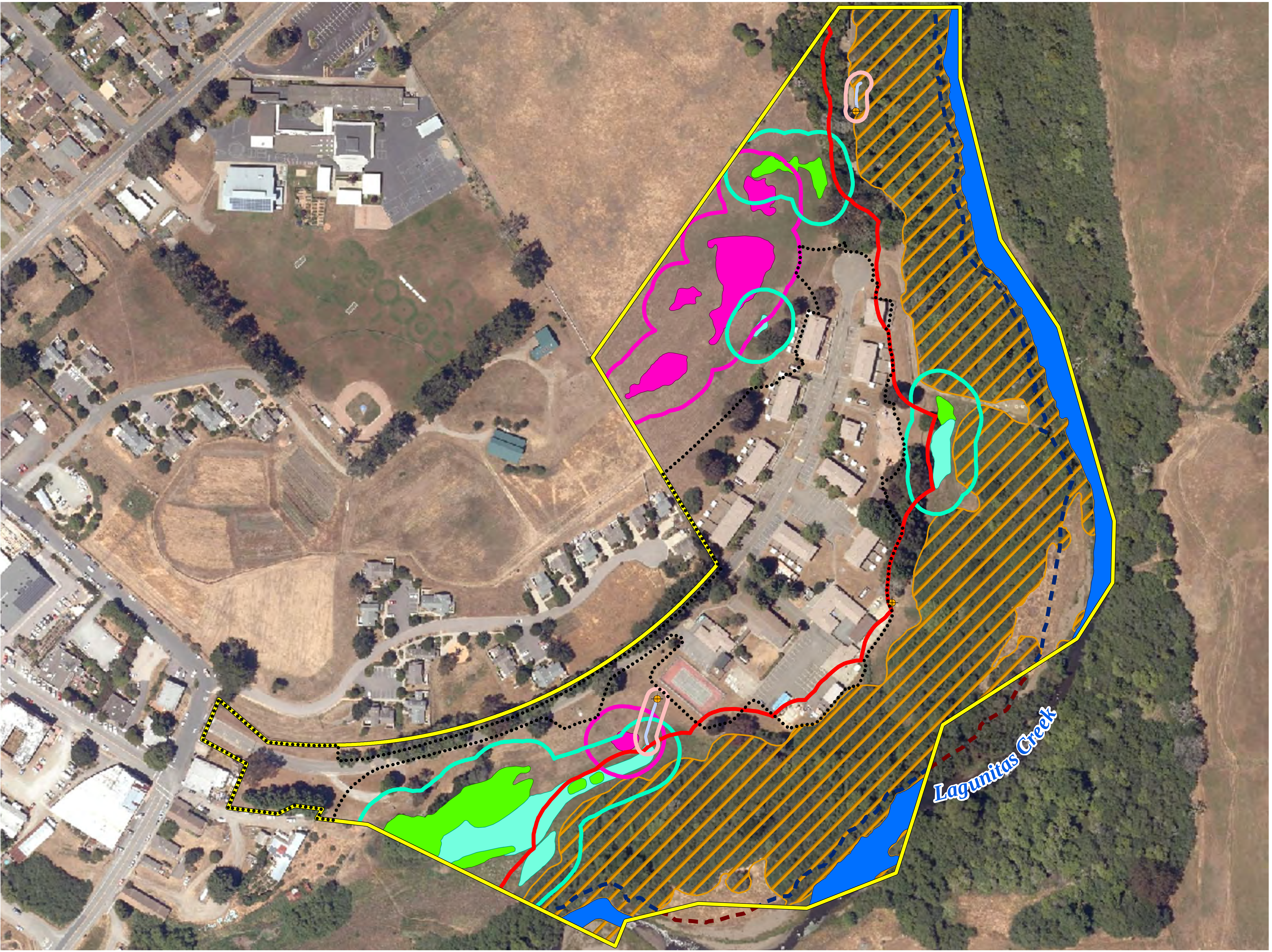
Sources: Marin County 2018 Aerial, WRA | Prepared By: mrochelle, 8/18/2022

Figure 4.
Project Area and ESHA Buffer Impacts

Point Reyes Station U.S. Coast Guard
Housing Site Redevelopment
Marin County, California



Study Area - 33.59 ac.

Project Area - 8.15 ac.

Culverts

Non-Environmentally Sensitive Habitat Area, Aquatic

Ephemeral Ditch - 0.01 ac.

Environmentally Sensitive Habitat Area, Aquatic

Non-Wetland Waters:

Perennial Stream - OHWM - 1.61 ac.

Perennial Stream - TOB - 3.05 ac.

Wetlands:

CCC Seasonal Wetland - 0.67 ac.

Corps Seasonal Wetland - 0.69 ac.

Off-Site Top of Bank

Riparian:

Riparian Woodland - 11.27 ac.

Environmentally Sensitive Habitat Area, Terrestrial

Purple Nedlegrass Grassland - 0.61 ac.

Setbacks

20' Ephemeral Stream Buffer

Reduced Coastal Stream and Riparian ESHA Buffer (50')

Wetland ESHA Buffer (50')

Maximum Terrestrial ESHA Buffer (50')

wra
ENVIRONMENTAL CONSULTANTS

Sources: Marin County 2018 Aerial, WRA | Prepared By: mrochelle, 12/8/2022

Path: E:\Acad 2000 Files\30000\30271\GIS\ArcMap\Project Area and ESHA Buffer Impacts.mxd

Appendix B

Species Observed in the Study Area

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Appendix B – Plant and wildlife species observed in Study Area, January 20, April 9, and June 4, 2021.

SCIENTIFIC NAME	COMMON NAME	ORIGIN	FORM	RARITY STATUS[1]	CAL-IPC STATUS[2]	WETLAND STATUS[3] (AW 2016)
Plants						
Acacia decurrens	Green wattle	non-native	tree	-	-	-
Acacia melanoxylon	Blackwood acacia	non-native (invasive)	tree	-	Limited	-
Acer macrophyllum	Bigleaf maple	native	tree	-	-	FAC
Acer negundo	Boxelder	native	tree	-	-	FACW
Aesculus californica	Buckeye	native	tree	-	-	-
Agrostis stolonifera	Redtop	non-native (invasive)	perennial grass	-	Limited	FACW
Aira caryophyllea	Silvery hairgrass	non-native (invasive)	annual grass	-	-	FACU
Alnus rubra	Red alder	native	tree, shrub	-	-	FACW
Anthemis cotula	Dog fennel	non-native (invasive)	annual herb	-	-	FACU
Artemisia douglasiana	California mugwort	native	perennial herb	-	-	FAC
Athyrium filix-femina var. *cyclosorum*	Western lady fern	native	fern	-	-	FAC
Baccharis pilularis ssp. *consanguinea*	Coyote brush	native	shrub	-	-	-
Bellis perennis	English lawn daisy	non-native (invasive)	perennial herb	-	-	-
Briza minor	Little rattlesnake grass	non-native	annual grass	-	-	FAC

SCIENTIFIC NAME	COMMON NAME	ORIGIN	FORM	RARITY STATUS[1]	CAL-IPC STATUS[2]	WETLAND STATUS[3] (AW 2016)
Bromus catharticus	Rescue grass	non-native	annual, perennial grass	-	-	-
Bromus diandrus	Ripgut brome	non-native (invasive)	annual grass	-	Moderate	-
Calocedrus decurrens	Incense cedar	native	tree	-	-	-
Carduus pycnocephalus ssp. *pycnocephalus*	Italian thistle	non-native	annual herb	-	-	-
Carex densa	Sedge	native	perennial grasslike herb	-	-	OBL
Cichorium intybus	Chicory	non-native	perennial herb	-	-	FACU
Cirsium vulgare	Bullthistle	non-native (invasive)	perennial herb	-	Moderate	FACU
Claytonia perfoliata	Miner's lettuce	native	annual herb	-	-	FAC
Conium maculatum	Poison hemlock	non-native (invasive)	perennial herb	-	Moderate	FACW
Convolvulus arvensis	Field bindweed	non-native (invasive)	perennial herb, vine	-	-	-
Cortaderia jubata	Andean pampas grass	non-native (invasive)	perennial grass	-	High	FACU
Cynodon dactylon	Bermuda grass	non-native (invasive)	perennial grass	-	Moderate	FACU
Cynosurus echinatus	Dogtail grass	non-native (invasive)	annual grass	-	Moderate	-
Cyperus eragrostis	Tall cyperus	native	perennial grasslike herb	-	-	FACW
Danthonia californica	California oatgrass	native	perennial grass	-	-	FAC
Datura stramonium	Jimson weed	non-native	annual herb	-	-	-

SCIENTIFIC NAME	COMMON NAME	ORIGIN	FORM	RARITY STATUS[1]	CAL-IPC STATUS[2]	WETLAND STATUS[3] (AW 2016)
Dittrichia graveolens	Stinkwort	non-native (invasive)	annual herb	-	Moderate	-
Elymus glaucus	Blue wildrye	native	perennial grass	-	-	FACU
Elymus triticoides	Beardless wild rye	native	perennial grass	-	-	FAC
Equisetum hyemale ssp. *affine*	Giant scouring rush	native	fern	-	-	FACW
Erigeron canadensis	Canada horseweed	native	annual herb	-	-	FACU
Erodium botrys	Big heron bill	non-native (invasive)	annual herb	-	-	FACU
Erodium cicutarium	Coastal heron's bill	non-native (invasive)	annual herb	-	Limited	-
Eschscholzia californica	California poppy	native	annual, perennial herb	-	-	-
Eucalyptus globulus	Blue gum	non-native (invasive)	tree	-	Limited	-
Eucalyptus polyanthemos	Silver dollar gum	non-native	tree	-	-	-
Eucalyptus spp.	Eucalyptus	non-native	Tree	-	-	-
Eucalyptus viminalis	Manna gum	non-native	tree	-	-	-
Festuca arundinacea	Reed fescue	non-native (invasive)	perennial grass	-	Moderate	FACU
Festuca bromoides	Brome fescue	non-native	annual grass	-	-	FACU
Festuca myuros	Rattail sixweeks grass	non-native (invasive)	annual grass	-	-	FACU
Festuca perennis	Italian rye grass	non-native	annual, perennial grass	-	-	FAC

SCIENTIFIC NAME	COMMON NAME	ORIGIN	FORM	RARITY STATUS[1]	CAL-IPC STATUS[2]	WETLAND STATUS[3] (AW 2016)
Foeniculum vulgare	Fennel	non-native (invasive)	perennial herb	-	High	-
Fraxinus latifolia	Oregon ash	native	tree	-	-	FACW
Galium aparine	Cleavers	native	annual herb	-	-	FACU
Geranium dissectum	Wild geranium	non-native (invasive)	annual herb	-	Limited	-
Geranium molle	Crane's bill geranium	non-native (invasive)	annual, perennial herb	-	-	-
Glyceria declinata	Waxy mannagrass	non-native (invasive)	perennial grass	-	Moderate	FACW
Hedera helix	English ivy	non-native (invasive)	vine, shrub	-	-	FACU
Helenium puberulum	Sneezeweed	native	perennial herb	-	-	FACW
Helminthotheca echioides	Bristly ox-tongue	non-native (invasive)	annual, perennial herb	-	-	FAC
Hesperocyparis macrocarpa	Monterey cypress	native	tree	Rank 1B.2*	-	-
Heteromeles arbutifolia	Toyon	native	shrub	-	-	-
Hirschfeldia incana	Mustard	non-native (invasive)	perennial herb	-	Moderate	-
Holcus lanatus	Common velvetgrass	non-native (invasive)	perennial grass	-	Moderate	FAC
Hordeum marinum ssp. *gussoneanum*	Barley	non-native	annual grass	-	-	FAC
Hypochaeris radicata	Hairy cats ear	non-native (invasive)	perennial herb	-	Moderate	FACU
Ilex aquifolium	Holly	non-native (invasive)	tree, shrub	-	Moderate	FACU

SCIENTIFIC NAME	COMMON NAME	ORIGIN	FORM	RARITY STATUS[1]	CAL-IPC STATUS[2]	WETLAND STATUS[3] (AW 2016)
Iris douglasiana	Douglas iris	native	perennial herb	-	-	-
Juncus effusus	Common bog rush	native	perennial grasslike herb	-	-	FACW
Juncus mexicanus	Mexican rush	native	perennial grasslike herb	-	-	FACW
Juncus occidentalis	Slender juncus	native	perennial grasslike herb	-	-	FACW
Juncus patens	Rush	native	perennial grasslike herb	-	-	FACW
Juncus phaeocephalus	Brown headed rush	native	perennial grasslike herb	-	-	FACW
Lathyrus vestitus	Common pacific pea	native	perennial herb	-	-	-
Lepidium nitidum	Shining pepper grass	native	annual herb	-	-	FAC
Limnanthes douglasii	Common meadow foam	native	annual herb	-	-	OBL
Linum bienne	Flax	non-native	annual herb	-	-	-
Lonicera hispidula	Pink honeysuckle	native	vine, shrub	-	-	FACU
Ludwigia sp.	-	-	-	-	-	-
Lysimachia arvensis	Scarlet pimpernel	non-native	annual herb	-	-	FAC
Matricaria discoidea	Pineapple weed	native	annual herb	-	-	FACU
Maytenus boaria	Mayten	non-native (invasive)	tree, shrub	-	-	-
Medicago polymorpha	California burclover	non-native (invasive)	annual herb	-	Limited	FACU

SCIENTIFIC NAME	COMMON NAME	ORIGIN	FORM	RARITY STATUS[1]	CAL-IPC STATUS[2]	WETLAND STATUS[3] (AW 2016)
Mentha pulegium	Pennyroyal	non-native (invasive)	perennial herb	-	Moderate	OBL
Myosotis latifolia	Wide leaved forget me not	non-native (invasive)	perennial herb	-	Limited	-
Nasturtium officinale	Watercress	native	perennial herb (aquatic)	-	-	OBL
Oenanthe sarmentosa	Water parsley	native	perennial herb	-	-	OBL
Phyla nodiflora	Common lippia	native	perennial herb	-	-	FACW
Pinus radiata	Monterey pine	native	tree	Rank 1B.1*	-	-
Pittosporum undulatum	Victorian box	non-native (invasive)	tree, shrub	-	-	-
Plantago lanceolata	Ribwort	non-native (invasive)	perennial herb	-	Limited	FAC
Poa annua	Annual blue grass	non-native	annual grass	-	-	FAC
Polygonum aviculare	Prostrate knotweed	non-native	annual, perennial herb	-	-	FAC
Polypodium sp.	-	-	-	-	-	-
Polystichum munitum	Western sword fern	native	fern	-	-	FACU
Pseudognaphalium luteoalbum	Jersey cudweed	non-native	annual herb	-	-	FAC
Pteridium aquilinum var. *pubescens*	Western bracken fern	native	fern	-	-	FACU
Quercus agrifolia	Coast live oak	native	tree	-	-	-
Ranunculus californicus	Common buttercup	native	perennial herb	-	-	FACU

SCIENTIFIC NAME	COMMON NAME	ORIGIN	FORM	RARITY STATUS[1]	CAL-IPC STATUS[2]	WETLAND STATUS[3] (AW 2016)
Ranunculus muricatus	Buttercup	non-native	annual, perennial herb	-	-	FACW
Raphanus sativus	Jointed charlock	non-native (invasive)	annual, biennial herb	-	Limited	-
Rubus armeniacus	Himalayan blackberry	non-native (invasive)	shrub	-	High	FAC
Rubus ursinus	California blackberry	native	vine, shrub	-	-	FAC
Rumex acetosella	Sheep sorrel	non-native (invasive)	perennial herb	-	Moderate	FACU
Rumex crispus	Curly dock	non-native (invasive)	perennial herb	-	Limited	FAC
Rumex pulcher	Fiddleleaf dock	non-native	perennial herb	-	-	FAC
Salix laevigata	Polished willow	native	tree	-	-	FACW
Salix lasiolepis	Arroyo willow	native	tree, shrub	-	-	FACW
Sanicula bipinnatifida	Purple sanicle	native	perennial herb	-	-	-
Sanicula crassicaulis	Pacific sanicle	native	perennial herb	-	-	-
Senecio vulgaris	Common groundsel	non-native	annual herb	-	-	FACU
Sequoia sempervirens	Coast redwood	native	tree	-	-	-
Silybum marianum	Milk thistle	non-native (invasive)	annual, perennial herb	-	Limited	-
Sisyrinchium bellum	Blue eyed grass	native	perennial herb	-	-	FACW
Sonchus oleraceus	Sow thistle	non-native	annual herb	-	-	UPL

SCIENTIFIC NAME	COMMON NAME	ORIGIN	FORM	RARITY STATUS[1]	CAL-IPC STATUS[2]	WETLAND STATUS[3] (AW 2016)
Stipa pulchra	Purple needle grass	native	perennial grass	-	-	-
Taraxia ovata	Sun cup	native	perennial herb	-	-	-
Toxicodendron diversilobum	Poison oak	native	vine, shrub	-	-	FACU
Trifolium dubium	Shamrock	non-native	annual herb	-	-	UPL
Trifolium hirtum	Rose clover	non-native (invasive)	annual herb	-	Limited	-
Trifolium subterraneum	Subterranean clover	non-native	annual herb	-	-	-
Umbellularia californica	California bay	native	tree	-	-	FAC
Veronica anagallis-aquatica	Water speedwell	non-native	perennial herb	-	-	OBL
Vicia sp.	Vetch	non-native	annual herb	-	-	-
Washingtonia robusta	Washington fan palm	non-native (invasive)	tree	-	Moderate	FACW
Xanthium strumarium	Cocklebur	native	annual herb	-	-	FAC

All species identified using the *Jepson Manual, 2nd Edition* (Baldwin et al. 2012) and *A Flora of Sonoma County* (Best et al. 1996); nomenclature follows *The Jepson Flora Project* (eFlora 2020) unless otherwise noted. Sp.: “species”, intended to indicate that the observer was confident in the identity of the genus but uncertain which species
Cf.: intended to indicate a species appeared to the observer to be specific, but was not identified based on diagnostic characters

[1] Rare Status: The CNPS Inventory of Rare and Endangered Plants (CNPS 2020)

FE:	Federal Endangered
FT:	Federal Threatened
SE:	State Endangered
ST:	State Threatened
SR:	State Rare

Rank 1A:	Plants presumed extirpated in California and either rare or extinct elsewhere
Rank 1B:	Plants rare, threatened, or endangered in California and elsewhere
Rank 2A:	Plants presumed extirpated in California, but more common elsewhere
Rank 2B:	Plants rare, threatened, or endangered in California, but more common elsewhere
Rank 3:	Plants about which we need more information – a review list
Rank 4:	Plants of limited distribution – a watch list

[2] Invasive Status: California Invasive Plant Inventory (Cal-IPC 2020)

High:	Severe ecological impacts; high rates of dispersal and establishment; most are widely distributed ecologically.
Moderate:	Substantial and apparent ecological impacts; moderate-high rates of dispersal, establishment dependent on disturbance; limited- moderate distribution ecologically
Limited:	Minor or not well documented ecological impacts; low-moderate rate of invasiveness; limited distribution ecologically
Assessed:	Assessed by Cal-IPC and determined to not be an existing current threat

[3] Wetland Status: National List of Plant Species that Occur in Wetlands, Arid West Region (Lichvar et al. 2016)

OBL:	Almost always a hydrophyte, rarely in uplands
FACW:	Usually a hydrophyte, but occasionally found in uplands
FAC:	Commonly either a hydrophyte or non-hydrophyte
FACU:	Occasionally a hydrophyte, but usually found in uplands
UPL:	Rarely a hydrophyte, almost always in uplands
NL:	Rarely a hydrophyte, almost always in uplands
NI:	No information; not factored during wetland delineation

*Rarity status only applies to native stands not present in the Study Area. Monterey pine and Monterey cypress within the Study Area are planted ornamentals outside of their native range.

Appendix B cont. Wildlife species observed in the Study Area on June 4, 2021

Scientific Name	Common Name
Birds	
Aphelocoma californica	California scrub-jay
Callipepla californica	California quail
Calypte anna	Anna's hummingbird
Cardellina pusilla	Wilson's warbler
Catharus ustulatus	Swainson's thrush
Ceryle alcyon	belted kingfisher
Chamaea fasciata	wrentit
Corvus brachyrhynchos	American crow
Empidonax difficilis	Pacific-slope flycatcher
Haemorhous mexicanus	house finch
Hirundo rustica	barn swallow
Molothrus ater	Brown-headed Cowbird
Passer domesticus	house sparrow (*non-native*)
Petrochelidon pyrrhonota	cliff swallow
Picoides nuttallii	Nuttall's woodpecker
Picoides villosus	hairy woodpecker
Pipilo maculatus	spotted towhee
Poecile rufescens	chestnut-backed chickadee
Psaltriparus minimus	bushtit
Sayornis nigricans	black phoebe
Streptopelia decaocto	Eurasian collared-dove (*non-native*)
Tachycineta thalassina	violet-green swallow

Appendix C

Potential for Special-status Species to Occur in the Study Area

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Appendix C Potential for Special-Status Plant and Wildlife Species to Occur in the Study Area. Special-status plant and wildlife species table with the potential to occur within the vicinity of the Study Area (Inverness, Drakes Bay, Tomales, Point Reyes NE, Petaluma, San Geronimo, Bolinas, Double Point USGS 7.5' topographic quadrangles) Results include database searches of California Native Plant Society (CNPS) Rare and Endangered Plant Inventory, California Natural Diversity Database (CNDDB, CDFW), Information Planning and Conservation (IPaC) as well as U.S. Fish and Wildlife Service Threatened and Endangered Species Lists.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
pink sand-verbena *Abronia umbellata* var. *breviflora*	Rank 1B.1	Coastal dunes. Elevation ranges from 0 to 35 feet (0 to 10 meters). Blooms Jun-Oct.	**No Potential.** The Study Area lacks coastal dunes necessary to support this species.	No further actions are recommended.
Blasdale's bent grass *Agrostis blasdalei*	Rank 1B.2	Coastal bluff scrub, coastal dunes, coastal prairie. Elevation ranges from 0 to 490 feet (0 to 150 meters). Blooms May-Jul.	**Unlikely.** The Study Area lacks coastal dunes, coastal bluff scrub, and coastal prairie necessary to support this species.	No further actions are recommended.
Franciscan onion *Allium peninsulare* var. *franciscanum*	Rank 1B.2	Cismontane woodland, valley and foothill grassland (clay soils; serpentine). Elevation ranges from 170 to 1000 feet (52 to 305 meters). Blooms (Apr) May-Jun.	**No Potential.** The Study Area lacks serpentine substrates necessary to support this species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
Sonoma alopecurus *Alopecurus aequalis* var. *sonomensis*	FE, Rank 1B.1	Marshes and swamps (freshwater), riparian scrub. Elevation ranges from 15 to 1200 feet (5 to 365 meters). Blooms May-Jul.	**Not Observed (initially assessed: Moderate Potential).** The Study Area contains riparian habitat that could support this species. However, this species was not observed in the Study Area during the site visits.	No further actions are recommended.
Napa false indigo *Amorpha californica* var. *napensis*	Rank 1B.2	Broadleafed upland forest (openings), chaparral, cismontane woodland. Elevation ranges from 390 to 6560 feet (120 to 2000 meters). Blooms Apr-Jul.	**No Potential.** The Study Area lacks upland forest and chaparral and is well below the documented elevation range of the species.	No further actions are recommended.
bent-flowered fiddleneck *Amsinckia lunaris*	Rank 1B.2	Coastal bluff scrub, cismontane woodland, valley and foothill grassland. Elevation ranges from 5 to 1640 feet (3 to 500 meters). Blooms Mar-Jun.	**Not Observed (initially assessed: Moderate Potential).** This species was initially assessed as having a moderate potential to occur within grasslands present in the Study Area. However this species was not observed during the site visits.	No further actions are recommended.
coast rockcress *Arabis blepharophylla*	Rank 4.3	Broadleafed upland forest, coastal bluff scrub, coastal prairie, coastal scrub. Elevation ranges from 5 to 3610 feet (3 to 1100 meters). Blooms Feb-May.	**No Potential.** The Study Area lacks rock outcrop habitat within coastal scrub associated with this species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
Mt. Tamalpais manzanita *Arctostaphylos montana* ssp. *montana*	Rank 1B.3	Chaparral, valley and foothill grassland; serpentine. Elevation ranges from 520 to 2495 feet (160 to 760 meters). Blooms Feb-Apr.	**No Potential.** The Study Area lacks serpentine substrates necessary to support this species.	No further actions are recommended.
Marin manzanita *Arctostaphylos virgata*	Rank 1B.2	Broadleafed upland forest, closed-cone coniferous forest, chaparral, north coast coniferous forest. Elevation ranges from 195 to 2295 feet (60 to 700 meters). Blooms Jan-Mar.	**No Potential.** The Study Area lacks the vegetation communities associated with this species.	No further actions are recommended.
Brewer's milk-vetch *Astragalus breweri*	Rank 4.2	Chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland (open, often gravelly, usually on serpentine). Elevation ranges from 295 to 2395 feet (90 to 730 meters). Blooms Apr-Jun.	**Unlikely.** The Study Area lacks serpentine substrates most often associated with this species.	No further actions are recommended.
coastal marsh milk-vetch *Astragalus pycnostachyus* var. *pycnostachyus*	Rank 1B.2	Coastal dunes (mesic), coastal scrub, marshes and swamps (coastal salt). Elevation ranges from 0 to 100 feet (0 to 30 meters). Blooms (Apr)Jun-Oct.	**No Potential.** The Study Area lacks salt marsh, and mesic coastal scrub habitat known to support this species.	No further actions are recommended.

SPECIES	**STATUS***	**HABITAT**	**POTENTIAL FOR OCCURRENCE****	**RECOMMENDATIONS*****
Plants				
Point Reyes Blennosperma *Blennosperma nanum* var. *robustum*	SR, Rank 1B.2	Coastal prairie, coastal scrub. Elevation ranges from 30 to 475 feet (10 to 145 meters). Blooms Feb-Apr.	**No Potential.** The Study Area lacks coastal prairie and coastal scrub. This species is only known from the Point Reyes Peninsula, west of the San Andreas Fault.	No further actions are recommended.
Thurber's reed grass *Calamagrostis crassiglumis*	Rank 2B.1	Coastal scrub (mesic), marshes and swamps (freshwater). Elevation ranges from 30 to 195 feet (10 to 60 meters). Blooms May-Aug.	**Unlikely.** The Study Area lacks freshwater marsh habitat surrounded by coastal scrub associated with this species.	No further actions are recommended.
serpentine reed grass *Calamagrostis ophiditis*	Rank 4.3	Chaparral (open, often north-facing slopes), lower montane coniferous forest, meadows and seeps, valley and foothill grassland; serpentine. Elevation ranges from 295 to 3495 feet (90 to 1065 meters). Blooms Apr-Jul.	**No Potential.** The Study Area lacks serpentine habitat known to support this species.	No further actions are recommended.
Oakland star-tulip *Calochortus umbellatus*	Rank 4.2	Broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest, valley and foothill grassland. Elevation ranges from 325 to 2295 feet (100 to 700 meters). Blooms Mar-May.	**Unlikely.** Despite potentially suitable grassland habitat present within the Study Area, this species is not known from west of Bolinas Ridge.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
coastal bluff morning-glory *Calystegia purpurata* ssp. *saxicola*	Rank 1B.2	Coastal bluff scrub, coastal dunes, coastal scrub, north coast coniferous forest. Elevation ranges from 0 to 345 feet (0 to 105 meters). Blooms (Mar)Apr-Sep.	**Unlikely.** The Study Area lacks the associated vegetation communities.	No further actions are recommended.
swamp harebell *Campanula californica*	Rank 1B.2	Bogs and fens, closed-cone coniferous forest, coastal prairie, meadows and seeps, marshes and swamps (freshwater), north coast coniferous forest. Elevation ranges from 0 to 1330 feet (1 to 405 meters). Blooms Jun-Oct.	**Not Observed (initially assessed: Moderate Potential).** The Study Area contains potentially suitable freshwater wetland habitat associated with this species. However, the species was not observed during the June site visit conducted during the species' bloom period.	No further actions are recommended.
seaside bittercress *Cardamine angulata*	Rank 2B.2	Lower montane coniferous forest, north coast coniferous forest. Elevation ranges from 80 to 3000 feet (25 to 915 meters). Blooms (Jan)Mar-Jul.	**No Potential.** The Study Area lacks the associated vegetation communities.	No further actions are recommended.
Buxbaum's sedge *Carex buxbaumii*	Rank 4.2	Bogs and fens, meadows and seeps (mesic), marshes and swamps. Elevation ranges from 5 to 10825 feet (3 to 3300 meters). Blooms Mar-Aug.	**Not Observed (initially assessed: Moderate Potential).** The Study Area contains potentially suitable freshwater wetland habitat associated with this species. However, the species was not observed during the site visits.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
bristle-stalked sedge *Carex leptalea*	Rank 2B.2	Bogs and fens, meadows and seeps (mesic), marshes and swamps. Elevation ranges from 0 to 2295 feet (0 to 700 meters). Blooms Mar-Jul.	**Not Observed (initially assessed: Moderate Potential).** The Study Area contains potentially suitable freshwater wetland habitat associated with this species. However, the species was not observed during the site visits.	No further actions are recommended.
Lyngbye's sedge *Carex lyngbyei*	Rank 2B.2	Marshes and swamps (brackish or freshwater). Elevation ranges from 0 to 35 feet (0 to 10 meters). Blooms Apr-Aug.	**Unlikely.** The Study Area lacks marshes and swamps necessary to support this species.	No further actions are recommended.
Tiburon paintbrush *Castilleja affinis* var. *neglecta*	FE, ST, Rank 1B.2	Valley and foothill grassland (serpentine). Elevation ranges from 195 to 1310 feet (60 to 400 meters). Blooms Apr-Jun.	**No Potential.** The Study Area lacks serpentine substrates necessary to support this species.	No further actions are recommended.
johnny-nip *Castilleja ambigua* var. *ambigua*	Rank 4.2	Coastal bluff scrub, coastal prairie, coastal scrub, marshes and swamps, valley and foothill grassland, vernal pools margins (mesic). Elevation ranges from 0 to 1425 feet (0 to 435 meters). Blooms Mar-Aug.	**Not Observed (initially assessed: Moderate Potential).** The Study Area contains potentially suitable mesic grassland habitat associated with this species. However, the species was not observed during the site visits.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
Humboldt Bay owl's-clover *Castilleja ambigua* var. *humboldtensis*	Rank 1B.2	Marshes and swamps (coastal salt). Elevation ranges from 0 to 10 feet (0 to 3 meters). Blooms Apr-Aug.	**No Potential.** The Study Area lacks coastal salt marsh habitat necessary to support this species.	No further actions are recommended.
Point Reyes paintbrush *Castilleja leschkeana*	Rank 1A	Marshes and swamps (coastal). Elevation ranges from 0 to 35 feet (0 to 10 meters). Blooms Jun.	**No Potential.** The Study Area lacks marshes and swamps. This species is considered extinct.	No further actions are recommended.
Nicasio Ceanothus *Ceanothus decornutus*	Rank 1B.2	Chaparral (maritime; serpentine). Elevation ranges from 770 to 950 feet (235 to 290 meters). Blooms Mar-May.	**No Potential.** The Study Area lacks serpentine chaparral necessary to support this species.	No further actions are recommended.
glory brush *Ceanothus gloriosus* var. *exaltatus*	Rank 4.3	Chaparral. Elevation ranges from 95 to 2000 feet (30 to 610 meters). Blooms Mar-Jun(Aug).	**No Potential.** The Study Area lacks chaparral habitat known to support this species.	No further actions are recommended.
Point Reyes Ceanothus *Ceanothus gloriosus* var. *gloriosus*	Rank 4.3	Coastal bluff scrub, closed-cone coniferous forest, coastal dunes, coastal scrub. Elevation ranges from 15 to 1705 feet (5 to 520 meters). Blooms Mar-May.	**No Potential.** The Study Area lacks the vegetation communities associated with this species.	No further actions are recommended.

SPECIES	**STATUS***	**HABITAT**	**POTENTIAL FOR OCCURRENCE****	**RECOMMENDATIONS*****
Plants				
Mt. Vision Ceanothus *Ceanothus gloriosus* var. *porrectus*	Rank 1B.3	Closed-cone coniferous forest, coastal prairie, coastal scrub, valley and foothill grassland. Elevation ranges from 80 to 1000 feet (25 to 305 meters). Blooms Feb-May.	**Unlikely.** The Study Area lacks the majority of vegetation communities associated with this species.	No further actions are recommended.
Mason's Ceanothus *Ceanothus masonii*	SR, Rank 1B.2	Chaparral (openings, rocky, serpentine). Elevation ranges from 750 to 1640 feet (230 to 500 meters). Blooms Mar-Apr.	**No Potential.** The Study Area lacks chaparral and serpentine substrates known to support this species.	No further actions are recommended.
Point Reyes bird's-beak *Chloropyron maritimum* ssp. *palustre*	Rank 1B.2	Marshes and swamps (coastal salt). Elevation ranges from 0 to 35 feet (0 to 10 meters). Blooms Jun-Oct.	**No Potential.** The Study Area lacks salt marsh habitat necessary to support this species.	No further actions are recommended.
San Francisco Bay spineflower *Chorizanthe cuspidata* var. *cuspidata*	Rank 1B.2	Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub (sandy). Elevation ranges from 5 to 705 feet (3 to 215 meters). Blooms Apr-Jul(Aug).	**No Potential.** The Study Area lacks sandy soils and coastal dunes known to support this species.	No further actions are recommended.
woolly-headed spineflower *Chorizanthe cuspidata* var. *villosa*	Rank 1B.2	Coastal dunes, coastal prairie, coastal scrub (sandy). Elevation ranges from 5 to 195 feet (3 to 60 meters). Blooms May-Jul(Aug).	**No Potential.** The Study Area lacks sandy soils and coastal dunes known to support this species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
robust spineflower *Chorizanthe robusta* var. *robusta*	FE, Rank 1B.1	Chaparral (maritime), cismontane woodland (openings), coastal dunes, coastal scrub. Elevation ranges from 5 to 985 feet (3 to 300 meters). Blooms Apr-Sep.	**No Potential.** The Study Area lacks sandy soils and within the vegetation communities associated with this species.	No further actions are recommended.
Sonoma spineflower *Chorizanthe valida*	FE, SE, Rank 1B.1	Coastal prairie (sandy). Elevation ranges from 30 to 1000 feet (10 to 305 meters). Blooms Jun-Aug.	**No Potential.** The Study Area lacks coastal prairie underlain by sandy soils necessary to support this species.	No further actions are recommended.
Bolander's water-hemlock *Cicuta maculata* var. *bolanderi*.	Rank 2B.1	Marshes and swamps coastal, fresh or brackish water. Elevation ranges from 0 to 655 feet (0 to 200 meters). Blooms Jul-Sep.	**No Potential.** The Study Area lacks salt marsh habitat necessary to support this species.	No further actions are recommended.
Franciscan thistle *Cirsium andrewsii*	Rank 1B.2	Broadleafed upland forest, coastal bluff scrub, coastal prairie, coastal scrub; bluffs, ravines, seeps (sometimes serpentine). Elevation ranges from 0 to 490 feet (0 to 150 meters). Blooms Mar-Jul.	**Unlikely.** The Study Area lacks seeps, ravines, and serpentine substrates most often associated with this species.	No further actions are recommended.
Mt. Tamalpais thistle *Cirsium hydrophilum* var. *vaseyi*	Rank 1B.2	Broadleafed upland forest, chaparral, meadows and seeps (serpentine). Elevation ranges from 785 to 2035 feet (240 to 620 meters). Blooms May-Aug.	**No Potential.** The Study Area lacks serpentines seeps and streams necessary to support this species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
Raiche's red ribbons *Clarkia concinna* ssp. *rachei*	Rank 1B.1	Coastal bluff scrub. Elevation ranges from 0 to 330 feet (0 to 100 meters). Blooms Apr-May.	**No Potential.** The Study Area lacks coastal bluff scrub necessary to support this species.	No further actions are recommended.
round-headed Chinese-houses *Collinsia corymbosa*	Rank 1B.2	Coastal dunes. Elevation ranges from 0 to 65 feet (0 to 20 meters). Blooms Apr-Jun.	**No Potential.** The Study Area lacks coastal dunes necessary to support this species.	No further actions are recommended.
Baker's larkspur *Delphinium bakeri*	FE, SE, Rank 1B.1	Broadleafed upland forest, coastal scrub,. Elevation ranges from 260 to 1000 feet (80 to 305 meters). Blooms Mar-May.	**No Potential.** The Study Area lacks the associated vegetation communities.	No further actions are recommended.
golden larkspur *Delphinium luteum*	FE, SR, Rank 1B.1	Chaparral, coastal prairie, coastal scrub. Elevation ranges from 0 to 330 feet (0 to 100 meters). Blooms Mar-May.	**No Potential.** The Study Area lacks the associated vegetation communities.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
western leatherwood *Dirca occidentalis*	Rank 1B.2	Broadleafed upland forest, closed-cone coniferous forest, chaparral, cismontane woodland, north coast coniferous forest, riparian forest, riparian woodland. Elevation ranges from 80 to 1395 feet (25 to 425 meters). Blooms Jan-Mar(Apr).	**Not Observed (initially assessed: Moderate Potential).** This species was initially assessed as having a moderate potential to occur in riparian habitat within the Study Area. However, However, this species was not observed in the Study Area during the January site visit conducted during the species' bloom period.	No further actions are recommended.
California bottle-brush grass *Elymus californicus*	Rank 4.3	Broadleafed upland forest, cismontane woodland, north coast coniferous forest, riparian woodland. Elevation ranges from 45 to 1540 feet (15 to 470 meters). Blooms May-Aug(Nov).	**Not Observed (initially assessed: Moderate Potential).** This species was initially assessed as having moderate potential to in riparian habitat within the Study Area However, this species was not observed in the Study Area during the June site visit conducted during the species' documented bloom period.	No further actions are recommended.
Koch's cord moss *Entosthodon kochii*	Rank 1B.3	Cismontane woodland (soil). Elevation ranges from 590 to 3280 feet (180 to 1000 meters).	**No Potential.** The Study Area lacks upland cismontane woodland and is much lower than the documented elevation range of the species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
supple daisy *Erigeron supplex*	Rank 1B.2	Coastal bluff scrub, coastal prairie. Elevation ranges from 30 to 165 feet (10 to 50 meters). Blooms May-Jul.	**Not Observed (initially assessed: Moderate Potential).** The Study Area contains native grassland habitat with coastal influence that could support this species. However, the species was not observed in the Study Area during the June site visit conducted during the species' documented bloom period.	No further actions are recommended.
Tiburon buckwheat *Eriogonum luteolum* var. *caninum*	Rank 1B.2	Chaparral, cismontane woodland, coastal prairie, valley and foothill grassland (serpentine). Elevation ranges from 0 to 2295 feet (0 to 700 meters). Blooms May-Sep.	**No Potential.** The Study Area lacks serpentine substrates necessary to support this species.	No further actions are recommended.
bluff wallflower *Erysimum concinnum*	Rank 1B.2	Coastal bluff scrub, coastal dunes, coastal prairie. Elevation ranges from 0 to 605 feet (0 to 185 meters). Blooms Feb-Jul.	**Unlikely.** The Study Area lacks coastal dunes, coastal bluff scrub, and sandy coastal prairie habitats known to support this species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
Marin checker lily *Fritillaria lanceolata* var. *tristulis*	Rank 1B.1	Coastal bluff scrub, coastal prairie, coastal scrub. Elevation ranges from 45 to 490 feet (15 to 150 meters). Blooms Feb-May.	**Not Observed (initially assessed: Moderate Potential).** The Study Area contains native grassland habitat with coastal influence that could support this species. However, the species was not observed in the Study Area during the June site visit conducted during the species' documented bloom period.	No further actions are recommended.
fragrant fritillary *Fritillaria liliacea*	Rank 1B.2	Cismontane woodland, coastal prairie, coastal scrub, valley and foothill grassland. Elevation ranges from 5 to 1345 feet (3 to 410 meters). Blooms Feb-Apr.	**Not Observed (originally assessed: Moderate Potential).** This species was initially assessed as having a moderate potential to occur due to the presence of potentially suitable grassland habitat. However, this species was not observed in the Study Area during the surveys conducted during the species' documented bloom period.	No further actions are recommended.
blue coast gilia *Gilia capitata* ssp. *chamissonis*	Rank 1B.1	Coastal dunes, coastal scrub (sandy). Elevation ranges from 5 to 655 feet (2 to 200 meters). Blooms Apr-Jul.	**No Potential.** The Study Area lacks coastal dunes, and sandy coastal scrub known to support this species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
woolly-headed gilia *Gilia capitata* ssp. *tomentosa*	Rank 1B.1	Coastal bluff scrub, valley and foothill grassland, rocky outrcops on the coast (often serpentine). Elevation ranges from 30 to 720 feet (10 to 220 meters). Blooms May-Jul.	**No Potential.** The Study Area lacks rocky outcrops and serpentine substrate necessary to support this species.	No further actions are recommended.
dark-eyed gilia *Gilia millefoliata*	Rank 1B.2	Coastal dunes. Elevation ranges from 5 to 100 feet (2 to 30 meters). Blooms Apr-Jul.	**No Potential.** The Study Area coastal dunes necessary to support this species.	No further actions are recommended.
San Francisco gumplant *Grindelia hirsutula* var. *maritima*	Rank 3.2	Coastal bluff scrub, coastal scrub, valley and foothill grassland (serpentine). Elevation ranges from 45 to 1310 feet (15 to 400 meters). Blooms Jun-Sep.	**No Potential.** The Study Area lacks serpentine substrate necessary to support this species.	No further actions are recommended.
congested-headed hayfield tarplant *Hemizonia congesta* ssp. *congesta*	Rank 1B.2	Valley and foothill grassland. Elevation ranges from 65 to 1835 feet (20 to 560 meters). Blooms Apr-Nov.	**Not Observed (initially assessed: Moderate Potential).** The Study Area contains potentially suitable grassland habitat that could support this species. This species was observed at a documented reference site near Petaluma on the date of the June site visit. However, this species was not observed in the Study Area.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
short-leaved evax *Hesperevax sparsiflora* var. *brevifolia*	Rank 1B.2	Coastal bluff scrub (sandy), coastal dunes, coastal prairie. Elevation ranges from 0 to 705 feet (0 to 215 meters). Blooms Mar-Jun.	**Not Observed (initially assessed: Moderate Potential).** The Study Area contains native grassland habitat with coastal influence that could support this species. However, the species was not observed in the Study Area during the June site visit conducted during the species' documented bloom period.	No further actions are recommended.
Marin western flax *Hesperolinon congestum*	FT, ST, Rank 1B.1	Chaparral, valley and foothill grassland (serpentine). Elevation ranges from 15 to 1215 feet (5 to 370 meters). Blooms Apr-Jul.	**No Potential.** The Study Area lacks serpentine substrate necessary to support this species.	No further actions are recommended.
water star-grass *Heteranthera dubia*	Rank 2B.2	Marshes and swamps (alkaline, still or slow-moving water). Elevation ranges from 95 to 4905 feet (30 to 1495 meters). Blooms Jul-Oct.	**No Potential.** The Study Area lacks marshes and swamps with alkaline, eutrophic water necessary to support this species.	No further actions are recommended.
Kellogg's horkelia *Horkelia cuneata* var. *sericea*	Rank 1B.1	Closed-cone coniferous forest, chaparral (maritime), coastal dunes, coastal scrub. Elevation ranges from 30 to 655 feet (10 to 200 meters). Blooms Apr-Sep.	**No Potential.** The Study Area lacks closed-cone coniferous forest, maritime chaparral, and coastal dunes. CNPS (2021) considers this species 'presumed extirpated' from Marin County.	No further actions are recommended.

SPECIES	**STATUS***	**HABITAT**	**POTENTIAL FOR OCCURRENCE****	**RECOMMENDATIONS*****
Plants				
Point Reyes horkelia *Horkelia marinensis*	Rank 1B.2	Coastal dunes, coastal prairie, coastal scrub. Elevation ranges from 15 to 2475 feet (5 to 755 meters). Blooms May-Sep.	**Not Observed (initially assessed: Moderate Potential).** This species was initially assessed as having high potential to occur due to the presence of potentially suitable grassland, and proximity to documented occurrences. However, this species was not observed in the Study Area during the June survey conducted during the species' documented bloom period.	No further actions are recommended.
thin-lobed horkelia *Horkelia tenuiloba*	Rank 1B.2	Broadleafed upland forest, chaparral, valley and foothill grassland. Elevation ranges from 160 to 1640 feet (50 to 500 meters). Blooms May-Jul(Aug).	**Not Observed (initially assessed: Moderate Potential).** This species was initially assessed as having moderate potential to occur due to the presence of potentially suitable grassland habitat. However, this species was not observed in the Study Area during the June survey conducted during the species' documented bloom period.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
harlequin lotus *Hosackia gracilis*	Rank 4.2	Broadleafed upland forest, coastal bluff scrub, closed-cone coniferous forest, cismontane woodland, coastal prairie, coastal scrub, meadows and seeps, marshes and swamps, north coast coniferous forest, valley and foothill grassland. Elevation ranges from 0 to 2295 feet (0 to 700 meters). Blooms Mar-Jul.	**Not Observed (initially assessed: Moderate Potential).** The Study Area contains potentially suitable seasonal wetland habitat which could support this species. However, this species was not observed in the Study Area during the June site visit conducted during the species' documented bloom period.	No further actions are recommended.
island rock lichen *Hypogymnia schizidiata*	Rank 1B.3	Closed-cone coniferous forest, chaparral. Elevation ranges from 1180 to 1330 feet (360 to 405 meters).	**No Potential.** The Study Area lacks the vegetation communities associated with this species and is well below the documented elevation range.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
coast iris *Iris longipetala*	Rank 4.2	Coastal prairie, lower montane coniferous forest, meadows and seeps. Elevation ranges from 0 to 1970 feet (0 to 600 meters). Blooms Mar-May.	**Not Observed (initially assessed: Moderate Potential).** This species was initially assessed as having moderate potential to occur due to the presence of potentially suitable grassland habitat with coastal influence. However, this species was not observed in the Study Area during the April survey conducted during the species' documented bloom period.	
small groundcone *Kopsiopsis hookeri*	Rank 2B.3	North coast coniferous forest. Elevation ranges from 295 to 2905 feet (90 to 885 meters). Blooms Apr-Aug.	**No Potential.** The Study Area lacks north coast coniferous forest known to support this species.	No further actions are recommended.
Baker's goldfields *Lasthenia californica* ssp. *bakeri*	Rank 1B.2	Closed-cone coniferous forest (openings), coastal scrub, meadows and seeps, marshes and swamps. Elevation ranges from 195 to 1705 feet (60 to 520 meters). Blooms Apr-Oct.	**Unlikely.** The Study Area lacks the vegetation communities associated with this species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
perennial goldfields *Lasthenia californica* ssp. *macrantha*	Rank 1B.2	Coastal bluff scrub, coastal dunes, coastal scrub. Elevation ranges from 15 to 1705 feet (5 to 520 meters). Blooms Jan-Nov.	**Unlikely.** The Study Area lacks the vegetation communities associated with this species.	No further actions are recommended.
beach layia *Layia carnosa*	FE, SE, Rank 1B.1	Coastal dunes, coastal scrub (sandy). Elevation ranges from 0 to 195 feet (0 to 60 meters). Blooms Mar-Jul.	**No Potential.** The Study Area lacks coastal dunes and sandy coastal scrub necessary to support this species.	No further actions are recommended.
bristly leptosiphon *Leptosiphon acicularis*	Rank 4.2	Chaparral, cismontane woodland, coastal prairie, valley and foothill grassland. Elevation ranges from 180 to 4920 feet (55 to 1500 meters). Blooms Apr-Jul.	**Not Observed (initially assessed: Moderate Potential).** This species was initially assessed as having a moderate potential to occur due to the presence of potentially suitable grassland habitat. However, this species was not observed in the Study Area during the April and June surveys conducted during the species' documented bloom period.	No further actions are recommended.
coast yellow leptosiphon *Leptosiphon croceus*	SS, Rank 1B.1	Coastal bluff scrub, coastal prairie. Elevation ranges from 30 to 490 feet (10 to 150 meters). Blooms Apr-Jun.	**Unlikely.** The Study Area lacks coastal bluff scrub, and coastal prairie habitat associated with this species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
large-flowered leptosiphon *Leptosiphon grandiflorus*	Rank 4.2	Coastal bluff scrub, closed-cone coniferous forest, cismontane woodland, coastal dunes, coastal prairie, coastal scrub, valley and foothill grassland (sandy soil). Elevation ranges from 15 to 4005 feet (5 to 1220 meters). Blooms Apr-Aug.	**Unlikely.** Despite the presence of potentially suitable grassland habitat, the Study Area lacks sandy soils associated with this species.	No further actions are recommended.
rose leptosiphon *Leptosiphon rosaceus*	Rank 1B.1	Coastal bluff scrub. Elevation ranges from 0 to 330 feet (0 to 100 meters). Blooms Apr-Jul.	**Unlikely.** The Study Area lacks coastal bluff scrub habitat known to support this species.	No further actions are recommended.
woolly-headed lessingia *Lessingia hololeuca*	Rank 3	Broadleafed upland forest, coastal scrub, lower montane coniferous forest, valley and foothill grassland (serpentine). Elevation ranges from 45 to 1000 feet (15 to 305 meters). Blooms Jun-Oct.	**No Potential.** The Study Area lacks serpentine substrate necessary to support this species.	No further actions are recommended.
Tamalpais lessingia *Lessingia micradenia* var. *micradenia*	Rank 1B.2	Chaparral, valley and foothill grassland (serpentine). Elevation ranges from 325 to 1640 feet (100 to 500 meters). Blooms (Jun)Jul-Oct.	**No Potential.** The Study Area lacks serpentine substrate necessary to support this species.	No further actions are recommended.

SPECIES	**STATUS***	**HABITAT**	**POTENTIAL FOR OCCURRENCE****	**RECOMMENDATIONS*****
Plants				
Mason's Lilaeopsis *Lilaeopsis masonii*	SR, Rank 1B.1	Marshes and swamps (brackish or freshwater), riparian scrub. Elevation ranges from 0 to 35 feet (0 to 10 meters). Blooms Apr-Nov.	**No Potential.** The Study Area lacks marshes and swamps known to support this species.	No further actions are recommended.
coast lily *Lilium maritimum*	Rank 1B.1	Broadleafed upland forest, closed-cone coniferous forest, coastal prairie, coastal scrub, marshes and swamps (freshwater), north coast coniferous forest. Elevation ranges from 15 to 1560 feet (5 to 475 meters). Blooms May-Aug.	**Not Observed (initially assessed: Moderate Potential).** The Study Area contains potentially suitable seasonal wetland habitat which could support this species. However, this species was not observed in the Study Area during the June site visit conducted during the species' documented bloom period.	No further actions are recommended.
Pitkin Marsh lily *Lilium pardalinum* ssp. *pitkense*	FE, SE, Rank 1B.1	Cismontane woodland, meadows and seeps, marshes and swamps (freshwater). Elevation ranges from 110 to 215 feet (35 to 65 meters). Blooms Jun-Jul.	**No Potential.** Despite potentially suitable wetland habitat, this species is only known from one location in Sonoma County, and is not known from Marin County (CNPS 2021).	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
Point Reyes meadowfoam *Limnanthes douglasii* ssp. *sulphurea*	SE, Rank 1B.2	Coastal prairie, meadows and seeps (mesic), marshes and swamps (freshwater), vernal pools. Elevation ranges from 0 to 460 feet (0 to 140 meters). Blooms Mar-May.	**Not Observed (initially assessed: Moderate Potential).** The Study Area contains potentially suitable seasonal wetland habitat which could support this species. However, this species was not observed in the Study Area during the June site visit conducted during the species' documented bloom period.	No further actions are recommended.
Tidestrom's lupine Lupinus tidestromii	FE, SE, Rank 1B.1	Coastal dunes. Elevation ranges from 0 to 330 feet (0 to 100 meters). Blooms Apr-Jun.	**No Potential.** The Study Area lacks coastal dunes necessary to support this species.	No further actions are recommended.
Mt. Diablo cottonweed *Micropus amphilobus*	Rank 3.2	On slopes, or ridges, underlain by shallow soils, of sedimentary or volcanic origin in broadleafed upland forest, chaparral, cismontane woodland, valley and foothill grassland (thin soils). Elevation ranges from 145 to 2705 feet (45 to 825 meters). Blooms Mar-May.	**Unlikely.** The Study Area lacks thin, rocky soils necessary to support this species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
marsh microseris *Microseris paludosa*	Rank 1B.2	Closed-cone coniferous forest, cismontane woodland, coastal scrub, valley and foothill grassland. Elevation ranges from 15 to 1165 feet (5 to 355 meters). Blooms Apr-Jun(Jul).	**Not Observed (initially assessed: Moderate Potential).** This species was initially assessed as having a moderate potential to occur due to the presence of potentially suitable grassland habitat, and proximity to documented occurrences. However, this species was not observed in the Study Area during the April and June surveys conducted during the species' documented bloom period.	No further actions are recommended.
elongate copper moss *Mielichhoferia elongata*	Rank 4.3	Broadleafed upland forest, chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, subalpine coniferous forest; growing on very acidic, metamorphic rock. Elevation ranges from 0 to 6430 feet (0 to 1960 meters).	**No Potential.** The Study Area lacks acidic, metamorphic rock necessary to support this species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
northern curly-leaved Monardella *Monardella sinuata* ssp. *nigrescens*	Rank 1B.2	Chaparral (scr co.), coastal dunes, coastal scrub, lower montane coniferous forest (scr co., ponderosa pine sandhills). Elevation ranges from 0 to 985 feet (0 to 300 meters). Blooms (Apr)May-Jul(Aug-Sep).	**No Potential.** The Study Area lacks coastal dunes and sandy substrates within chaparral, coastal scrub, and ponderosa pine forest habitats known to support this species.	No further actions are recommended.
Marin County navarretia *Navarretia rosulata*	Rank 1B.2	Closed-cone coniferous forest, chaparral (serpentine). Elevation ranges from 655 to 2085 feet (200 to 635 meters). Blooms May-Jul.	**No Potential.** The Study Area lacks serpentine habitat necessary to support this species.	No further actions are recommended.
Gairdner's yampah *Perideridia gairdneri* ssp. *gairdneri*	Rank 4.2	Broadleafed upland forest, chaparral, coastal prairie, valley and foothill grassland, vernal pools. Elevation ranges from 0 to 2000 feet (0 to 610 meters). Blooms Jun-Oct.	**Not Observed (initially assessed: Moderate Potential).** The Study Area contains potentially suitable seasonal wetland habitat which could support this species. However, this specsei was not observed during the June site visit conducted during the species' documented bloom period.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
North Coast phacelia *Phacelia insularis* var. *continentalis*	Rank 1B.2	Coastal bluff scrub, coastal dunes. Elevation ranges from 30 to 560 feet (10 to 170 meters). Blooms Mar-May.	**No Potential.** The Study Area lacks coastal dunes and sandy substrates within coastal bluff scrub known to support this species.	No further actions are recommended.
Point Reyes rein orchid *Piperia elegans* ssp. *decurtata*	Rank 1B.1	Coastal bluff scrub, coastal prairie. Elevation ranges from 45 to 605 feet (15 to 185 meters). Blooms Jul-Oct.	**No Potential.** The Study Area lacks the vegetation communities associated with this species. This species is only known from two locations on the Point Reyes' peninsula on the immediate coastline.	No further actions are recommended.
Michael's rein orchid *Piperia michaelii*	Rank 4.2	Coastal bluff scrub, closed-cone coniferous forest, chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest. Elevation ranges from 5 to 3000 feet (3 to 915 meters). Blooms Apr-Aug.	**No Potential.** The Study Area lacks the vegetation communities associated with this species.	No further actions are recommended.
Petaluma popcornflower *Plagiobothrys mollis* ssp. *vestitus*	Rank 1A	Marshes and swamps (coastal salt), valley and foothill grassland (mesic). Elevation ranges from 30 to 165 feet (10 to 50 meters). Blooms Jun-Jul.	**Unlikely.** The Study Area lacks coastal salt marsh habitat, and despite potentially suitable mesic grassland, this species has not been observed since 1880 and is considered likely extinct (CNPS 2021).	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
North Coast semaphore grass *Pleuropogon hooverianus*	ST, Rank 1B.1	Broadleafed upland forest, meadows and seeps, north coast coniferous forest. Elevation ranges from 30 to 2200 feet (10 to 671 meters). Blooms Apr-Jun.	**Not Observed (initially assessed: Moderate Potential).** The Study Area contains potentially suitable mesic grassland habitat which could support this species. However, this species was not observed during the April and June site visits conducted during the species' documented bloom period.	No further actions are recommended.
nodding semaphore grass *Pleuropogon refractus*	Rank 4.2	Lower montane coniferous forest, meadows and seeps, north coast coniferous forest, riparian forest. Elevation ranges from 0 to 5250 feet (0 to 1600 meters). Blooms (Mar)Apr-Aug.	**Not Observed (initially assessed: Moderate Potential).** The Study Area contains potentially suitable mesic riparian habitat which could support this species. However, this species was not observed during the April and June site visits conducted during the species' documented bloom period.	No further actions are recommended.
Marin knotweed *Polygonum marinense*	Rank 3.1	Marshes and swamps (coastal salt or brackish). Elevation ranges from 0 to 35 feet (0 to 10 meters). Blooms (Apr)May-Aug(Oct).	**No Potential.** The Study Area lacks coastal salt marshes known to support this species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
Tamalpais oak *Quercus parvula* var. *tamalpaisensis*	Rank 1B.3	Lower montane coniferous forest. Elevation ranges from 325 to 2460 feet (100 to 750 meters). Blooms Mar-Apr.	**No Potential.** This Study Area lacks lower montane coniferous forest and is below the documented elevation range of the species.	No further actions are recommended.
Lobb's aquatic buttercup *Ranunculus lobbii*	Rank 4.2	Cismontane woodland, north coast coniferous forest, valley and foothill grassland, vernal pools. Elevation ranges from 45 to 1540 feet (15 to 470 meters). Blooms Feb-May.	**No Potential.** The Study Area lacks seasonally ponded water of 6 inches or deeper necessary to support this species.	No further actions are recommended.
California beaked-rush *Rhynchospora californica*	Rank 1B.1	Bogs and fens, lower montane coniferous forest, meadows and seeps (seeps), marshes and swamps (freshwater). Elevation ranges from 145 to 3315 feet (45 to 1010 meters). Blooms May-Jul.	**Unlikely.** The Study Area lacks freshwater marshes and swamps known to support this species.	No further actions are recommended.
Victor's gooseberry *Ribes victoris*	Rank 4.3	Broadleafed upland forest, chaparral. Elevation ranges from 325 to 2460 feet (100 to 750 meters). Blooms Mar-Apr.	**No Potential.** The Study Area lacks broadleafed upland forest and chaparral known to support this species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
Sanford's arrowhead *Sagittaria sanfordii*	Rank 1B.2	Marshes and swamps (assorted shallow freshwater). Elevation ranges from 0 to 2135 feet (0 to 650 meters). Blooms May-Oct(Nov).	**No Potential.** The Study Area lacks perennially ponded water necessary to support this species.	No further actions are recommended.
Point Reyes checkerbloom *Sidalcea calycosa* ssp. *rhizomata*	Rank 1B.2	Marshes and swamps (freshwater, near coast). Elevation ranges from 5 to 245 feet (3 to 75 meters). Blooms Apr-Sep.	**No Potential.** The Study Area lacks freshwater marshes known to support this species.	No further actions are recommended.
Marin checkerbloom *Sidalcea hickmanii* ssp. *viridis*	Rank 1B.1	Chaparral (serpentine). Elevation ranges from 160 to 1410 feet (50 to 430 meters). Blooms May-Jun.	**No Potential.** The Study Area lacks serpentine chaparral habitat known to support this species.	No further actions are recommended.
purple-stemmed checkerbloom *Sidalcea malviflora* ssp. *purpurea*	Rank 1B.2	Broadleafed upland forest, coastal prairie. Elevation ranges from 45 to 280 feet (15 to 85 meters). Blooms May-Jun.	**Unlikely.** The Study Area lacks broadleaf upland forest and coastal prairie habitat associated with this species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
Scouler's catchfly *Silene scouleri* ssp. *scouleri*	Rank 2B.2	Coastal bluff scrub, coastal prairie, valley and foothill grassland. Elevation ranges from 0 to 1970 feet (0 to 600 meters). Blooms (Mar-May)Jun-Aug(Sep).	**Unlikely.** The Study Area lacks shallow sandy soil and exposed marine headlands known to support this species (Howell et al. 2007).	No further actions are recommended.
Santa Cruz microseris *Stebbinsoseris decipiens*	Rank 1B.2	Broadleafed upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, valley and foothill grassland (usually on serpentine). Elevation ranges from 30 to 1640 feet (10 to 500 meters). Blooms Apr-May.	**Unlikely.** The Study Area lacks serpentine substrates most often associated with this species.	No further actions are recommended.
beach starwort *Stellaria littoralis*	Rank 4.2	Bogs and fens, coastal bluff scrub, coastal dunes, coastal scrub, marshes and swamps. Elevation ranges from 15 to 130 feet (5 to 40 meters). Blooms Mar,May,Jun,Jul.	**Unlikely.** The Study Area lacks the associated vegetation communities.	No further actions are recommended.
Tamalpais jewelflower *Streptanthus batrochopus*	Rank 1B.3	Closed-cone coniferous forest, chaparral. Elevation ranges from 1000 to 2135 feet (305 to 650 meters). Blooms Apr-Jul.	**No Potential.** The Study Area lacks serpentine substrates necessary to support this species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
Mt. Tamalpais bristly jewelflower *Streptanthus glandulosus* ssp. *pulchellus*	Rank 1B.2	Chaparral, valley and foothill grassland. Elevation ranges from 490 to 2625 feet (150 to 800 meters). Blooms May-Jul(Aug).	**No Potential.** The Study Area lacks serpentine substrates necessary to support this species.	No further actions are recommended.
whiteworm lichen *Thamnolia vermicularis*	Rank 2B.1	On rocks derived from sandstone in chaparral, valley and foothill grassland. Elevation ranges from 295 to 295 feet (90 to 90 meters).	**No Potential.** The Study Area lacks rocky outcrops of sandstone rock known to support this species.	No further actions are recommended.
two-fork clover *Trifolium amoenum*	FE, Rank 1B.1	Coastal bluff scrub, valley and foothill grassland (sometimes serpentine). Elevation ranges from 15 to 1360 feet (5 to 415 meters). Blooms Apr-Jun.	**Moderate Potential (Not Observed).** This species was initially assessed as having moderate potential to occur due to the presence of potentially suitable grassland habitat and proximity to the only documented extant occurrence near Dillon Beach (CDFW 2021). However, this species was not observed during protocol-level rare plant surveys conducted during the species' documented bloom period.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS***
Plants				
Pacific Grove clover *Trifolium polypodon`*	SR, Rank 1B.1	Closed-cone coniferous forest, coastal prairie, meadows and seeps, valley and foothill grassland. Elevation ranges from 15 to 1395 feet (5 to 425 meters). Blooms Apr-Jun(Jul).	**Unlikely.** Despite potentially suitable grassland habitat, this species is not documented from Marin County (Howell et al. 2007, CCH 2021).	No further actions are recommended.
San Francisco owl's-clover *Triphysaria floribunda*	Rank 1B.2	Coastal prairie, coastal scrub, valley and foothill grassland. Elevation ranges from 30 to 525 feet (10 to 160 meters). Blooms Apr-Jun.	**Unlikely.** The Study Area lacks shallow soil and exposed marine headlands known to support this species.	No further actions are recommended.
coastal Triquetrella *Triquetrella californica*	Rank 1B.2	Coastal bluff scrub, coastal scrub. Elevation ranges from 30 to 330 feet (10 to 100 meters).	**No Potential.** The Study Area lacks the vegetation communities associated with this species.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
MAMMALS				

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
pallid bat *Antrozous pallidus*	SSC, WBWG High	Found in deserts, grasslands, shrublands, woodlands, and forests. Most common in open, forages along river channels. Roost sites include crevices in rocky outcrops and cliffs, caves, mines, trees and various manmade structures such as bridges, barns, and buildings (including occupied buildings). Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	**Moderate Potential.** Unoccupied buildings within the Study Area may be used for roosting; there are CNDDB occurrences in the vicinity (CDFW 2022a).	A pre-construction habitat assessment and survey effort should be performed prior to the initiation of building demolition; see report section 6.2.2.
Point Reyes mountain beaver *Aplodontia rufa phaea*	SSC	Occurs only in western Marin County, almost entirely within Point Reyes National Seashore. Found on moist, north-facing slopes within areas of coastal scrub. Lives in burrow systems and forages on a variety of herbaceous plants.	**No Potentia**l. The Study Area is outside of this species' known local range; the nearest occurrence in CNDDB is located greater than 4.5 miles to the northwest (CDFW 2022a).	No further actions are recommended.
Sonoma tree vole *Arborimus pomo*	SCC	North coastal fog belt from Oregon border to Sonoma County. Occurs In Douglas fir, redwood and montane hardwood-conifer forests. Feeds almost exclusively on Douglas fir needles. Will occasionally take needles of grand fir, hemlock or spruce.	**No Potential.** The Study Area lacks coniferous forest, and outside of this species' known range.	No further actions are recommended.
Townsend's western big-eared bat *Corynorhinus townsendii townsendii*	SSC, WBWG High	Humid coastal regions of northern and central California. Roost in limestone caves, lava tubes, mines, buildings etc. Will only roost in the open, hanging from walls and ceilings. Roosting sites limiting. Extremely sensitive to disturbance	**Moderate Potential.** Unoccupied buildings within the Study Area may be used for roosting; there are CNDDB occurrences in the vicinity (CDFW 2022a).	A pre-construction habitat assessment and survey effort should be performed prior to the initiation of building demolition; see report section 6.2.2.

SPECIES	**STATUS***	**HABITAT**	**POTENTIAL FOR OCCURRENCE**	**RECOMMENDATIONS**
western red bat *Lasiurus blossevillii*	SSC, WBWG High	Highly migratory and typically solitary, roosting primarily in the foliage of trees or shrubs. It is associated with broad-leaved tree species including cottonwoods, sycamores, alders, and maples. Day roosts are commonly in edge habitats adjacent to streams or open fields, in orchards, and sometimes in urban areas.	**Unlikely.** The Study Area lacks large broad-leaved trees and other typical roosting substrates.	No further actions are recommended.
fringed myotis *Myotis thysanodes*	WBWG High	Associated with a wide variety of habitats including dry woodlands, desert scrub, mesic coniferous forest, grassland, and sage-grass steppes. Buildings, mines and large trees and snags are important day and night roosts.	**Unlikely.** The Study Area lacks trees, caves/mines and other typical roost substrates for this species.	No further actions are recommended.
salt-marsh harvest mouse *Reithrodontomys raviventris*	FE, SE, SFP	Found only in the saline emergent wetlands of the San Francisco Bay Estuary and its tributaries. Pickleweed is primary habitat, but may use other thick wetland vegetation. Does not burrow, builds loosely organized nests. Requires higher areas for flood escape.	**No Potential.** The Study Area does not provide any tidal or otherwise saline marsh.	No further actions are recommended.

SPECIES	**STATUS***	**HABITAT**	**POTENTIAL FOR OCCURRENCE**	**RECOMMENDATIONS**
American badger *Taxidea taxus*	SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats. Requires friable soils and open, uncultivated ground. Preys on burrowing rodents.	**High Potential.** The Study Area provides grassland areas with friable soils. Unused/remnant badger burrows were observed within grassland in the northern portion of the ; this site, and this species may occur there again in the future.	Pre-construction surveys prior to ground disturbance; any burrows not within the project footprint should be left undisturbed. See report section 6.2.2.
Point Reyes jumping mouse *Zapus trinotatus orarius*	SSC	Inhabits bunch grass marshes on the uplands of Point Reyes in areas safe from continuous inundation. Eats mainly grass seeds with some insects and fruit taken. Builds grassy nests on ground under vegetation, burrows in winter.	**No Potential**. The Study Area lacks suitable habitat and is outside of this species' range.	No further actions are recommended.
BIRDS				
tricolored blackbird *Agelaius tricolor*	ST, SSC	Nearly endemic to California, where it is most numerous in the Central Valley and vicinity. Highly colonial, nesting in dense aggregations over or near freshwater in emergent growth or riparian thickets. Also uses flooded agricultural fields. Abundant insect prey near breeding areas essential.	**Unlikely.** This species' local distribution includes the Point Reyes Peninsula and adjacent areas (CDFW 2022a, Shuford 1993). However, the Study Area lacks tall, dense emergent vegetation or similar herbaceous vegetation for nesting. May occur with other blackbirds during the non-breeding season.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
grasshopper sparrow *Ammodramus savannarum*	SSC	Summer resident. Breeds in open grasslands in lowlands and foothills, generally with low- to moderate-height grasses and scattered shrubs. Well-hidden nests are placed on the ground.	**Moderate Potential.** Areas of open grassland within the Study Area are limited in contiguous extent, but may be large enough to support this species.	Perform pre-construction surveys if vegetation removal and/or ground disturbance is initiated during the nesting season; see report section 6.2.2.
great egret *Ardea alba*	none; breeding sites protected by CDFW	Year-round resident. Nests colonially or semi-colonially, usually in trees, occasionally on the ground or elevated platforms. Breeding sites usually in close proximity to foraging areas: marshes, lake margins, tidal flats, and rivers. Forages primarily on fishes and other aquatic prey, also smaller terrestrial vertebrates.	**Unlikely.** Suitable nest trees are present within the Study Area, but no indication of nesting (or presence of the species) was observed during site visits. May occasionally forage there.	No further actions are recommended.
great blue heron *Ardea herodias*	none; breeding sites protected by CDFW	Year-round resident. Nests colonially or semi-colonially in tall trees and cliffs, also sequestered terrestrial substrates. Breeding sites usually in close proximity to foraging areas: marshes, lake margins, tidal flats, and rivers. Forages primarily on fishes and other aquatic prey, also smaller terrestrial vertebrates.	**Unlikely.** Suitable nest trees are present within the Study Area, but no indication of nesting (or presence of the species) was observed during site visits. May occasionally forage there.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
burrowing owl *Athene cunicularia*	SSC	Year-round resident and winter visitor. Occurs in open, dry grasslands and scrub habitats with low-growing vegetation, perches and abundant mammal burrows. Preys upon insects and small vertebrates. Nests and roosts in old mammal burrows, most commonly those of ground squirrels.	**Unlikely.** The Study Area provides some open grassland. However, this species is extirpated from Marin County as a breeder (Shuford and Gardali 2008); recent, local wintering observations are concentrated on the Point Reyes Peninsula or areas with large expanses of grassland/pastureland, the nearest located approximately 1.5 miles to the north (eBird 2022).	No further actions are recommended.
marbled murrelet *Brachyramphus marmoratus*	FT, SE	Predominantly coastal marine. Nests in old-growth coniferous forests up to 30 miles inland along the Pacific coast, from Eureka to Oregon border, and in Santa Cruz/San Mateo Counties. Nests are highly cryptic, and typically located on platform-like branches of mature redwoods and Douglas firs. Forages on marine invertebrates and small fishes.	**No Potential.** The Study Area does not contain coniferous forest and provides no habitat for this species.	No further actions are recommended.
western snowy plover *Charadrius nivosus (alexandrines) nivosus*	FT, SSC	Federal listing applies only to the Pacific coastal population. Year-round resident and winter visitor. Occurs on sandy beaches, salt pond levees, and the shores of large alkali lakes. Nests on the ground, requiring sandy, gravelly or friable soils.	**No Potential.** The Study Area lacks suitable beach or shoreline habitat, and does not provide any suitable nesting substrates.	No further actions are recommended.

SPECIES	**STATUS***	**HABITAT**	**POTENTIAL FOR OCCURRENCE**	**RECOMMENDATIONS**
northern harrier *Circus cyaneus*	SSC	Year-round resident and winter visitor. Found in open habitats including grasslands, prairies, marshes and agricultural areas. Nests on the ground in dense vegetation, typically near water or otherwise moist areas. Preys on small vertebrates.	**Unlikely (nesting).** The Study Area provides suitable foraging habitat and is within this species' local nesting range (Shuford 1993). However, areas of grassland area relatively small in area and disturbed by surrounding development, rendering nesting unlikely.	No further actions are recommended.
western yellow-billed cuckoo *Coccyzus americanus occidentalis*	FT, SE	Summer resident, breeding in dense riparian forests and jungles, typically with early successional vegetation present. Utilizes densely-foliaged deciduous trees and shrubs. Eats mostly caterpillars. Current breeding distribution within California very restricted.	**Unlikely.** Riparian woodland is present within the Study Area, but there are no modern breeding records in Marin County (Shuford 1993).	No further actions are recommended.
black swift *Cypseloides niger*	SSC	Summer resident with a fragmented breeding distribution; most occupied areas in California either montane or coastal. Breeds in small colonies on cliffs behind or adjacent to waterfalls, in deep canyons, and sea-bluffs above surf. Forages aerially over wide areas.	**No Potential.** Study Area lacks any suitable nesting habitat (waterfalls, cliffs).	No further actions are recommended.
white-tailed kite *Elanus leucurus*	SFP	Year-long resident of coastal and valley lowlands, including agricultural areas. Nests in a variety of tree types. Preys on small diurnal mammals and occasional birds, insects, reptiles, and amphibians.	**Moderate Potential.** The Study Area provides suitable nest trees and adjacent open areas for foraging.	Perform pre-construction surveys if tree removal and/or ground disturbance is initiated during the nesting season; see report section 6.2.2.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
tufted puffin *Fratercula cirrhata*	SSC	Pelagic and coastal marine. Nests near or along the coast on islands, islets, and (rarely) isolated mainland cliffs. Requires sod or earth into which the birds can burrow, or rocky crevices where friable soil is absent. Forages at sea, primarily for fish.	**No Potential.** The Study Area does not contain marine waters or coastal islets/islands for nesting.	No further actions are recommended.
San Francisco (saltmarsh) common yellowthroat *Geothlypis trichas sinuosa*	SSC	Resident of the San Francisco Bay region, in fresh and salt water marshes. Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, willows for nesting.	**Moderate Potential.** While the Study Area lacks dense and well-developed marsh habitat, moist riparian areas with a dense understory may support this species.	Perform pre-construction surveys if vegetation removal and/or ground disturbance in or adjacent to riparian woodland is initiated during the nesting season; see report section 6.2.2.
bald eagle *Haliaeetus leucocephalus*	SE, SFP	Occurs year-round in California, but primarily a winter visitor. Nests in large trees in the vicinity of larger lakes, reservoirs and rivers. Wintering habitat somewhat more variable but usually features large concentrations of waterfowl or fish.	**Unlikely.** Nests locally on Inverness Ridge. No typical nest trees are present in the Study Area nor was any indication of presence observed during site visits.	No further actions are recommended.
California black rail *Laterallus jamaicensis coturniculus*	ST, SFP	Year-round resident in marshes (saline to freshwater) with dense vegetation within four inches of the ground. Prefers larger, undisturbed marshes that have an extensive upper zone and are close to a major water source. Extremely secretive and cryptic.	**No Potential.** The Study Area lacks extensive tidal or brackish marsh.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
ashy storm-petrel *Oceanodroma homochroa*	SSC	Marine species; nests in rocky crevices on offshore islands and rocks from southern Mendocino County to northern Baja California. Forages over open ocean for invertebrates and larval fishes.	**No Potential.** The Study Area does not contain marine waters or coastal islets/islands for nesting.	No further actions are recommended.
Bryant's savannah sparrow *Passerculus sandwichensis alaudinus*	SSC	Year-round resident associated with the coastal fog belt, primarily between Humboldt and northern Monterey Counties. Occupies low tidally influenced habitats and adjacent areas; often found where wetland communities merge into grassland. May also occur in drier grasslands. Nests near the ground in taller vegetation, including along roads, levees, and canals.	**Moderate Potential.** Areas of open grassland within the Study Area are limited in contiguous extent, but may be large enough to support this species.	Perform pre-construction surveys if vegetation removal and/or ground disturbance is initiated during the nesting season; see report section 6.2.2.
California Ridgway's (clapper) rail *Rallus obsoletus obsoletus*	FE, SE, SFP	Year-round resident in tidal marshes of the San Francisco Bay estuary. Requires tidal sloughs and intertidal mud flats for foraging, and dense marsh vegetation for nesting and cover. Typical habitat features abundant growth of cordgrass and pickleweed. Feeds primarily on molluscs and crustaceans.	**No Potential.** The Study Area does not feature any tidal marsh.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
bank swallow *Riparia riparia*	ST	Summer resident in riparian and other lowland habitats near rivers, lakes and the ocean in northern California. Nests colonially in excavated burrows on vertical cliffs and bank cuts (natural and manmade) with fine-textured soils. Currently known to breed in Siskiyou, Shasta, and Lassen Cos., portions of the north coast, and along Sacramento River from Shasta Co. south to Yolo Co.	**No Potential.** The Study Area lacks suitable cliff and riparian habitat; no local modern breeding records.	No further actions are recommended.
yellow warbler *Setophaga petechia brewsteri*	SSC	Summer resident throughout much of California. Breeds in riparian vegetation close to water, including streams and wet meadows. Microhabitat used for nesting variable, but dense willow growth is typical. Occurs widely on migration.	**Moderate Potential.** Riparian woodland and thickets within the Study Area provides suitable nesting habitat.	Perform pre-construction surveys if tree removal and/or ground disturbance in or adjacent to riparian woodland is initiated during the nesting season; see report section 6.2.2.
northern spotted owl *Strix occidentalis caurina*	FT,ST, SSC	Year-round resident in dense, structurally complex forests, generally with old-growth or otherwise mature conifers. In Marin County, uses both coniferous and mixed (coniferous-hardwood) forests. Nests on platform-like substrates in the forest canopy, including in tree cavities. Preys mostly on mammals.	**Unlikely.** The Study Area lacks mature coniferous or mixed forest of the type this species requires.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
REPTILES AND AMPHIBIANS				
western pond turtle *Actinemys marmorata*	SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches with aquatic vegetation. Require basking sites such as partially submerged logs, vegetation mats, or open mud banks, and suitable upland habitat (sandy banks or grassy open fields) for egg-laying.	**High Potential (Lagunitas Creek).** This species is presumably present at least intermittently in Lagunitas Creek, but is unlikely overall to be present within the Project Area.	No further actions are recommended; see report section 6.2.2.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
California tiger salamander *Ambystoma californiense*	FE/FT, ST, SSC	Populations in Santa Barbara and Sonoma counties currently listed as endangered; threatened in remainder of range. Inhabits grassland, oak woodland and savannah. Spends most of life underground in mammal burrows and similar refugia. Vernal pools and other seasonal water features used for breeding.	**No Potential.** The Study Area is outside of this species' local range.	No further actions are recommended.
California giant salamander *Dicamptodon ensatus*	SSC	Occurs in the north-central Coast Ranges. Moist coniferous and mixed forests are typical habitat; also uses woodland and chaparral. Adults are terrestrial and fossorial, breeding in cold, permanent or semi-permanent streams. Larvae usually remain aquatic for over a year.	**Unlikely.** The reach of Lagunitas Creek within the Study Area is presumably too saline and has unfavorable hydrology (very strong flows during the wet season) to support breeding; typical forested freshwater streams are absent.	No further actions are recommended.
California red-legged frog *Rana draytonii*	FT, SSC	Lowlands and foothills in or near permanent sources of deep water with dense emergent and/or overhanging riparian vegetation. Favors perennial to intermittent ponds, stream pools and wetlands. Requires 11 to 20 weeks of continuous inundation for larval development. Disperses through upland habitats during and after rains.	**Moderate Potential.** Aquatic breeding within the Study Area is unlikely, but may occur in non-breeding aquatic habitat (e.g., inundated stream side channels), and also in upland areas during movement or dispersal. There are several CNDDB occurrences within 1 mile (CDFW 2022a).	Pre-construction surveys, avoidance measures during construction, and possibly consultation with the USFWS; see report section 6.2.2.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
foothill yellow-legged frog *Rana boylii*	SSC	Found in or near rocky streams in a variety of habitats. Prefers partly-shaded, shallow streams and riffles with a rocky substrate; requires at least some cobble-sized substrate for egg-laying. Needs at least 15 weeks to attain metamorphosis. Feeds on both aquatic and terrestrial invertebrates. Highly aquatic.	**No Potential.** The Study Area lacks typical rocky stream habitat; this species appears to be extirpated in the vicinity (CDFW 2022a).	No further actions are recommended.
FISHES				
Coho salmon - central CA coast ESU *Oncorhynchus kisutch*	FE, SE	Federal listing includes populations between Punta Gorda and San Lorenzo River. State listing includes populations south of San Francisco Bay only. Occurs inland and in coastal marine waters. Requires beds of loose, silt-free, coarse gravel for spawning. Also needs cover, cool water and sufficient dissolved oxygen.	**Present (Lagunitas Creek only).** Lagunitas Creek and several tributary streams support spawning populations of this species (CDFW 2022a); individuals likely present primarily during in- and out-migrations.	Lagunitas Creek and directly associated riparian vegetation should be completely avoided; see report section 6.2.2.
steelhead - central CA coast DPS *Oncorhynchus mykiss irideus*	FT, NMFS	Occurs from the Russian River south to Soquel Creek and Pajaro River. Also in San Francisco and San Pablo Bay Basins. Adults migrate upstream to spawn in cool, clear, well-oxygenated streams. Juveniles remain in fresh water for 1 or more years before migrating downstream to the ocean.	**Present (Lagunitas Creek only).** Lagunitas Creek and portions of its watershed support spawning populations of this species (CDFW 2022a); individuals likely present primarily during in- and out-migrations.	Lagunitas Creek and directly associated riparian vegetation should be completely avoided; see report section 6.2.2.

SPECIES	**STATUS***	**HABITAT**	**POTENTIAL FOR OCCURRENCE**	**RECOMMENDATIONS**
Tomales roach *Lavinia symmetricus* ssp. 2	SSC	Occurs in tributaries to Tomales Bay. Habitat generalist, tolerant of relatively high temperatures and low oxygen levels in a variety of freshwater stream reaches. Intolerant of highly saline conditions.	**High Potential (Lagunitas Creek only).** The reach of Lagunitas Creek within the Study Area may support this species, presumably dependent on when low-salinity conditions exist.	Lagunitas Creek and directly associated riparian vegetation should be completely avoided; see report section 6.2.2.
tidewater goby *Eucyclogobius newberryi*	FE, SSC	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River. Found in shallow lagoons and lower stream reaches, they need fairly still but not stagnant water and high oxygen levels.	**Unlikely.** Although there are historic occurrences in lower Lagunitas Creek, as per CDFW (2022a) the species is now likely extirpated there.	No further actions are recommended.
longfin smelt *Spirinchus thaleichthys*	FC, ST	Euryhaline, nektonic and anadromous. Found in open waters of estuaries, mostly in middle or bottom of water column. Prefer salinities of 15 to 30 ppt, but can be found in completely freshwater to almost pure seawater.	**Unlikely.** This species is known from Tomales Bay, though apparently spawning in Lagunitas Creek has not been documented; reach of the creek within the Study Area may be too fresh.	No further actions are recommended.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE	RECOMMENDATIONS
INVERTEBRATES				
western bumblebee *Bombus occidentalis*	SC	Formerly common throughout much of western North America; populations from southern British Columbia to central California have nearly disappeared. Occurs in a wide variety of habitat types. Nests are constructed annually in pre-existing cavities, usually those on the ground (e.g. mammal burrows). Many plant species are visited and pollinated.	**Unlikely.** Although there are documented occurrences in CNDDB within 5 miles, this species is considered extirpated from the greater San Francisco Bay Area.	No further actions are recommended.
San Bruno elfin butterfly *Callophrys mossii bayensis*	FE	Restricted to the vicinity of San Bruno Mountain, San Mateo County. Colonies are located on in rocky outcrops and cliffs in coastal scrub habitat on steep, north-facing slopes within the fog belt. Species range is tied to the distribution of the larval host plant, *Sedum spathulifolium*.	**No Potential.** Species is currerntly confined to San Mateo County.	No further actions are recommended.
monarch butterfly *Danaus plexippus*	FC; winter roosts protected by CDFW	Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico. Roosts located in wind-protected tree groves (usually eucalyptus, Monterey pine, Monterey cypress), with nectar and water sources nearby.	**Moderate Potential (winter roosting).** While there is no record of monarch roosting within or in proximity to the Study Area, the site provides mature eucalyptus trees that could be support roosting by this species.	A winter roost survey should be performed prior to tree removal; see report section 6.2.2.

SPECIES	**STATUS***	**HABITAT**	**POTENTIAL FOR OCCURRENCE**	**RECOMMENDATIONS**
Mission blue butterfly *Icaricia icarioides missionensis*	FE	Inhabits grasslands and coastal chaparral of the San Francisco peninsula and southern Marin County, but mostly found on San Bruno Mountain. Three larval host plants: *Lupinus albifrons*, *L. variicolor*, and *L. formosus*, of which *L. albifrons* is favored.	**No Potential.** The Study Area does not support the host plants and is outside of this species' known range.	No further actions are recommended.
Myrtle's silverspot butterfly *Speyeria zerene myrtleae*	FE	Restricted to the fog belt of northern Marin and southernmost Sonoma County, including the Point Reyes Peninsula; extirpated from coastal San Mateo County. Occurs in coastal prairie, dunes, and grassland. Larval foodplant is typically *Viola adunca*. Adult flight season may range from late June to early September.	**Unlikely.** While the Study Area provides grassland areas, *Viola* (host plant) was not observed there during appropriamtely-timed botanical surveys. The nearest occurrence in CNDDB is located greater than 5 miles to the west on the Point Reyes Peninsula (CDFW 2022a).	No further actions are recommended.
California freshwater shrimp *Syncaris pacifica*	FE, SE	Endemic to Marin, Napa, and Sonoma counties. Found in low elevation, low gradient streams where riparian cover is moderate to heavy. Favors shallow pools away from the main stream flow. Winter: undercut banks with exposed roots; summer: leafy branches touching water.	**Present (Lagunitas Creek only).** This species is known from Lagunitas Creek and as per CDFW (2022a), was observed "to Point Reyes Station" in 1988-1989; presence is thus assumed. Local presence may vary seasonally depenent on aquatic conditions.	Lagunitas Creek and directly associated riparian vegetation should be completely avoided; see report section 6.0.

*** Key to status codes:**

FE	Federal Endangered
FT	Federal Threatened
SE	State Endangered
SD	State Delisted
ST	State Threatened
SSC	Species of Special Concern
SSI	Special Status Invertebrate
CFP	CDFW Fully Protected
BCC	Bird of Conservation Concern
WBWG	Western Bat Working Group Medium or High Priority
California Rare Plant Rank (CRPR)	
Rank 1A	CRPR 1A: Plants presumed extinct in California
Rank 1B	CRPR 1B: Plants rare, threatened or endangered in California and elsewhere
Rank 2A	CRPR 2A: Plants presumed extirpated in California, but more common elsewhere
Rank 2B	CRPR 2B: Plants rare, threatened, or endangered in California, but more common elsewhere
Rank 3	CRPR 3: Plants about which CNPS needs more information (a review list)
Rank 4	CRPR 4: Plants of limited distribution (a watch list)
Threat Ranks	
0.1	Seriously threatened in California
0.2	Moderately threatened in California
0.3	Not very threatened in California

****Potential to Occur:**
No Potential. Habitat on and adjacent to the site is clearly unsuitable for the species requirements (cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).
Unlikely. Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.
Moderate Potential. Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.
High Potential. All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.

*****Results and Recommendations:**
Present. Species was observed on the site or has been recorded (i.e. CNDDB, other reports) on the site recently.
Assumed Present. Species has a high likelihood of occurring and actions to avoid/mitigate impacts are recommended; surveys not conducted.

Assumed Absent. Species is assumed to not be present or utilize the site due to a lack of key habitat components.
Not Observed. Species was not observed during protocol-level surveys.

Appendix D

Representative Photographs

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Photograph 1. Photograph depicting developed/landscaped area including the entry road at left and existing gravel parking area in the Project Area. Photograph taken April 9, 2021.

Photograph 2. Photograph depicting developed/landscaped area consisting of the previously developed USCG housing site. Photograph taken April 9, 2021.

Photograph 3. Photograph depicting low-lying CCC seasonal wetland and Corps seasonal wetland area (aquatic ESHAs) in foreground in southwest portion of Study Area, outside of Project Area. Riparian arroyo willow thicket (aquatic ESHA) seen in the background. Photograph taken January 20, 2021.

Photograph 4. Photograph a representative portion of Lagunitas Creek, an aquatic ESHA, within the Study Area (left bank and riparian are in the Study Area; area across creek outside of Study Area). Photograph taken January 20, 2021.

Photograph 5. Photograph depicting a Corps seasonal wetland, an aquatic ESHA, in the southwestern portion of the Study Area. Photograph taken April 9, 2021.

Photograph 6. Photograph depicting purple needlegrass grassland, a terrestrial ESHA in the northeast portion of the Study Area on a slope above the developed/landscaped area. Photograph taken April 9, 2021.

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Marin County, California

Local office

Sacramento Fish And Wildlife Office

☎ (916) 414-6600
📠 (916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Salt Marsh Harvest Mouse Reithrodontomys raviventris Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/613	Endangered

Birds

NAME	STATUS
California Least Tern Sterna antillarum browni Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8104	Endangered
Hawaiian Petrel Pterodroma sandwichensis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6746	Endangered
Marbled Murrelet Brachyramphus marmoratus There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/4467	Threatened

Northern Spotted Owl Strix occidentalis caurina Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1123	Threatened
Short-tailed Albatross Phoebastria (=Diomedea) albatrus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/433	Endangered
Western Snowy Plover Charadrius nivosus nivosus There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/8035	Threatened
Yellow-billed Cuckoo Coccyzus americanus There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

Reptiles

NAME	STATUS
Green Sea Turtle Chelonia mydas No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6199	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog Rana draytonii Wherever found There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/2891	Threatened

Fishes

NAME	STATUS
Longfin Smelt Spirinchus thaleichthys No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9011	Proposed Endangered
Tidewater Goby Eucyclogobius newberryi Wherever found There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/57	Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate
Myrtle's Silverspot Butterfly Speyeria zerene myrtleae Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6929	Endangered

Crustaceans

NAME	STATUS

California Freshwater Shrimp Syncaris pacifica Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7903	Endangered

Flowering Plants

NAME	STATUS
Baker's Larkspur Delphinium bakeri Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/5031	Endangered
Clover (tidestrom''s) Lupine Lupinus tidestromii Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4459	Endangered
Marin Dwarf-flax Hesperolinon congestum Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5363	Threatened
Robust Spineflower Chorizanthe robusta var. robusta Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/9287	Endangered
Showy Indian Clover Trifolium amoenum Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6459	Endangered
Sonoma Alopecurus Alopecurus aequalis var. sonomensis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/557	Endangered
Sonoma Spineflower Chorizanthe valida Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7698	Endangered
Tiburon Paintbrush Castilleja affinis ssp. neglecta Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2687	Endangered
Yellow Larkspur Delphinium luteum Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/3578	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
California Red-legged Frog Rana draytonii https://ecos.fws.gov/ecp/species/2891#crithab	Final

Marbled Murrelet Brachyramphus marmoratus https://ecos.fws.gov/ecp/species/4467#crithab	Final
Tidewater Goby Eucyclogobius newberryi https://ecos.fws.gov/ecp/species/57#crithab	Final

Bald & Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

Additional information can be found using the following links:

- Eagle Managment https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Jan 1 to Aug 31
Golden Eagle Aquila chrysaetos This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (🟩)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

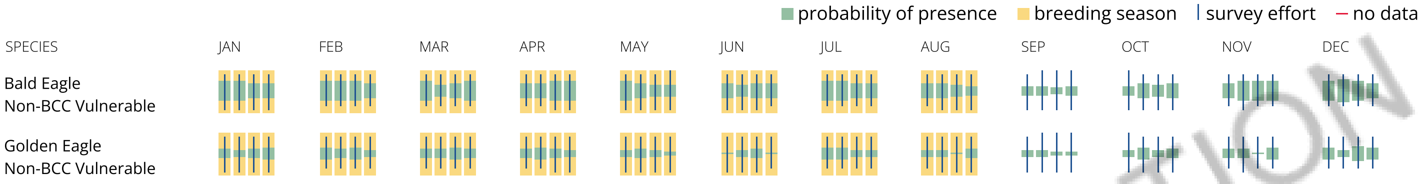
Breeding Season (🟨)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/ documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Allen's Hummingbird Selasphorus sasin This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9637	Breeds Feb 1 to Jul 15
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Jan 1 to Aug 31
Belding's Savannah Sparrow Passerculus sandwichensis beldingi This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8	Breeds Apr 1 to Aug 15
Black Oystercatcher Haematopus bachmani This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9591	Breeds Apr 15 to Oct 31
Black Scoter Melanitta nigra This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Black Swift Cypseloides niger This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8878	Breeds Jun 15 to Sep 10
Black Turnstone Arenaria melanocephala This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Black-footed Albatross Phoebastria nigripes This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8033	Breeds elsewhere
Black-legged Kittiwake Rissa tridactyla This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Black-vented Shearwater Puffinus opisthomelas This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Brown Pelican Pelecanus occidentalis This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Jan 15 to Sep 30
Bullock's Oriole Icterus bullockii This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Mar 21 to Jul 25

California Gull Larus californicus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 1 to Jul 31
California Thrasher Toxostoma redivivum This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jan 1 to Jul 31
Cassin's Finch Carpodacus cassinii This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9462	Breeds May 15 to Jul 15
Clark's Grebe Aechmophorus clarkii This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jun 1 to Aug 31
Common Loon gavia immer This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/4464	Breeds Apr 15 to Oct 31
Common Murre Uria aalge This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Apr 15 to Aug 15
Common Yellowthroat Geothlypis trichas sinuosa This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/2084	Breeds May 20 to Jul 31
Double-crested Cormorant phalacrocorax auritus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/3478	Breeds Apr 20 to Aug 31
Golden Eagle Aquila chrysaetos This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31
Lawrence's Goldfinch Carduelis lawrencei This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9464	Breeds Mar 20 to Sep 20
Long-eared Owl asio otus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3631	Breeds Mar 1 to Jul 15
Long-tailed Duck Clangula hyemalis This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/7238	Breeds elsewhere
Marbled Godwit Limosa fedoa This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds elsewhere
Nuttall's Woodpecker Picoides nuttallii This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9410	Breeds Apr 1 to Jul 20

Oak Titmouse Baeolophus inornatus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9656	Breeds Mar 15 to Jul 15
Olive-sided Flycatcher Contopus cooperi This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31
Pink-footed Shearwater Puffinus creatopus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Pomarine Jaeger Stercorarius pomarinus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Red Phalarope Phalaropus fulicarius This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Red-breasted Merganser Mergus serrator This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Red-necked Phalarope Phalaropus lobatus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Red-throated Loon Gavia stellata This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Ring-billed Gull Larus delawarensis This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Short-billed Dowitcher Limnodromus griseus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Surf Scoter Melanitta perspicillata This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Tricolored Blackbird Agelaius tricolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3910	Breeds Mar 15 to Aug 10
Western Grebe aechmophorus occidentalis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/6743	Breeds Jun 1 to Aug 31
White-winged Scoter Melanitta fusca This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere

Willet *Tringa semipalmata* — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wrentit *Chamaea fasciata* — Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Yellow Rail *Coturnicops noveboracensis* — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9476

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (🟩)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

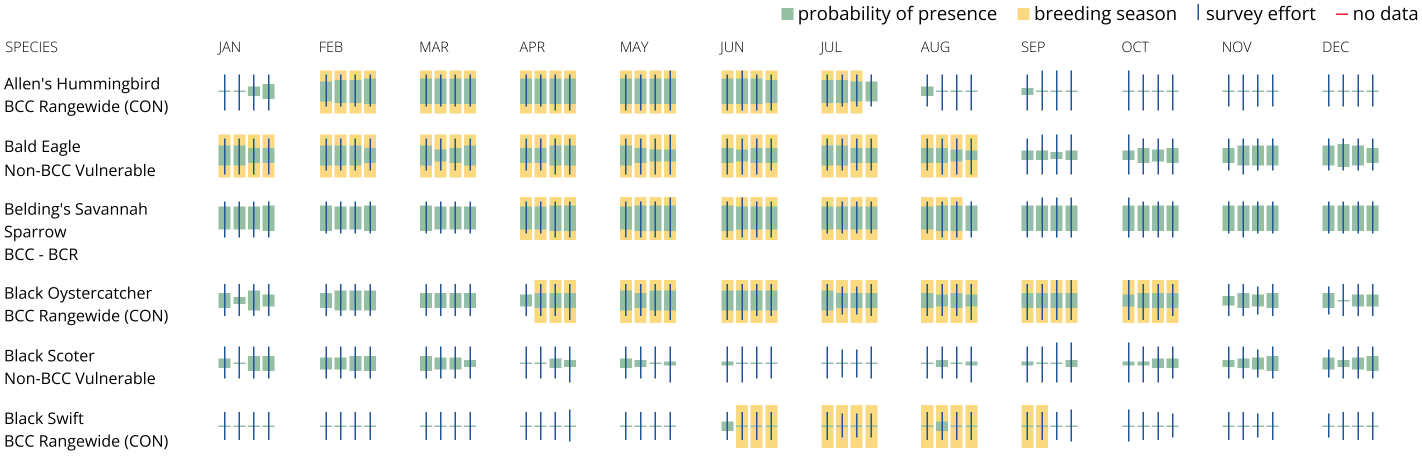
Breeding Season (🟨)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Black Turnstone
BCC Rangewide (CON)

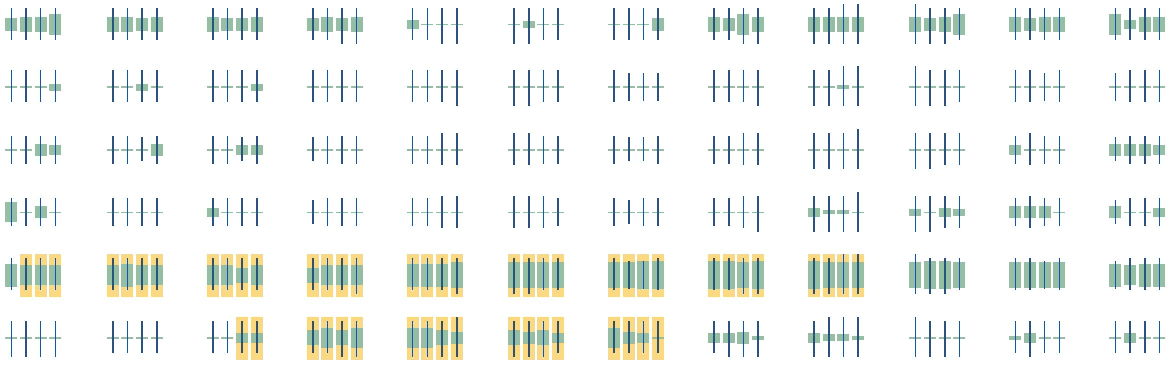
Black-footed Albatross
BCC Rangewide (CON)

Black-legged Kittiwake
Non-BCC Vulnerable

Black-vented Shearwater
BCC Rangewide (CON)

Brown Pelican
Non-BCC Vulnerable

Bullock's Oriole
BCC - BCR



SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

California Gull
BCC Rangewide (CON)

California Thrasher
BCC Rangewide (CON)

Cassin's Finch
BCC Rangewide (CON)

Clark's Grebe
BCC Rangewide (CON)

Common Loon
Non-BCC Vulnerable

Common Murre
Non-BCC Vulnerable

Common Yellowthroat
BCC - BCR

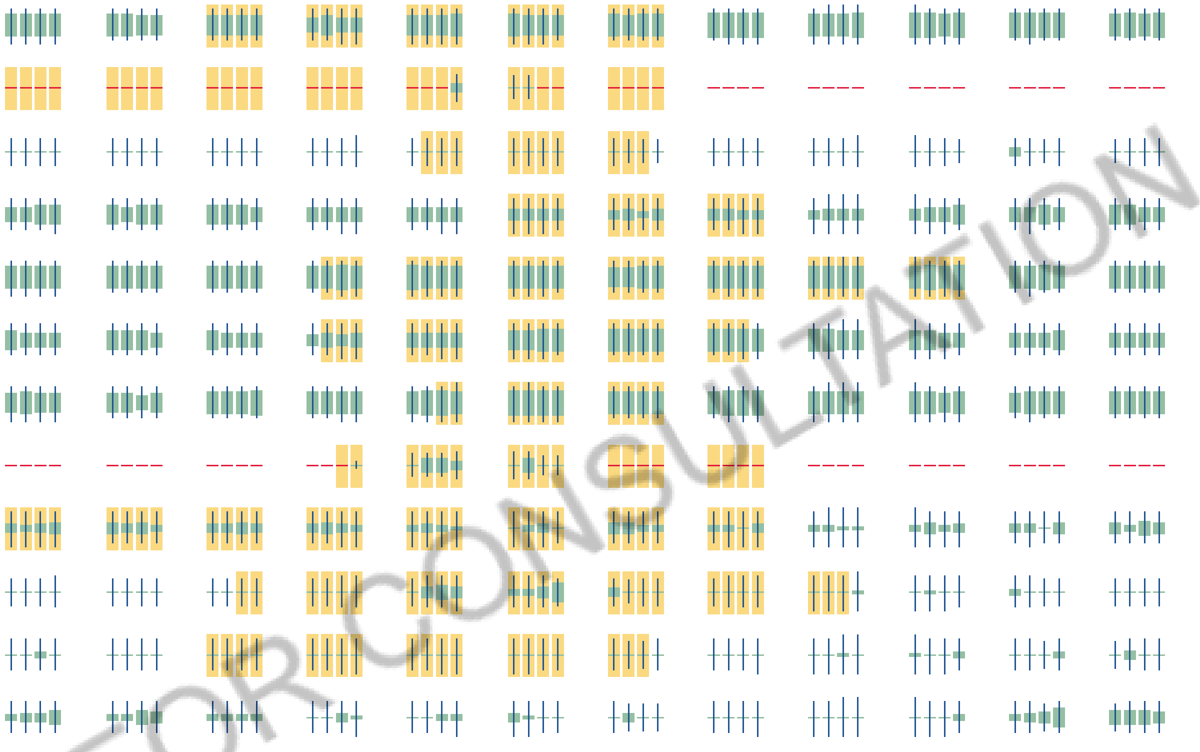
Double-crested Cormorant
Non-BCC Vulnerable

Golden Eagle
Non-BCC Vulnerable

Lawrence's Goldfinch
BCC Rangewide (CON)

Long-eared Owl
BCC Rangewide (CON)

Long-tailed Duck
Non-BCC Vulnerable



SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Marbled Godwit
BCC Rangewide (CON)

Nuttall's Woodpecker
BCC - BCR

Oak Titmouse
BCC Rangewide (CON)

Olive-sided Flycatcher
BCC Rangewide (CON)

Pink-footed Shearwater
BCC Rangewide (CON)

Pomarine Jaeger
Non-BCC Vulnerable

Red Phalarope
Non-BCC Vulnerable

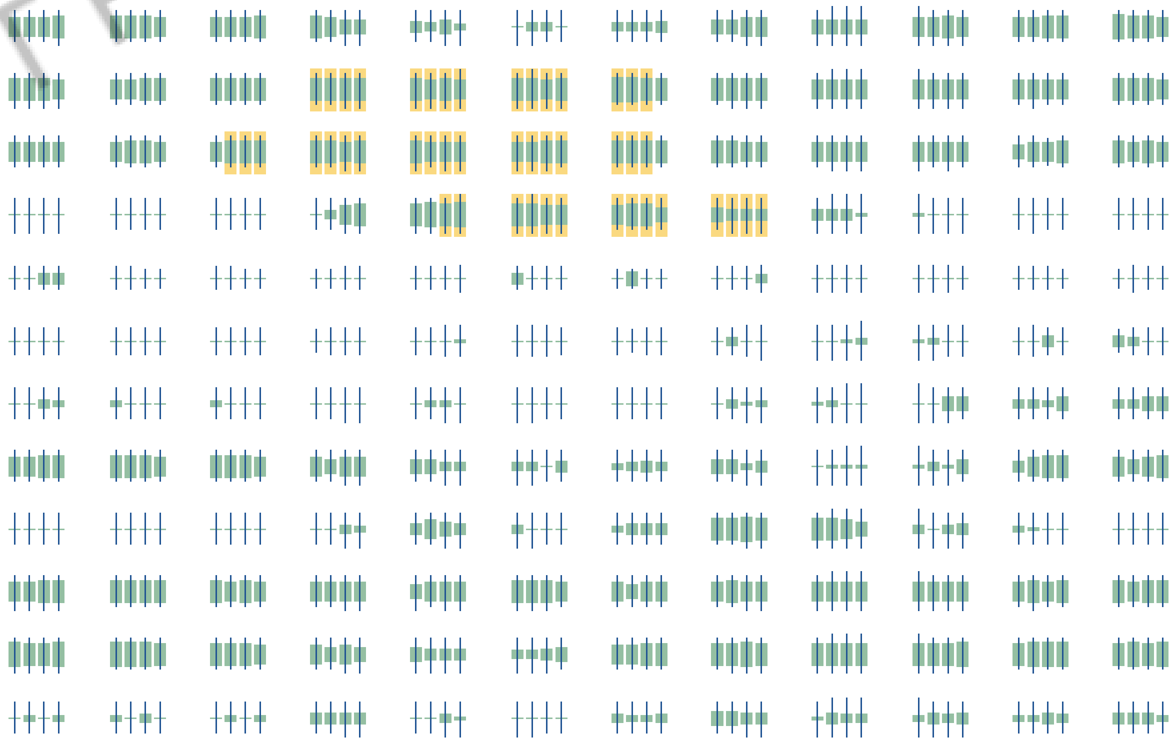
Red-breasted Merganser
Non-BCC Vulnerable

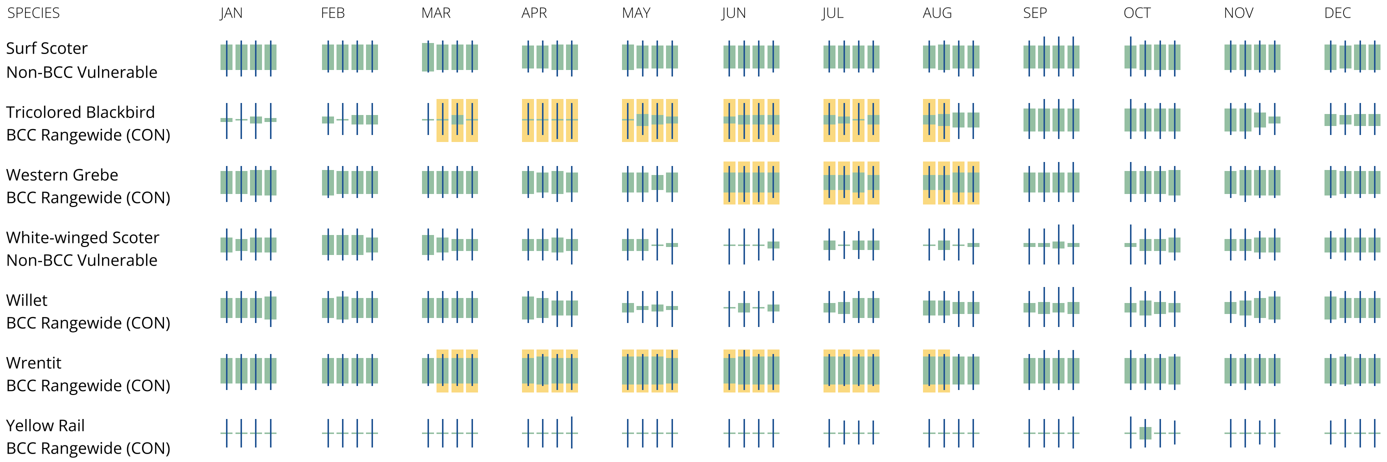
Red-necked Phalarope
Non-BCC Vulnerable

Red-throated Loon
Non-BCC Vulnerable

Ring-billed Gull
Non-BCC Vulnerable

Short-billed Dowitcher
BCC Rangewide (CON)





Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

California Native Plant Society

Plant Species with the Potential to Occur within the Project Area

Common Name	Latin Name
Under Redwoods	
Showy Milkweed	*Asclepias speciosa*
Deer Fern	*Blechnum (Struthiopteris) spicant*
Low blue blossom	*Ceanothus thyrsiflorus repens*
Red twig dogwood	*Comus stolonifera*
Coastal wood fern	*Dryopteris arguta*
Coast strawberry	*Frageria chiloensis or vesca*
Cherry Moneyflower	*Mimulus aurantiacus 'cherry'*
Seep monkeyflower	*Mimulus guttatus*
Thimbleberry	*Rubus parviflorus*
Western azalea	*Rhododendron occidentale*
Yerba Buena	*Satureja douglasii*
Under Pines/Oaks/Cypress	
Yarrow	*Achillea millefolium*
Litte Sur Manzanita	*Arctostaphylos edmundsii 'Little Sur'*
Carmel Sur Manzanita	*Arctostaphylos edmundsii 'Carmel Sur'*
Leafy reed grass	*Calamagrostis foliosia*
Heuchera varieties	*Heuchera spp.*
Canyon Prince Wildrye	*Leymus condensatus 'Canyon Prince'*
Oregon Grape	*Mahonia aquifolium*
California Holly Grape	*Mahonia pinnata*
Deer Grass	*Muhlenbergia rigens*
Western sword fern	*Polystichum munitum*
Creeping sage	*Salvia sonomensis*

Common Name	Latin Name
Hummingbird sage	*Salvia spathacea*
No Mow Turf	
Delta Blue Grass Native Mow Free	*Festuca idahoensis, Festuca rubra, Festuca occidentalis*
Riparian Edge	
Service-berry	*Amelanchier alnifolia*
Dwarf coyote bush	*Baccharis pilularis*
Red twig dogwood	*Cornus stolonifera*
Ocean Spray	*Holodiscus discolor*
Cherry Moneyflower	*Mimulus aurantiacus 'cherry'*
Western azalea	*Rhododendron occidentale*
Thimbleberry	*Rubus parviflorus*
California huckleberry	*Vaccinium ovatum*
Western chain fern	*Woodwardia fimbriata*
Under Removed Eucalyptus	
Dwarf coyote bush	*Baccharis pilularis*
Leafy reed grass	*Calamagrostis foliosia*
Seaside daisy	*Erigeron glaucus*
Toyon	*Heteromeles arbutifolia*
Deer Grass	*Muhlenbergia rigens*
Coffeeberry	*Rhamnus californica (Frangula cal.)*
Purple Sage	*Salvia leucophylla*
Stormwater Plants	
Yarrow	*Achillea millefolium*
Cape Rush	*Chondropetalum tectorum*
Common Rush	*Juncus effusus*
Brown Headed Rush	*Juncus phaocephalus*
Canyon Prince Wildrye	*Leymus condensatus 'Canyon Prince'*
Native Erosion Control Seed Mix	
California Brome	*Bromus carinatus*
Blue Wildrye	*Elymus glaucus*

Common Name	Latin Name
Three Weeks Fescue	*Festuca microstachys*
Purple needle grass	*Nassella pulchra*
Tomcat Clover	*Trifolium willdenovii*
Irrigated Wildflowers and Grasses	
Yarrow	*Achillea millefolium*
Red fuscue	*Festuca rubra*
California barley	*Hordum californicum*
Meadow barley	*Hordeum brachyantherum*
Goodfields	*Lasthenia glabrata*
Native erosion control seed mix	*Phacelia campanularia*
Creeping sage	*Salvia sonomensis*
Blue-Eyed Grass	*Sisyrinchium bellum*
Grasses	
Purple Three Awn	*Artistida purpurea*
Blue Grama	*Bouteloua gracilis*
Leafy red grass	*Calamagrostis foliosia*
Berkeley Sedge	*Carex tumulicola*
Tufted Hair Grass	*Deschampsia cespitosa*
California Fescue	*Festuca idahoensis*
Deer Grass	*Muhlenbergia rigens*
Groundcovers	
Pacific Mist Manzanita	*Arctostaphylos 'Pacific Mist'*
California honeysuckle	*Lonicera hispidula*

APPENDIX C

CALEEMOD

USCG Pt Reyes Housing Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	USCG Pt Reyes Housing
Construction Start Date	1/1/2024
Operational Year	2026
Lead Agency	Marin County
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.20
Precipitation (days)	49.8
Location	38.06821086838124, -122.8002538807811
County	Marin
City	Unincorporated
Air District	Bay Area AQMD
Air Basin	San Francisco Bay Area
TAZ	906
EDFZ	2
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.20

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description

Condo/Townhouse	54.0	Dwelling Unit	3.38	62,452	0.00	307,000	130	Residential
Parking Lot	119	Space	1.07	0.00	0.00	0.00	—	Parking Areas
General Light Industry	26.0	1000sqft	0.60	674	0.00	0.00	—	WWTP

1.3. User-Selected Emission Reduction Measures by Emissions Sector

Sector	#	Measure Title
Transportation	T-4	Integrate Affordable and Below Market Rate Housing
Transportation	T-14*	Provide Electric Vehicle Charging Infrastructure
Transportation	T-34*	Provide Bike Parking
Energy	E-10-B	Establish Onsite Renewable Energy Systems: Solar Power
Energy	E-24*	Provide Battery Storage
Water	W-1	Use Reclaimed Non-Potable Water

* Qualitative or supporting measure. Emission reductions not included in the mitigated emissions results.

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.37	7.42	13.8	24.7	0.03	0.50	2.42	2.93	0.46	0.51	0.97	—	5,111	5,111	0.26	0.23	9.58	5,197
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	3.00	8.28	17.1	30.5	0.03	0.59	3.26	3.86	0.54	0.69	1.24	—	6,307	6,307	0.33	0.29	0.33	6,403

Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.83	2.68	4.18	8.51	0.01	0.13	1.01	1.14	0.12	0.23	0.34	—	1,799	1,799	0.08	0.08	1.95	1,825
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.15	0.49	0.76	1.55	< 0.005	0.02	0.18	0.21	0.02	0.04	0.06	—	298	298	0.01	0.01	0.32	302

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	2.37	1.95	13.8	24.7	0.03	0.50	2.42	2.93	0.46	0.51	0.97	—	5,111	5,111	0.26	0.23	9.58	5,197
2025	0.65	7.42	1.47	6.20	< 0.005	0.04	0.99	1.03	0.03	0.23	0.27	—	1,213	1,213	0.03	0.04	4.19	1,230
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	3.00	8.28	17.1	30.5	0.03	0.59	3.26	3.86	0.54	0.69	1.24	—	6,307	6,307	0.33	0.29	0.33	6,403
2025	1.38	8.21	4.77	13.9	0.01	0.17	1.98	2.15	0.16	0.47	0.62	—	2,722	2,722	0.09	0.09	0.22	2,751
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.83	0.76	4.18	8.51	0.01	0.13	1.01	1.14	0.12	0.23	0.34	—	1,799	1,799	0.08	0.08	1.95	1,825
2025	0.26	2.68	0.71	2.43	< 0.005	0.02	0.39	0.41	0.02	0.09	0.11	—	495	495	0.01	0.02	0.74	502
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.15	0.14	0.76	1.55	< 0.005	0.02	0.18	0.21	0.02	0.04	0.06	—	298	298	0.01	0.01	0.32	302
2025	0.05	0.49	0.13	0.44	< 0.005	< 0.005	0.07	0.08	< 0.005	0.02	0.02	—	82.0	82.0	< 0.005	< 0.005	0.12	83.0

2.3. Construction Emissions by Year, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	2.37	1.95	13.8	24.7	0.03	0.50	2.42	2.93	0.46	0.51	0.97	—	5,111	5,111	0.26	0.23	9.58	5,197
2025	0.65	7.42	1.47	6.20	< 0.005	0.04	0.99	1.03	0.03	0.23	0.27	—	1,213	1,213	0.03	0.04	4.19	1,230
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	3.00	8.28	17.1	30.5	0.03	0.59	3.26	3.86	0.54	0.69	1.24	—	6,307	6,307	0.33	0.29	0.33	6,403
2025	1.38	8.21	4.77	13.9	0.01	0.17	1.98	2.15	0.16	0.47	0.62	—	2,722	2,722	0.09	0.09	0.22	2,751
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.83	0.76	4.18	8.51	0.01	0.13	1.01	1.14	0.12	0.23	0.34	—	1,799	1,799	0.08	0.08	1.95	1,825
2025	0.26	2.68	0.71	2.43	< 0.005	0.02	0.39	0.41	0.02	0.09	0.11	—	495	495	0.01	0.02	0.74	502
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.15	0.14	0.76	1.55	< 0.005	0.02	0.18	0.21	0.02	0.04	0.06	—	298	298	0.01	0.01	0.32	302
2025	0.05	0.49	0.13	0.44	< 0.005	< 0.005	0.07	0.08	< 0.005	0.02	0.02	—	82.0	82.0	< 0.005	< 0.005	0.12	83.0

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.16	3.59	1.44	18.8	0.04	0.04	3.69	3.73	0.03	0.93	0.96	30.0	4,149	4,179	3.19	0.15	14.9	4,317
Mit.	2.16	3.59	1.44	18.8	0.04	0.04	3.69	3.73	0.03	0.93	0.96	30.0	3,997	4,027	3.16	0.14	14.9	4,164
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	4%	4%	1%	2%	—	4%

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.82	3.26	1.65	14.8	0.04	0.04	3.69	3.73	0.03	0.93	0.96	30.0	3,921	3,951	3.20	0.16	0.82	4,080
Mit.	1.82	3.26	1.65	14.8	0.04	0.04	3.69	3.73	0.03	0.93	0.96	30.0	3,769	3,799	3.18	0.16	0.82	3,927
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	4%	4%	1%	2%	—	4%
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.20	3.60	2.55	15.4	0.04	0.09	3.20	3.29	0.08	0.81	0.90	30.0	3,753	3,783	3.19	0.14	6.03	3,911
Mit.	2.20	3.60	2.55	15.4	0.04	0.09	3.20	3.29	0.08	0.81	0.90	30.0	3,601	3,631	3.16	0.14	6.03	3,758
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	4%	4%	1%	2%	—	4%
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.40	0.66	0.47	2.81	0.01	0.02	0.58	0.60	0.02	0.15	0.16	4.97	621	626	0.53	0.02	1.00	648
Mit.	0.40	0.66	0.47	2.81	0.01	0.02	0.58	0.60	0.02	0.15	0.16	4.97	596	601	0.52	0.02	1.00	622
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	4%	4%	1%	2%	—	4%

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	1.87	1.71	1.38	15.7	0.04	0.03	3.68	3.70	0.02	0.93	0.96	—	3,971	3,971	0.15	0.14	14.4	4,030
Area	0.29	1.88	0.03	3.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.00	8.31	8.31	< 0.005	< 0.005	—	8.34
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	152	152	0.02	< 0.005	—	153
Water	—	—	—	—	—	—	—	—	—	—	—	3.13	12.9	16.0	0.32	0.01	—	26.4

Waste	—	—	—	—	—	—	—	—	—	—	—	26.9	0.00	26.9	2.69	0.00	—	94.2
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.45	0.45
Stationary	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetation	—	< 0.005	0.03	—	< 0.005	0.01	0.01	0.02	< 0.005	< 0.005	0.01	—	4.92	4.92	—	—	—	4.92
Total	2.16	3.59	1.44	18.8	0.04	0.04	3.69	3.73	0.03	0.93	0.96	30.0	4,149	4,179	3.19	0.15	14.9	4,317
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	1.82	1.66	1.63	14.8	0.04	0.03	3.68	3.70	0.02	0.93	0.96	—	3,752	3,752	0.17	0.15	0.37	3,801
Area	0.00	1.60	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	152	152	0.02	< 0.005	—	153
Water	—	—	—	—	—	—	—	—	—	—	—	3.13	12.9	16.0	0.32	0.01	—	26.4
Waste	—	—	—	—	—	—	—	—	—	—	—	26.9	0.00	26.9	2.69	0.00	—	94.2
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.45	0.45
Stationary	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetation	—	< 0.005	0.03	—	< 0.005	0.01	0.01	0.02	< 0.005	< 0.005	0.01	—	4.92	4.92	—	—	—	4.92
Total	1.82	3.26	1.65	14.8	0.04	0.04	3.69	3.73	0.03	0.93	0.96	30.0	3,921	3,951	3.20	0.16	0.82	4,080
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	1.61	1.46	1.38	12.9	0.03	0.02	3.19	3.21	0.02	0.81	0.83	—	3,373	3,373	0.14	0.13	5.58	3,421
Area	0.14	1.74	0.01	1.52	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.00	4.10	4.10	< 0.005	< 0.005	—	4.11
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	152	152	0.02	< 0.005	—	153
Water	—	—	—	—	—	—	—	—	—	—	—	3.13	12.9	16.0	0.32	0.01	—	26.4
Waste	—	—	—	—	—	—	—	—	—	—	—	26.9	0.00	26.9	2.69	0.00	—	94.2
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.45	0.45

Stationary	0.44	0.40	1.13	1.03	< 0.005	0.06	0.00	0.06	0.06	0.00	0.06	0.00	207	207	0.01	< 0.005	0.00	208
Vegetation	—	< 0.005	0.03	—	< 0.005	0.01	0.01	0.02	< 0.005	< 0.005	0.01	—	4.92	4.92	—	—	—	4.92
Total	2.20	3.60	2.55	15.4	0.04	0.09	3.20	3.29	0.08	0.81	0.90	30.0	3,753	3,783	3.19	0.14	6.03	3,911
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.29	0.27	0.25	2.35	0.01	< 0.005	0.58	0.59	< 0.005	0.15	0.15	—	558	558	0.02	0.02	0.92	566
Area	0.03	0.32	< 0.005	0.28	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.00	0.68	0.68	< 0.005	< 0.005	—	0.68
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	25.1	25.1	< 0.005	< 0.005	—	25.4
Water	—	—	—	—	—	—	—	—	—	—	—	0.52	2.13	2.65	0.05	< 0.005	—	4.37
Waste	—	—	—	—	—	—	—	—	—	—	—	4.46	0.00	4.46	0.45	0.00	—	15.6
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.07	0.07
Stationary	0.08	0.07	0.21	0.19	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	0.00	34.3	34.3	< 0.005	< 0.005	0.00	34.4
Vegetation	—	< 0.005	0.01	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.81	0.81	—	—	—	0.81
Total	0.40	0.66	0.47	2.81	0.01	0.02	0.58	0.60	0.02	0.15	0.16	4.97	621	626	0.53	0.02	1.00	648

2.6. Operations Emissions by Sector, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	1.87	1.71	1.38	15.7	0.04	0.03	3.68	3.70	0.02	0.93	0.96	—	3,971	3,971	0.15	0.14	14.4	4,030
Area	0.29	1.88	0.03	3.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.00	8.31	8.31	< 0.005	< 0.005	—	8.34
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.06	0.06	< 0.005	< 0.005	—	0.06
Water	—	—	—	—	—	—	—	—	—	—	—	3.13	12.5	15.6	0.32	0.01	—	26.0
Waste	—	—	—	—	—	—	—	—	—	—	—	26.9	0.00	26.9	2.69	0.00	—	94.2

Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.45	0.45
Stationary	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetation	—	< 0.005	0.03	—	< 0.005	0.01	0.01	0.02	< 0.005	< 0.005	0.01	—	4.92	4.92	—	—	—	4.92
Total	2.16	3.59	1.44	18.8	0.04	0.04	3.69	3.73	0.03	0.93	0.96	30.0	3,997	4,027	3.16	0.14	14.9	4,164
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	1.82	1.66	1.63	14.8	0.04	0.03	3.68	3.70	0.02	0.93	0.96	—	3,752	3,752	0.17	0.15	0.37	3,801
Area	0.00	1.60	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.06	0.06	< 0.005	< 0.005	—	0.06
Water	—	—	—	—	—	—	—	—	—	—	—	3.13	12.5	15.6	0.32	0.01	—	26.0
Waste	—	—	—	—	—	—	—	—	—	—	—	26.9	0.00	26.9	2.69	0.00	—	94.2
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.45	0.45
Stationary	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetation	—	< 0.005	0.03	—	< 0.005	0.01	0.01	0.02	< 0.005	< 0.005	0.01	—	4.92	4.92	—	—	—	4.92
Total	1.82	3.26	1.65	14.8	0.04	0.04	3.69	3.73	0.03	0.93	0.96	30.0	3,769	3,799	3.18	0.16	0.82	3,927
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	1.61	1.46	1.38	12.9	0.03	0.02	3.19	3.21	0.02	0.81	0.83	—	3,373	3,373	0.14	0.13	5.58	3,421
Area	0.14	1.74	0.01	1.52	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.00	4.10	4.10	< 0.005	< 0.005	—	4.11
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.06	0.06	< 0.005	< 0.005	—	0.06
Water	—	—	—	—	—	—	—	—	—	—	—	3.13	12.5	15.6	0.32	0.01	—	26.0
Waste	—	—	—	—	—	—	—	—	—	—	—	26.9	0.00	26.9	2.69	0.00	—	94.2
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.45	0.45
Stationary	0.44	0.40	1.13	1.03	< 0.005	0.06	0.00	0.06	0.06	0.00	0.06	0.00	207	207	0.01	< 0.005	0.00	208

Vegetatio	—	< 0.005	0.03	—	< 0.005	0.01	0.01	0.02	< 0.005	< 0.005	0.01	—	4.92	4.92	—	—	—	4.92
Total	2.20	3.60	2.55	15.4	0.04	0.09	3.20	3.29	0.08	0.81	0.90	30.0	3,601	3,631	3.16	0.14	6.03	3,758
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.29	0.27	0.25	2.35	0.01	< 0.005	0.58	0.59	< 0.005	0.15	0.15	—	558	558	0.02	0.02	0.92	566
Area	0.03	0.32	< 0.005	0.28	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.00	0.68	0.68	< 0.005	< 0.005	—	0.68
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.01	0.01	< 0.005	< 0.005	—	0.01
Water	—	—	—	—	—	—	—	—	—	—	—	0.52	2.07	2.59	0.05	< 0.005	—	4.31
Waste	—	—	—	—	—	—	—	—	—	—	—	4.46	0.00	4.46	0.45	0.00	—	15.6
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.07	0.07
Stationary	0.08	0.07	0.21	0.19	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	0.00	34.3	34.3	< 0.005	< 0.005	0.00	34.4
Vegetation	—	< 0.005	0.01	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.81	0.81	—	—	—	0.81
Total	0.40	0.66	0.47	2.81	0.01	0.02	0.58	0.60	0.02	0.15	0.16	4.97	596	601	0.52	0.02	1.00	622

3. Construction Emissions Details

3.1. Demolition (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.32	0.27	2.58	3.53	< 0.005	0.08	—	0.08	0.08	—	0.08	—	528	528	0.02	< 0.005	—	530

Demolition	—	—	—	—	—	—	0.15	0.15	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.16	0.21	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	31.8	31.8	< 0.005	< 0.005	—	31.9
Demolition	—	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.27	5.27	< 0.005	< 0.005	—	5.29
Demolition	—	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.32	0.29	0.28	3.02	0.00	0.00	0.66	0.66	0.00	0.16	0.16	—	656	656	0.02	0.03	0.08	665
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	< 0.005	0.21	0.11	< 0.005	< 0.005	0.03	0.04	< 0.005	0.01	0.01	—	131	131	0.02	0.02	0.01	137
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.18	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	39.7	39.7	< 0.005	< 0.005	0.08	40.3
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	7.88	7.88	< 0.005	< 0.005	0.01	8.29
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	6.57	6.57	< 0.005	< 0.005	0.01	6.67
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.30	1.30	< 0.005	< 0.005	< 0.005	1.37

3.2. Demolition (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.32	0.27	2.58	3.53	< 0.005	0.08	—	0.08	0.08	—	0.08	—	528	528	0.02	< 0.005	—	530
Demolition	—	—	—	—	—	—	0.15	0.15	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.16	0.21	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	31.8	31.8	< 0.005	< 0.005	—	31.9
Demolition	—	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	< 0.005	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.27	5.27	< 0.005	< 0.005	—	5.29
Demolition	—	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.32	0.29	0.28	3.02	0.00	0.00	0.66	0.66	0.00	0.16	0.16	—	656	656	0.02	0.03	0.08	665
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	< 0.005	0.21	0.11	< 0.005	< 0.005	0.03	0.04	< 0.005	0.01	0.01	—	131	131	0.02	0.02	0.01	137
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.18	0.00	0.00	0.04	0.04	0.00	0.01	0.01	—	39.7	39.7	< 0.005	< 0.005	0.08	40.3
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	7.88	7.88	< 0.005	< 0.005	0.01	8.29
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	6.57	6.57	< 0.005	< 0.005	0.01	6.67
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.30	1.30	< 0.005	< 0.005	< 0.005	1.37

3.3. Grading (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.20	1.01	9.58	12.9	0.02	0.43	—	0.43	0.40	—	0.40	—	1,967	1,967	0.08	0.02	—	1,974
Dust From Material Movement	—	—	—	—	—	—	0.53	0.53	—	0.06	0.06	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.20	1.01	9.58	12.9	0.02	0.43	—	0.43	0.40	—	0.40	—	1,967	1,967	0.08	0.02	—	1,974
Dust From Material Movement	—	—	—	—	—	—	0.53	0.53	—	0.06	0.06	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.22	0.18	1.73	2.34	< 0.005	0.08	—	0.08	0.07	—	0.07	—	356	356	0.01	< 0.005	—	357
Dust From Material Movement	—	—	—	—	—	—	0.10	0.10	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.03	0.32	0.43	< 0.005	0.01	—	0.01	0.01	—	0.01	—	58.9	58.9	< 0.005	< 0.005	—	59.1

Dust From Material Movement	—	—	—	—	—	—	0.02	0.02	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.33	0.30	0.22	3.37	0.00	0.00	0.66	0.66	0.00	0.16	0.16	—	704	704	0.01	0.03	3.04	715
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.14	0.02	1.33	0.75	0.01	0.02	0.22	0.24	0.01	0.06	0.07	—	881	881	0.12	0.14	1.83	928
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.32	0.29	0.28	3.02	0.00	0.00	0.66	0.66	0.00	0.16	0.16	—	656	656	0.02	0.03	0.08	665
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.14	0.02	1.40	0.75	0.01	0.02	0.22	0.24	0.01	0.06	0.07	—	881	881	0.12	0.14	0.05	926
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.05	0.05	0.53	0.00	0.00	0.12	0.12	0.00	0.03	0.03	—	119	119	< 0.005	0.01	0.24	121
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.03	< 0.005	0.25	0.14	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	159	159	0.02	0.03	0.14	168
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.10	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	—	19.7	19.7	< 0.005	< 0.005	0.04	20.0
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.05	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	26.4	26.4	< 0.005	< 0.005	0.02	27.7

3.4. Grading (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.20	1.01	9.58	12.9	0.02	0.43	—	0.43	0.40	—	0.40	—	1,967	1,967	0.08	0.02	—	1,974
Dust From Material Movemen	—	—	—	—	—	—	0.53	0.53	—	0.06	0.06	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.20	1.01	9.58	12.9	0.02	0.43	—	0.43	0.40	—	0.40	—	1,967	1,967	0.08	0.02	—	1,974
Dust From Material Movemen	—	—	—	—	—	—	0.53	0.53	—	0.06	0.06	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.22	0.18	1.73	2.34	< 0.005	0.08	—	0.08	0.07	—	0.07	—	356	356	0.01	< 0.005	—	357
Dust From Material Movemen	—	—	—	—	—	—	0.10	0.10	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.03	0.32	0.43	< 0.005	0.01	—	0.01	0.01	—	0.01	—	58.9	58.9	< 0.005	< 0.005	—	59.1
Dust From Material Movement	—	—	—	—	—	—	0.02	0.02	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.33	0.30	0.22	3.37	0.00	0.00	0.66	0.66	0.00	0.16	0.16	—	704	704	0.01	0.03	3.04	715
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.14	0.02	1.33	0.75	0.01	0.02	0.22	0.24	0.01	0.06	0.07	—	881	881	0.12	0.14	1.83	928
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.32	0.29	0.28	3.02	0.00	0.00	0.66	0.66	0.00	0.16	0.16	—	656	656	0.02	0.03	0.08	665
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.14	0.02	1.40	0.75	0.01	0.02	0.22	0.24	0.01	0.06	0.07	—	881	881	0.12	0.14	0.05	926
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.05	0.05	0.53	0.00	0.00	0.12	0.12	0.00	0.03	0.03	—	119	119	< 0.005	0.01	0.24	121
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.03	< 0.005	0.25	0.14	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	159	159	0.02	0.03	0.14	168
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.10	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	—	19.7	19.7	< 0.005	< 0.005	0.04	20.0
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.05	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	26.4	26.4	< 0.005	< 0.005	0.02	27.7

3.5. Building Construction (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.20	0.16	2.25	2.61	< 0.005	0.06	—	0.06	0.05	—	0.05	—	448	448	0.02	< 0.005	—	449
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.20	0.16	2.25	2.61	< 0.005	0.06	—	0.06	0.05	—	0.05	—	448	448	0.02	< 0.005	—	449
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.12	1.60	1.86	< 0.005	0.04	—	0.04	0.04	—	0.04	—	319	319	0.01	< 0.005	—	320
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.29	0.34	< 0.005	0.01	—	0.01	0.01	—	0.01	—	52.8	52.8	< 0.005	< 0.005	—	53.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.49	0.45	0.33	5.05	0.00	0.00	0.99	0.99	0.00	0.23	0.23	—	1,055	1,055	0.02	0.04	4.56	1,072
Vendor	0.01	< 0.005	0.08	0.05	< 0.005	< 0.005	0.01	0.02	< 0.005	< 0.005	< 0.005	—	57.3	57.3	0.01	0.01	0.14	60.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.48	0.44	0.41	4.52	0.00	0.00	0.99	0.99	0.00	0.23	0.23	—	984	984	0.03	0.04	0.12	997
Vendor	0.01	< 0.005	0.09	0.05	< 0.005	< 0.005	0.01	0.02	< 0.005	< 0.005	< 0.005	—	57.3	57.3	0.01	0.01	< 0.005	59.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.34	0.31	0.27	3.11	0.00	0.00	0.68	0.68	0.00	0.16	0.16	—	704	704	0.02	0.03	1.40	714
Vendor	0.01	< 0.005	0.06	0.03	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	40.8	40.8	< 0.005	0.01	0.04	42.7
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.05	0.57	0.00	0.00	0.12	0.12	0.00	0.03	0.03	—	117	117	< 0.005	< 0.005	0.23	118
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	6.76	6.76	< 0.005	< 0.005	0.01	7.07
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.6. Building Construction (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.20	0.16	2.25	2.61	< 0.005	0.06	—	0.06	0.05	—	0.05	—	448	448	0.02	< 0.005	—	449
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.20	0.16	2.25	2.61	< 0.005	0.06	—	0.06	0.05	—	0.05	—	448	448	0.02	< 0.005	—	449
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.12	1.60	1.86	< 0.005	0.04	—	0.04	0.04	—	0.04	—	319	319	0.01	< 0.005	—	320
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.29	0.34	< 0.005	0.01	—	0.01	0.01	—	0.01	—	52.8	52.8	< 0.005	< 0.005	—	53.0
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.49	0.45	0.33	5.05	0.00	0.00	0.99	0.99	0.00	0.23	0.23	—	1,055	1,055	0.02	0.04	4.56	1,072
Vendor	0.01	< 0.005	0.08	0.05	< 0.005	< 0.005	0.01	0.02	< 0.005	< 0.005	< 0.005	—	57.3	57.3	0.01	0.01	0.14	60.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.48	0.44	0.41	4.52	0.00	0.00	0.99	0.99	0.00	0.23	0.23	—	984	984	0.03	0.04	0.12	997

Vendor	0.01	< 0.005	0.09	0.05	< 0.005	< 0.005	0.01	0.02	< 0.005	< 0.005	< 0.005	—	57.3	57.3	0.01	0.01	< 0.005	59.9
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.34	0.31	0.27	3.11	0.00	0.00	0.68	0.68	0.00	0.16	0.16	—	704	704	0.02	0.03	1.40	714
Vendor	0.01	< 0.005	0.06	0.03	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	40.8	40.8	< 0.005	0.01	0.04	42.7
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.05	0.57	0.00	0.00	0.12	0.12	0.00	0.03	0.03	—	117	117	< 0.005	< 0.005	0.23	118
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	6.76	6.76	< 0.005	< 0.005	0.01	7.07
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.7. Paving (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.33	0.28	2.99	4.00	0.01	0.15	—	0.15	0.14	—	0.14	—	614	614	0.02	< 0.005	—	616
Paving	—	0.13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	< 0.005	< 0.005	0.02	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	4.81	4.81	< 0.005	< 0.005	—	4.82
Paving	—	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.80	0.80	< 0.005	< 0.005	—	0.80
Paving	—	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.48	0.44	0.41	4.52	0.00	0.00	0.99	0.99	0.00	0.23	0.23	—	984	984	0.03	0.04	0.12	997
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	7.73	7.73	< 0.005	< 0.005	0.02	7.85
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.28	1.28	< 0.005	< 0.005	< 0.005	1.30
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.8. Paving (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.33	0.28	2.99	4.00	0.01	0.15	—	0.15	0.14	—	0.14	—	614	614	0.02	< 0.005	—	616
Paving	—	0.13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	4.81	4.81	< 0.005	< 0.005	—	4.82
Paving	—	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.80	0.80	< 0.005	< 0.005	—	0.80
Paving	—	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.48	0.44	0.41	4.52	0.00	0.00	0.99	0.99	0.00	0.23	0.23	—	984	984	0.03	0.04	0.12	997
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	7.73	7.73	< 0.005	< 0.005	0.02	7.85
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.28	1.28	< 0.005	< 0.005	< 0.005	1.30
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Paving (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.31	0.26	2.84	4.00	0.01	0.13	—	0.13	0.12	—	0.12	—	614	614	0.02	< 0.005	—	616
Paving	—	0.13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.01	0.16	0.22	< 0.005	0.01	—	0.01	0.01	—	0.01	—	33.7	33.7	< 0.005	< 0.005	—	33.8
Paving	—	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.57	5.57	< 0.005	< 0.005	—	5.59
Paving	—	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.43	0.42	0.38	4.22	0.00	0.00	0.99	0.99	0.00	0.23	0.23	—	965	965	0.03	0.04	0.11	978
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.22	0.00	0.00	0.05	0.05	0.00	0.01	0.01	—	53.1	53.1	< 0.005	< 0.005	0.10	53.9
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	8.79	8.79	< 0.005	< 0.005	0.02	8.92

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.10. Paving (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.31	0.26	2.84	4.00	0.01	0.13	—	0.13	0.12	—	0.12	—	614	614	0.02	< 0.005	—	616
Paving	—	0.13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.01	0.16	0.22	< 0.005	0.01	—	0.01	0.01	—	0.01	—	33.7	33.7	< 0.005	< 0.005	—	33.8
Paving	—	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.57	5.57	< 0.005	< 0.005	—	5.59
Paving	—	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.43	0.42	0.38	4.22	0.00	0.00	0.99	0.99	0.00	0.23	0.23	—	965	965	0.03	0.04	0.11	978
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.22	0.00	0.00	0.05	0.05	0.00	0.01	0.01	—	53.1	53.1	< 0.005	< 0.005	0.10	53.9
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	8.79	8.79	< 0.005	< 0.005	0.02	8.92
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.11. Architectural Coating (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.22	0.18	1.21	1.53	< 0.005	0.04	—	0.04	0.04	—	0.04	—	178	178	0.01	< 0.005	—	179
Architectural Coatings	—	6.81	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.39	1.39	< 0.005	< 0.005	—	1.40
Architectural Coatings	—	0.05	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.23	0.23	< 0.005	< 0.005	—	0.23
Architectural Coatings	—	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.48	0.44	0.41	4.52	0.00	0.00	0.99	0.99	0.00	0.23	0.23	—	984	984	0.03	0.04	0.12	997
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	7.73	7.73	< 0.005	< 0.005	0.02	7.85
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.28	1.28	< 0.005	< 0.005	< 0.005	1.30
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.12. Architectural Coating (2024) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.22	0.18	1.21	1.53	< 0.005	0.04	—	0.04	0.04	—	0.04	—	178	178	0.01	< 0.005	—	179
Architectural Coatings	—	6.81	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.39	1.39	< 0.005	< 0.005	—	1.40

Architect Coatings	—	0.05	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.23	0.23	< 0.005	< 0.005	—	0.23
Architectural Coatings	—	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.48	0.44	0.41	4.52	0.00	0.00	0.99	0.99	0.00	0.23	0.23	—	984	984	0.03	0.04	0.12	997
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	7.73	7.73	< 0.005	< 0.005	0.02	7.85
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.28	1.28	< 0.005	< 0.005	< 0.005	1.30
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.13. Architectural Coating (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	0.17	1.18	1.52	< 0.005	0.04	—	0.04	0.03	—	0.03	—	178	178	0.01	< 0.005	—	179
Architectural Coatings	—	6.81	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	0.17	1.18	1.52	< 0.005	0.04	—	0.04	0.03	—	0.03	—	178	178	0.01	< 0.005	—	179
Architectural Coatings	—	6.81	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.06	0.42	0.54	< 0.005	0.01	—	0.01	0.01	—	0.01	—	63.4	63.4	< 0.005	< 0.005	—	63.6
Architectural Coatings	—	2.43	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.08	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	10.5	10.5	< 0.005	< 0.005	—	10.5
Architectural Coatings	—	0.44	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.45	0.43	0.30	4.68	0.00	0.00	0.99	0.99	0.00	0.23	0.23	—	1,035	1,035	0.02	0.04	4.19	1,051
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.43	0.42	0.38	4.22	0.00	0.00	0.99	0.99	0.00	0.23	0.23	—	965	965	0.03	0.04	0.11	978
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.15	0.15	0.12	1.45	0.00	0.00	0.34	0.34	0.00	0.08	0.08	—	345	345	0.01	0.01	0.64	350
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.02	0.26	0.00	0.00	0.06	0.06	0.00	0.01	0.01	—	57.1	57.1	< 0.005	< 0.005	0.11	58.0
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.14. Architectural Coating (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	0.17	1.18	1.52	< 0.005	0.04	—	0.04	0.03	—	0.03	—	178	178	0.01	< 0.005	—	179
Architectural Coatings	—	6.81	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	0.17	1.18	1.52	< 0.005	0.04	—	0.04	0.03	—	0.03	—	178	178	0.01	< 0.005	—	179
Architectural Coatings	—	6.81	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.06	0.42	0.54	< 0.005	0.01	—	0.01	0.01	—	0.01	—	63.4	63.4	< 0.005	< 0.005	—	63.6
Architectural Coatings	—	2.43	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.08	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	10.5	10.5	< 0.005	< 0.005	—	10.5
Architectural Coatings	—	0.44	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.45	0.43	0.30	4.68	0.00	0.00	0.99	0.99	0.00	0.23	0.23	—	1,035	1,035	0.02	0.04	4.19	1,051
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.43	0.42	0.38	4.22	0.00	0.00	0.99	0.99	0.00	0.23	0.23	—	965	965	0.03	0.04	0.11	978
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.15	0.15	0.12	1.45	0.00	0.00	0.34	0.34	0.00	0.08	0.08	—	345	345	0.01	0.01	0.64	350
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.02	0.26	0.00	0.00	0.06	0.06	0.00	0.01	0.01	—	57.1	57.1	< 0.005	< 0.005	0.11	58.0
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	1.86	1.70	1.37	15.6	0.04	0.03	3.66	3.68	0.02	0.93	0.95	—	3,950	3,950	0.15	0.13	14.3	4,008
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
General Light Industry	0.01	0.01	0.01	0.08	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	—	21.3	21.3	< 0.005	< 0.005	0.08	21.6
Total	1.87	1.71	1.38	15.7	0.04	0.03	3.68	3.70	0.02	0.93	0.96	—	3,971	3,971	0.15	0.14	14.4	4,030
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	1.81	1.65	1.62	14.7	0.04	0.03	3.66	3.68	0.02	0.93	0.95	—	3,732	3,732	0.16	0.15	0.37	3,781
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
General Light Industry	0.01	0.01	0.01	0.08	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	—	20.1	20.1	< 0.005	< 0.005	< 0.005	20.3
Total	1.82	1.66	1.63	14.8	0.04	0.03	3.68	3.70	0.02	0.93	0.96	—	3,752	3,752	0.17	0.15	0.37	3,801
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Condo/T	0.29	0.27	0.25	2.33	0.01	< 0.005	0.58	0.58	< 0.005	0.15	0.15	—	555	555	0.02	0.02	0.92	563
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
General Light Industry	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.33	3.33	< 0.005	< 0.005	0.01	3.38
Total	0.29	0.27	0.25	2.35	0.01	< 0.005	0.58	0.59	< 0.005	0.15	0.15	—	558	558	0.02	0.02	0.92	566

4.1.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	1.86	1.70	1.37	15.6	0.04	0.03	3.66	3.68	0.02	0.93	0.95	—	3,950	3,950	0.15	0.13	14.3	4,008
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
General Light Industry	0.01	0.01	0.01	0.08	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	—	21.3	21.3	< 0.005	< 0.005	0.08	21.6
Total	1.87	1.71	1.38	15.7	0.04	0.03	3.68	3.70	0.02	0.93	0.96	—	3,971	3,971	0.15	0.14	14.4	4,030
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	1.81	1.65	1.62	14.7	0.04	0.03	3.66	3.68	0.02	0.93	0.95	—	3,732	3,732	0.16	0.15	0.37	3,781
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

General Light Industry	0.01	0.01	0.01	0.08	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	—	20.1	20.1	< 0.005	< 0.005	< 0.005	20.3
Total	1.82	1.66	1.63	14.8	0.04	0.03	3.68	3.70	0.02	0.93	0.96	—	3,752	3,752	0.17	0.15	0.37	3,801
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	0.29	0.27	0.25	2.33	0.01	< 0.005	0.58	0.58	< 0.005	0.15	0.15	—	555	555	0.02	0.02	0.92	563
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
General Light Industry	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.33	3.33	< 0.005	< 0.005	0.01	3.38
Total	0.29	0.27	0.25	2.35	0.01	< 0.005	0.58	0.59	< 0.005	0.15	0.15	—	558	558	0.02	0.02	0.92	566

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	125	125	0.02	< 0.005	—	126
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	22.8	22.8	< 0.005	< 0.005	—	23.1
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	3.91	3.91	< 0.005	< 0.005	—	3.94
Total	—	—	—	—	—	—	—	—	—	—	—	—	152	152	0.02	< 0.005	—	153

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	125	125	0.02	< 0.005	—	126
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	22.8	22.8	< 0.005	< 0.005	—	23.1
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	3.91	3.91	< 0.005	< 0.005	—	3.94
Total	—	—	—	—	—	—	—	—	—	—	—	—	152	152	0.02	< 0.005	—	153
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	20.7	20.7	< 0.005	< 0.005	—	20.9
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	3.78	3.78	< 0.005	< 0.005	—	3.82
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.65	0.65	< 0.005	< 0.005	—	0.65
Total	—	—	—	—	—	—	—	—	—	—	—	—	25.1	25.1	< 0.005	< 0.005	—	25.4

4.2.2. Electricity Emissions By Land Use - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00

Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.06	0.06	< 0.005	< 0.005	—	0.06
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.06	0.06	< 0.005	< 0.005	—	0.06
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.06	0.06	< 0.005	< 0.005	—	0.06
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.06	0.06	< 0.005	< 0.005	—	0.06
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.01	0.01	< 0.005	< 0.005	—	0.01
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.01	0.01	< 0.005	< 0.005	—	0.01

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00

4.2.4. Natural Gas Emissions By Land Use - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00

General Light Industry	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Consumer Products	—	1.35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.29	0.28	0.03	3.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.31	8.31	< 0.005	< 0.005	—	8.34
Total	0.29	1.88	0.03	3.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.00	8.31	8.31	< 0.005	< 0.005	—	8.34
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Consumer Products	—	1.35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Architectural	—	0.25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	0.00	1.60	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Consumer Products	—	0.25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.04	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.03	0.02	< 0.005	0.28	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.68	0.68	< 0.005	< 0.005	—	0.68
Total	0.03	0.32	< 0.005	0.28	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.00	0.68	0.68	< 0.005	< 0.005	—	0.68

4.3.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Consumer Products	—	1.35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.29	0.28	0.03	3.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.31	8.31	< 0.005	< 0.005	—	8.34

Total	0.29	1.88	0.03	3.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.00	8.31	8.31	< 0.005	< 0.005	—	8.34
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Consumer Products	—	1.35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	0.00	1.60	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Consumer Products	—	0.25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.04	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.03	0.02	< 0.005	0.28	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.68	0.68	< 0.005	< 0.005	—	0.68
Total	0.03	0.32	< 0.005	0.28	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.00	0.68	0.68	< 0.005	< 0.005	—	0.68

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	3.13	12.9	16.0	0.32	0.01	—	26.4
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	3.13	12.9	16.0	0.32	0.01	—	26.4
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	3.13	12.9	16.0	0.32	0.01	—	26.4
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	3.13	12.9	16.0	0.32	0.01	—	26.4
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	0.52	2.13	2.65	0.05	< 0.005	—	4.37
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	0.52	2.13	2.65	0.05	< 0.005	—	4.37

4.4.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	3.13	12.5	15.6	0.32	0.01	—	26.0
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	3.13	12.5	15.6	0.32	0.01	—	26.0
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	3.13	12.5	15.6	0.32	0.01	—	26.0
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	3.13	12.5	15.6	0.32	0.01	—	26.0
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	0.52	2.07	2.59	0.05	< 0.005	—	4.31
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00

General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	0.52	2.07	2.59	0.05	< 0.005	—	4.31

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	21.6	0.00	21.6	2.16	0.00	—	75.5
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	5.32	0.00	5.32	0.53	0.00	—	18.6
Total	—	—	—	—	—	—	—	—	—	—	—	26.9	0.00	26.9	2.69	0.00	—	94.2
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	21.6	0.00	21.6	2.16	0.00	—	75.5
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	5.32	0.00	5.32	0.53	0.00	—	18.6

Total	—	—	—	—	—	—	—	—	—	—	—	26.9	0.00	26.9	2.69	0.00	—	94.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	3.57	0.00	3.57	0.36	0.00	—	12.5
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.88	0.00	0.88	0.09	0.00	—	3.08
Total	—	—	—	—	—	—	—	—	—	—	—	4.46	0.00	4.46	0.45	0.00	—	15.6

4.5.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	21.6	0.00	21.6	2.16	0.00	—	75.5
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	5.32	0.00	5.32	0.53	0.00	—	18.6
Total	—	—	—	—	—	—	—	—	—	—	—	26.9	0.00	26.9	2.69	0.00	—	94.2
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	21.6	0.00	21.6	2.16	0.00	—	75.5

Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	5.32	0.00	5.32	0.53	0.00	—	18.6
Total	—	—	—	—	—	—	—	—	—	—	—	26.9	0.00	26.9	2.69	0.00	—	94.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	3.57	0.00	3.57	0.36	0.00	—	12.5
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.88	0.00	0.88	0.09	0.00	—	3.08
Total	—	—	—	—	—	—	—	—	—	—	—	4.46	0.00	4.46	0.45	0.00	—	15.6

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.45	0.45
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.45	0.45
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Condo/T	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.45	0.45
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.45	0.45
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.07	0.07
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.07	0.07

4.6.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.45	0.45
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.45	0.45
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.45	0.45
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.45	0.45
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.07	0.07
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.07	0.07

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.7.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	0.08	0.07	0.21	0.19	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	0.00	34.3	34.3	< 0.005	< 0.005	0.00	34.4
Total	0.08	0.07	0.21	0.19	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	0.00	34.3	34.3	< 0.005	< 0.005	0.00	34.4

4.8.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Emergency Generator	0.08	0.07	0.21	0.19	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	0.00	34.3	34.3	< 0.005	< 0.005	0.00	34.4
Total	0.08	0.07	0.21	0.19	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	0.00	34.3	34.3	< 0.005	< 0.005	0.00	34.4

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.10	0.10	—	—	—	0.10
Blue gum eucalyptus(Eucalyptus globulus)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.44	0.44	—	—	—	0.44
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.10	3.10	—	—	—	3.10
Flooded gum eucalyptus(Eucalyptus grandis)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.21	0.21	—	—	—	0.21
Green Wattle(Acacia irrorata)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.20	0.20	—	—	—	0.20
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.71	0.71	—	—	—	0.71
Mayten(Maytenus boaria)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.86	0.86	—	—	—	0.86

Narrow-leaf	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.24	0.24	—	—	—	0.24
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.24	0.24	—	—	—	0.24
Tarata(Pittosporum eugenioides)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.71	0.71	—	—	—	0.71
Bishop pine(Pinus muricata)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.18	-0.18	—	—	—	-0.18
Boxelder (Acer negundo)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.45	-0.45	—	—	—	-0.45
California laurel(Umbellularia californica)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.16	-0.16	—	—	—	-0.16
Coast redwood(Sequoia sempervirens)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.49	-0.49	—	—	—	-0.49
Mountain Mahogany spp(Cercocarpus)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.94	-0.94	—	—	—	-0.94
Oregon ash(Fraxinus latifolia)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.85	-0.85	—	—	—	-0.85
Red alder(Alnus rubra)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.93	-0.93	—	—	—	-0.93

Serviceb spp(Amelanchier)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.76	-0.76	—	—	—	-0.76
Subtotal	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.04	2.04	—	—	—	2.04
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	—	—	—	0.00
Blue gum eucalyptus(Eucalyptus globulus)	—	—	—	—	—	—	—	—	—	—	—	—	0.04	0.04	—	—	—	0.04
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	—	—	—	—	—	—	—	—	—	—	—	5.19	5.19	—	—	—	5.19
Flooded gum eucalyptus(Eucalyptus grandis)	—	—	—	—	—	—	—	—	—	—	—	—	1.46	1.46	—	—	—	1.46
Green Wattle(Acacia irrorata)	—	—	—	—	—	—	—	—	—	—	—	—	0.15	0.15	—	—	—	0.15
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	—	—	—	—	—	—	—	—	—	—	—	2.60	2.60	—	—	—	2.60
Mayten(Maytenus boaria)	—	—	—	—	—	—	—	—	—	—	—	—	2.91	2.91	—	—	—	2.91

Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	—	—	—	—	—	—	—	—	—	—	—	0.19	0.19	—	—	—	0.19
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	—	—	—	—	—	—	—	—	—	—	—	1.90	1.90	—	—	—	1.90
Tarata(Pittosporum eugenioides)	—	—	—	—	—	—	—	—	—	—	—	—	0.84	0.84	—	—	—	0.84
Bishop pine(Pinus muricata)	—	—	—	—	—	—	—	—	—	—	—	—	-0.36	-0.36	—	—	—	-0.36
Boxelder (Acer negundo)	—	—	—	—	—	—	—	—	—	—	—	—	-2.68	-2.68	—	—	—	-2.68
California laurel(Umbellularia californica)	—	—	—	—	—	—	—	—	—	—	—	—	-0.49	-0.49	—	—	—	-0.49
Coast redwood(Sequoia sempervirens)	—	—	—	—	—	—	—	—	—	—	—	—	-1.00	-1.00	—	—	—	-1.00
Mountain Mahogany spp(Cercocarpus)	—	—	—	—	—	—	—	—	—	—	—	—	-0.47	-0.47	—	—	—	-0.47

Oregon ash(Fraxinus latifolia)	—	—	—	—	—	—	—	—	—	—	—	—	-2.55	-2.55	—	—	—	-2.55
Red alder(Alnus rubra)	—	—	—	—	—	—	—	—	—	—	—	—	-2.42	-2.42	—	—	—	-2.42
Serviceberry spp(Amelanchier)	—	—	—	—	—	—	—	—	—	—	—	—	-2.44	-2.44	—	—	—	-2.44
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	2.87	2.87	—	—	—	2.87
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	—	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	—	—	—	—	—	—
Blue gum eucalyptus(Eucalyptus globulus)	—	—	0.01	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	—	0.02	—	< 0.005	0.01	0.01	0.01	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Flooded gum eucalyptus(Eucalyptus grandis)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Green Wattle(Acacia irrorata)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—

Mayten(boaria)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Tarata(Pittosporum eugenioides)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Bishop pine(Pinus muricata)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Boxelder (Acer negundo)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
California laurel(Umbellularia californica)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Coast redwood(Sequoia sempervirens)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—

Mountain Mahogany spp(Cercocarpus)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Oregon ash(Fraxinus latifolia)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Red alder(Alnus rubra)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Serviceberry spp(Amelanchier)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Subtotal	—	—	0.03	—	< 0.005	0.01	0.01	0.02	< 0.005	< 0.005	0.01	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	< 0.005	0.03	—	< 0.005	0.01	0.01	0.02	< 0.005	< 0.005	0.01	—	4.92	4.92	—	—	—	4.92
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.10	0.10	—	—	—	0.10
Blue gum eucalyptus(Eucalyptus globulus)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.44	0.44	—	—	—	0.44
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.10	3.10	—	—	—	3.10
Flooded gum eucalyptus(Eucalyptus grandis)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.21	0.21	—	—	—	0.21

Green Wattle(Acacia irrorata)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.20	0.20	—	—	—	0.20
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.71	0.71	—	—	—	0.71
Mayten(Maytenus boaria)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.86	0.86	—	—	—	0.86
Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.24	0.24	—	—	—	0.24
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.24	0.24	—	—	—	0.24
Tarata(Pittosporum eugenioides)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.71	0.71	—	—	—	0.71
Bishop pine(Pinus muricata)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.18	-0.18	—	—	—	-0.18
Boxelder (Acer negundo)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.45	-0.45	—	—	—	-0.45

California laurel(U californica)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.16	-0.16	—	—	—	-0.16
Coast redwood(Sequoia sempervirens)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.49	-0.49	—	—	—	-0.49
Mountain Mahogany spp(Cercocarpus)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.94	-0.94	—	—	—	-0.94
Oregon ash(Fraxinus latifolia)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.85	-0.85	—	—	—	-0.85
Red alder(Alnus rubra)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.93	-0.93	—	—	—	-0.93
Serviceberry spp(Amelanchier)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.76	-0.76	—	—	—	-0.76
Subtotal	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.04	2.04	—	—	—	2.04
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	—	—	—	0.00
Blue gum eucalyptus(Eucalyptus globulus)	—	—	—	—	—	—	—	—	—	—	—	—	0.04	0.04	—	—	—	0.04
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	—	—	—	—	—	—	—	—	—	—	—	5.19	5.19	—	—	—	5.19

Flooded gum eucalyptus(Eucalyptus grandis)	—	—	—	—	—	—	—	—	—	—	—	—	1.46	1.46	—	—	—	1.46
Green Wattle(Acacia irrorata)	—	—	—	—	—	—	—	—	—	—	—	—	0.15	0.15	—	—	—	0.15
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	—	—	—	—	—	—	—	—	—	—	—	2.60	2.60	—	—	—	2.60
Mayten(Maytenus boaria)	—	—	—	—	—	—	—	—	—	—	—	—	2.91	2.91	—	—	—	2.91
Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	—	—	—	—	—	—	—	—	—	—	—	0.19	0.19	—	—	—	0.19
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	—	—	—	—	—	—	—	—	—	—	—	1.90	1.90	—	—	—	1.90
Tarata(Pittosporum eugenioides)	—	—	—	—	—	—	—	—	—	—	—	—	0.84	0.84	—	—	—	0.84
Bishop pine(Pinus muricata)	—	—	—	—	—	—	—	—	—	—	—	—	-0.36	-0.36	—	—	—	-0.36

Boxelder (Acer negundo	—	—	—	—	—	—	—	—	—	—	—	—	-2.68	-2.68	—	—	—	-2.68
California laurel(Umbellularia californica)	—	—	—	—	—	—	—	—	—	—	—	—	-0.49	-0.49	—	—	—	-0.49
Coast redwood(Sequoia sempervirens)	—	—	—	—	—	—	—	—	—	—	—	—	-1.00	-1.00	—	—	—	-1.00
Mountain Mahogany spp(Cercocarpus)	—	—	—	—	—	—	—	—	—	—	—	—	-0.47	-0.47	—	—	—	-0.47
Oregon ash(Fraxinus latifolia)	—	—	—	—	—	—	—	—	—	—	—	—	-2.55	-2.55	—	—	—	-2.55
Red alder(Alnus rubra)	—	—	—	—	—	—	—	—	—	—	—	—	-2.42	-2.42	—	—	—	-2.42
Serviceberry spp(Amelanchier)	—	—	—	—	—	—	—	—	—	—	—	—	-2.44	-2.44	—	—	—	-2.44
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	2.87	2.87	—	—	—	2.87
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	—	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	—	—	—	—	—	—
Blue gum eucalyptus(Eucalyptus globulus)	—	—	0.01	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—

Dwarf blue gum(Eucalyptus globulus v. compacta)	—	—	0.02	—	< 0.005	0.01	0.01	0.01	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Flooded gum eucalyptus(Eucalyptus grandis)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Green Wattle(Acacia irrorata)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Mayten(Maytenus boaria)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—

Tarata(Pittosporum eugenioides)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Bishop pine(Pinus muricata)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Boxelder (Acer negundo)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
California laurel(Umbellularia californica)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Coast redwood(Sequoia sempervirens)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Mountain Mahogany spp(Cercocarpus)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Oregon ash(Fraxinus latifolia)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Red alder(Alnus rubra)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Serviceberry spp(Amelanchier)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Subtotal	—	—	0.03	—	< 0.005	0.01	0.01	0.02	< 0.005	< 0.005	0.01	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Total	—	< 0.005	0.03	—	< 0.005	0.01	0.01	0.02	< 0.005	< 0.005	0.01	—	4.92	4.92	—	—	—	4.92
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.02	0.02	—	—	—	0.02
Blue gum eucalyptus(Eucalyptus globulus)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.07	0.07	—	—	—	0.07
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.51	0.51	—	—	—	0.51
Flooded gum eucalyptus(Eucalyptus grandis)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.03	0.03	—	—	—	0.03
Green Wattle(Acacia irrorata)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.03	0.03	—	—	—	0.03
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.12	0.12	—	—	—	0.12
Mayten(Maytenus boaria)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.14	0.14	—	—	—	0.14

Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.04	0.04	—	—	—	0.04
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.04	0.04	—	—	—	0.04
Tarata(Pittosporum eugenioides)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.12	0.12	—	—	—	0.12
Bishop pine(Pinus muricata)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.03	-0.03	—	—	—	-0.03
Boxelder (Acer negundo)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.07	-0.07	—	—	—	-0.07
California laurel(Umbellularia californica)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.03	-0.03	—	—	—	-0.03
Coast redwood(Sequoia sempervirens)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.08	-0.08	—	—	—	-0.08
Mountain Mahogany spp(Cercocarpus)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.15	-0.15	—	—	—	-0.15

Oregon ash(Fraxinus latifolia)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.14	-0.14	—	—	—	-0.14
Red alder(Alnus rubra)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.15	-0.15	—	—	—	-0.15
Serviceberry spp(Amelanchier)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.13	-0.13	—	—	—	-0.13
Subtotal	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.34	0.34	—	—	—	0.34
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	—	—	—	0.00
Blue gum eucalyptus(Eucalyptus globulus)	—	—	—	—	—	—	—	—	—	—	—	—	0.01	0.01	—	—	—	0.01
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	—	—	—	—	—	—	—	—	—	—	—	0.86	0.86	—	—	—	0.86
Flooded gum eucalyptus(Eucalyptus grandis)	—	—	—	—	—	—	—	—	—	—	—	—	0.24	0.24	—	—	—	0.24
Green Wattle(Acacia irrorata)	—	—	—	—	—	—	—	—	—	—	—	—	0.02	0.02	—	—	—	0.02
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	—	—	—	—	—	—	—	—	—	—	—	0.43	0.43	—	—	—	0.43

Mayten(boaria)	—	—	—	—	—	—	—	—	—	—	—	—	0.48	0.48	—	—	—	0.48
Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	—	—	—	—	—	—	—	—	—	—	—	0.03	0.03	—	—	—	0.03
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	—	—	—	—	—	—	—	—	—	—	—	0.32	0.32	—	—	—	0.32
Tarata(Pittosporum eugenioides)	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14	—	—	—	0.14
Bishop pine(Pinus muricata)	—	—	—	—	—	—	—	—	—	—	—	—	-0.06	-0.06	—	—	—	-0.06
Boxelder (Acer negundo)	—	—	—	—	—	—	—	—	—	—	—	—	-0.44	-0.44	—	—	—	-0.44
California laurel(Umbellularia californica)	—	—	—	—	—	—	—	—	—	—	—	—	-0.08	-0.08	—	—	—	-0.08
Coast redwood(Sequoia sempervirens)	—	—	—	—	—	—	—	—	—	—	—	—	-0.17	-0.17	—	—	—	-0.17

Mountain Mahogany spp(Cercocarpus)	—	—	—	—	—	—	—	—	—	—	—	—	-0.08	-0.08	—	—	—	-0.08
Oregon ash(Fraxinus latifolia)	—	—	—	—	—	—	—	—	—	—	—	—	-0.42	-0.42	—	—	—	-0.42
Red alder(Alnus rubra)	—	—	—	—	—	—	—	—	—	—	—	—	-0.40	-0.40	—	—	—	-0.40
Serviceberry spp(Amelanchier)	—	—	—	—	—	—	—	—	—	—	—	—	-0.40	-0.40	—	—	—	-0.40
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	0.48	0.48	—	—	—	0.48
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	—	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	—	—	—	—	—	—
Blue gum eucalyptus(Eucalyptus globulus)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Flooded gum eucalyptus(Eucalyptus grandis)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Green Wattle(Acacia irrorata)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—

Manna gum(Eucalyptus viminalis ssp. viminalis)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Mayten(Maytenus boaria)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Tarata(Pittosporum eugenioides)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Bishop pine(Pinus muricata)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Boxelder (Acer negundo)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—

California laurel(Umbellularia californic	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Coast redwood(Sequoia sempervirens)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Mountain Mahogany spp(Cercocarpus)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Oregon ash(Fraxinus latifolia)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Red alder(Alnus rubra)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Serviceberry spp(Amelanchier)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Subtotal	—	—	0.01	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	< 0.005	0.01	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.81	0.81	—	—	—	0.81

4.10.4. Soil Carbon Accumulation By Vegetation Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.5. Above and Belowground Carbon Accumulation by Land Use Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.6. Avoided and Sequestered Emissions by Species - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.10	0.10	—	—	—	0.10

Blue gum eucalyptus(Eucalyptus globulus)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.44	0.44	—	—	—	0.44
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.10	3.10	—	—	—	3.10
Flooded gum eucalyptus(Eucalyptus grandis)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.21	0.21	—	—	—	0.21
Green Wattle(Acacia irrorata)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.20	0.20	—	—	—	0.20
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.71	0.71	—	—	—	0.71
Mayten(Maytenus boaria)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.86	0.86	—	—	—	0.86
Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.24	0.24	—	—	—	0.24
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.24	0.24	—	—	—	0.24

Tarata(Pi eugenioides)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.71	0.71	—	—	—	0.71
Bishop pine(Pinus muricata)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.18	-0.18	—	—	—	-0.18
Boxelder (Acer negundo)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.45	-0.45	—	—	—	-0.45
California laurel(Umbellularia californica)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.16	-0.16	—	—	—	-0.16
Coast redwood(Sequoia sempervirens)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.49	-0.49	—	—	—	-0.49
Mountain Mahogany spp(Cercocarpus)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.94	-0.94	—	—	—	-0.94
Oregon ash(Fraxinus latifolia)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.85	-0.85	—	—	—	-0.85
Red alder(Alnus rubra)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.93	-0.93	—	—	—	-0.93
Serviceberry spp(Amelanchier)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.76	-0.76	—	—	—	-0.76
Subtotal	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.04	2.04	—	—	—	2.04
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	—	—	—	0.00

Blue gum eucalyptus(Eucalyptus globulus)	—	—	—	—	—	—	—	—	—	—	—	—	0.04	0.04	—	—	—	0.04
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	—	—	—	—	—	—	—	—	—	—	—	5.19	5.19	—	—	—	5.19
Flooded gum eucalyptus(Eucalyptus grandis)	—	—	—	—	—	—	—	—	—	—	—	—	1.46	1.46	—	—	—	1.46
Green Wattle(Acacia irrorata)	—	—	—	—	—	—	—	—	—	—	—	—	0.15	0.15	—	—	—	0.15
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	—	—	—	—	—	—	—	—	—	—	—	2.60	2.60	—	—	—	2.60
Mayten(Maytenus boaria)	—	—	—	—	—	—	—	—	—	—	—	—	2.91	2.91	—	—	—	2.91
Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	—	—	—	—	—	—	—	—	—	—	—	0.19	0.19	—	—	—	0.19
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	—	—	—	—	—	—	—	—	—	—	—	1.90	1.90	—	—	—	1.90

Tarata(Pi eugenioides)	—	—	—	—	—	—	—	—	—	—	—	—	0.84	0.84	—	—	—	0.84
Bishop pine(Pinus muricata)	—	—	—	—	—	—	—	—	—	—	—	—	-0.36	-0.36	—	—	—	-0.36
Boxelder (Acer negundo)	—	—	—	—	—	—	—	—	—	—	—	—	-2.68	-2.68	—	—	—	-2.68
California laurel(Umbellularia californica)	—	—	—	—	—	—	—	—	—	—	—	—	-0.49	-0.49	—	—	—	-0.49
Coast redwood(Sequoia sempervirens)	—	—	—	—	—	—	—	—	—	—	—	—	-1.00	-1.00	—	—	—	-1.00
Mountain Mahogany spp(Cercocarpus)	—	—	—	—	—	—	—	—	—	—	—	—	-0.47	-0.47	—	—	—	-0.47
Oregon ash(Fraxinus latifolia)	—	—	—	—	—	—	—	—	—	—	—	—	-2.55	-2.55	—	—	—	-2.55
Red alder(Alnus rubra)	—	—	—	—	—	—	—	—	—	—	—	—	-2.42	-2.42	—	—	—	-2.42
Serviceberry spp(Amelanchier)	—	—	—	—	—	—	—	—	—	—	—	—	-2.44	-2.44	—	—	—	-2.44
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	2.87	2.87	—	—	—	2.87
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	—	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	—	—	—	—	—	—

Blue gum eucalyptus(Eucalyptus globulus)	—	—	0.01	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	—	0.02	—	< 0.005	0.01	0.01	0.01	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Flooded gum eucalyptus(Eucalyptus grandis)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Green Wattle(Acacia irrorata)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Mayten(Maytenus boaria)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—

Tarata(Pi eugenioides)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Bishop pine(Pinus muricata)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Boxelder (Acer negundo)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
California laurel(Umbellularia californica)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Coast redwood(Sequoia sempervirens)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Mountain Mahogany spp(Cercocarpus)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Oregon ash(Fraxinus latifolia)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Red alder(Alnus rubra)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Serviceberry spp(Amelanchier)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Subtotal	—	—	0.03	—	< 0.005	0.01	0.01	0.02	< 0.005	< 0.005	0.01	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	< 0.005	0.03	—	< 0.005	0.01	0.01	0.02	< 0.005	< 0.005	0.01	—	4.92	4.92	—	—	—	4.92

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.10	0.10	—	—	—	0.10
Blue gum eucalyptus(Eucalyptus globulus)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.44	0.44	—	—	—	0.44
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	3.10	3.10	—	—	—	3.10
Flooded gum eucalyptus(Eucalyptus grandis)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.21	0.21	—	—	—	0.21
Green Wattle(Acacia irrorata)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.20	0.20	—	—	—	0.20
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.71	0.71	—	—	—	0.71
Mayten(Maytenus boaria)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.86	0.86	—	—	—	0.86

Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.24	0.24	—	—	—	0.24
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.24	0.24	—	—	—	0.24
Tarata(Pittosporum eugenioides)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.71	0.71	—	—	—	0.71
Bishop pine(Pinus muricata)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.18	-0.18	—	—	—	-0.18
Boxelder (Acer negundo)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.45	-0.45	—	—	—	-0.45
California laurel(Umbellularia californica)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.16	-0.16	—	—	—	-0.16
Coast redwood(Sequoia sempervirens)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.49	-0.49	—	—	—	-0.49
Mountain Mahogany spp(Cercocarpus)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.94	-0.94	—	—	—	-0.94

Oregon ash(Fraxinus latifolia)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.85	-0.85	—	—	—	-0.85
Red alder(Alnus rubra)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.93	-0.93	—	—	—	-0.93
Serviceberry spp(Amelanchier)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.76	-0.76	—	—	—	-0.76
Subtotal	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.04	2.04	—	—	—	2.04
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	—	—	—	0.00
Blue gum eucalyptus(Eucalyptus globulus)	—	—	—	—	—	—	—	—	—	—	—	—	0.04	0.04	—	—	—	0.04
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	—	—	—	—	—	—	—	—	—	—	—	5.19	5.19	—	—	—	5.19
Flooded gum eucalyptus(Eucalyptus grandis)	—	—	—	—	—	—	—	—	—	—	—	—	1.46	1.46	—	—	—	1.46
Green Wattle(Acacia irrorata)	—	—	—	—	—	—	—	—	—	—	—	—	0.15	0.15	—	—	—	0.15
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	—	—	—	—	—	—	—	—	—	—	—	2.60	2.60	—	—	—	2.60

Mayten(boaria)	—	—	—	—	—	—	—	—	—	—	—	—	2.91	2.91	—	—	—	2.91
Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	—	—	—	—	—	—	—	—	—	—	—	0.19	0.19	—	—	—	0.19
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	—	—	—	—	—	—	—	—	—	—	—	1.90	1.90	—	—	—	1.90
Tarata(Pittosporum eugenioides)	—	—	—	—	—	—	—	—	—	—	—	—	0.84	0.84	—	—	—	0.84
Bishop pine(Pinus muricata)	—	—	—	—	—	—	—	—	—	—	—	—	-0.36	-0.36	—	—	—	-0.36
Boxelder (Acer negundo)	—	—	—	—	—	—	—	—	—	—	—	—	-2.68	-2.68	—	—	—	-2.68
California laurel(Umbellularia californica)	—	—	—	—	—	—	—	—	—	—	—	—	-0.49	-0.49	—	—	—	-0.49
Coast redwood(Sequoia sempervirens)	—	—	—	—	—	—	—	—	—	—	—	—	-1.00	-1.00	—	—	—	-1.00

Mountain Mahogany spp(Cercocarpus)	—	—	—	—	—	—	—	—	—	—	—	—	-0.47	-0.47	—	—	—	-0.47
Oregon ash(Fraxinus latifolia)	—	—	—	—	—	—	—	—	—	—	—	—	-2.55	-2.55	—	—	—	-2.55
Red alder(Alnus rubra)	—	—	—	—	—	—	—	—	—	—	—	—	-2.42	-2.42	—	—	—	-2.42
Serviceberry spp(Amelanchier)	—	—	—	—	—	—	—	—	—	—	—	—	-2.44	-2.44	—	—	—	-2.44
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	2.87	2.87	—	—	—	2.87
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	—	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	—	—	—	—	—	—
Blue gum eucalyptus(Eucalyptus globulus)	—	—	0.01	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	—	0.02	—	< 0.005	0.01	0.01	0.01	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Flooded gum eucalyptus(Eucalyptus grandis)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Green Wattle(Acacia irrorata)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—

Manna gum(Eucalyptus viminalis ssp. viminalis)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Mayten(Maytenus boaria)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Tarata(Pittosporum eugenioides)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Bishop pine(Pinus muricata)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Boxelder (Acer negundo)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—

California laurel(Umbellularia californic	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Coast redwood(Sequoia sempervirens)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Mountain Mahogany spp(Cercocarpus)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Oregon ash(Fraxinus latifolia)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Red alder(Alnus rubra)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Serviceberry spp(Amelanchier)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Subtotal	—	—	0.03	—	< 0.005	0.01	0.01	0.02	< 0.005	< 0.005	0.01	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	< 0.005	0.03	—	< 0.005	0.01	0.01	0.02	< 0.005	< 0.005	0.01	—	4.92	4.92	—	—	—	4.92
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.02	0.02	—	—	—	0.02
Blue gum eucalyptus(Eucalyptus globulus)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.07	0.07	—	—	—	0.07

Dwarf blue gum(Eucalyptus globulus v. compacta)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.51	0.51	—	—	—	0.51
Flooded gum eucalyptus(Eucalyptus grandis)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.03	0.03	—	—	—	0.03
Green Wattle(Acacia irrorata)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.03	0.03	—	—	—	0.03
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.12	0.12	—	—	—	0.12
Mayten(Maytenus boaria)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.14	0.14	—	—	—	0.14
Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.04	0.04	—	—	—	0.04
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.04	0.04	—	—	—	0.04

Tarata(Pittosporum eugenioides)	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.12	0.12	—	—	—	0.12
Bishop pine(Pinus muricata)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.03	-0.03	—	—	—	-0.03
Boxelder (Acer negundo)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.07	-0.07	—	—	—	-0.07
California laurel(Umbellularia californica)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.03	-0.03	—	—	—	-0.03
Coast redwood(Sequoia sempervirens)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.08	-0.08	—	—	—	-0.08
Mountain Mahogany spp(Cercocarpus)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.15	-0.15	—	—	—	-0.15
Oregon ash(Fraxinus latifolia)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.14	-0.14	—	—	—	-0.14
Red alder(Alnus rubra)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.15	-0.15	—	—	—	-0.15
Serviceberry spp(Amelanchier)	—	> -0.005	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	-0.13	-0.13	—	—	—	-0.13
Subtotal	—	< 0.005	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.34	0.34	—	—	—	0.34
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Alder spp(Alnus)	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	—	—	—	0.00
Blue gum eucalyptus(Eucalyptus globulus)	—	—	—	—	—	—	—	—	—	—	—	—	0.01	0.01	—	—	—	0.01
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	—	—	—	—	—	—	—	—	—	—	—	0.86	0.86	—	—	—	0.86
Flooded gum eucalyptus(Eucalyptus grandis)	—	—	—	—	—	—	—	—	—	—	—	—	0.24	0.24	—	—	—	0.24
Green Wattle(Acacia irrorata)	—	—	—	—	—	—	—	—	—	—	—	—	0.02	0.02	—	—	—	0.02
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	—	—	—	—	—	—	—	—	—	—	—	0.43	0.43	—	—	—	0.43
Mayten(Maytenus boaria)	—	—	—	—	—	—	—	—	—	—	—	—	0.48	0.48	—	—	—	0.48
Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	—	—	—	—	—	—	—	—	—	—	—	—	0.03	0.03	—	—	—	0.03

Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	—	—	—	—	—	—	—	—	—	—	—	0.32	0.32	—	—	—	0.32
Tarata(Pittosporum eugenioides)	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14	—	—	—	0.14
Bishop pine(Pinus muricata)	—	—	—	—	—	—	—	—	—	—	—	—	-0.06	-0.06	—	—	—	-0.06
Boxelder (Acer negundo)	—	—	—	—	—	—	—	—	—	—	—	—	-0.44	-0.44	—	—	—	-0.44
California laurel(Umbellularia californica)	—	—	—	—	—	—	—	—	—	—	—	—	-0.08	-0.08	—	—	—	-0.08
Coast redwood(Sequoia sempervirens)	—	—	—	—	—	—	—	—	—	—	—	—	-0.17	-0.17	—	—	—	-0.17
Mountain Mahogany spp(Cercocarpus)	—	—	—	—	—	—	—	—	—	—	—	—	-0.08	-0.08	—	—	—	-0.08
Oregon ash(Fraxinus latifolia)	—	—	—	—	—	—	—	—	—	—	—	—	-0.42	-0.42	—	—	—	-0.42
Red alder(Alnus rubra)	—	—	—	—	—	—	—	—	—	—	—	—	-0.40	-0.40	—	—	—	-0.40

Serviceberry spp(Ame	—	—	—	—	—	—	—	—	—	—	—	—	-0.40	-0.40	—	—	—	-0.40
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	0.48	0.48	—	—	—	0.48
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alder spp(Alnus)	—	—	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	—	—	—	—	—	—
Blue gum eucalyptus(Eucalyptus globulus)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Dwarf blue gum(Eucalyptus globulus v. compacta)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Flooded gum eucalyptus(Eucalyptus grandis)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Green Wattle(Acacia irrorata)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Manna gum(Eucalyptus viminalis ssp. viminalis)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Mayten(Maytenus boaria)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—

Narrow-leaf peppermint(Eucalyptus	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Tarata(Pittosporum eugenioides)	—	—	< 0.005	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
Bishop pine(Pinus muricata)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Boxelder (Acer negundo)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
California laurel(Umbellularia californica)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Coast redwood(Sequoia sempervirens)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Mountain Mahogany spp(Cercocarpus)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Oregon ash(Fraxinus latifolia)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—

Red alder(Alnus rubra)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Serviceberry spp(Amelanchier)	—	—	> -0.005	—	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	> -0.005	—	—	—	—	—	—	—
Subtotal	—	—	0.01	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	< 0.005	0.01	—	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.81	0.81	—	—	—	0.81

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Demolition	Demolition	1/1/2024	1/30/2024	5.00	22.0	—
Grading	Grading	1/1/2024	4/1/2024	5.00	66.0	—
Building Construction	Building Construction	1/1/2024	12/27/2024	5.00	260	—
Paving	Paving	12/28/2024	1/28/2025	5.00	22.0	—
Architectural Coating	Architectural Coating	12/28/2024	7/1/2025	5.00	132	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Demolition	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Demolition	Skid Steer Loaders	Diesel	Average	1.00	8.00	71.0	0.37
Grading	Excavators	Diesel	Average	2.00	8.00	36.0	0.38

Grading	Tractors/Loaders/Backhoes	Diesel	Average	3.00	8.00	84.0	0.37
Grading	Skid Steer Loaders	Diesel	Average	1.00	8.00	71.0	0.37
Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Building Construction	Forklifts	Diesel	Average	1.00	8.00	82.0	0.20
Building Construction	Aerial Lifts	Diesel	Average	2.00	8.00	46.0	0.31
Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	1.00	8.00	89.0	0.36
Architectural Coating	Air Compressors	Diesel	Average	1.00	8.00	37.0	0.48

5.2.2. Mitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Demolition	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Demolition	Skid Steer Loaders	Diesel	Average	1.00	8.00	71.0	0.37
Grading	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Grading	Tractors/Loaders/Backhoes	Diesel	Average	3.00	8.00	84.0	0.37
Grading	Skid Steer Loaders	Diesel	Average	1.00	8.00	71.0	0.37
Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Building Construction	Forklifts	Diesel	Average	1.00	8.00	82.0	0.20
Building Construction	Aerial Lifts	Diesel	Average	2.00	8.00	46.0	0.31
Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	1.00	8.00	89.0	0.36
Architectural Coating	Air Compressors	Diesel	Average	1.00	8.00	37.0	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Demolition	—	—	—	—
Demolition	Worker	80.0	11.7	LDA,LDT1,LDT2
Demolition	Vendor	—	8.40	HHDT,MHDT
Demolition	Hauling	1.73	20.0	HHDT
Demolition	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	80.0	11.7	LDA,LDT1,LDT2
Grading	Vendor	—	8.40	HHDT,MHDT
Grading	Hauling	11.6	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	120	11.7	LDA,LDT1,LDT2
Building Construction	Vendor	2.00	8.40	HHDT,MHDT
Building Construction	Hauling	0.00	20.0	HHDT
Building Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	120	11.7	LDA,LDT1,LDT2
Paving	Vendor	—	8.40	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	120	11.7	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	8.40	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT

5.3.2. Mitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Demolition	—	—	—	—
Demolition	Worker	80.0	11.7	LDA,LDT1,LDT2
Demolition	Vendor	—	8.40	HHDT,MHDT
Demolition	Hauling	1.73	20.0	HHDT
Demolition	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	80.0	11.7	LDA,LDT1,LDT2
Grading	Vendor	—	8.40	HHDT,MHDT
Grading	Hauling	11.6	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	120	11.7	LDA,LDT1,LDT2
Building Construction	Vendor	2.00	8.40	HHDT,MHDT
Building Construction	Hauling	0.00	20.0	HHDT
Building Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	120	11.7	LDA,LDT1,LDT2
Paving	Vendor	—	8.40	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	120	11.7	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	8.40	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Architectural Coating	126,465	42,155	1,011	337	2,799

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (Building Square Footage)	Acres Paved (acres)
Demolition	0.00	0.00	0.00	3,278	—
Grading	3,070	3,070	33.0	0.00	—
Paving	0.00	0.00	0.00	0.00	1.07

5.6.2. Construction Earthmoving Control Strategies

Non-applicable. No control strategies activated by user.

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Condo/Townhouse	—	0%
Parking Lot	1.07	100%
General Light Industry	0.00	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2024	0.00	204	0.03	< 0.005
2025	0.00	204	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Condo/Townhouse	395	440	339	143,658	4,679	5,203	4,014	1,700,609
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
General Light Industry	2.08	2.08	2.08	759	28.1	28.1	28.1	10,240

5.9.2. Mitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Condo/Townhouse	395	440	339	143,658	4,679	5,203	4,014	1,700,609
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
General Light Industry	2.08	2.08	2.08	759	28.1	28.1	28.1	10,240

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

Hearth Type	Unmitigated (number)
Condo/Townhouse	—
Wood Fireplaces	0
Gas Fireplaces	0
Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	26
Conventional Wood Stoves	0
Catalytic Wood Stoves	0
Non-Catalytic Wood Stoves	0
Pellet Wood Stoves	0

5.10.1.2. Mitigated

Hearth Type	Unmitigated (number)
Condo/Townhouse	—
Wood Fireplaces	0
Gas Fireplaces	0
Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	26
Conventional Wood Stoves	0
Catalytic Wood Stoves	0
Non-Catalytic Wood Stoves	0
Pellet Wood Stoves	0

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
126465.29999999999	42,155	1,011	337	2,799

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.10.4. Landscape Equipment - Mitigated

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Condo/Townhouse	223,481	204	0.0330	0.0040	0.00
Parking Lot	40,868	204	0.0330	0.0040	0.00
General Light Industry	6,988	204	0.0330	0.0040	0.00

5.11.2. Mitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Condo/Townhouse	0.00	204	0.0330	0.0040	0.00

Parking Lot	0.00	204	0.0330	0.0040	0.00
General Light Industry	111	204	0.0330	0.0040	0.00

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Condo/Townhouse	1,631,988	2,527,494
Parking Lot	0.00	0.00
General Light Industry	0.00	0.00

5.12.2. Mitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Condo/Townhouse	1,631,988	2,527,494
Parking Lot	0.00	0.00
General Light Industry	0.00	0.00

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Condo/Townhouse	40.1	—
Parking Lot	0.00	—
General Light Industry	9.88	—

5.13.2. Mitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Condo/Townhouse	40.1	—
Parking Lot	0.00	—
General Light Industry	9.88	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Condo/Townhouse	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Condo/Townhouse	Household refrigerators and/or freezers	R-134a	1,430	0.12	0.60	0.00	1.00

5.14.2. Mitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Condo/Townhouse	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Condo/Townhouse	Household refrigerators and/or freezers	R-134a	1,430	0.12	0.60	0.00	1.00

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.15.2. Mitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor
Emergency Generator	Diesel	1.00	0.00	150	300	0.73

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)
Bishop pine(Pinus muricata)	1.00	2,172	10.9
Boxelder(Acer negundo)	5.00	6,657	21.4
California laurel(Umbellularia californica)	1.00	2,021	9.90
Coast redwood(Sequoia sempervirens)	3.00	6,119	30.4
Mountain Mahogany spp(Cercocarpus)	8.00	11,865	56.0
Oregon ash(Fraxinus latifolia)	9.00	12,733	40.9
Red alder(Alnus rubra)	9.00	13,850	44.6
Serviceberry spp(Amelanchier)	11.0	11,412	36.6
Alder spp(Alnus)	-1.00	1,233	6.60
Blue gum eucalyptus(Eucalyptus globulus)	-2.00	5,733	30.0
Dwarf blue gum(Eucalyptus globulus v. compacta)	-13.0	37,410	196
Flooded gum eucalyptus(Eucalyptus grandis)	-1.00	2,561	13.1
Green Wattle(Acacia irrorata)	-1.00	2,381	12.4
Manna gum(Eucalyptus viminalis ssp. viminalis)	-3.00	8,599	45.0
Mayten(Maytenus boaria)	-4.00	10,429	54.1
Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	-1.00	2,940	15.3

Red box(Eucalyptus polyanthemos ssp. polyanthemos)	-1.00	2,866	15.0
Tarata(Pittosporum eugenioides)	-4.00	8,800	43.4

5.18.2.2. Mitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)
Bishop pine(Pinus muricata)	1.00	2,172	10.9
Boxelder(Acer negundo)	5.00	6,657	21.4
California laurel(Umbellularia californica)	1.00	2,021	9.90
Coast redwood(Sequoia sempervirens)	3.00	6,119	30.4
Mountain Mahogany spp(Cercocarpus)	8.00	11,865	56.0
Oregon ash(Fraxinus latifolia)	9.00	12,733	40.9
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Serviceberry spp(Amelanchier)	11.0	11,412	36.6
Alder spp(Alnus)	-1.00	1,233	6.60
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Dwarf blue gum(Eucalyptus globulus v. compacta)	-13.0	37,410	196
Flooded gum eucalyptus(Eucalyptus grandis)	-1.00	2,561	13.1
Green Wattle(Acacia irrorata)	-1.00	2,381	12.4
Manna gum(Eucalyptus viminalis ssp. viminalis)	-3.00	8,599	45.0
Mayten(Maytenus boaria)	-4.00	10,429	54.1
Narrow-leaf peppermint(Eucalyptus radiata ssp. radiata)	-1.00	2,940	15.3
Red box(Eucalyptus polyanthemos ssp. polyanthemos)	-1.00	2,866	15.0
Tarata(Pittosporum eugenioides)	-4.00	8,800	43.4

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	9.52	annual days of extreme heat
Extreme Precipitation	15.3	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	19.1	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A

Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—

AQ-Ozone	7.52
AQ-PM	6.96
AQ-DPM	1.57
Drinking Water	93.3
Lead Risk Housing	50.6
Pesticides	36.0
Toxic Releases	17.3
Traffic	17.3
Effect Indicators	—
CleanUp Sites	7.71
Groundwater	91.7
Haz Waste Facilities/Generators	22.0
Impaired Water Bodies	83.0
Solid Waste	97.9
Sensitive Population	—
Asthma	7.29
Cardio-vascular	2.72
Low Birth Weights	40.7
Socioeconomic Factor Indicators	—
Education	23.3
Housing	54.6
Linguistic	22.9
Poverty	33.2
Unemployment	3.21

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	49.85243167
Employed	76.27357885
Median HI	33.70973951
Education	—
Bachelor's or higher	68.40754523
High school enrollment	100
Preschool enrollment	22.58437059
Transportation	—
Auto Access	58.09059412
Active commuting	86.24406519
Social	—
2-parent households	76.55588349
Voting	97.48492237
Neighborhood	—
Alcohol availability	88.39984602
Park access	17.09226229
Retail density	3.310663416
Supermarket access	10.18863082
Tree canopy	92.91672013
Housing	—
Homeownership	42.43551906
Housing habitability	54.88258694
Low-inc homeowner severe housing cost burden	28.48710381
Low-inc renter severe housing cost burden	59.11715642
Uncrowded housing	54.07416913

Health Outcomes	—
Insured adults	64.90440139
Arthritis	0.0
Asthma ER Admissions	93.7
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	79.5
Cognitively Disabled	32.0
Physically Disabled	19.5
Heart Attack ER Admissions	98.8
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	65.3
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	46.4

Children	88.7
Elderly	4.0
English Speaking	51.9
Foreign-born	27.2
Outdoor Workers	11.7
Climate Change Adaptive Capacity	—
Impervious Surface Cover	96.4
Traffic Density	12.5
Traffic Access	23.0
Other Indices	—
Hardship	30.0
Other Decision Support	—
2016 Voting	98.2

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	16.0
Healthy Places Index Score for Project Location (b)	69.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	Yes
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Land Use	Per project description.
Construction: Construction Phases	Per project description.
Construction: Off-Road Equipment	Per project description.
Operations: Energy Use	All electric per project description.
Operations: Water and Waste Water	Assume 0 indoor water use for WWTP.
Operations: Solid Waste	WWTP solid waste placeholder.
Operations: Refrigerants	No refrigerant use at WWTP.
Operations: Emergency Generators and Fire Pumps	Placeholder.
Operations: Hearths	All electric per project description.
Construction: Trips and VMT	Per project description.
Operations: Vehicle Data	Assume 1 worker per day at WWTF.

APPENDIX D

HISTORIC RESOURCE ASSESSMENT

est. 2021

GROUNDWORK

PLANNING & PRESERVATION

HISTORIC RESOURCE ASSESSMENT

U.S. COAST GUARD HOUSING FACILITY, COMMUNICATIONS AREA MASTER STATION PACIFIC (CAMSPAC), POINT REYES STATION, CALIFORNIA

NOVEMBER 20, 2023

Prepared by Gretchen Hilyard Boyce
Groundwork Planning & Preservation

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Table of Contents

Acronyms/Abbreviations

California Register	California Register of Historical Resources
CAMSPAC	Communications Area Master Plan Pacific
CEQA	California Environmental Quality Act
CLAM	Community Land Trust Association of West Marin
DPR form	State of California Department of Parks & Recreation DPR 523 form
Eden	Eden Housing, Inc.
Groundwork	Groundwork Planning & Preservation
HRA	Historic Resource Assessment
IS/MND	Initial Study/Mitigated Negative Declaration
National Register	National Register of Historic Places
USCG	United States Coast Guard

Summary of Findings

Community Land Trust Association of West Marin (CLAM) and Eden Housing, Inc. (Eden) are proposing to adaptively reuse and repurpose the former United States Coast Guard (USCG) Housing Facility for the Communications Area Master Plan Pacific (CAMSPAC) at Point Reyes Station, California to provide affordable housing units in Point Reyes Station.

This Historic Resource Assessment (HRA) was prepared by Groundwork Planning & Preservation (Groundwork) on behalf of Panorama Environmental, Inc. (environmental consultant) for the County of Marin (lead agency). The HRA was conducted for the project in compliance with the lead agencies responsibilities under the California Environmental Quality Act (CEQA) and Section 106 of the National Historic Preservation Act. The purpose of this report is to evaluate historic-age properties within the study area to determine if any would qualify as historical resources under CEQA to inform the analysis of the proposed project in the Initial Study/Mitigated Negative Declaration (IS/MND) being prepared by Panorama Environmental, Inc. for the County of Marin. The HRA was prepared by Groundwork's founder, Gretchen Hilyard Boyce, who exceeds the *Secretary of the Interior's Professional Qualification Standards* in History and Architectural History.

This HRA identifies and evaluates historic-age properties within the study area for eligibility for listing in the National Register of Historic Places (National Register) and California Register of Historical Resources (California Register) The study area contains one historic-age property, the former USCG Housing Facility for the CAMSPAC at Point Reyes Station, which is comprised of 23 buildings, structures, and recreational features. Detailed evaluations of these properties are recorded on State of California Department of Parks and Recreation DPR 523 forms (DPR forms), which are attached in the Appendix.

Groundwork concludes that the historic-age property located within the study area does not meet the criteria for listing in the National Register or California Register and does not qualify as a historical resource under CEQA. The final determination will be made by the County of Marin during their review of the findings of this HRA and attached DPR forms. Due to the absence of historical resources within the study area, there is no potential for the proposed project to impact historical resources. A separate archeological study is being conducted for the project by a separate consultant.

I. Description of the Undertaking

Property Description

The subject property is known as the U.S. Coast Guard Housing Facility for the Communications Area Master Station Pacific (CAMSPAC) and is located approximately 1.5 miles east of the town of Point Reyes Station in unincorporated Marin County, California **(see Figure A: Location Map).** The approximately 33.59-acre property sits on a terrace that is 110 feet in elevation and is developed with buildings, structures and recreational features associated with its use as housing for the CAMSPAC. The property was constructed in 1973-1974 and contains 23 features, including: 11 residential buildings, 7 non-residential structures, and 5 recreational facilities including a playground area, tennis court, basketball court, and aboveground pool, and hot tub/spa.

The property is bounded on the west by Point Reyes Family Homes affordable housing, on the north and northeast by an unimproved parcel, and on the east and south by Golden Gate National Recreation Area and Lagunitas Creek, which frames the southern and eastern border of the Property. A commercial property and a small farm are adjacent to the property to the south.

Access to the subject property is from Mesa Road, near the intersection of Mesa Road and State Highway 1, immediately northeast of the town of Point Reyes Station. Commodore Webster Drive extends east from Mesa Road and provides access into the property on a northeast axis, creating a central spine along which many of the buildings are oriented. Commodore Webster Drive is an asphalt paved, two-lane private road that terminates in a small cul-de-sac at the north end of the property.

Project Description

CLAM and Eden, referred to jointly as Applicant, have filed an application with Marin County for a Coastal Permit and Conditional Use Permit to adaptively reuse and repurpose the former United States Coast Guard (USCG) site to provide affordable housing units in Point Reyes Station. The proposed project would:

1. Rehabilitate existing townhomes contained in 10, two-story buildings (Buildings 101, 102, 103, 104, 201, 202, 203, 204, 205, 206) to provide 36 affordable housing units;
2. Rehabilitate and repurpose the existing “barracks” building (Building 50) to provide 15 affordable housing units;
3. Rehabilitate “Building 100A” to provide 3 housing units;
4. Renovate and expand an existing kitchen/galley building (Building 1) to provide a resident services building;
5. Construct a new, on-site wastewater treatment system;
6. Remove trees from a riparian area; and
7. Reconstruct an existing playground.

The project would require re-parcelization to create four parcels within the project site. Marin County is the lead agency responsible for compliance with the California Environmental Quality Act (CEQA).

Study Area

The study area **(see Figure A)** for the evaluation includes the approximately 33.59-acre property located at 100 Commodore Webster Drive in Point Reyes Station in Marin County, California. The property is located approximately 1.5 miles southeast of Point Reyes Station, in a semi-rural setting. The property occupies Marin County Assessor Parcel Numbers 119-240-73 and 119-236-10. The property is bound on the west by Point Reyes Family Homes affordable housing, on the north and northeast by an unimproved parcel, and on the east and south by Golden Gate National Recreation Area and Lagunitas Creek, which frames the southern and eastern border of the Property. A commercial property and a small farm are located adjacent to the property to the south.

II. Study Methods and Findings

Current Historic Status

Historic-age properties identified within the study area have not previously been evaluated for listing in any local, state, or federal historic registry or database, including the National Register nor the California Register.

Methodology

Groundwork prepared this report using primary and secondary sources collected at various repositories and based on field investigation conducted in September 2023. Archival research was targeted at archives and online repositories as needed to obtain information about the development of the property, historic context, and alterations over time.

Cultural Resources Background and Research

Groundwork prepared this report using primary and secondary sources available at the following archives: Marin County Free Library, California State Archives, National Park Service Point Reyes National Seashore Photograph Archive, newspapers.com, and Ancestry.com. Research support was provided by Ettienne LeFebre, a Master of Arts in Public History candidate at California State University, Sacramento.

Table 1 below lists the key technical reports which provided background information to inform the evaluations:

Table 1. Previous Studies and Reports in the Area of Potential Effects

Author	Date	Report Title
Essel Environmental Engineering and Consulting	2021	*Phase I Environmental Site Assessment: Commodore Webster Drive, Point Reyes Station, California*
EMG	2018	*Facility Condition Assessment of Point Reyes Station, Commodore Webster Drive, Point Reyes, California*
Tetra Tech	2016	*Environmental Compliance Due Diligence Activities Report: U.S. Coast Guard Point Reyes Station, California Housing Units*
Alshuth and Oringer	2016	*A Historical Resources Study for the Point Reyes Station U.S. Coast Guard Base Housing Project, Point Reyes Station U.S. Coast Guard Base, Marin County, California*

Historical Resources Field Investigation

On September 5, 2023, Groundwork staff Gretchen Hilyard Boyce, Principal, visited the site and conducted a pedestrian survey for field verification of the presence or absence of historical resources. At various locations, she observed the existing conditions of the buildings, structures, and recreational features. The site visit included the survey of 23 historic-age features listed below **(see Figure B).**

Table 2. Historic-Age Buildings, Structures and Recreational Features Surveyed

DPR #	Building # (keyed to Figure B)	Type	Building/Feature Name
1	1	Building	Galley (kitchen)
2	50	Building	Bachelor Enlisted Quarters
3	100A	Building	Facilities and Engineering Building
4	100B	Building	Chemical and Equipment Storage Building
5	100C	Building	Mechanical Shop/Yard Maintenance Building
6	101 A,B,C,D	Building	residential
7	102 A,B,C,D	Building	residential
8	103 A,B,C,D	Building	residential
9	104 A,B,C,D	Building	residential
10	201 A,B,C,D	Building	residential
11	202 A,B,C,D	Building	residential
12	203 A,B,C,D	Building	residential
13	204 A,B	Building	residential
14	205 A,B,C	Building	residential
15	206 A,B,C	Building	residential

16		Structure	Landscape Equipment Storage Shed
17		Structure	Storage Shed/Housing Lawn Shed
18		Structure	Wood Recreational Pavilion
19		Recreational Feature	Play Area and Recreational Pavilion
20		Recreational Feature	Basketball Court
21		Recreational Feature	Hot Tub
22		Recreational Feature	Pool
23		Recreational Feature	Tennis Court

Evaluation of Potential Historical Resources

The subject property was constructed as a housing facility in 1973-1974 and is comprised of 23 buildings, structures, and recreational features. It was determined that the property would be best evaluated as a potential historic district. Groundwork prepared a DPR 523 D (District) record for the subject property and 23 DPR 523 A (Primary) records for individual buildings, structures, and recreational features located within the study area (see Appendix). The findings of those evaluations and historic context sections are summarized below.

Historic Context

Early Settlement of the Point Reyes Peninsula

The Coastal Miwok inhabited the Point Reyes Peninsula for over 3,000 years before the arrival of the first European, Sir Francis Drake, who observed the area in 1579. Tribes throughout the peninsula and Tomales Bay managed the grasslands through controlled burning and selective harvesting (MIG Inc., 15). European settlement did not start in the region until the Spanish established Mission San Rafael Arcángel in San Rafael, California in 1817, which had a large agricultural output and introduced over 2,000 cattle to the peninsula. The longhorn cattle were raised mainly for their hides and tallow, as both were lucrative products in global markets at the time. The cattle drastically altered the Point Reyes and Tomales Bay landscape due to free-range grazing that disturbed the native vegetation that was curated and cultivated by the Coast Miwok (Edmonds et. al, 16-17).

Mexico gained independence from Spain in 1821 and the secularization of the Mission System in 1834 transformed land ownership patterns across the state. Large Mexican land grants were claimed by Californios of Mexican and foreign origin. The land on which the subject property is located today was within the boundaries of 8,863-acre Rancho Tomales y Baulenes (**Figure 10**)[1]. Established in 1837 by Mexican corporal Rafael Garcia, who built the first non-indigenous settlement outside of Mission San Rafael in Bolinas Bay in 1833, Rancho Tomales y Baulenes continued the cattle ranching tradition of the previous Spanish occupants (Edmonds et. al, 17). This land was also claimed by the nearby 9,478-acre Nicasio Land Grant, which was common as many Mexican Land Grants had informal record keeping methods and boundaries were often disputed **(Figure 11)** (CA Department of Transportation, 17). In 1851, James Black purchased the section of the Nicasio Land Grant that encompasses present-day Point Reyes Station (Alshuth and Origer, 5).

After the United States acquired California in the Mexican American War in 1848, the San Francisco Bay area and surrounding regions experienced an influx of migration from the Eastern United States and other countries. Land disputes between Anglo settlers and Mexican land grant holders became common, exacerbated by the fact that there was little government oversight of these transactions in the northern frontier of Mexico. In 1850, the U.S. Congress passed the California Land Act of 1850, which led Rafael Garcia to enter a protracted land grant battle before the California Land Commission in 1853 due to the Mexican government never ratifying his deed of purchase (Avery, 39). In 1866 Garcia obtained the title to his land and died four months later and by this time had already sold 4,336 acres of the land.

The Proliferation of Dairy Farming and the Founding of Point Reyes Station

Sometime in the 1860s Sheriff James C. Stocker rented the subject property from Black and utilized it as a dairy farm (EIP Corporation, 58). Since Stocker was a renter, it is possible he was a tenant dairy farmer who participated in the burgeoning butter industry. By this time, Point Reyes and Olema Valley had become a center for dairy farming in California; the Point Reyes Peninsula farms were established in 1857 and the Olema Valley dairies in 1856. The Shafter brothers, lawyers based in San Francisco, purchased former rancho land and also likely received some land as payment by ranchero owners who were their clients (Edmonds et al., 20). Rancheros, the Mexican Californios who owned the land grants, were often rich in land but poor in actual capital, so they often paid their lawyers in land (Pitt, 89). The Shafter brothers acquired about 66,000 acres of land and developed a system of tenant dairy farms on the northern end of the peninsula **(Figure 12)**. Between 1865 and 1875 the Shafter's and Howard's system of tenant dairy farms - often rented by European immigrants like the Irish, Italians, Italian-speaking Swiss, and Azorean Portuguese - became well known for their butter production across the state. Chinese farm workers also occupied the area in the 1870s, but their presence on the peninsula diminished by the end of the nineteenth century (CA Department of Transportation, 6). The Shafters were involved in the management and construction of the dairy farms with their tenants, whose leases

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[1] *Note: Figure references below refer to the DPR District Record included in the Appendix.*

often ran one to three years (Edmonds et al., 22). The Shafters focused on butter because it did not spoil as quickly as other dairy products when transporting via schooner and steamship to San Francisco.

The Olema Valley Ranches, located on the southern end of the peninsula, were established both as tenant farms and independent dairies starting in 1856 with the Stewart, Randall, and Genazzi Ranches **(Figure 13)** (Edmonds et al., 25). The Olema Farms also focused on butter production and contributed to the Marin County dairy industry, which was considered the most productive and profitable dairy production region in the state.

In 1875, Mary Black (daughter of James Black and owner of James Stocker's rented land) sold the land to the North Pacific Coast Railroad. The North Pacific Coast Railroad established a railroad station on the former pastureland, which was followed by the establishment of Point Reyes Station and its growth in the late 1870s and 1880s **(Figure 14)** (EIR Corporation, 58; Peterson and Patterson, 4). A portion of this railroad line ran across the subject property along the contemporary Commodore Webster Drive. Point Reyes Station's new status as a stopping point on the railroad led to a population boom in the town and provided the dairy farms with faster, more reliable, and safer transportation of their products (CA Department of Transportation, 5). The dairy industry grew at an accelerated pace as butter could be transported in a matter of hours rather than the three days it took by schooner. The railroad was also used by local farmers for the transportation of cattle and hogs. As legislation surrounding dairy production increased in the late nineteenth and early twentieth century, the surrounding farms upgraded their traditional wood dairy barns to industrial Grade A dairy warehouses. In 1915, the California Pure Milk Law passed and required all milk produced in the state to be pasteurized. To meet this regulation, as most dairy farmers in the area did not possess the equipment to pasteurize, the Point Reyes Dairymen Association established the Point Reyes Cooperative Creamery at Point Reyes Station (Edmonds et al., 24).

Point Reyes' Maritime History and the U.S. Coast Guard

As early as 1854 there were calls for a lighthouse to be built on the Point Reyes Peninsula (White, 17). Maritime routes to San Francisco often passed by the Point Reyes Peninsula, which was dangerous for ships due to the topography of the seashore and the high likelihood of foggy conditions. From 1854 to 1869 the U.S. Congress authorized thousands of dollars for the construction of a lighthouse and fog signal, but delays in the adjudication of Mexican Land Grants in the region stalled the construction project. In 1857 the Shafter brothers and son-in-law Charles Webb Howard acquired the Rancho de los Reyes land grant, which would be the eventual site of the proposed lighthouse (Edmonds et al.,20). In 1869, 83 acres of this land was sold to the U.S. government for construction of the lighthouse at the west most point of the peninsula. On December 1, 1870, the lighthouse became operable **(Figure 15)**, and provided mariners with a new sense of safety traveling parallel to the coast, including ships transporting lumber from Portland, Oregon and Seattle, Washington, as well as the schooners that transported butter to San Francisco from the Marin County dairy farms (*Point Reyes Lifeboat Station: CLR*, 18). However, shipwrecks persisted, including eight major shipwrecks occurring throughout the 1870s and 1880s, and only lighthouse personnel and dairy ranchers were able to provide assistance to the crews of shipwrecked boats. In 1878 the U.S. Life-saving Service, an early precursor to the U.S. Coast Guard, was founded to address rising numbers of shipwrecks due to a nationwide increase in maritime shipping. In 1886, the U.S. Life-saving Service began negotiations with Charles Webb Howard to purchase property for the establishment of a Life-saving station on the Point Reyes coast.

In 1888 Howard sold a 3.5-acre property on Ten-Mile beach, three miles north of the point. The Point Reyes Life-saving Station began operations on July 8, 1890, with 37 crewmembers **(Figure 16)**. The station operated until 1927 and assisted in numerous small rescue operations and 14 major shipwrecks during its 37 years of operation (*Point Reyes Lifeboat Station: CLR*, 18). The location of the life-saving station, however, was poor for the launch of the boats needed to conduct life-saving missions, which led to the construction of an auxiliary boathouse on Howard's land a few hundred yards north of the station in 1894. It was clear that the life-saving station needed a new location even after the construction of the auxiliary boathouse, yet construction stalled for several decades and led to deteriorating conditions of the Point Reyes Life-saving Station. In 1915, the U.S. Life-Saving Service joined with the Revenue Cutter Service to create the U.S. Coast Guard Service, who took over operations of the life-saving station. Finally in 1928, the Coast Guard established the Point Reyes Lifeboat Station in a new location on land bought from the heirs of Howard in northwestern Drake's Bay **(Figure 17)** (*Point Reyes Lifeboat Station: CLR*, 20-24).

The Lifeboat Station operated for 41 years until 1957. During this time crew members assisted with numerous incidents relating to fishing boats and private boating. During both World War I and World War II, Coast Guard personnel were enlisted into military service to protect the Pacific Coastline. Life at the station was particularly difficult for Coast Guard members who had family, as family housing was not provided by the station: men were expected to either find nearby lodging for their family on their own, live away from their family, or relocate to stations with family lodging (*Point Reyes Lifeboat Station: CLR*, 27-30). In 1946 the Coast Guard expanded the facility, expecting long-term activity at the station to increase, but the vast improvements in maritime navigational technology and decreased fishing fleet numbers led to the eventual shuttering of the station in 1968 (*Point Reyes Lifeboat Station: CLR,* 49).

U.S. Coast Guard Communications Operations in the Point Reyes National Seashore (PRNS)

In the mid-1960s, during the closure of the Point Reyes Lifeboat Station, the Coast Guard made plans to create a Pacific-wide Communication System to meet the demands of new maritime navigational technology ("Coast Guard berths in Pt. Reyes Station," Leane). The Coast Guard hired Palo Alto communications consulting firm Grangers Associates to determine where would be the best location for the communications system, and ten options across the west coastline were considered. Ultimately the Point Reyes Peninsula was recommended as an ideal location for a maritime communications facility, where RCA and AT&T had already been conducting commercial maritime communications for years. In 1970 Congress authorized $5 million for the construction of communications stations with family and individual housing for Coast Guard personnel. This was a notable departure from earlier Coast Guard operations that failed to provide housing for families.

Establishment of the Point Reyes National Seashore

From the late 1950s to the 1970s, the National Park Service began establishing federally protected parkland closer to urban centers for recreational purposes and the preservation of the environment from urban sprawl (Watt, 67). The rise of environmentalism in California during this period contributed to calls for federal protection of Point Reyes Peninsula from environmentalists and residents concerned with urban and suburban sprawl disturbing the natural landscapes on the peninsula. However, while the NPS formally began drawing up leaseback agreements with the regions dairy farmers, many of which descended from the original dairy farmers on the peninsula 100 years before, some farmers and residents of West Marin County opposed the establishment of a national park and criticized NPS officials and lawmakers for their lack of inclusion in discussions on the park proposal (Watt, 79). Proposed protected pastoral zones were often situated on land unsuitable for cattle grazing, and there were concerns in some communities about noise level and traffic increases from park visitors. RCA and AT&T, who owned private property for radio operating systems on the peninsula also opposed designation, as the low noise levels on the peninsula made radio operation conditions excellent at Point Reyes (Watt, 78). Additionally, the NPS wanted to designate segments of pastureland into "wilderness zones" and remove man-made influences on the land, which would effectively prohibit some dairy farmers from using their inherited land. Despite these concerns and heated debates that prompted years of tense negotiations between the NPS and farmers, the NPS officially owned the majority of the Point Reyes Peninsula and designated it a protected national seashore in 1962. By this time, the largest entities that still owned private land on the peninsula included RCA, AT&T, and the U.S. Coast Guard.

Creation and Operation of the U.S. Coast Guard Point Reyes Housing Facility

Two communications stations were built on the Point Reyes peninsula from 1970-1973, one on the seashore near the town of Inverness and the other about 16 miles southeast of Bolinas. Lieutenant Commander Stephen P. Leane was appointed commanding officer and Lieutenant Phillip Ellia was appointed executive officer of the communications station (Leane, "Coast Guard berths in Pt. Reyes Station").

Stephen P. Leane

Stephen Patrick Leane was born on October 31, 1939, in Center, Indiana to John Hawkins Leane and Kathryn Louise Gish, and was raised in Indianapolis, Indiana ("Stephen Patrick Leane Birth Certificate," Ancestry.com). He attended Thomas Carr High School in Indianapolis from about 1954-1958, and afterwards attended and graduated from the U.S. Coast Guard Academy in New London, Connecticut in 1961 ("Stephen Patrick Leane Yearbook Picture," Ancestry.com; "Coast Guard Groundbreaking at Point Reyes Station," *Petaluma-Argus Courier*). After graduating, he worked for the Coast Guard on the Atlantic Coast until moving to Monterrey, California in 1964 to attend the Navy's Postgraduate School. On December 3, 1965, he married Dana Timmins in Monterrey, and graduated from the Navy Postgraduate school in 1966 with a master's degree in communications engineering ("Stephen P Leane and Dana T Willcox Marriage Index Entry," Ancestry.com).

Leane worked in various communications positions at the Coast Guard headquarters after earning his masters, and around the late 1960s and early 1970s worked as the executive officer of the Cutter's Steadfast in St. Petersburg, Florida. In 1972 he was appointed the commanding officer of the Point Reyes Coast Guard Communications Facility ("Coast Guard Groundbreaking at Point Reyes Station," *Petaluma-Argus Courier*). While stationed in Point Reyes he was instrumental in negotiations with the West Marin School for the school and the communications housing complex to jointly share the school's recreational facilities in exchange for the Coast Guard contributing money to a recreation fund ("Coast Guard and school pool recreation efforts," *Daily Independent Journal*). Around 1978 Leane was transferred to the Coast Guard's 11th District Long Beach Station and acted as a Planning Officer in Staff of Commander ("Navy will meet," *Camarillo Daily News*). In 1986 he worked for the Coast Guard in Alaska monitoring commercial fishing fleets and was involved in a tense encounter in Soviet waters during this time. In 1987 he received the Captain David H. Jarvis Award for Inspirational Leadership from the Navy ("Award Recipients for the Annual Navy League Awards," Navy League of the United States). At unknown times in his career, he also served in Honolulu and Washington D.C. for the Coast Guard.

After retiring from the Coast Guard in 1987, he lived in Yuba City, California and worked as a director of general services for the county. A year after moving to Yuba City he moved to San Luis Obispo with his wife, and in 1991 became the harbor manager of Port San Luis (Porter, *The County Telegram-Tribune*). He and his wife have two children.

Phillip Ellia

Phillip Ellia was born on July 12, 1930, in Fitchburg, Massachusetts to Suka and Seloka Ellia ("Phillip Ellia 1940 Census Entry," Ancestry.com). He joined the Coast Guard as a communications officer circa 1950 and married Ardyth Loreen Frick on August 1, 1951 in Hoquiam, Washington ("Coast Guard Groundbreaking at Point Reyes Station," *Petaluma-Argus Courier*.; "Marriage Certificate No. 21298," Ancestry.com) Around this time he was stationed at a Coast Guard station in Seattle, Washington, and served at a station in Portland, Maine out of Coos Bay in circa 1959 ("Phillip Ellia 1959 Portland, Maine City Directory Entry," Ancestry.com). During the 1960s Ellia served for the Coast Guard in Wisconsin; Adak Island, Alaska; and Guam both as a communications officer on ships and in land-based stations. In the late 1960s he served as the assistant chief for the communications branch in San Francisco, California on the staff of the commander, and in 1972 he was assigned as the executive officer of the Point Reyes Coast Guard Communications Station ("Coast Guard Groundbreaking at Point Reyes Station," *Petaluma-Argus Courier*). He lived in the San Francisco Bay Area until at least 1974, and by the mid-1980s had retired from the Coast Guard and relocated to Weymouth, Massachusetts with his wife. In 1988 his wife passed away in Weymouth. His last recorded residence was in 2020 in Weymouth, Massachusetts, and he and his wife had at least two children ("Ardyth Loreen Ellia Obituary," Ancestry.com).

Despite the communications stations themselves being built with relative ease, there were multiple issues with the planning and construction of the accompanying family housing complex. The Coast Guard originally proposed to convert the Inverness Valley Inn and pastureland on Tomales Bay into housing facilities in 1969. However, local residents and Marin County planners objected to the plans on the grounds that population density of the area would skyrocket to twice the proposed density outlined in the West Marin Master Plan, and that the development of the inn would diminish the rustic feeling of the town (Cook, "Marin Village Battling Coast Guard Development").

Despite Coast Guard officials designating the Inverness site as the best location for the housing complex due to its proximity to the communications stations and adequate water on site, in August of 1971 officials announced the housing complex would be constructed adjacent to the town of Point Reyes Station on the 37-acre subject property (EIP Corporation, 29). Previously the property had served as pastureland for surrounding farms **(Figures 18 and 19)**. 109 buildings were present in Point Reyes Station prior to construction of the facility, and the population of the town was 394. The construction of the subject property, located northeast of Point Reyes Station, would add 13 buildings and 175 people to the community (EIP Corporation, 28). Gil Construction Company of Pacheco, California was commissioned to build the $1.1 million complex, and on July 7, 1972, a groundbreaking ceremony was held on the property with local residents and invited government officials ("Coast Guard Groundbreaking at Point Reyes Station," *Petaluma-Argus Courier*).

Construction of the residential buildings were planned to be completed in March of 1973, but delays occurred again due to several reasons **(Figure 20)** (EIR Corporation, 29). First, construction costs exceeded the budget, prompting changes to construction plans. Second, local attorney Paul Keyfetz challenged the construction due to the lack of an Environmental Impact Report prior to groundbreaking, which the Coast Guard explained was due to these reports not being required in 1971 when the project was authorized. Finally, existing and new wastewater treatment issues in Point Reyes Station complicated construction, an issue that continually plagued the facility (EIR Corporation, 30). The Environmental Health Department of the Marin County Public Health Department already disapproved of Point Reyes Station's septic tank system that contained its sewage on site until private contractors could truck the waste away. The confluence of low elevation, soil type, and frequent rainfall in Point Reyes Station, caused sewage leaks on several occasions into Tomales Bay and surrounding pastureland. Concerns were raised that the introduction of the Coast Guard Housing Facility could complicate the issues further (EIR Corporation, 25). Originally the Coast Guard planned to build its own sewage reclamation system, but after the North Marin County Water District was advised in June of 1970 to oversee construction, and after several rejected locations, the Coast Guard employed the Environmental Impact Planning Corporation to prepare an Environmental Impact Statement to better determine the fate of the facility's wastewater system. Ultimately sewage concerns were not remedied before completion of the housing complex, and like Point Reyes Station, the housing facility planned to have its waste contained on on-site in septic tanks that would be trucked into Petaluma for treatment (Wells, "Rescue only part of coast guard job").

The facility was designed by architect Kenneth A. Klein of Fresno, California and engineers from the U.S. Coast Guard's 12th District, Office of Civil Engineering located in San Francisco. The property was constructed by the Gil Construction Company of Pacheco, California. Full scale radio operations began at the communications station on February 1, 1973, and the housing facility was officially completed in 1974.

Kenneth A. Klein

Kenneth August Klein was born on November 5, 1932, in Los Angeles, California to Edward T. Klein and Sophia Moser, and was raised in Pasadena, California ("Kenneth August Klein Obituary," *The Fresno Bee*.; "Kenneth Klein 1950 Census Entry," Ancestry.com). He attended Herbert Hoover High School in Glendale, California from 1947-1950, and started attending Pasadena Junior College in 1951 ("Kenneth Klein Yearbook Picture," Ancestry.com.; "Pasadena Junior College Architecture Club Entry," Ancestry.com). At Pasadena Junior College he was a member of the Architecture Club and modern design was a focus of the group. In 1955 Klein was a senior in the California State Polytechnic School studying architectural engineering, and on June 25, 1955, Klein married Shirley Thurber of Fresno, California at the Calvary Presbyterian Church ("Shirley Thurber Will Recite Vows in June Wedding," *The Fresno Bee*).

By 1973 Klein relocated to Fresno where he worked as an architect and acted as lieutenant governor of the Kiwanis Club ("News in Brief - Kiwanis Club," *The Fresno Bee*). In 1973 he designed the Point Reyes Coast Guard Communications Housing Facility for the U.S. Coast Guard (Klein, "United States Coast Guard Housing: Point Reyes Station, California"). In 1975 his wife Shirley passed away, and on June 3, 1978, he remarried to Georgiea T. Skinner in Fresno ("Kenneth August Klein Obituary," *The Fresno Bee*.; "Kenneth A. Klein and Georgiea T. Skinner," Ancestry.com). He and Skinner divorced in September of 1984, and the same year he remarried for a third time to Twyla Hinson-Bane ("Kenneth A. Klein and Georgiea T, Ancestry.com.; "Kenneth August Klein Obituary," *The Fresno Bee*). In 1987 Klein and Hinson-Bane were baptized as Jehovah's Witnesses and he was known as a devout follower of the faith for the remainder of his life. He worked at Fresno City College for 40 years as an architecture professor, and in his private practice notably volunteered to build and plan Jehovah's Witness houses of worship for 20 years. He passed away in Fresno, California on January 1, 2017, at the age of 85. He was survived by two children from Thurber and four adopted children from Hinson-Bane.

U.S. Coast Guard, 12th District, Office of Civil Engineering, San Francisco

The U.S. Coast Guard (USCG) is organized in two geographic regions (Atlantic, Pacific) and three organizational divisions: Deputy Commandant for Mission Support (DCMS), Deputy Commandant for Operations (DO), and Direct Reports. All are overseen by USCG Headquarters. The civil engineering for the subject property was designed by the Office of Civil Engineering of the 12th District, Pacific

Region, which was located in San Francisco and is no longer in operation. Currently, District 11 (located in Alameda, California) is responsible for Coast Guard activities in California, Nevada, Utah and Arizona. According to the United States Coast Guard:

> "The Office of Civil Engineering is responsible for managing the shore facility capital asset portfolio for the Coast Guard, providing the necessary planning, designing, contracting, acquiring, engineering and environmental stewardship services to support the "right" facility, at the "right" location, at the "right" time, and for the "right" cost. The office also provides technical support for visual and audible aids to navigation and pollution response hardware." (U.S. Coast Guard, "Program Offices" and "Organizational Chart")

Gil Construction Company

Gil Construction Company was located in Pacheco, California and operated from ca. 1960s to the 1970s ("Coast Guard Groundbreaking at Point Reyes Station," *Petaluma-Argus Courier*). They were successful in bidding for building contracts throughout Northern California, primarily in the San Francisco Bay area. Building projects mainly consisted of large municipal buildings and facilities for cities, universities, and the federal government ("Gil Awarded Pittsburg Contract," *Oakland Tribune.*; "College Contract to Pacheco Firm," *Morning News-Gazette.*; "Army Awards Pact for SC Pump Station," *Santa Cruz Sentinel*). In the 1970s their name changed to the Gil-Wynn Construction Company ("Westmoor Bid Awarded," *South San Francisco Enterprise-Journal*). This company built the original complex in 1973-1974.

Post-1974 to Present

After 1974, the Point Reyes Coast Guard Housing Complex provided housing for hundreds of enlisted Coast Guard personnel **(Figure 21)**. The facility included 11 residential buildings that housed Coast Guard personnel and their families, including ten family townhouses on Commodore Webster Drive and one Bachelors Enlisted Quarters (Building 50). A Galley (Building 1) served as a cafeteria for the Bachelors Enlisted Quarters, and multiple recreation facilities, including pavilions, a basketball court, tennis court, pool and spa were provided to residents. In 1975, Stephen P. Leane negotiated with the West Marin School to share joint access of the school's recreation facilities in exchange for a contribution to the school's recreation fund from the Point Reyes Coast Guard ("Coast Guard and school pool recreation efforts," *Daily Independent Journal*). In the 1980s agency cutbacks forced the closure of several San Francisco Bay Area Coast Guard stations. The then-90 employee Point Reyes Coast Guard Housing Complex remained one of the few stations unaffected by the cutbacks (Horowitz, "Coast Guard cutbacks boost boating risk").

The 1990s and 2000s saw a series of alterations to both the structures and sewage system of the Point Reyes Coast Guard Housing Complex. In 1993, the Coast Guard authorized a rehabilitation project to update the residential buildings in the complex, which largely included rehabilitation of the townhouse interiors, fenestration, and some of the siding for both the townhouses and the Bachelors Enlisted Quarters (U.S. Coast Guard Civil Engineering Division, "CAMPSAC Housing Rehab," 1). In 1995 the plans were revised, and construction was completed in ca. 1997 date by Gil Construction & Associates (note: Despite a similar name, this is a different company that the Gil Construction Company that built the subject property in the 1970s).

> *Gil Construction & Associates*
>
> Gil Construction & Associates was founded in 1995 as a Residential and Commercial General Contractor to serve the San Francisco Bay and Peninsula region. Their headquarters is located in Millbrae, California and their owner and director of operations in the San Francisco Bay Area is Ron Gil. They are currently still in operation and specialize in residential and commercial construction services ("About Gil Construction & Associates Inc.," Gil Construction & Associates, Inc.). This company worked on the renovations to the subject property in the 1990s.

In 1997 the Coast Guard conducted a study on new strategies to dispose of wastewater on the property, as wastewater was still being transported to Petaluma for treatment, which was both costly and had the potential to contaminate the nearby Nicasio Reservoir and Tomales Bay in the process of transportation (Sox, 1). The status quo system was still considered to be a primary choice for future wastewater treatment, but new methods were also considered including: the creation and use of septic tanks and leach fields at the subject property and neighboring Toby Giacommi property, the construction of a secondary treatment plant for nearby non-residential reuse operations, and the creation of a city-wide municipal system for full sewage treatment. However, action does not seem to have been taken until 2009, when the Coast Guard rehabilitated the previous sump tank system (U.S. Coast Guard Civil Engineering Division, "Sewer System Rehab," 1). It appears that the sewage line that runs under Commodore Webster Drive was simply updated and the sump tanks already employed were replaced with superior models, indicating that the Point Reyes Coast Guard Housing Complex still does not have a process for treating wastewater on-site in any capacity. Three septic tanks remain on the western side of the property (Tetra Tech, Inc., A-16).

At an unknown time, Commander Glenn Stocks became the final commanding officer of the CAMPSAC station (Johnson, "Affordable housing plan gets support"). Around 2013 a nationwide trend of decommissioning surplus military facilities affected Coast Guard stations across the San Francisco Bay area (*Associated Press*, "Bay Area bases to be closed"). Beginning in 2014, Marin County and the Coast Guard also entered negotiations to transform the Point Reyes Coast Guard Housing Complex into affordable housing **(Figure 22).** These two factors seem to have contributed to the CAMPSAC communications facilities closure on September 11, 2015, and the County of Marin purchased the vacant property in 2019 ("Cdr. Glenn Stocks, commanding officer of communications," NARA & DVIDS Public Domain Archive.; Johnson, "Affordable housing plan gets support"). Since 2019 the Marin County Fire Department has used the former housing facility as a storage and training facility.

Evaluation Summary

The evaluation of the subject property is summarized below, and the detailed evaluation can be found in the Appendix, *Department of Parks and Recreation 523 District Record: U.S. Coast Guard Housing Facility, Communications Area Master Station Pacific (CAMSPAC), Point Reyes Station*.

Criterion A

To be eligible under the event criterion, the property cannot merely be associated with historic events or trends but must have a specific association to be considered significant. The subject property provided housing for the USCG Communications Area Master Station Pacific (CAMSPAC) facilities at Point Reyes from its construction in 1974 until the property was vacated by the USCG in 2016, as part of a larger national trend in decommissioning surplus military facilities. The property was purchased by the County of Marin in 2019 to be rehabilitated into affordable housing and is currently used as a training facility by the Marin County Fire Department.

The facility was constructed late in the development of Coast Guard facilities in the area, which began with the establishment of the Point Reyes Lighthouse in 1870 and Life-saving Station in 1886. As a housing facility supporting the cluster of associated Coast Guard and communication facilities constructed in the 20th century on the Point Reyes peninsula, the subject property does not stand out singularly within this context. The property was constructed as part of a community-wide need to provide housing for the Coast Guard personnel stationed on the Point Reyes Peninsula. Research did not uncover any other important events or associations of the property with the development of Point Reyes Station or Coast Guard operations in the 20th century.

Based on the evaluation above, the subject property does not appear to qualify for listing in the National Register under Criterion A or California Register under Criterion 1 (Events).

Criterion B

During its history, the subject property served as housing and support services for Coast Guard personnel who were living and working on the Point Reyes peninsula. The subject property is associated with numerous individuals from the Coast Guard who resided at the property during its occupation from 1974 to 2016, including the original commanding officer Stephen P. Leane and executive officer Phillip Ellia. Research did not uncover any significant contributions by Leane and Ellia such that the subject property would be eligible under this criterion. To be found eligible under Criterion B, the property must be directly tied to a historically important person and the place where the individual conducted or produced the work for which he or she is known. If Leane and Ellia were found to have made significant contributions to the Coast Guard operations on the Point Reyes peninsula, those contributions would most likely be associated with the communications facilities they managed, not the housing complex where personnel lived. Research did not uncover the names of any additional individuals who would be significantly associated with the property.

Based on the evaluation above, the subject property does not appear to qualify for listing in the National Register under Criterion A or the California Register under Criterion 2 (Persons).

Criterion C

The subject property was constructed in 1974 in a Contemporary architectural style, which was widely applied by builders and architects for residential buildings across California and the United States in the late 20th century. The residential buildings are not distinctive in their architectural design and have minimal architectural detailing, limited to overhanging eaves, hipped roofs, and square posts supporting projecting porch entries. The non-residential buildings are not distinctive in their architectural design and architectural features include: overhanging eaves, hipped roofs, vertical panels on the facades, rows of metal or vinyl windows, shared balconies, and exterior metal stairs supported by metal posts. The structures and recreational features are functional and utilitarian in their design and do not represent any particular architectural style. Overall, these buildings and structures are moderate examples of Contemporary style architecture and do not embody the characteristics of a particular type, period, region, or method of construction.

The buildings were designed by architect Kenneth A. Klein of Fresno, California, the property was built by the Gil Construction Company of Pacheco, California, and the site and infrastructure was designed by engineers from the U.S. Coast Guard's 12th District office in San Francisco, California. Research did not reveal any evidence to indicate that Klein, Gil Construction, or the 12th district engineers should be considered master designers and therefore the subject property is not an example of a work of a master, nor does it possess high artistic values.

Based on the evaluation above, the subject property does not appear to qualify for listing in the National Register under Criterion C or the California Register under Criterion 3 (Design/Construction).

Criterion D

Criterion D/4 most commonly applies to archaeological resources. A separate archeological study is being conducted for the project by another consultant, which will cover the archeological evaluation of the property.

Where historical resources are concerned, Criterion D most commonly applies to transitional buildings or sites that demonstrate rare construction types or technologies such as an early use of a newly developed material, engineering techniques, or blending of design typologies. The subject property is not an example of a rare construction type and does not appear to qualify for listing in the National Register under Criterion D or California Register under Criterion 4 (Information Potential).

Integrity

In order to qualify for listing in the National Register/California Register, a property must possess significance under one of the aforementioned criteria *and* retain sufficient historic integrity to convey its significance. The subject property does not appear to be historically significant under any of the National Register/California Register criteria; therefore, an evaluation of integrity is not pertinent or included here.

Conclusion

As outlined above, the subject property is not eligible for listing in the National Register/California Register due to its lack of significance under the evaluative criteria. Therefore, the subject property should not be considered a historical resource for the purposes of environmental review.

III. References

Alshuth, Taylor and Thomas M. Oringer. *A Historical Resources Study for the Point Reyes Station U.S. Coast Guard Base Housing Project, Point Reyes Station U.S. Coast Guard Base, Marin County, California*. 2016.

Essel Environmental Engineering and Consulting. *Phase I Environmental Site Assessment: Commodore Webster Drive, Point Reyes Station, California*. 2021.

EMG, *Facility Condition Assessment of Point Reyes Station, Commodore Webster Drive, Point Reyes, California.* 2018.

Tetra Tech. *Environmental Compliance Due Diligence Activities Report: U.S. Coast Guard Point Reyes Station, California Housing Units.* 2016.

IV. Preparer's Qualifications

Gretchen Hilyard Boyce (B.A. Architectural History, University of Virginia; M.S. Historic Preservation, University of Pennsylvania) is a Principal Architectural Historian and Cultural Landscape Specialist and meets the *Secretary of the Interior's Professional Qualifications Standards* for Architectural History and History. Ms. Boyce has 20 years of specialized experience in architectural history, historic preservation, and cultural landscapes. Ms. Boyce's work has focused on California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA), National Register, and Section 106 cultural resources assessments throughout California.

Ettienne LeFebre (B.A. History, California State University, Sacramento), is an intern with Groundwork Planning & Preservation. Ms. LeFebre is a Master of Arts candidate in Public Historic at California State University, Sacramento.

V. Appendix

- Location Maps
- Department of Parks and Recreation 523 District Record
- Department of Parks and Recreation 523 Primary Records

Figure A: Location Map, Google Earth modified by author, 2023. Study area outlined in yellow.

Figure B: Site Plan prepared by Groundwork Planning & Preservation. Base: Google Earth aerial, 2023.

APPENDIX E

GEOTECHNICAL INVESTIGATION

ROCKRIDGE
GEOTECHNICAL

Prepared for **Eden Housing**

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
RENOVATION AND IMPROVEMENTS
POINT REYES COAST GUARD HOUSING
POINT REYES STATION, CALIFORNIA

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July 14, 2022
Project No. 21-2050

ROCKRIDGE
GEOTECHNICAL

July 14, 2022
Project No. 21-2050

Mr. Jeremy Hoffman
Associate Director of Real Estate Development
Eden Housing
22645 Grand Street
Hayward, California 94541

Subject: Final Report
Geotechnical Investigation
Proposed Residential Development Renovation and Improvements
Point Reyes Coast Guard Housing
Point Reyes Station, California

Dear Mr. Hoffman,

This report presents the results of our geotechnical investigation for the proposed residential development renovations to be performed at the Point Reyes Coast Guard Housing in Point Reyes Station, California. Our geotechnical investigation was performed in accordance with our proposal dated June 10, 2021.

The subject property is located at the terminus of Commodore Webster Road, approximately one-quarter mile east of downtown Point Reyes Station. The site is currently occupied by 10 townhome buildings, two administrative buildings, parking lots, a tennis court, and landscaped areas.

Plans are to renovate the existing buildings, including adding 14 one-bedroom apartments, installing an elevator, and constructing an enlarged community kitchen/gathering space at Building 50. Other proposed improvements include upgrades to wastewater treatment facilities, constructing additional community spaces, and upgrading outdoor common spaces, roadways, pedestrian paths, and sidewalks.

From a geotechnical standpoint, we conclude the proposed improvements can be constructed as planned. We conclude the proposed improvements may be supported on conventional spread footings bearing on the existing fill or on new fill if placement of new fill is required to raise grades

The recommendations contained in our report are based on a limited subsurface exploration and laboratory testing program. Consequently, variations between expected and actual subsurface conditions may be found in localized areas during construction. Therefore, we should be engaged to observe excavation, grading, and installation of foundations, during which time we may make changes in our recommendations, if deemed necessary.

We appreciate the opportunity to provide our services to you on this project. If you have any questions, please call.

Sincerely,
ROCKRIDGE GEOTECHNICAL, INC.

REGISTERED PROFESSIONAL ENGINEER
CRAIG S. SHIELDS
GE2116
3/31/23
GEOTECHNICAL
STATE OF CALIFORNIA

Craig S. Shields, P.E., G.E.
Principal Geotechnical Engineer

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GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT RENOVATION AND IMPROVEMENTS
POINT REYES COAST GUARD HOUSING
100 COMMODORE WEBSTER DRIVE
Point Reyes Station, California

1.0 INTRODUCTION

This report presents the results of the geotechnical investigation performed by Rockridge Geotechnical, Inc. for the proposed residential development renovation and improvements to be performed at the Point Reyes Coast Guard Housing at 100 Commodore Webster Drive in Point Reyes Station, California. The project site is at the terminus of Commodore Webster Drive, east of its intersection with Mesa Road, as shown on the Site Location Map, Figure 1.

The site is relatively level and located approximately one-quarter mile east of downtown Point Reyes Station. It is currently occupied by 10 at-grade, wood-framed, two- to three-story townhome buildings and two administrative buildings, as well as parking lots and landscaped areas.

Plans are to renovate the existing buildings, including adding 14 one-bedroom apartments, installing an elevator, and constructing an enlarged community kitchen/gathering space at Building 50. Other proposed improvements include improvements to wastewater treatment facilities, constructing additional community spaces, and upgrading outdoor common spaces, roadways, pedestrian paths, and sidewalks.

2.0 SCOPE OF SERVICES

Our investigation was performed in accordance with our proposal dated June 10, 2021. Our scope of services consisted of exploring subsurface conditions at the site by drilling four test borings, performing laboratory testing on selected soil samples, and performing engineering analyses to develop conclusions and recommendations regarding:

- site seismicity and seismic hazards, including potential for liquefaction and liquefaction-induced ground failure

- the most appropriate foundation type(s) for the proposed improvements
- design criteria for the recommended foundation type(s), including vertical and lateral capacities
- estimates of foundation settlement under static and seismic conditions
- design groundwater elevation
- lateral earth pressures for design of the retaining walls, including below-grade walls for the proposed elevator pit
- subgrade preparation for slab-on-grade floors and exterior flatwork
- site grading and excavation, including criteria for fill quality and compaction
- flexible and rigid pavement sections
- corrosivity of the near-surface soil and the potential effects on buried concrete and metal structures and foundations
- 2019 California Building Code (CBC) site class and design spectral response acceleration parameters
- construction considerations.

3.0 PREVIOUS GEOTECHINCAL INVESTIGATION

Questa Engineering Corporation (Questa) previously performed subsurface investigations at the site in November 2000 and December 2020. Questa's investigation in 2020 included drilling four test borings to depths ranging from 21 to 40 feet below the ground surface (bgs). In 2000, Questa installed seven monitoring wells to depths ranging from 13 to 40 feet bgs. Monitoring wells MW-1 and MW-2 were drilled east and northeast of the project site, respectively, and were not considered for our investigation. The approximate locations of Questa's test borings and monitoring wells MW-3 through MW-7 are shown on Figure 2. The logs of the borings and monitoring wells are attached in Appendix C.

4.0 FIELD INVESTIGATION AND LABORATORY TESTING

Our field investigation consisted of drilling four test borings and performing laboratory testing on selected soil samples. Prior to advancing the borings, we obtained a drilling permit from the Marin County Environmental Health Services (MCEHS). We also contacted Underground

Service Alert (USA) to notify them of our work, as required by law, and retained a private utility locator, Precision Locating, LLC, to reduce the potential for encountering existing buried utilities in the boreholes. Details of the field investigation and laboratory testing are described below.

4.1 Test Borings

Subsurface conditions at the site were explored by drilling four test borings, designated as B-1 through B-4. at the approximate locations shown on Figure 2. The borings were advanced on July 6, 2021 by Benevent Building of Concord, California to a depth of 21-1/2 feet below the existing ground surface (bgs) using a limited-access drill rig equipped with four-inch-diameter solid-stem flight augers. During drilling, our field engineer logged the soil encountered and obtained representative samples for visual classification and laboratory testing. The logs of the borings are presented in Appendix A on Figures A-1 through A-4. The soil and bedrock encountered in the borings were classified in accordance with the classification charts shown on Figures A-5 and A-6, respectively.

Soil samples were obtained using the following samplers:

- Modified California (MC) split-barrel sampler with a 3.0-inch outside diameter and 2.5-inch inside diameter, lined with 2.43-inch inside diameter stainless steel tubes.
- Standard Penetration Test (SPT) split-barrel sampler with a 2.0-inch outside and 1.5-inch inside diameter; the sampler was designed to accommodate liners, but liners were not used.

The type of sampler used was selected based on material type and the desired sample quality for laboratory testing. The MC and SPT samplers were driven with a 140-pound safety hammer falling 30 inches per drop using a rope-and-cathead system. The samplers were driven up to 18 inches and the hammer blows required to drive the samplers were recorded every six inches and are presented on the boring logs. A “blow count” is defined as the number of hammer blows per six inches of penetration or 50 blows for six inches or less of penetration. The blow counts required to drive the MC and SPT samplers were converted to approximate SPT N-values using factors of 0.7 and 1.2, respectively, to account for sampler type and approximate hammer energy.

The blow counts used for this conversion were the last two blow counts. The converted SPT N-values are presented on the boring logs.

Upon completion, the boreholes were backfilled with cement grout in accordance with MCEHS requirements. Soil cuttings generated from the soil borings were spread near the boring locations.

4.2 Laboratory Testing

We re-examined each soil and bedrock sample obtained from our borings to confirm the field classifications and selected representative samples for laboratory testing. Soil samples were tested by Construction Materials Testing, Inc. of Livermore, California to measure moisture content, dry density, Atterberg limits, particles passing the No. 200 sieve, and resistance value (R-value). Soil samples were also tested by Project X Corrosion Engineering of Murrieta, California to measure corrosivity potential. The results of the laboratory tests are presented on the boring logs and in Appendix B.

5.0 SUBSURFACE CONDITIONS

Regional geologic information (Figure 3) indicates the site is underlain by Holocene-age alluvium (Qhy). The site is near the geologic contact of Pleistocene-age alluvium, Holocene-age alluvium, and Pleistocene-age marine terrace deposits. A review of an aerial photograph from 1965, which was prior to development of the site, indicates the site sloped gently down to the southeast prior to development.

Based on the results of our field investigation and the previous field investigations by Questa, we conclude the site is blanketed by fill ranging in thickness from approximately 1-1/2 feet at the Boring B-1 location to about six feet at the Boring B-2 location. The logs of the Questa borings drilled in 2020 indicate fill ranging in thickness from from 3 to 4 feet was encountered in Borings CG-2 through CG-4. No fill was noted on the log of Boring CG-1. The fill in our borings consisted of medium dense to dense clayey sand and very stiff to hard clay with varying sand and gravel content. Based on the SPT N-values, the fill appears to be well compacted. Atterberg limits tests performed on two samples of the near-surface clay at depths of 1.5 and 4 feet bgs resulted in plasticity indices (PI) of 4 and 9, respectively indicating the clay has a low expansion potential.

At the locations of Borings B-1, B-2, and B-4, the fill is underlain by native soil consisting of terrace deposits and old alluvium that extends to depths ranging from about 8 to 18 feet bgs. The native soil encountered in our borings consisted of medium dense to dense clayey sand with varying gravel content, dense clayey gravel with sand, dense sand, and hard sandy clay with gravel. Below the native soil, we encountered either residual soil (i.e., decomposed bedrock) consisting of very stiff to hard sandy clay or deeply to completely weathered Franciscan mélange bedrock. At the Boring B-3 location, moderately weathered sandstone was encountered below the fill at a depth of approximately five feet bgs. The Franciscan mélange bedrock encountered in our borings was moderately to completely weathered and included sandstone, shale/serpentinite, and greenstone.

5.1 Groundwater

Groundwater was encountered in borings B-1 and B-2 at depths of 12 feet and 11 feet bgs, respectively. The groundwater levels measured in the borings may not have stabilized at the time when the measurements were taken. During Questa Engineering's field investigation in 2000, groundwater was encountered between 8 and 33 feet bgs. To further estimate the highest potential groundwater level at the site, we reviewed information on the State of California Water Resources Control Board GeoTracker website (https://geotracker.waterboards.ca.gov/). From the GeoTracker website, we obtained information from monitoring wells installed for a former Chevron storage facility located at 11095 State Route 1, located about 0.25 miles southwest of the site. Summary of groundwater level measurements presented in the *2010 Annual Groundwater Monitoring Report, Former Redwood Oil/Chevron Bulk Terminal 20-6457, 11095 State Route 1, Point Reyes, California* prepared by Conestoga-Rovers & Associates (CRA) indicate the groundwater level was measured between May 2004 to May 2010. Measured groundwater levels ranged from 4.37 to 14.18 feet bgs.

The depth to groundwater is expected to vary several feet annually depending on rainfall amounts. We estimate the historic high groundwater at the site to be about five feet bgs.

6.0 SEISMIC CONSIDERATIONS

6.1 Regional Seismicity

The site is in the Coast Ranges geomorphic province of California that is characterized by northwest-southeast trending valleys and ridges. These topographic features are controlled by folds and faults that resulted from the collision of the Farallon and North American plates and subsequent strike-slip faulting along the San Andreas Fault system. The San Andreas Fault is more than 600 miles long from Point Arena in the north to the Gulf of California in the south. The Coast Ranges province is bounded on the east by the Great Valley and on the west by the Pacific Ocean.

The major active faults in the area are the San Andreas, San Gregorio and Hayward faults. These and other faults of the region are shown on Figure 4. For these and other active faults within a 50-kilometer radius of the site, the distance and direction from the site and characteristic moment magnitude[1] [Petersen et al. (2014) & Thompson et al. (2016)] are summarized in Table 1. These references are based on the Third Uniform California Earthquake Rupture Forecast (UCERF3), prepared by Field et al. (2013).

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[1] Moment magnitude is an energy-based scale and provides a physically meaningful measure of the size of a faulting event. Moment magnitude is directly related to average slip and fault rupture area.

TABLE 1
Regional Faults and Seismicity

Fault Segment	Approximate Distance from Site (km)	Direction from Site	Characteristic Moment Magnitude
Total North San Andreas (SAO+SAN+SAP+SAS)	1.3	Southwest	8.04
North San Andreas (North Coast, SAN)	1.3	Southwest	7.52
San Gregorio (North)	17	Southeast	7.44
North San Andreas (Peninsula, SAP)	22	Southeast	7.38
Total Hayward + Rodgers Creek (RC+HN+HS+HE)	31	East	7.58
Hayward (North, HN)	31	East	6.90
Rodgers Creek - Healdsburg	31	Northeast	7.19
West Napa	48	East	6.97
Maacama	50	Northeast	7.55

In the past 200 years, four major earthquakes have been recorded on the San Andreas Fault. In 1836, an earthquake with an estimated maximum intensity of VII on the Modified Mercalli (MM) scale occurred east of Monterey Bay on the San Andreas Fault (Toppozada and Borchardt 1998). The estimated moment magnitude, M_w, for this earthquake is about 6.25. The San Francisco Earthquake of 1906 caused the most significant damage in the history of the Bay Area in terms of loss of lives and property damage. This earthquake created a surface rupture along the San Andreas Fault from Shelter Cove to San Juan Bautista approximately 470 kilometers in length. It had a maximum intensity of XI (MM), an M_w of about 7.9, and was felt 560 kilometers away in Oregon, Nevada, and Los Angeles. The Loma Prieta Earthquake of October 17, 1989 had an M_w of 6.9 and occurred approximately 140 kilometers south of the site.

In 1868, an earthquake with an estimated maximum intensity of X on the MM scale occurred on the southern segment (between San Leandro and Fremont) of the Hayward Fault. The estimated M_w for the earthquake is 7.0. In 1861, an earthquake of unknown magnitude (probably an M_w of about 6.5) was reported on the Calaveras Fault. The most recent significant earthquake on this fault was the 1984 Morgan Hill earthquake which had an M_w of 6.2.

In the North Bay, on August 24, 2014, an earthquake occurred on a splay of the West Napa fault about 48 kilometers northeast of the site. The epicenter of this earthquake was located about 10 kilometers southwest of the Town of Napa, California. The earthquake had an M_w of 6.0 and a maximum intensity of VIII on the MM scale.

As a part of the UCERF3 project, researchers estimate that the probability of at least one $M_w \geq 6.7$ earthquake occurring in the greater San Francisco Bay Area during a 30-year period (starting in 2014) is 72 percent. The highest probabilities are assigned to sections of the Hayward (South), Calaveras (Central) and the North San Andreas (Santa Cruz Mountains) faults. The respective probabilities are approximately 25, 21, and 17 percent.

6.2 Geologic Hazards

Because the project site is in a seismically active region, we evaluated the potential for earthquake-induced geologic hazards including ground shaking, ground surface rupture, liquefaction,[2] lateral spreading,[3] and cyclic densification[4]. We used the results of our field investigation to evaluate the potential of these phenomena occurring at the project site.

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[2] Liquefaction is a phenomenon where loose, saturated, cohesionless soil experiences temporary reduction in strength during cyclic loading such as that produced by earthquakes.

[3] Lateral spreading is a phenomenon in which surficial soil displaces along a shear zone that has formed within an underlying liquefied layer. Upon reaching mobilization, the surficial blocks are transported downslope or in the direction of a free face by earthquake and gravitational forces.

[4] Cyclic densification is a phenomenon in which non-saturated, cohesionless soil is compacted by earthquake vibrations, causing ground-surface settlement.

6.2.1 Ground Shaking

The seismicity of the site is governed by the activity of the San Andreas fault, which is located approximately 1.3 kilometers southwest of the site, although ground shaking from future earthquakes on other faults will also be felt at the site. The intensity of earthquake ground motion at the site will depend upon the characteristics of the generating fault, distance to the earthquake epicenter, and magnitude and duration of the earthquake. We judge that strong to very strong ground shaking could occur at the site during a large earthquake on one of the nearby faults.

6.2.2 Ground Surface Rupture

Historically, ground surface displacements closely follow the trace of geologically young faults. The site is not within an Earthquake Fault Zone, as defined by the Alquist-Priolo Earthquake Fault Zoning Act, and no known active or potentially active faults exist on the site. We therefore conclude the risk of fault offset at the site from a known active fault is very low. In a seismically active area, the remote possibility exists for future faulting in areas where no faults previously existed; however, we conclude the risk of surface faulting and consequent secondary ground failure from previously unknown faults is also very low.

6.2.3 Liquefaction and Associated Hazards

When a saturated, cohesionless soil liquefies, it experiences a temporary loss of shear strength created by a transient rise in excess pore pressure generated by strong ground motion. Soil susceptible to liquefaction includes loose to medium dense sand and gravel, low-plasticity silt, and some low-plasticity clay deposits. Flow failure, lateral spreading, differential settlement, loss of bearing strength, ground fissures and sand boils are evidence of excess pore pressure generation and liquefaction.

The site is located within a “low” level of liquefaction susceptibility as shown on the map titled *Liquefaction Susceptibility Hazards Map 2-11, San Francisco Bay Region, California*, dated 2000 (see Figure 5). We evaluated the liquefaction potential of soil encountered below groundwater at the site using data collected in our borings and the methodology proposed by

Youd et al. (2001). Our analysis was performed using a high groundwater depth of five feet bgs. In accordance with the 2019 California Building Code (CBC), we used a peak ground acceleration of 1.12 times gravity (g) in our liquefaction evaluation; this peak ground acceleration is consistent with the Maximum Considered Earthquake Geometric Mean (MCE_G) peak ground acceleration adjusted for site effects (PGA_M) for a Site Class D. We also used a moment magnitude 8.04 earthquake, which is consistent with the mean characteristic moment magnitude for the San Andreas Fault, as presented in Table 1.

Based on the results of our analyses, we conclude the potential for liquefaction and ground failures associated with liquefaction, including lateral spreading, to occur at the site during a seismic event is low due to the high relative density and/or cohesion of the soil below the design groundwater level.

6.2.4 Cyclic Densification

Cyclic densification (also referred to as differential compaction) of non-saturated sand (sand above groundwater table) can occur during an earthquake, resulting in settlement of the ground surface and overlying improvements. Based on our investigation, we conclude the granular soil above the groundwater table is not susceptible to cyclic densification because of its cohesion and/or relative density. Therefore, we conclude the potential for settlement of the ground surface and the site improvements due to cyclic densification is very low.

8.0 RECOMMENDATIONS

Our recommendations for site preparation and grading, foundation design, pavement design, seismic design, and other geotechnical aspects of the project are presented in this section.

8.1 Site Preparation and Grading

Site demolition for any new construction, including the addition at Building 50, should include the removal of all existing pavements, underground utilities and buried foundations that will interfere with new construction. In general, abandoned underground utilities should be removed to the property line or service connections and properly capped or plugged with concrete. Where existing utility lines are outside of the proposed addition footprint and will not interfere with the proposed construction, they may be abandoned in-place provided the lines are filled with lean concrete or cement grout to the property line. It may be feasible to leave existing foundations in place if they will not interfere with new construction; however, this should be evaluated on a case-by-case basis. Voids resulting from demolition activities should be properly backfilled with compacted fill under the observation of our field engineer and following the recommendations provided in this section.

In areas that will receive fill or improvements (i.e., pavement, foundations, or concrete flatwork), the soil subgrade should be scarified to a depth of at least eight inches, moisture-conditioned to above optimum moisture content, and compacted to at least 90 percent relative compaction[5]. The upper eight inches of soil subgrade for vehicular pavements should be compacted to at least 95 percent relative compaction and be non-yielding. The soil subgrade should be kept moist until it is covered by fill or improvements.

Fill should consist of on-site soil or imported soil (select fill) that is free of organic matter, contains no rocks or lumps larger than three inches in greatest dimension, has a liquid limit of less than 40 and a plasticity index lower than 12, and is approved by the Geotechnical Engineer. Samples of proposed imported fill material should be submitted to the Geotechnical Engineer at least three business days prior to use at the site. The grading contractor should provide analytical test results or other suitable environmental documentation indicating the imported fill is free of hazardous materials at least three days before use at the site. If this data is not available, up to two weeks should be allowed to perform analytical testing on the proposed imported material.

Fill should be placed in horizontal lifts not exceeding eight inches in uncompacted thickness, moisture-conditioned to near optimum moisture content, and compacted to at least 90 percent

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[5] Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same material, as determined by the ASTM D1557 laboratory compaction procedure.

relative compaction. Fill consisting of clean sand or gravel (defined as poorly-graded soil with less than five percent fines by weight) should be compacted to at least 95 percent relative compaction. Fill greater than five feet in thickness should also be compacted to at least 95 percent relative compaction.

8.1.1 Utility Trench Backfill

Excavations for trenches can readily be made with a backhoe. All trenches should conform to the current CAL-OSHA requirements. To provide uniform support, pipes or conduits should be bedded on a minimum of four inches of clean sand or fine gravel. After the pipes and conduits are tested, inspected (if required) and approved, they should be covered to a depth of six inches with clean sand or fine gravel, which should be mechanically tamped. Backfill for utility trenches and other excavations is also considered fill and should be placed and compacted according to the recommendations previously presented. Special care should be taken when backfilling utility trenches within the building footprint and beneath pavements. Poor compaction may result in excessive settlement and damage to the building and/or pavements. If imported clean sand or gravel (defined as poorly-graded soil with less than five percent fines by weight) is used for trench backfill, it should be compacted to at least 95 percent relative compaction. Jetting of trench backfill should not be permitted.

8.1.2 Exterior Concrete Flatwork

Exterior concrete flatwork that will not receive vehicular traffic (i.e. sidewalk) should be underlain by at least four inches of Class 2 aggregate base compacted to at least 90 percent relative compaction. Prior to placement of the aggregate base, the upper eight inches of the subgrade soil should be scarified, moisture-conditioned to near optimum moisture content, and compacted to at least 90 percent relative compaction.

8.1.3 Drainage and Landscaping

Positive surface drainage should be provided around the buildings to direct surface water away from foundations and below-grade walls. To reduce the potential for water ponding adjacent to the buildings, we recommend the ground surface within a horizontal distance of five feet from the buildings slope down away from the buildings with a surface gradient of at least two percent in unpaved areas and one percent in paved areas. In addition, roof downspouts should be discharged into controlled drainage facilities to keep the water away from the foundation and below-grade walls.

8.2 Spread Footings

We anticipate the existing buildings, which are relatively light, are supported on spread footings bottomed in the existing fill, although some footings may extend into the native soil. If new loads will be imposed on the existing footings, test pits should be excavated to determine the depth and width of the footings. Assuming the footings are bottomed at least 18 inches below the lowest adjacent grade, an allowable bearing pressure of 2,500 pounds per square foot (psf) may be used to evaluate existing footings for dead-plus-live-load conditions. The value may be increased by one-third for total load conditions. We estimate settlement of existing footings will not exceed 1/2 inch.

Proposed improvements may be supported on conventional spread footings bearing on the existing fill or on new fill if placement of new fill is required to raise grades. Continuous footings should be at least 16 inches wide and isolated footings should be at least 18 inches wide. Footings should be bottomed at least 18 inches below the lowest adjacent soil subgrade. Spread footings should be designed using an allowable bearing pressure of 2,500 psf for dead-plus-live loads; this value may be increased by one-third for total design loads, which include wind or seismic forces; these values include factors of safety of at least 2.0 and 1.5, respectively. We estimate total settlement of new footings under static loads will not exceed 3/4 inch and differential settlement will be less than 1/2 inch over a horizontal distance of 30 feet.

Lateral loads may be resisted by a combination of passive pressure on the vertical faces of the footings and friction between the bottoms of the footings and the supporting soil. To compute lateral resistance provided by footings, we recommend using an equivalent fluid weight of 260 pounds per cubic foot (pcf). Passive pressure in the upper one foot of soil should be neglected unless confined by a slab or pavement. Frictional resistance should be computed using a base friction coefficient of 0.30. The passive pressure and frictional resistance values include a factor of safety of at least 1.5 and may be used in combination without reduction.

We should check footing excavations prior to the placement of reinforcing steel. Footing excavations should be free of standing water, debris, and disturbed materials prior to placing concrete. If unsuitable bearing material is encountered at the bottom of footing excavations, as determined by our field engineer, the unsuitable material should be removed until competent bearing soil is reached. The overexcavation should be backfilled with lean concrete or controlled low-strength material (CLSM). If the unsuitable bearing material is less than one foot thick, the soil may be compacted in place to at least 90 percent relative compaction using a jumping-jack-type compactor.

If footings are excavated during the rainy season, they should incorporate a rat slab to protect the footing subgrade. This will involve over-excavating the footing by about 2 to 3 inches and placing lean concrete or CLSM in the bottom (following an inspection by our engineer). A rat slab will help protect the footing subgrade during the placement of reinforcing steel. Water, if present, can then be pumped from the excavations prior to the placement of structural concrete. The bottoms and sides of the footing excavations should be moistened following excavation and maintained in a moist condition until the concrete is placed.

8.3 Concrete Slab-on-Grade Floors

The subgrade for new slab-on-grade floors should be prepared in accordance with our recommendations in Section 8.1. Where water vapor transmission through the new floor slab is not desirable, we recommend installing a capillary moisture break and water vapor retarder beneath the floor slab. A capillary moisture break consists of at least four inches of clean, free-draining gravel or crushed rock. The particle size of the capillary break material should meet the gradation requirements presented in Table 2.

TABLE 2
Gradation Requirements for Capillary Moisture Break

Sieve Size	Percentage Passing Sieve
1 inch	90 – 100
3/4 inch	30 – 100
1/2 inch	5 – 25
3/8 inch	0 – 6

The vapor retarder should meet the requirements for Class B vapor retarders stated in ASTM E1745. The vapor retarder should be placed in accordance with the requirements of ASTM E1643. These requirements include overlapping seams by six inches, taping seams, and sealing penetrations in the vapor retarder.

Concrete mixes with high water/cement (w/c) ratios result in excess water in the concrete, which increases the cure time and can result in excessive vapor transmission through the slab/mat. Where the concrete is poured directly over the vapor retarder, we recommend the w/c ratio of the concrete not exceed 0.45. Water should not be added to the concrete mix in the field. If necessary, workability should be increased by adding plasticizers. In addition, the slab/mat should be properly cured. Before the floor covering is placed, the contractor should check that the concrete surface and the moisture emission levels (if emission testing is required) meet the manufacturer’s requirements.

8.4 Permanent Retaining Walls

Retaining walls should be designed to resist static lateral earth pressures, lateral pressures caused by earthquakes, and traffic loads (if vehicular traffic is expected within a horizontal distance equal to 1.5 times the wall height). All on-site walls, including low retaining walls in landscaped areas, should be designed in accordance with the recommendations presented in this section, although checking the walls for seismic loading is not required for walls less than six feet high.

Retaining walls that are restrained from movement at the top or sides (e.g., a wall with a 90-degree turn) should be designed using the at-rest pressure presented in Table 3. Walls that are not restrained from rotation may be designed using the active pressure presented in Table 3.

TABLE 3
Lateral Earth Pressures for Retaining Wall Design

Wall Restraint Condition	Wall Drainage	Static Equivalent Fluid Weight	Seismic Equivalent Fluid Weight[2]
Unrestrained	Drained	35 pcf[1]	35 pcf + 19 pcf
Unrestrained	Undrained	80 pcf	80 pcf + 9 pcf
Restrained	Drained	55 pcf	35 pcf + 47 pcf
Restrained	Undrained	90 pcf	80 pcf + 23 pcf

1. Equivalent fluid weight (triangular distribution); pcf = pounds per cubic foot)
2. Seismic condition to be checked for walls that retain more than six feet of soil

The recommended pressures above are based on a level backfill condition with no additional surcharge loads. To avoid surcharging the elevator pit walls with lateral pressures imposed by the proposed footings, the footings should be bottomed below a zone-of-influence line projected upward at an inclination of 1.5:1 (horizontal:vertical) from the bottom of the below-grade walls. Where there will be vehicular traffic behind the top of a permanent wall within a horizontal distance equal to 1.5 times the height of the wall, the wall should be designed for vehicular surcharge of 50 psf, applied over the entire wall height.

To protect against moisture migration, below-grade walls should be waterproofed and water stops should be placed at all construction joints. Although the below-grade walls will be above the design groundwater level, water can accumulate behind the walls from other sources, such as rainfall, irrigation, and broken water lines, etc. If the “drained” earth pressures (i.e., pressures for above design groundwater table) presented above are used to design the walls, they will need to incorporate a drainage system. Alternatively, the walls may be designed for the recommended "undrained" earth pressures (i.e., pressures for below the groundwater table) presented above over their entire height, in which case the drainage system may be omitted.

One acceptable method for back-draining a retaining wall is to place a prefabricated drainage panel against the back of the wall. The drainage panel should extend down to a perforated PVC collector pipe. The pipe should be surrounded on all sides by at least four inches of Caltrans Class 2 permeable material or 3/4-inch drain rock wrapped in filter fabric (Mirafi NC or equivalent). A proprietary, prefabricated collector drain system, such as Tremdrain Total Drain or Hydroduct Coil (or equivalent), designed to work in conjunction with the drainage panel may be used in lieu of the perforated pipe surrounded by gravel described above. The pipe should be connected to a suitable discharge point; a sump and pump system may be required to drain the collector pipes if the grades do not permit draining by gravity to the storm drain system.

If backfill is required behind walls, it should consist of engineered fill. Placement of the engineered fill may impose unacceptable surcharges on the walls. The project structural engineer should determine when the concrete has sufficient strength to resist surcharges imposed by compaction equipment. Bracing may be used to mitigate construction-related surcharge pressures. We recommend lightweight, hand-compaction equipment be used to minimize the potential for damage.

8.5 Flexible (Asphaltic Concrete) Pavement Design

The State of California flexible pavement design method was used to develop the recommended asphaltic concrete (AC) pavement sections. Results of laboratory tests indicate the near surface clay has an R-value of 44. Recommended pavement sections for traffic indices (TIs) ranging from 4.5 to 6.5 are presented in Table 4. The project civil engineer should determine the appropriate design TI based on the anticipated vehicular traffic the pavement will experience. We can provide additional pavement sections for different TIs upon request.

TABLE 4
Asphalt Concrete Pavement Sections

Traffic Index	Asphaltic Concrete (inches)	Class 2 Aggregate Base R = 78 (inches)
4.5	2.5	6.0[1]
5.0	3.0	6.0
5.5	3.0	6.0
6.0	3.5	6.0
6.5	4.0	6.0

1. The minimum recommended AB thickness beneath AC pavements is six inches.

The soil subgrade beneath AC pavements should be scarified to a depth of eight inches, moisture-conditioned to near optimum moisture content, and compacted to at least 95 percent relative compaction. In addition, the subgrade should be a firm and non-yielding surface. The subgrade should be proof-rolled to confirm it is non-yielding prior to placing the aggregate base. The Class 2 aggregate base should be moisture-conditioned to near optimum moisture content and compacted to at least 95 percent relative compaction and be non-yielding

8.6 Portland Cement Concrete Pavement

Concrete pavement design is based on a maximum single-axle load of 20,000 pounds and a maximum tandem axle load of 32,000 pounds and moderate truck traffic (i.e., several trucks per week). The recommended rigid pavement section for these axle loads is six inches of Portland cement concrete (PCC) over six inches of Class 2 aggregate base. For areas that will receive fire truck traffic, the PCC thickness should be increased to seven inches. For areas that will experience only passenger vehicle traffic, the recommended pavement section is five inches of PCC over six inches of Class 2 aggregate base.

The modulus of rupture and unconfined compressive strength of the concrete should be at least 500 and 4,000 pounds per square inch (psi) at 28 days, respectively. Contraction joints should be placed at maximum 15-foot spacing. Where the outer edge of concrete pavement meets asphalt pavement, the concrete slab should be thickened by 50 percent at a taper not to exceed a slope of 1 in 10. The pavement should be reinforced with a minimum of No. 4 bars at 18 inches on center in both directions.

The subgrade and aggregate base should be compacted in accordance with the recommendations for asphalt pavement in Section 8.1.

8.7 Soil Corrosivity

Corrosivity analyses were performed by Project X Corrosion Engineering to evaluate the corrosivity of the near-surface soil from Boring B-1 at a depth of 3.25 feet bgs and B-2 at a depth of 1 feet bgs, the results of which are presented in Appendix B.

The resistivity test results (3,350 ohm-cm and 12,730 ohm-cm) indicate the near-surface soil is "mildly corrosive to corrosive[6]" to buried metallic structures. The pH (6.3 and 6.8) indicate the soil is "mildly to moderately corrosive" to buried metal. The chloride ion concentration (42.8 mg/kg and 47.5 mg/kg) and sulfate ion concentration (34.1 mg/kg and 114.5 mg/kg) indicate the near-surface soil is "negligibly corrosive" to buried metallic structures and reinforcing steel in concrete structures below ground.

Despite the soil apparently having a relatively low corrosion potential, we believe it would be prudent to protect buried iron, steel, cast iron, ductile iron, galvanized steel, and dielectric-coated steel or iron to reduce the potential for corrosion. If it is necessary to have metal in contact with soil, a corrosion engineer should be consulted to provide recommendations for corrosion protection.

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[6] Roberge, Pierre R. (2018). *Corrosion Basics, an Introduction, Third Edition*. NACE International, P. 189.

8.8 Seismic Design

For design in accordance with the 2019 California Building Code (CBC), we recommend Site Class D be used. The latitude and longitude of the site are 38.0682° and -122.8004°, respectively. Hence, in accordance with the 2019 CBC, we recommend the following:

- S_S = 2.381g, S_1 = 0.997g

The 2019 CBC is based on the guidelines contained within ASCE 7-16 which stipulates that where S_1 is greater than 0.2 times gravity (g) for Site Class D, a ground motion hazard analysis is needed unless the seismic response coefficient (C_s) value will be calculated as outlined in Section 11.4.8, Exception 2. Assuming the C_s value will be calculated as outlined in Section 11.4.8, Exception 2, we recommend the following seismic design parameters:

- F_a = 1.0, F_v = 1.7
- S_{MS} = 2.381g, S_{M1} = 1.695g
- S_{DS} = 1.587g, S_{D1} = 1.130g
- Seismic Design Category E (for Risk Categories I, II and III).

8.9 Construction Considerations

The near-surface soil at the site consists mainly of clayey and silty sand and sandy clay with varying amounts of gravel that can be excavated with conventional earth-moving equipment such as loaders and backhoes. Removal of existing foundations will require equipment capable of breaking up reinforced concrete, such as a hoe-ram. All disturbed soil resulting from demolition activities that will be below the building pad or footing subgrade should be overexcavated and recompacted in accordance with the recommendations in Section 8.1 under the observation of our field engineer.

Excavations that will be deeper than five feet or will extend below groundwater and will be entered by workers should be sloped or shored in accordance with CAL-OSHA standards (29 CFR Part 1926). The contractor should be responsible for the construction and safety of temporary slopes.

Groundwater may be encountered when excavating utility trenches. Dewatering should be the responsibility of the contractor. The dewatering system selected by the contractor should be capable of providing a dry subgrade to allow proper placement and compaction of fill.

9.0 ADDITIONAL GEOTECHNICAL SERVICES

Prior to construction, Rockridge Geotechnical should review the project plans and specifications to verify that they conform to the intent of our recommendations. During construction, our field engineer should provide on-site observation and testing during site preparation, placement and compaction of fill, and preparation of building foundations. These observations will allow us to compare actual with anticipated subsurface conditions and to verify that the contractor's work conforms to the geotechnical aspects of the plans and specifications.

10.0 LIMITATIONS

This geotechnical investigation has been conducted in accordance with the standard of care commonly used as state-of-practice in the profession. No other warranties are either expressed or implied. The recommendations made in this report are based on the assumption that the subsurface soil and groundwater conditions do not deviate appreciably from those disclosed in the exploratory borings. If any variations or undesirable conditions are encountered during construction, we should be notified so that additional recommendations can be made. The foundation recommendations presented in this report are developed exclusively for the proposed development described in this report and are not valid for other locations and construction in the project vicinity.

REFERENCES

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California Building Code (2019).

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Cao, T., Bryant, W.A., Rowshandel, B., Branum, D., and Wills, C.J. (2003). “The Revised 2002 California Probabilistic Seismic Hazards Maps.”

Conestoga-Rovers and Associates (2010). 2010 Annual Groundwater Monitoring Report, Former Redwood Oil/Chevron Bulk Terminal 20-6457, 11095 State Route 1, Point Reyes, California, dated July 27, 2010.

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Toppazada, T.R., and Borchardt, G. (1998). “Re-evaluation of the 1936 “Hayward Fault” and the 1838 San Andreas Fault Earthquakes.” Bulletin of Seismological Society of America, 88(1), 140-159.

FIGURES

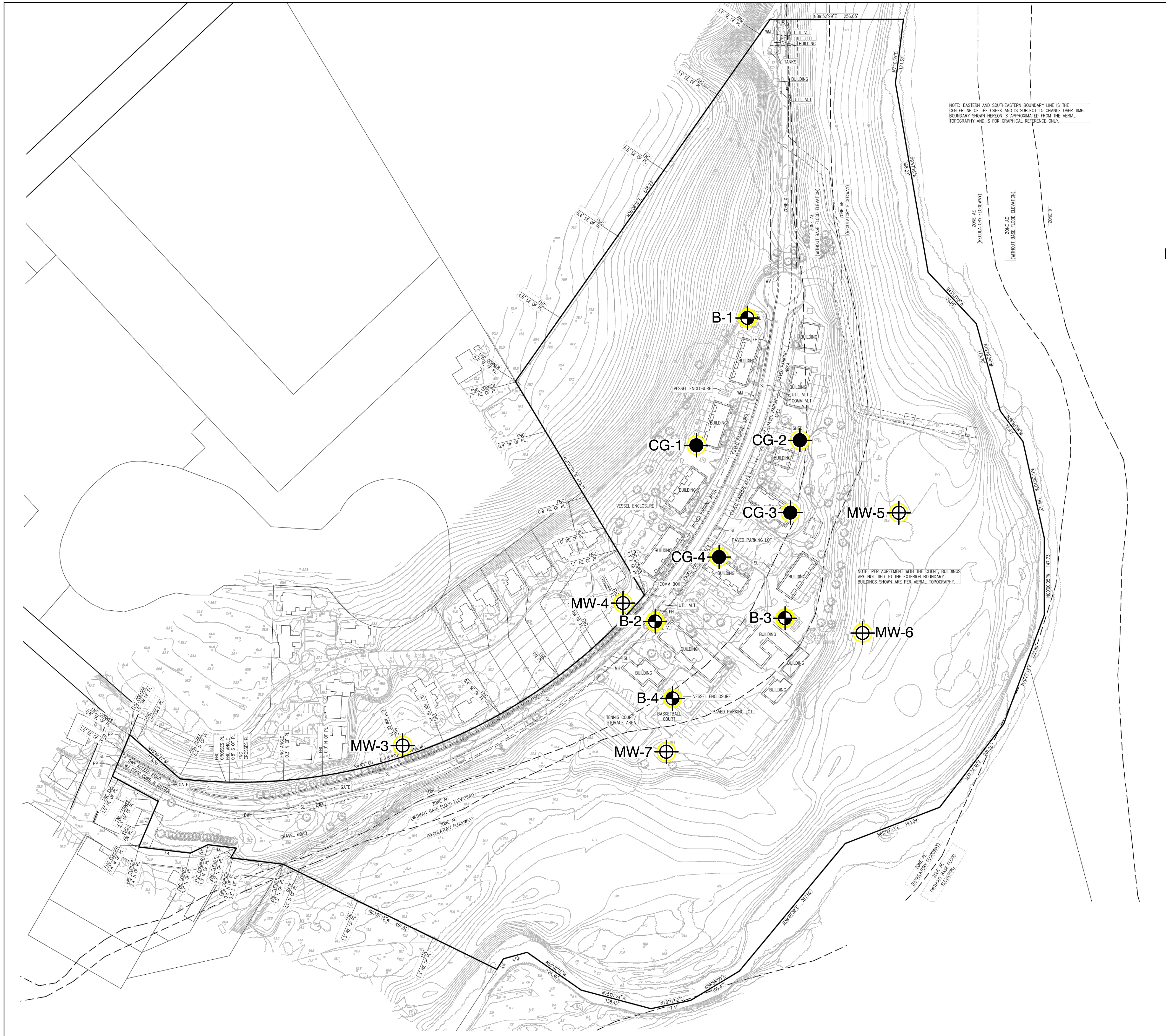
Base map: Google Maps, 2021

POINT REYES COAST GUARD HOUSING
100 COMMODORE WEBSTER DRIVE
Point Reyes Station, California

ROCKRIDGE GEOTECHNICAL

SITE LOCATION MAP

Date 06/30/22 | Project No. 21-2050 | Figure 1

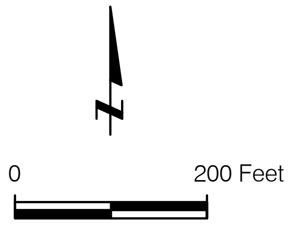


NOTE: EASTERN AND SOUTHEASTERN BOUNDARY LINE IS THE CENTERLINE OF THE CREEK AND IS SUBJECT TO CHANGE OVER TIME. BOUNDARY SHOWN HEREON IS APPROXIMATED FROM THE AERIAL TOPOGRAPHY AND IS FOR GRAPHICAL REFERENCE ONLY.

NOTE: PER AGREEMENT WITH THE CLIENT, BUILDINGS ARE NOT TIED TO THE EXTERIOR BOUNDARY. BUILDINGS SHOWN ARE PER AERIAL TOPOGRAPHY.

EXPLANATION

B-1 ⊕	Approximate location of boring by Rockridge Geotechnical, Inc., July 6, 2021
CG-1 ●	Approximate location of boring by Questa Engineering, December 2020
MW-3 ⊕	Approximate location of monitoring wells by Questa Engineering, November 2000



Approximate scale

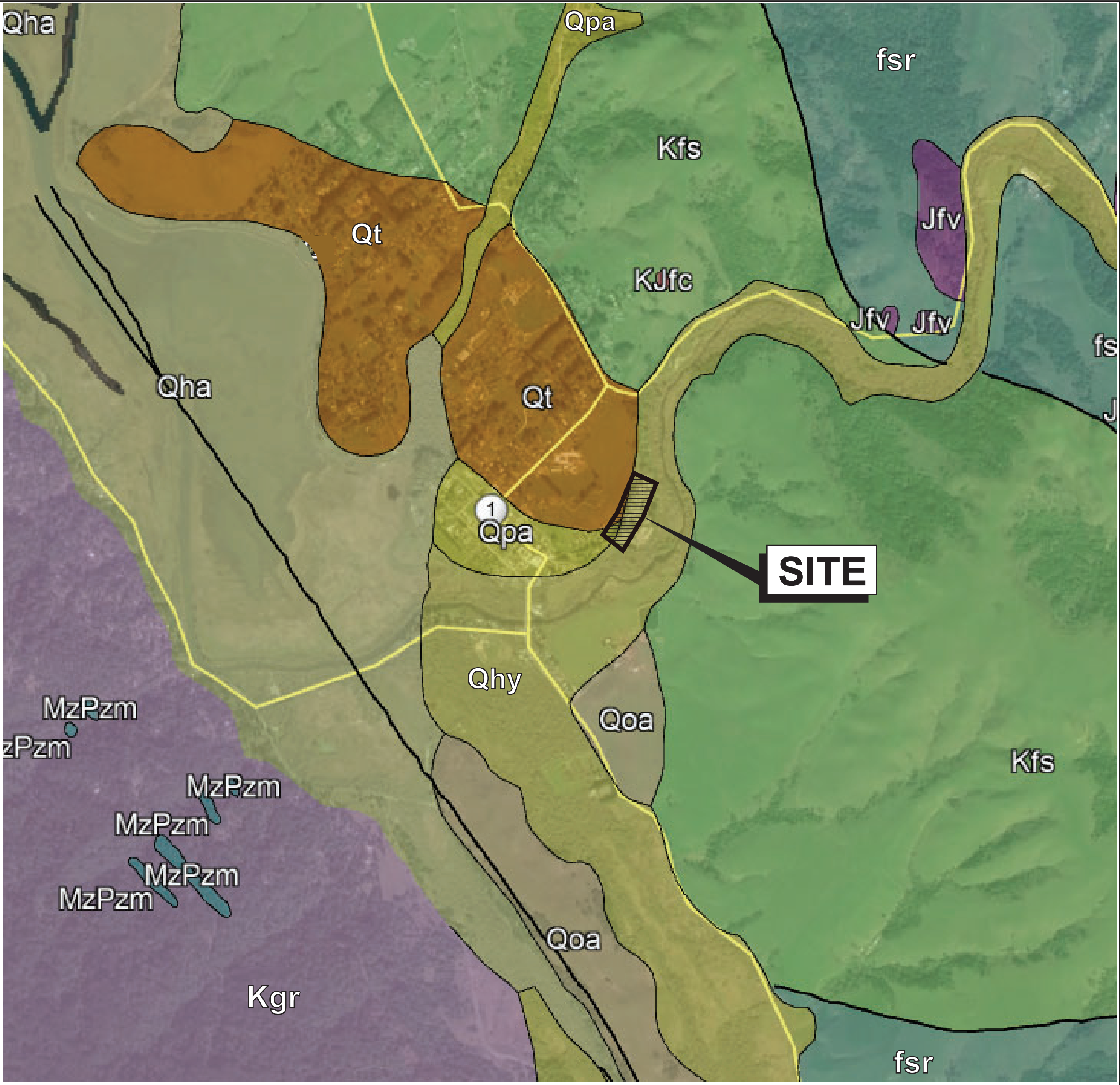
POINT REYES COAST GUARD HOUSING
100 COMMODORE WEBSTER DRIVE
Point Reyes Station, California

SITE PLAN

Date 07/13/22 | Project No. 21-2050 | Figure 2

ROCKRIDGE GEOTECHNICAL

Reference: Base map from a drawing titled "A.L.T.A./ N.S.P.S. Land Title Survey, 100 Commodore Webster Drive", by cbg Surveyors, December 23, 2021.



Base map: Google Earth with U.S. Geological Survey (USGS), Marin County, 2021

Qhy	Alluvium (late Holocene)
Qpa	Alluvium (Pleistocene)
Qha	Alluvium (Holocene)
Qt	Marine terrace deposits (Pleistocene)
Qoa	Alluvium (early (Pleistocene)
fsr	Franciscan Complex melange (Eocene, Paleocene, and (or) Late Cretaceous)
Kgr	Salinian complex plutonic (granite) rocks (Cretaceous)
Kfs	Franciscan Complex sedimentary rocks (Cretaceous)
KJfc	Franciscan Complex chert (Early Cretaceous and (or) Late Jurassic)
Jfv	Franciscan Complex volcanic rocks (Jurassic)
MzPzm	Salinian complex metamorphic rocks (Mesozoic and (or) Paleozoic)

Geologic contact:
dashed where approximate and dotted
where concealed, queried where uncertain

0 2,000 4,000 Feet

Approximate scale

POINT REYES COAST GUARD HOUSING
100 COMMODORE WEBSTER DRIVE
Point Reyes Station, California

ROCKRIDGE
GEOTECHNICAL

REGIONAL GEOLOGIC MAP

Date 06/30/22 | Project No. 21-2050 | Figure 3

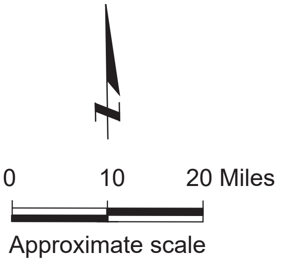
Base Map: U.S. Geological Survey (USGS), National Seismic Hazards Maps - Fault Sources, 2014.

EXPLANATION

🟥 Strike slip

🟨 Thrust (Reverse)

🟦 Normal

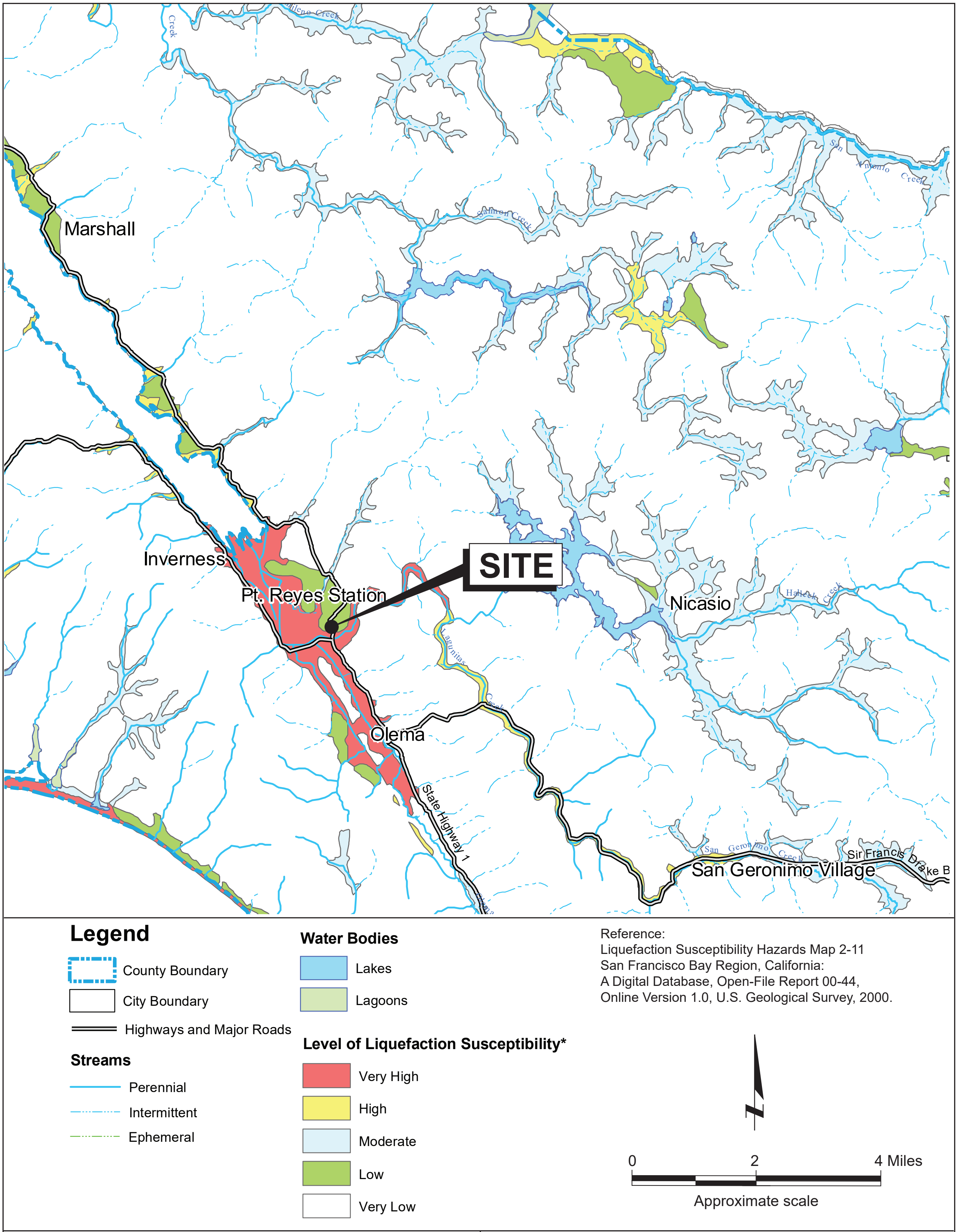


POINT REYES COAST GUARD HOUSING
100 COMMODORE WEBSTER DRIVE
Point Reyes Station, California

ROCKRIDGE
GEOTECHNICAL

REGIONAL FAULT MAP

Date 06/30/22	Project No. 21-2050	Figure 4



Reference:
Liquefaction Susceptibility Hazards Map 2-11
San Francisco Bay Region, California:
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POINT REYES COAST GUARD HOUSING
100 COMMODORE WEBSTER DRIVE
Point Reyes Station, California

ROCKRIDGE
GEOTECHNICAL

LIQUEFACTION SUSCEPTIBILITY MAP

Date 06/30/22 | Project No. 21-2050 | Figure 5

APPENDIX A

Logs of Test Borings

PROJECT: **POINT REYES COAST GUARD HOUSING**
100 COMMODORE WEBSTER DRIVE
Point Reyes Station, California

Log of Boring B-1

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Date started: 07/06/2021
Date finished: 07/06/2021
Drilling method: 4-inch-diameter solid stem auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Rope & cathead safety hammer
Sampler: Modified California (MC), Standard Penetration Test (SPT)

Logged by: A. Limpert
Drilled by: Benevent Building
Rig: Portable Hydraulic Rig

	SAMPLES							LABORATORY TEST DATA					
DEPTH (feet)	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION		Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1						SANDY CLAY (CL) yellow grades to brown with yellow-brown mottling, very stiff, moist, fine sand	FILL						
2	MC	■	14 15 24	27		SANDY CLAY (CL) yellow-brown to red-yellow with gray veins, hard, moist	TERRACE DEPOSITS						
3					CL	Soil Corrosivity Test; see Appendix B							
4	MC	■	17 27 40	47									
5						trace gravel							
6	SPT	◪	10 13 20	40									
7						CLAYEY SAND with GRAVEL (SC) red-yellow with yellow-brown and light brown, medium dense to dense, moist, fine angular gravel							
8	SPT	◪	16 14 11	30	SC								
9													
10						CLAYEY SAND (SC) brown, medium dense, moist, fine to coarse sand	OLD ALLUVIUM						
11	SPT	◪	12 8 9	20		Particle Size Distribution; see Appendix B					36	20.4	
12					SC	∇ (07/06/2021; 9:10 AM)							
13													
14													
15													
16	SPT	⊡	11 15 15	36	SP	SAND (SP) brown, dense, wet							
17						decreasing coarse sand							
18	SPT	◪	10 14 14	34									
19						SANDY CLAY (CL) blue to gray with black, hard, wet, fine sand	RESIDUAL SOIL						
20					CL	melange, serpentinite and sheared							
21	SPT	◪	13 14 17	37									
22													
23													
24													
25													
26													
27													
28													
29													
30													

Boring terminated at a depth of 21.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater encountered at a depth of 12 feet during drilling.

[1] MC and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively, to account for sampler type and hammer energy.

ROCKRIDGE GEOTECHNICAL

Project No.: 21-2050

Figure: A-1

PROJECT: **POINT REYES COAST GUARD HOUSING**
100 COMMODORE WEBSTER DRIVE
Point Reyes Station, California

Log of Boring B-2

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Date started: 07/06/2021
Date finished: 07/06/2021
Drilling method: 4-inch-diameter solid stem auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Rope & cathead safety hammer
Sampler: Modified California (MC), Standard Penetration Test (SPT)

Logged by: A. Limpert
Drilled by: Benevent Building
Rig: Portable Hydraulic Rig

DEPTH (feet)	SAMPLES Sampler Type	SAMPLES Sample	SAMPLES Blows/ 6"	SAMPLES SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION		LABORATORY TEST DATA Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1 2	MC		10 12 14	18	CL	SANDY CLAY (CL) dark brown with trace red veins, very stiff, moist, trace fine gravel, rootlets Soil Corrosivity Test; see Appendix B	FILL						
3 4	MC		18 24 28	36		brown, hard, increasing gravel content LL = 25, PI = 9; see Appendix B						11.8	118
5 6	MC		16 26 34	42		brown grades to dark brown mottled with brown, increasing sand content							
7 8					SC	CLAYEY SAND with GRAVEL (SC) brown with black gravel pieces, dense, moist, medium sand, fine subrounded gravel	TERRACE DEPOSITS						
9 10 11 12 13 14 15 16	SPT		21 19 11	36	SC	CLAYEY SAND with GRAVEL (SC) brown with black gravel pieces, dense, moist to wet, medium sand, fine subrounded gravel ▽ (07/06/2021; 12:55 PM)	OLD ALLUVIUM (?)						
17 18 19 20 21	SPT		8 10 13	28	CL	SANDY CLAY (CL) gray, very stiff, wet, trace sand and gravel melange, sheared sandstone, shale, and serpentinite	RESIDUAL SOIL						
22 23 24 25 26 27 28 29 30													

Boring terminated at a depth of 21.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater encountered at a depth of 11 feet during drilling.

[1] MC and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively, to account for sampler type and hammer energy.

ROCKRIDGE GEOTECHNICAL

Project No.: 21-2050
Figure: A-2

PROJECT: **POINT REYES COAST GUARD HOUSING**
100 COMMODORE WEBSTER DRIVE
Point Reyes Station, California

Log of Boring B-3

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Date started: 07/06/2021
Date finished: 07/06/2021
Drilling method: 4-inch-diameter solid stem auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Rope & cathead safety hammer
Sampler: Modified California (MC), Standard Penetration Test (SPT)

Logged by: A. Limpert
Drilled by: Benevent Building
Rig: Portable Hydraulic Rig

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
2	MC	■	26 19 16	25	CL-ML	SILTY CLAY with GRAVEL (CL-ML) brown to yellow-brown with light brown, very stiff, moist, medium sand, fine to medium subrounded subangular gravel LL = 24, PI = 4; see Appendix B FILL					7.6	113
4	MC	■	13 11 14	18	SC	CLAYEY SAND with GRAVEL (SC) brown with yellow-brown, medium dense, moist, fine to medium sand, fine to medium subrounded to subangular gravel						
6	MC	■	14 21 17	27		SANDSTONE yellow-brown with black grades to olive with gray and brown, low hardness, friable to weak, moderately weathered FRANCISCAN MELANGE						
10	SPT	◩	19 18 32	60		GREENSTONE olive with brown and gray, low hardness, weak, deeply to moderately weathered						
16	SPT	◩	4 6 9	18		SHALE/SERPENTINITE olive-gray, sheared, low hardness, weak, completely weathered, prune pits present						
21	SPT	◩	5 9 8	20								

LABORATORY TEST DATA

Boring terminated at a depth of 21.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] MC and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively, to account for sampler type and hammer energy.

ROCKRIDGE GEOTECHNICAL

Project No.: 21-2050
Figure: A-3

PROJECT: **POINT REYES COAST GUARD HOUSING**
100 COMMODORE WEBSTER DRIVE
Point Reyes Station, California

Log of Boring B-4

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Date started: 07/06/2021
Date finished: 07/06/2021
Drilling method: 4-inch-diameter solid stem auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Rope & cathead safety hammer
Sampler: Modified California (MC), Standard Penetration Test (SPT)

Logged by: A. Limpert
Drilled by: Benevent Building
Rig: Portable Hydraulic Rig

DEPTH (feet)	SAMPLES: Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION		LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1 2	MC		28 40 25	46	SC	CLAYEY SAND with GRAVEL (SC) brown grades to dark brown, dense, dry to moist, broken 2-inch-diameter gravel in shoe	FILL						
3 4	MC		13 23 39	43	CL	SANDY CLAY with GRAVEL (CL) brown to yellow-brown, hard, moist, fine gravel, rootlets	TERRACE DEPOSITS						
5 6 7 8	SPT		16 15 14	35	GC	CLAYEY GRAVEL with SAND (GC) brown with gray gravel, dense, dry to moist, resistan sandstone gravel							
9 10 11 12 13 14	SPT		13 14 14	34		SHALE/SERPENTINITE olive with brown, black, and light gray, sheared, low hardness, friable to weak, deeply to completely weathered to clay locally	FRANCISCAN MELANGE						
15 16 17 18 19	SPT		33 20 12	38		1-inch-diameter gravel stuck in shoe							
20 21	SPT		15 21 15	43		dark gray							
22 23 24 25 26 27 28 29 30													

Boring terminated at a depth of 21.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] MC and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively, to account for sampler type and hammer energy.

ROCKRIDGE GEOTECHNICAL

Project No.: 21-2050
Figure: A-4

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions		Symbols	Typical Names
Coarse-Grained Soils (more than half of soil > no. 200 sieve size)	Gravels (More than half of coarse fraction > no. 4 sieve size)	**GW**	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	Sands (More than half of coarse fraction < no. 4 sieve size)	**SW**	Well-graded sands or gravelly sands, little or no fines
		SP	Poorly-graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
Fine -Grained Soils (more than half of soil < no. 200 sieve size)	Silts and Clays LL = < 50	**ML**	Inorganic silts and clayey silts of low plasticity, sandy silts, gravelly silts
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
		OL	Organic silts and organic silt-clays of low plasticity
	Silts and Clays LL = > 50	**MH**	Inorganic silts of high plasticity
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic silts and clays of high plasticity
Highly Organic Soils		**PT**	Peat and other highly organic soils

GRAIN SIZE CHART

Classification	Range of Grain Sizes	
	U.S. Standard Sieve Size	Grain Size in Millimeters
Boulders	Above 12"	Above 305
Cobbles	12" to 3"	305 to 76.2
Gravel coarse fine	3" to No. 4 3" to 3/4" 3/4" to No. 4	76.2 to 4.76 76.2 to 19.1 19.1 to 4.76
Sand coarse medium fine	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200	4.76 to 0.075 4.76 to 2.00 2.00 to 0.420 0.420 to 0.075
Silt and Clay	Below No. 200	Below 0.075

▽	Unstabilized groundwater level
▼	Stabilized groundwater level

SAMPLE DESIGNATIONS/SYMBOLS

⬒	Sample taken with California or Modified California split-barrel sampler. Darkened area indicates soil recovered
◪	Classification sample taken with Standard Penetration Test sampler
◨	Undisturbed sample taken with thin-walled tube
☒	Disturbed sample
⊡	Sampling attempted with no recovery
◫	Core sample
▣	Analytical laboratory sample
▥	Sample taken with Direct Push sampler
▥	Sonic

SAMPLER TYPE

C	Core barrel
CA	California split-barrel sampler with 2.5-inch outside diameter and a 1.93-inch inside diameter
D&M	Dames & Moore piston sampler using 2.5-inch outside diameter, thin-walled tube
O	Osterberg piston sampler using 3.0-inch outside diameter, thin-walled Shelby tube
PT	Pitcher tube sampler using 3.0-inch outside diameter, thin-walled Shelby tube
MC	Modified California sampler with a 3.0-inch outside diameter and a 2.43-inch inside diameter
SPT	Standard Penetration Test (SPT) split-barrel sampler with a 2.0-inch outside diameter and a 1.5-inch inside diameter
ST	Shelby Tube (3.0-inch outside diameter, thin-walled tube) advanced with hydraulic pressure

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CLASSIFICATION CHART

Date 06/30/22 | Project No. 21-2050 | Figure A-5

I FRACTURING

Intensity	Size of Pieces in Feet
Very little fractured	Greater than 4.0
Occasionally fractured	1.0 to 4.0
Moderately fractured	0.5 to 1.0
Closely fractured	0.1 to 0.5
Intensely fractured	0.05 to 0.1
Crushed	Less than 0.05

II HARDNESS

1. **Soft** - reserved for plastic material alone.
2. **Low hardness** - can be gouged deeply or carved easily with a knife blade.
3. **Moderately hard** - can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and is readily visible after the powder has been blown away.
4. **Hard** - can be scratched with difficulty; scratch produced a little powder and is often faintly visible.
5. **Very hard** - cannot be scratched with knife blade; leaves a metallic streak.

III STRENGTH

1. **Plastic** or very low strength.
2. **Friable** - crumbles easily by rubbing with fingers.
3. **Weak** - an unfractured specimen of such material will crumble under light hammer blows.
4. **Moderately strong** - specimen will withstand a few heavy hammer blows before breaking.
5. **Strong** - specimen will withstand a few heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments.
6. **Very strong** - specimen will resist heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments.

IV WEATHERING - The physical and chemical disintegration and decomposition of rocks and minerals by natural processes such as oxidation, reduction, hydration, solution, carbonation, and freezing and thawing.

D. Deep - moderate to complete mineral decomposition; extensive disintegration; deep and thorough discoloration; many fractures, all extensively coated or filled with oxides, carbonates and/or clay or silt.

M. Moderate - slight change or partial decomposition of minerals; little disintegration; cementation little to unaffected. Moderate to occasionally intense discoloration. Moderately coated fractures.

L. Little - no megascopic decomposition of minerals; little of no effect on normal cementation. Slight and intermittent, or localized discoloration. Few stains on fracture surfaces.

F. Fresh - unaffected by weathering agents. No disintegration of discoloration. Fractures usually less numerous than joints.

ADDITIONAL COMMENTS:

V CONSOLIDATION OF SEDIMENTARY ROCKS: usually determined from unweathered samples. Largely dependent on cementation.

U = unconsolidated
P = poorly consolidated
M = moderately consolidated
W = well consolidated

VI BEDDING OF SEDIMENTARY ROCKS

Splitting Property	Thickness	Stratification
Massive	Greater than 4.0 ft.	very thick-bedded
Blocky	2.0 to 4.0 ft.	thick bedded
Slabby	0.2 to 2.0 ft.	thin bedded
Flaggy	0.05 to 0.2 ft.	very thin-bedded
Shaly or platy	0.01 to 0.05 ft.	laminated
Papery	less than 0.01	thinly laminated

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100 COMMODORE WEBSTER DRIVE
Point Reyes Station, California

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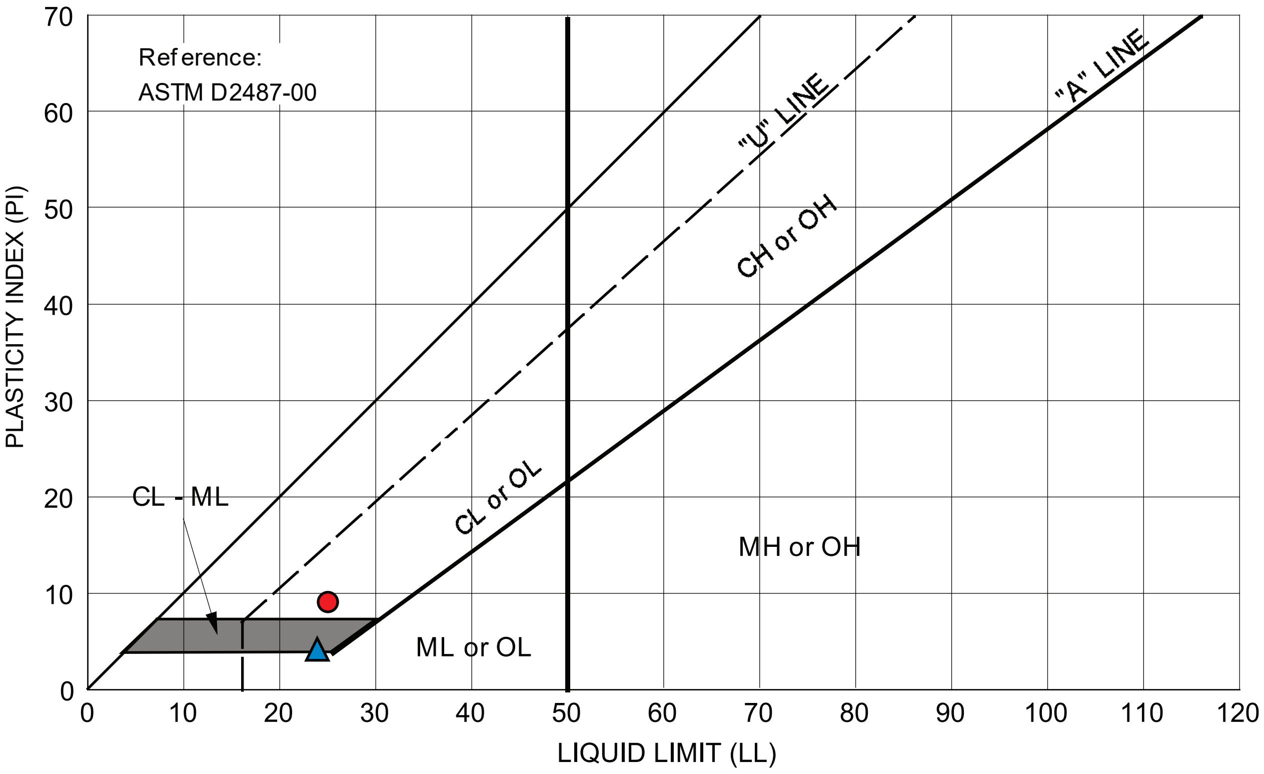
PHYSICAL PROPERTIES CRITERIA FOR ROCK DESCRIPTIONS

Date 06/30/22 | Project No. 21-2050 | Figure A-6

APPENDIX B

Laboratory Test Results



Symbol	Source	Description and Classification	Natural M.C. (%)	Liquid Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
●	B-2 at 4.0 feet	SANDY CLAY (CL), dark brown with trace red veins	11.8	25	9	--
▲	B-3 at 2.0 feet	SILTY CLAY with GRAVEL (CL-ML), brown to yellow-brown with light brown	7.6	24	4	--

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PLASTICITY CHART

Date 06/30/22 | Project No. 21-2050 | Figure B-1

Sample No.	Description	Elev.	Dry Weight [g]	Wt. Retained on #200 [g]	% Retained on #200	% Passing #200
B-1-5	CLAYEY SAND (SC), brown	10.0'	601	387	64.4	35.6

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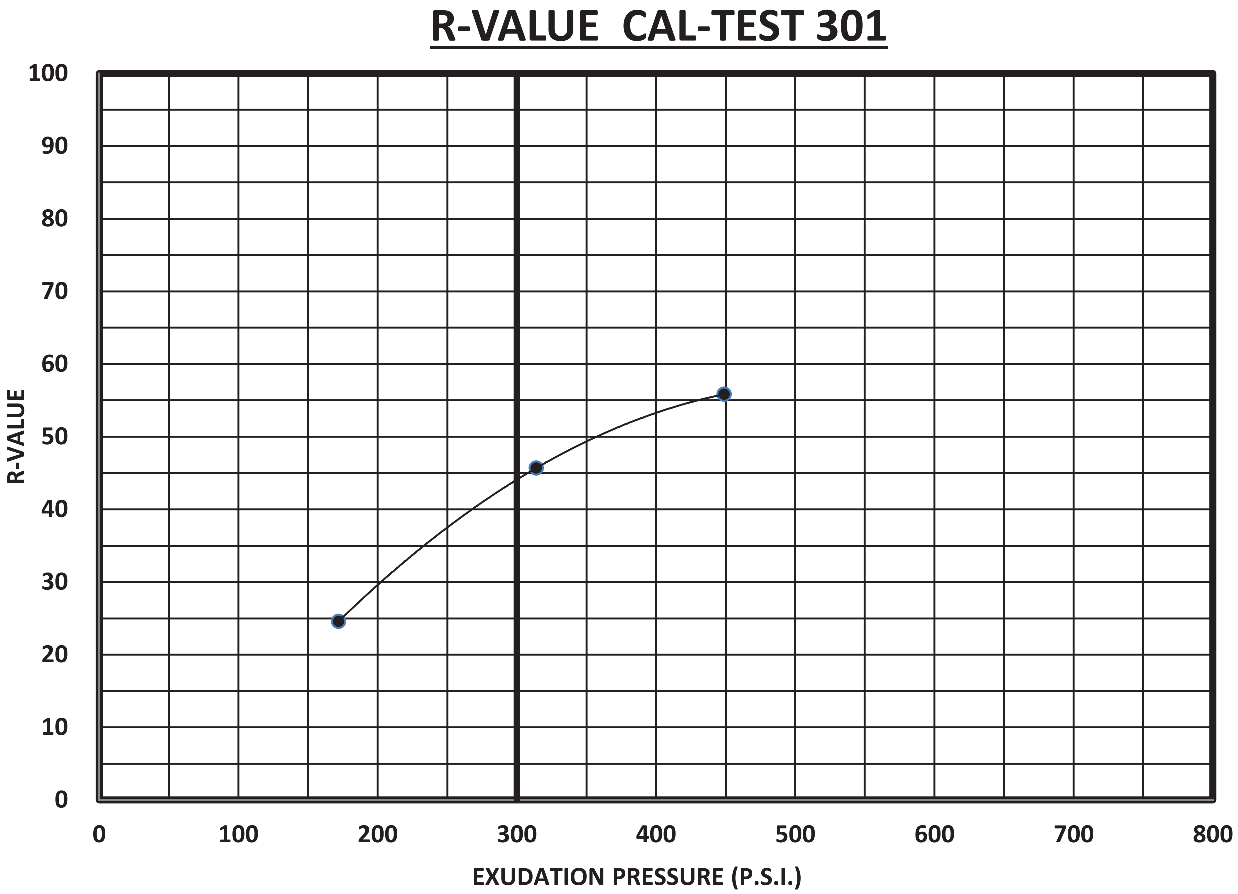
MATERIAL FINER THAN -200 SIEVE

Date 06/30/22 | Project No. 21-2050 | Figure B-2



Exudation (psi)	Compaction (psi)	Expansion (0.0001”)	Expansion (psf)	Moisture %	Dry Density	Resistance Value
449	295	65	281	16.4	110.5	56
314	218	60	260	17.8	110.1	46
172	155	30	130	19.5	104.8	25

Test Results	Material Description
R-Value at 300 psi exudation pressure = 44	SANDY CLAY (CL), dark brown with trace red veins
	Sample Source: B-2 at 0.5-5 feet

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RESISTANCE VALUE TEST REPORT

Date 06/30/22 | Project No. 21-2050 | Figure B-3

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM D4972	ASTM G200	ASTM D4658	ASTM D4327	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D4327	ASTM D4327
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}		**Chlorides** Cl^-		**Resistivity**		**pH**	**Redox**	**Sulfide** S^{2-}	**Nitrate** NO_3^-	**Ammonium** NH_4^+	**Lithium** Li^+	**Sodium** Na^+	**Potassium** K^+	**Magnesium** Mg^{2+}	**Calcium** Ca^{2+}	**Fluoride** F_2^-	**Phosphate** PO_4^{3-}
	(ft)	(mg/kg)	(wt%)	(mg/kg)	(wt%)	As Rec'd (Ohm-cm)	Minimum (Ohm-cm)		(mV)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
B-1: SANDY CLAY (CL) yellow-brown to red-yellow with gray veins	3.25	34.1	0.0034	42.8	0.0043	6,700	3,350	6.3	86	<0.01	0.4	5.4	0.02	69.5	1.9	90.5	189.0	1.9	0.5
B-2: SANDY CLAY (CL) dark brown with trace red veins	1	114.5	0.0114	47.5	0.0048	107,200	12,730	6.8	92	<0.01	0.3	7.5	0.02	104.0	3.0	64.6	228.0	2.6	0.3

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

POINT REYES COAST GUARD HOUSING
100 COMMODORE WEBSTER DRIVE
Point Reyes Station, California

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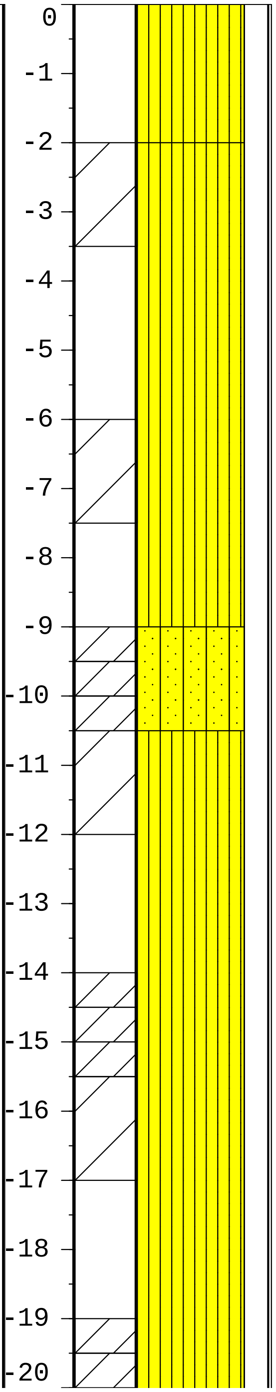
SOIL CORROSIVITY
TEST RESULTS

Date
Project No. 21-2050
Figure B-4

APPENDIX C

Logs of Previous Borings and Monitoring Wells by Questa

Lab Tests	Torvane, tsf	Sampler Type	% Passing #200 Sieve	Dry Density, pcf	Moisture %	Penetrometer, tsf	Blows/Foot * (Converted to SPT N-value)
		SPT		122	14.5		15
		SPT					14
		CAM					30*
		SPT		125	16.3		25
		CAM					22*
		SPT		130	16.8		21
		CAM					25*



USCS Symbol	Lithologic Description
ML	ML: Dark Yellowish Brown Sandy Silt (10YR 3/6), Dry, Loose
ML	ML: Dark Yellowish Brown Sandy Silt with Gravel (10YR 4/4), Moist, Stiff
SM	SM: Dark Yellowish Brown Silty Sand with Gravel, Moist, Stiff
ML	ML: Greenish Black Silt with Sand (GLEY 1 2.5/1), Moist, Very Stiff

Drilling Performed by Pearson Drilling Using a B-53 Drill Rig

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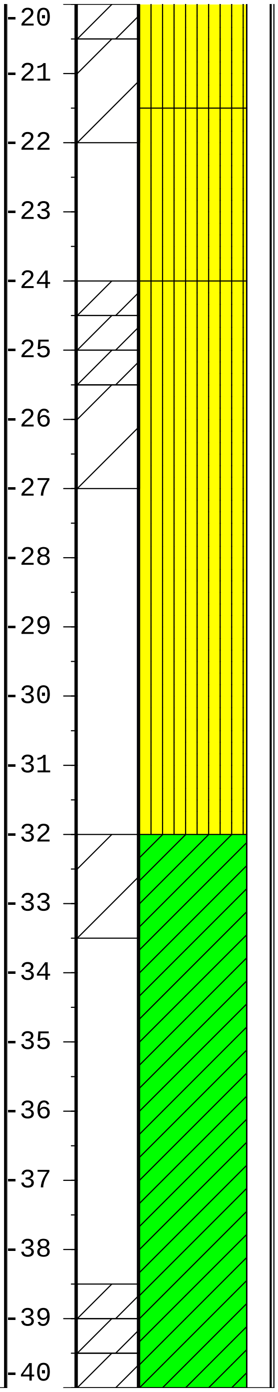
LOG OF BOREHOLE CG-1

Coast Guard 2020

Point Reyes Station

Figure A-1

Lab Tests	Torvane, tsf	Sampler Type	% Passing #200 Sieve	Dry Density, pcf	Moisture %	Penetrometer, tsf	Blows/Foot * (Converted to SPT N-value)	Sample Location	Graphical Symbol	Groundwater Depth	USCS Symbol	Lithologic Description
		SPT		131	16.1		31					
											ML	ML: Greenish Black Silt with Sand (GLEY 1 2.5/1), Moist, Very Stiff, Rare Gravel
											ML	ML: Greenish Black Silt with Sand (GLEY 1 2.5/1), Moist, Very Stiff
		CAM					23*					
		SPT		134	15.8		28					
											CL	CL: Greenish Black Clay with Sand (GLEY 1 2.5/1), Moist, Very Stiff, Rare Gravel
		SPT		123	15.9		29					
												Bottom of Hole at 40' BGS. No Groundwater or Bedrock Found.
		CAM					39*					



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LOG OF BOREHOLE **CG-1**

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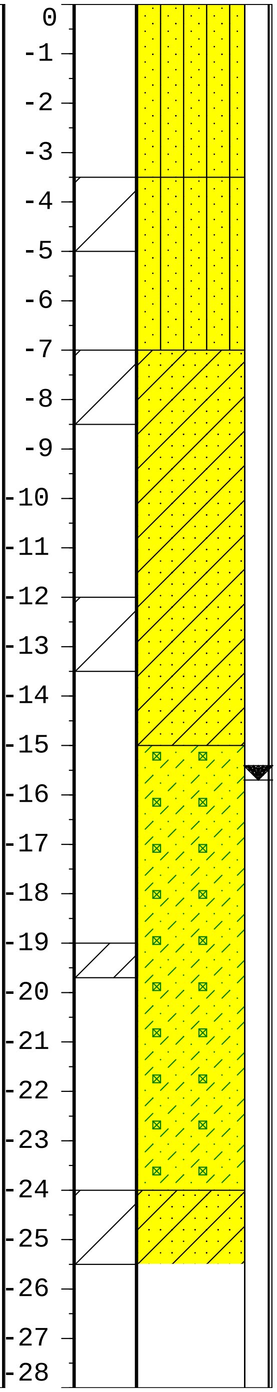
Figure

A-1

Lab Tests	Torvane, tsf	Sampler Type	% Passing #200 Sieve	Dry Density, pcf	Moisture %	Penetrometer, tsf	Blows/Foot * (Converted to SPT N-value)	USCS Symbol	Lithologic Description
								SM	SM: Dark Yellowish Brown Silty Sand with Gravel (Fill) (10YR 4/4), Dry to Moist, Loose
		SPT					23	SM	SM: Yellowish Brown Silty Sand with Gravel (10YR 5/4), Dry to Moist, Dense
		SPT					44	SC	SC: Yellowish Brown Clayey Sand with Gravel (10YR 5/8), Dry to Moist, Dense, Rounded Gravel
		SPT		97	14.1		81		
								GC	GC: Dark Yellowish Brown Clayey Gravel with Sand (10YR 4/6), Moist, Very Dense
		CAM				>4.5	16*/ 1.5"		
		SPT		123	14.0		40	SC	SC: Dark Yellowish Brown Clayey Sand with Gravel (10YR 4/4), Moist to Wet, Dense
									Bottom of Hole at 25.5', Bottom of Well at 24', Groundwater Found at 24', Rose to 15.7' on 12/4/20. Resistance to drilling at 24'.



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LOG OF BOREHOLE CG-2

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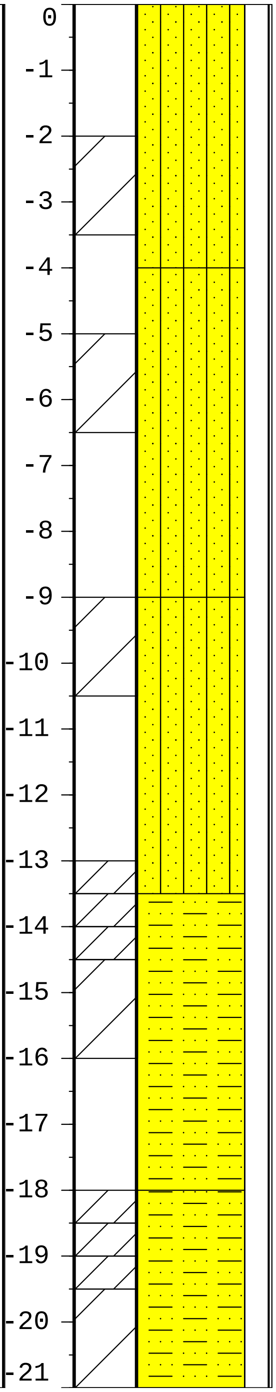
Point Reyes Station

Figure A-2

Lab Tests	Torvane, tsf	Sampler Type	% Passing #200 Sieve	Dry Density, pcf	Moisture %	Penetrometer, tsf	Blows/Foot * (Converted to SPT N-value)
		SPT					23
		SPT					32
		SPT		116	12.5		33
		CAM				3.75 >4.5	22*
		SPT		123	15.0		38
		CAM				>4.5	37*
		SPT		129	12.4		31



USCS Symbol	Lithologic Description
SM	SM: Brown Silty Sand with Gravel (Fill) (10YR 4/3), Dry, Loose
SM	SM: Dark Yellowish Brown Silty Sand with Gravel (10YR 4/4), Dry to Moist, Dense
SM	SM: Dark Yellowish Brown Silty Sand (10YR 4/4), Dry to Moist, Med. Dense to Dense
	Siltstone: Dark Greenish Grey Siltstone (GLEY 1 3/1), Moist, Closely Fractured, Low to Med. Hardness, Soft to Weak Strength, Deep Weathering
	Siltstone: Dark Grey Siltstone (GLEY 1 4/N), Moist, Intensely Fractured, Low Hardness, Weak Strength, Deep Weathering Bottom of Hole at 21' BGS, No Groundwater Found

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LOG OF BOREHOLE CG-3

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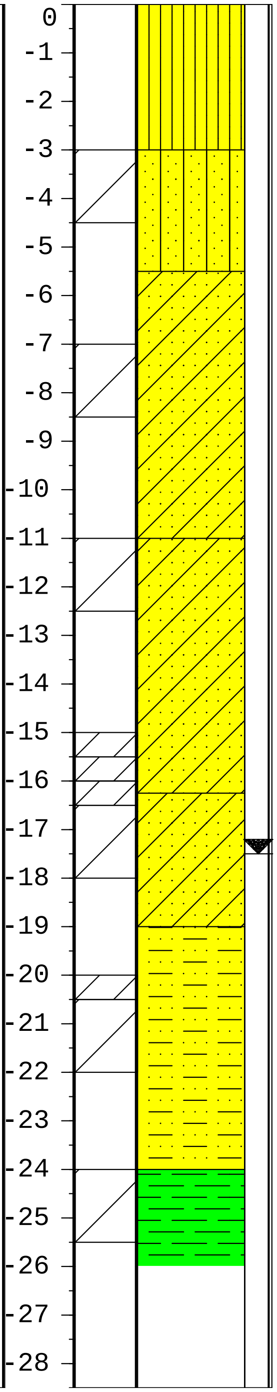
Figure A-3

Lab Tests	Torvane, tsf	Sampler Type	% Passing #200 Sieve	Dry Density, pcf	Moisture %	Penetrometer, tsf	Blows/Foot * (Converted to SPT N-value)
		SPT		120	13.3		22
		SPT			13.6		28
		SPT			13.3		37
		CAM				>4.5	30*
		SPT		118	16.9		44
		CAM				>4.5	16*/ 3"
		SPT			15.7		47
		SPT		139	13.7		27



USCS Symbol	Lithologic Description
ML	ML: Dark Brown Sandy Silt with Gravel (Fill) (10YR 3/3), Moist, Med. Stiff
SM	SM: Dark Brown Silty Sand with Gravel (7.5YR 3/4), Moist, Dense
SC	SC: Strong Brown Clayey Sand with Gravel (7.5YR 4/6), Moist, Dense
SC	SC: Dark Yellowish Brown Clayey Sand with Gravel (10YR 4/4), Moist to Wet, Dense
SC	SC: Dark Greenish Grey Clayey Sand with Gravel (GLEY 1 3/1), Moist to Wet, Dense
	Siltstone: Dark Greenish Grey Siltstone (GLEY 1 3/1), Moist, Intensely Fractured, Soft, Friable, Deep Weathering
	Shale: Dark Grey Shale (GLEY 1 4/N), Moist, Crushed, Soft, Plastic/ Friable, Deep Weathering
	Bottom of Hole at 25.5' BGS, Bottom of Well at 24' BGS. Groundwater Found at 16'BGS and Stabilized at 17.5' at 12:00pm.

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LOG OF BOREHOLE CG-4

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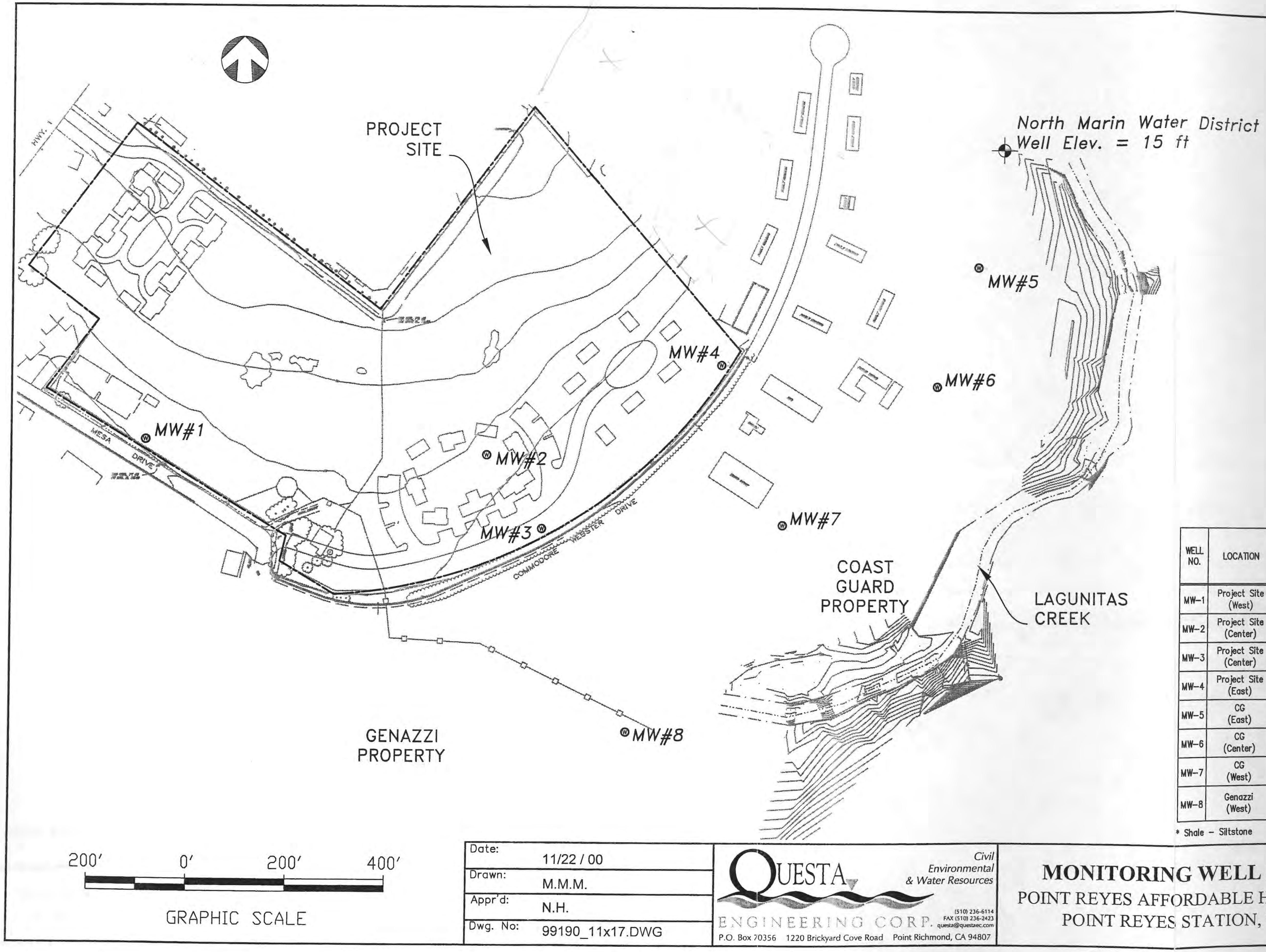
Figure

A-4

From 2001 Hydrogeologic Investigation by Questa Engineering

APPENDIX A

Monitoring Well Completion Logs



WELL NO.	LOCATION	WELL HEAD ELEVATION (ft, msl)	GROUND SURFACE ELEVATION (ft, msl)	TOTAL DEPTH (ft)	SCREENED INTERVAL	DEPTH TO BEDROCK* (ft)
MW–1	Project Site (West)	41.79	42.0	33	13–33	28
MW–2	Project Site (Center)	47.11	47.6	35	20–35	32
MW–3	Project Site (Center)	32.27	32.6	34	14–34	16
MW–4	Project Site (East)	30.07	30.2	26.5	13–26.5	22
MW–5	CG (East)	12.39	12.5	40	20–40	>40
MW–6	CG (Center)	14.18	14.4	34	14–34	25
MW–7	CG (West)	21.16	21.4	34	14–34	29
MW–8	Genazzi (West)	12.94	13.2	13 (Caving)	3–10	>38

* Shale – Siltstone

Date:	11/22 / 00
Drawn:	M.M.M.
Appr'd:	N.H.
Dwg. No:	99190_11x17.DWG

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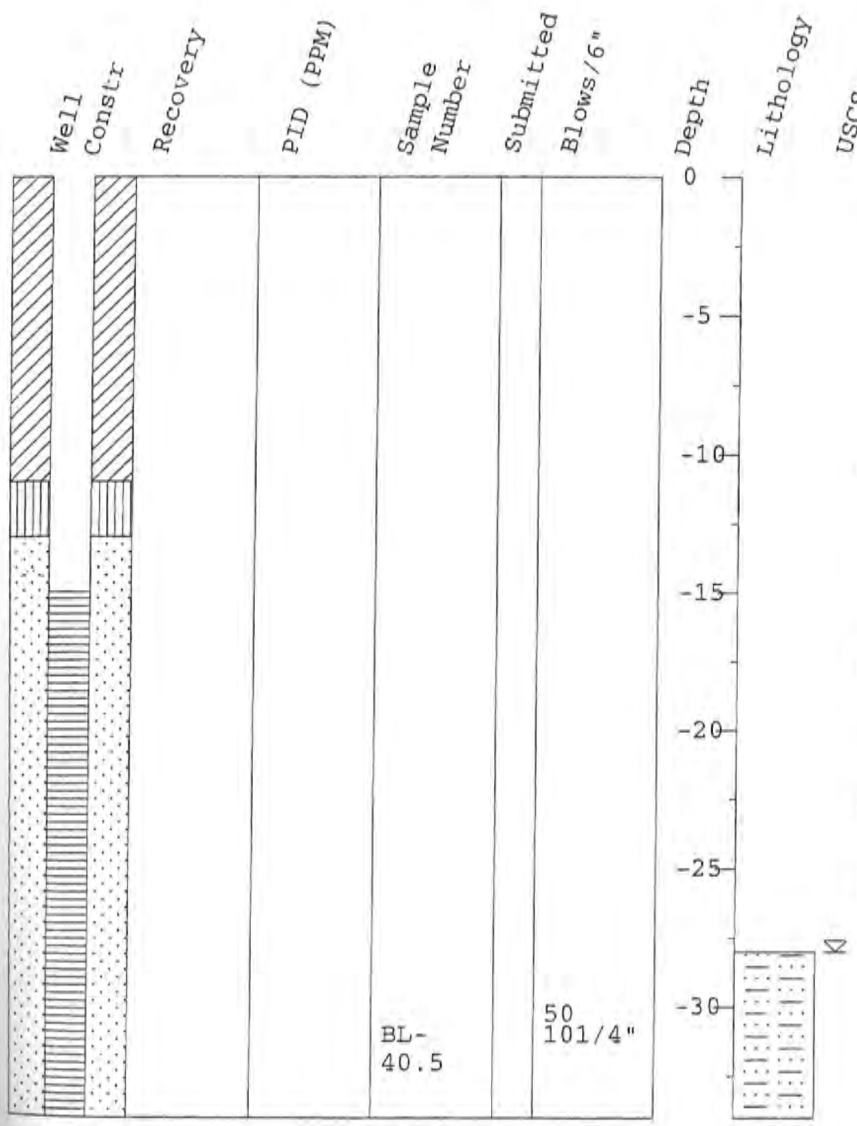
MONITORING WELL LOCATIONS
POINT REYES AFFORDABLE HOUSING PROJECT
POINT REYES STATION, CALIFORNIA

FIGURE
2



USCS Symbol	Soil Description / Field Notes
SM	GRAVELLY LOAM: brown, loose, damp; change in color to reddish-brown and increase in sand with depth
CL	SANDY CLAY: reddish-brown, medium stiff, damp; change in color to yellow-brown and increase in gravel with depth
SP	LOAMY GRAVEL: grey-brown, medium dense, moist
CL	GRAVELLY SANDY CLAY: grey-brown, stiff, increase in sand to 25 feet
GC	CLAYEY GRAVEL: grey, moist, dense,
	SILTSTONE: grey, very hard. Groundwater @ 28 feet

Date:	11-15-2000
Job Name :	EAH- Pt. Reyes
Job No	99190

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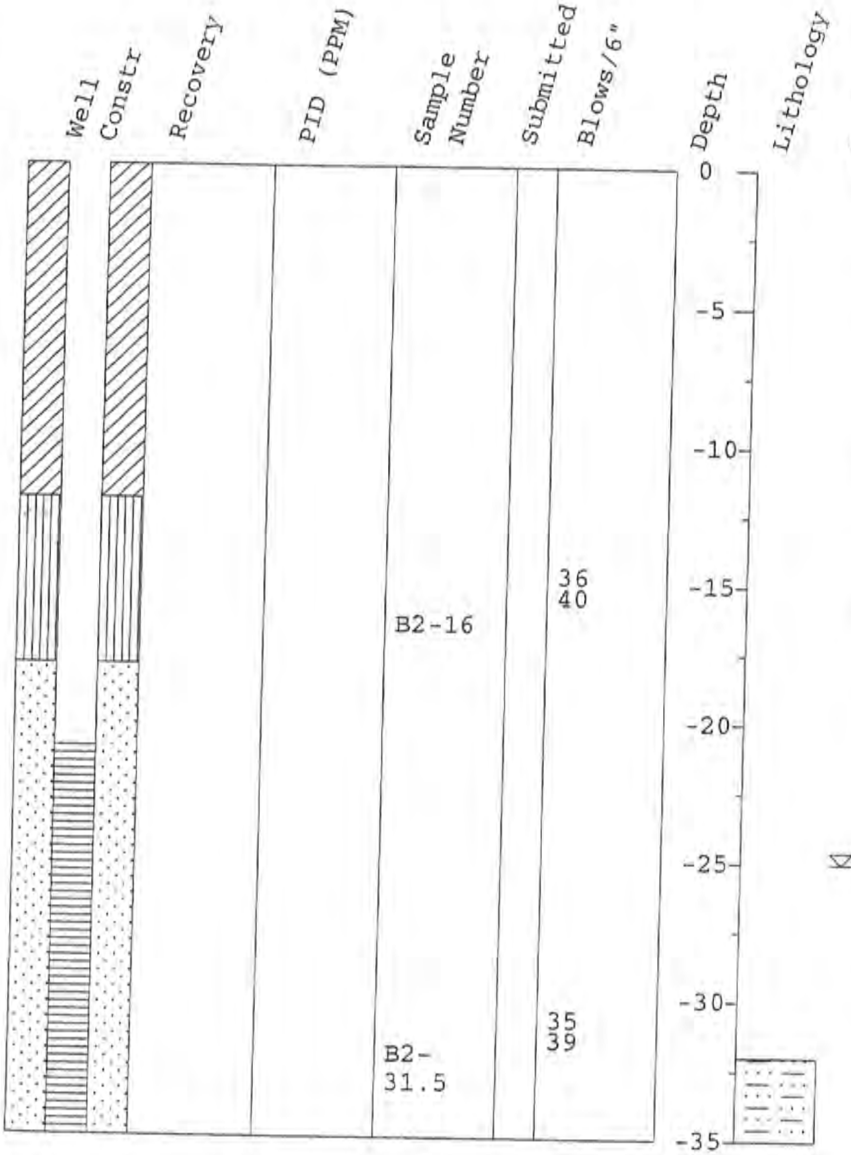
Log of Monitoring Well 1
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-1



USCS Symbol	Soil Description / Field Notes
SM	GRAVELLY LOAM: dark brown, loose, damp; change in color to brown at 1.5 -2.0 feet
SM	CLAY LOAM w/GRAVEL: reddish-brown, damp, slightly sticky
SM	GRAVEL LOAM: light brown, medium dense, damp; some blue-grey rock
GP	SANDY GRAVEL: brown, dense
CL	SANDY CLAY: brown, damp, medium stiff, slightly plastic
SC	CLAYEY SAND: dark to medium brown, dense, moist; increase in moisture @ 25-27 feet
GW	SANDY GRAVEL: yellow-brown(some orange-brown), wet, dense
	SILTSTONE: dark gray

Date: 11-15-2000
Job Name: EAH- Pt. Reyes
Job No. 99190

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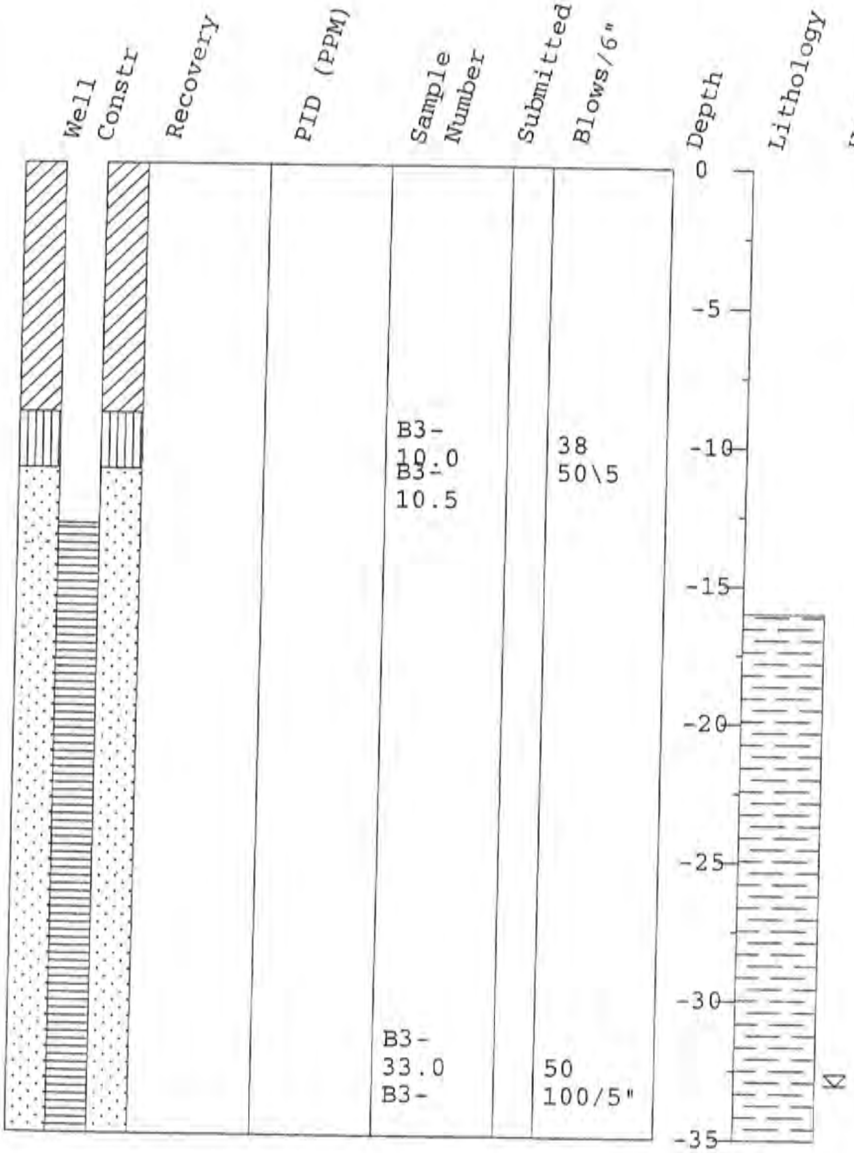
Log of Monitoring Well 2
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-2



USCS Symbol	Soil Description / Field Notes
SM	GRAVELLY LOAM: brown, loose, damp
SM	LOAMY GRAVEL: light brown, medium dense, damp
SM	GRAVELLY LOAM: tan, medium dense, damp
	SANDY GRAVEL: light brown, very dense, damp
	SHALE: grey, moderately hard, slow drilling groundwater @ 33 feet

Date:	11-15-2000
Job Name :	EAH- Pt. Reyes
Job No.	99190

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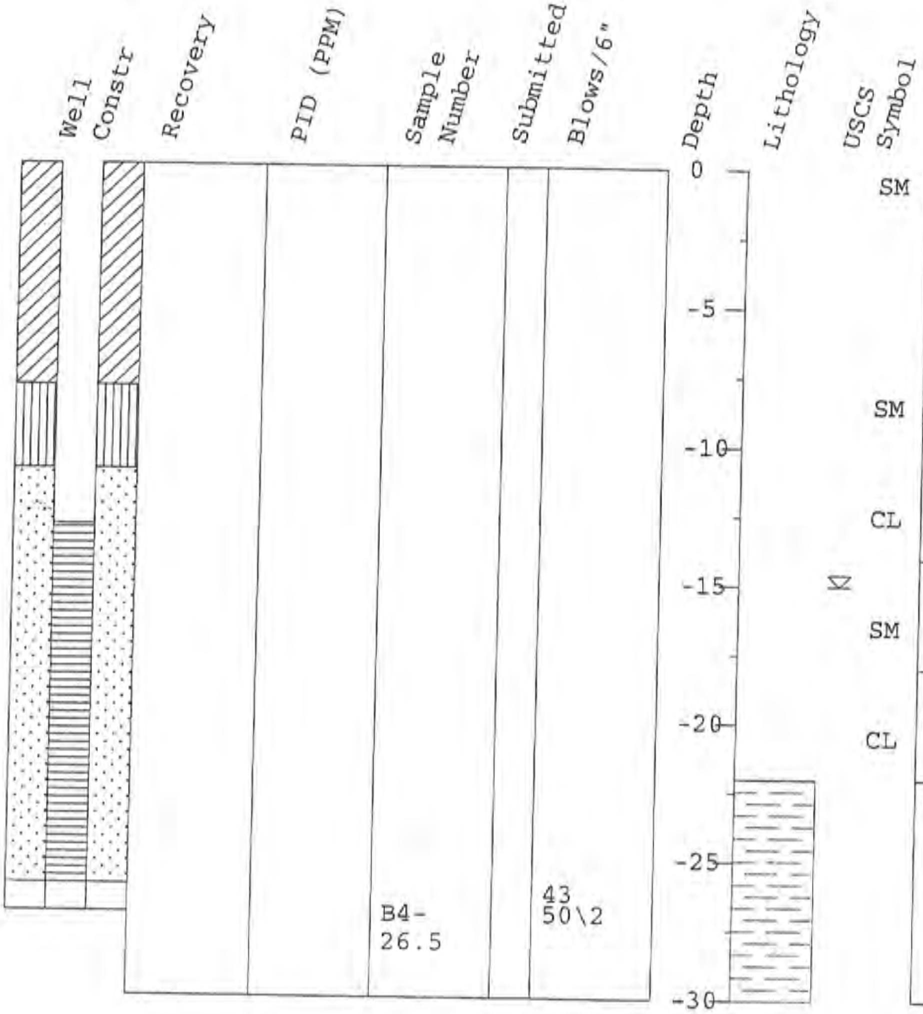
Log of Monitoring Well 3
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-3



USCS Symbol	Soil Description / Field Notes
SM	GRAVELLY LOAM: brown, loose, damp
	LOAMY GRAVEL: light brown, medium dense, damp
SM	GRAVELLY LOAM: tan, medium dense,
CL	SANDY CLAY: brown to reddish brown, medium stiff, moist, low to no plasticity
SM	GRAVELLY LOAM ground water @ 15-20 feet: light brown, damp, dense
CL	SANDY CLAY: brown, stiff, moist; some gravel
	SHALE: grey, hard

Date:	11-15-2000
Job Name:	EAH- Pt. Reyes
Job No.	99190

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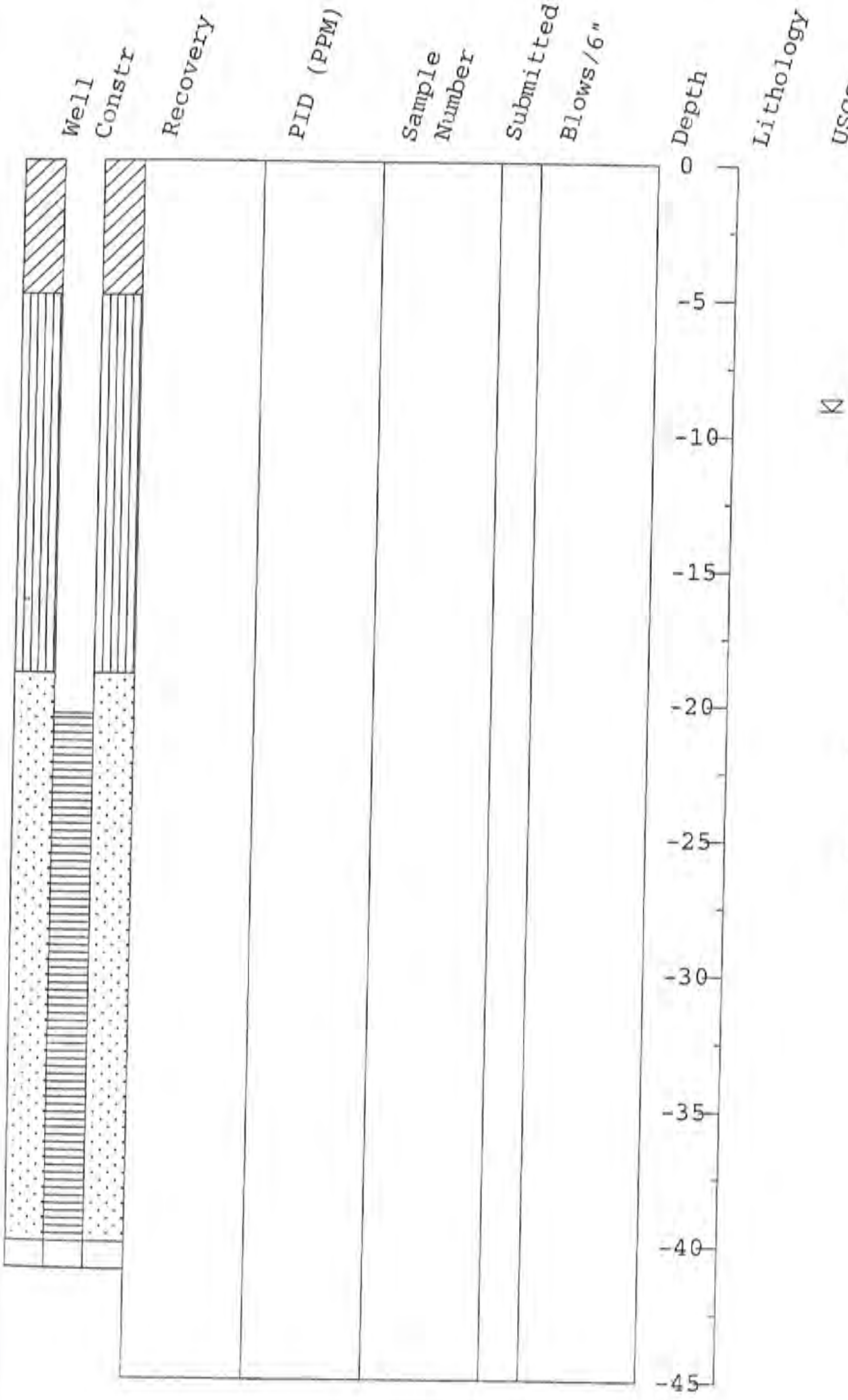
Log of Monitoring Well 4
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-4



USCS Symbol	Soil Description / Field Notes
SM	SANDY LOAM: reddish-brown, loose,
SM	SILTY SANDY LOAM: brown, medium dense(soft), very moist
SM	SILTY SANDY LOAM to CLAYEY SILTY SAND: brown to dark brown, medium dense, very moist to wet groundwater @ 9-10 feet
SC	CLAYEY SAND: dark brown to dark grey, wet, sticky, very soft(flowing); interbeds of sand and clayey sand with depth, becomes denser at 18 to 19.5 feet.
SC	
CL	SANDY CLAY: grey, very moist, sticky and plastic, relativelt soft-firms up with depth
SC	CLAYEY SAND: dark grey-brown, very moist to wet

Date: 11-15-2000
Job Name : EAH- Pt. Reyes
Job No. 99190

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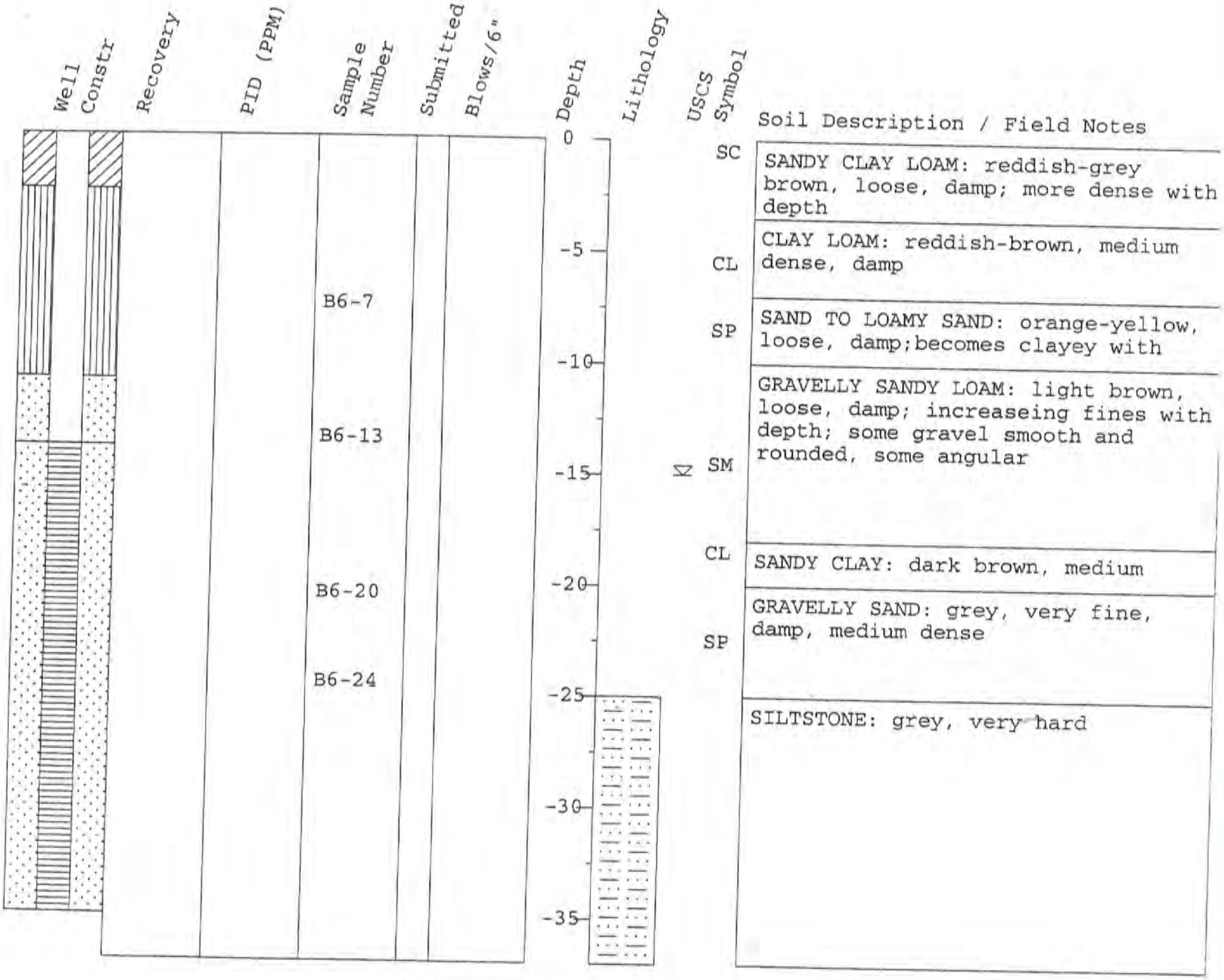
Log of Monitoring Well 5
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-5



Soil Description / Field Notes

SANDY CLAY LOAM: reddish-grey brown, loose, damp; more dense with depth

CLAY LOAM: reddish-brown, medium dense, damp

SAND TO LOAMY SAND: orange-yellow, loose, damp;becomes clayey with

GRAVELLY SANDY LOAM: light brown, loose, damp; increaseing fines with depth; some gravel smooth and rounded, some angular

SANDY CLAY: dark brown, medium

GRAVELLY SAND: grey, very fine, damp, medium dense

SILTSTONE: grey, very hard

Date:	11-15-2000
Job Name :	EAH- Pt. Reyes
Job No.	99190

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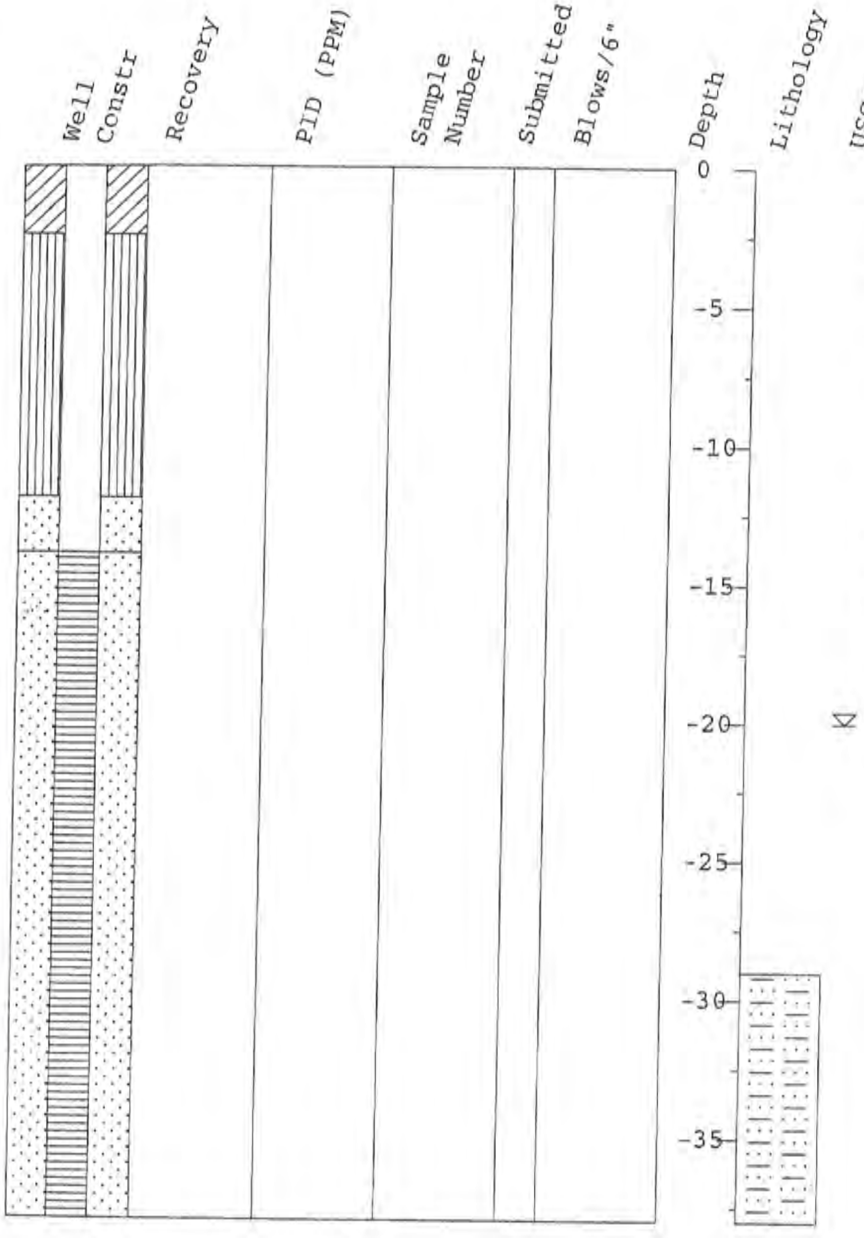
Log of Monitoring Well 6
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-6



USCS Symbol	Soil Description / Field Notes
SM	SANDY LOAM: brown, loose, damp
SC	SANDY CLAY LOAM: light brown, damp; increase in clay content to almost sandy clay with depth
SC	CLAY LOAM: orange brown, loose to medium dense, damp; has 4-6 inch sand lenses
SP	LOAMY SAND: grey-brown, loose, damp;some gravel with depth
SC	SANDY CLAY LOAM: grey brown, damp
SM	SANDY LOAM: grey brown, loose, damp
GP	GRAVELLY SAND: grey-brown, very dense, wet; interbeds of sand and gravelly san, some fractured siltstone with depth
	SILTSTONE: grey, hard

Date:	11-15-2000
Job Name :	EAH- Pt. Reyes
Job No.	99190

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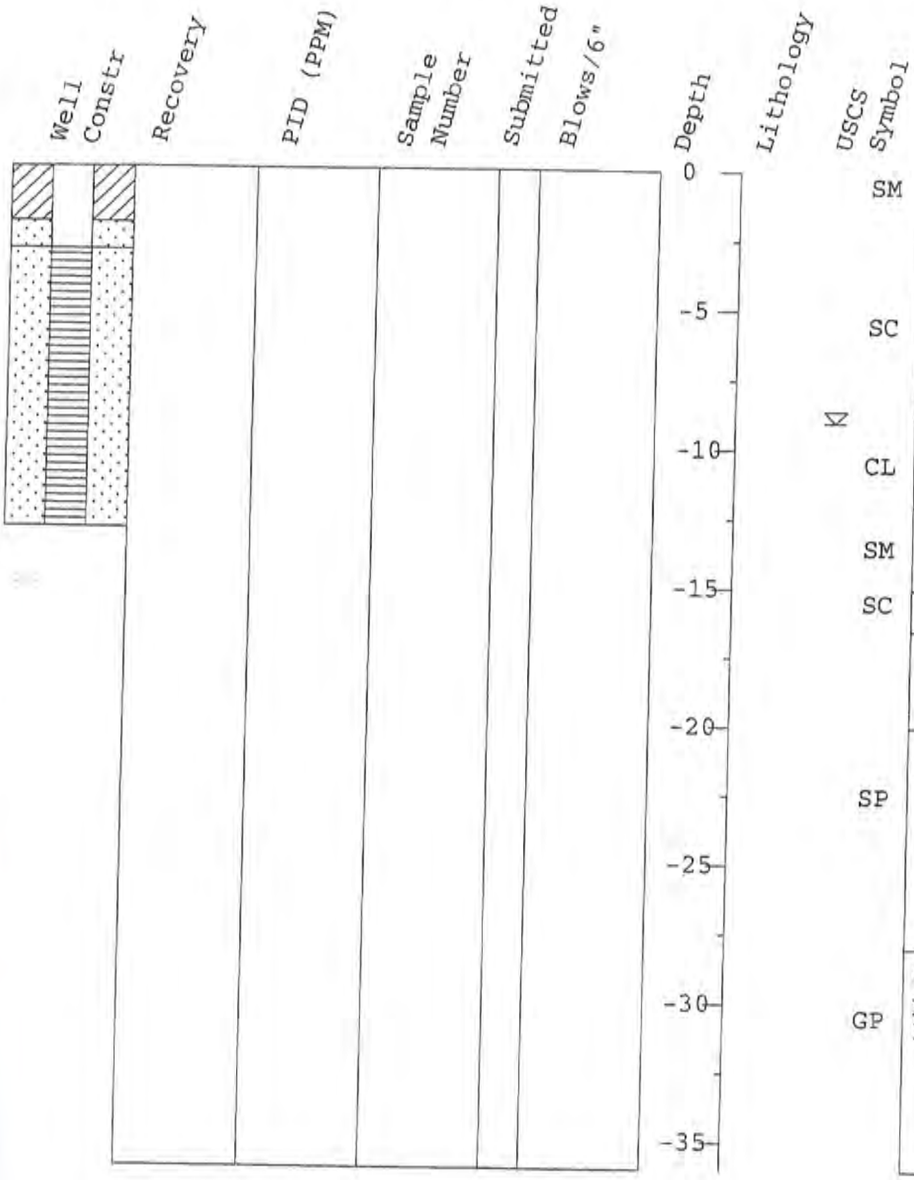
Log of Monitoring Well 7
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-7



USCS Symbol	Soil Description / Field Notes
SM	SANDY LOAM: light reddish-brown, loose, damp
SC	SANDY CLAY LOAM: dark reddish-brown, moist, soft
CL	SANDY CLAY: brown, soft, low plasticity, moist to wet
SM	SILTY SAND: grey, very loose, wet; becomes flowing sands
SC	SANDY CLAY LOAM: grey brown, damp
	SANDY LOAM: grey brown, loose, damp; denser with depth-21-22 feet
SP	GRAVELLY SAND: grey, interspersed with silty sands, grey wet, sticky
GP	SANDY GRAVEL: grey-brown, larger pieces of fractured bedrock at 35-36 feet

Date: 11-15-2000
Job Name : EAH- Pt. Reyes
Job No. 99190

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Log of Monitoring Well 8
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-8

APPENDIX F

GROUNDWATER AND SOILS INVESTIGATION FOR ONSITE WASTEWATER FACILITIES

QUESTA
ENGINEERING CORP.

Groundwater and Soils Investigation for Onsite Wastewater Facilities

Former U.S. Coast Guard Site
Point Reyes Station
Marin County, California

Prepared for

Eden Housing, Inc.
and
Community Land Trust
Association of West Marin

July 15, 2022

Civil,
Environmental
& Water
Resources

Groundwater and Soils Investigation
for
Onsite Wastewater Facilities

Former U.S. Coast Guard Site
Point Reyes Station
Marin County, California

Prepared for:

Eden Housing, Inc
Hayward, California
and
Community Land Trust Association of West Marin
Point Reyes Station, California

Project #2000131

Prepared by:

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July 15, 2022

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SECTION 1: INTRODUCTION AND BACKGROUND

INTRODUCTION

This report presents the results of field investigations and analysis of soils, geology and groundwater conditions on the former Coast Guard site in Point Reyes Station, California (**Figure 1**). The work was conducted for Eden Housing, Inc. and Community Land Trust Association of Marin (CLAM) who are in the process of planning building renovations and site improvements to support affordable housing and other community-oriented activities on the site.

The primary purpose of the work was to: (a) determine the hydrogeologic conditions at the site and the relationship and potential impacts to the groundwater supply for the public water supply wells operated by North Marin Water District (NMWD) located in the northeast portion of the site; and (b) explore and test certain areas of the site to determine their suitability for subsurface dispersal of wastewater that will be generated by the project facilities.

Preliminary work conducted by Questa Engineering in 2016 for the County of Marin identified favorable soil conditions for onsite wastewater dispersal mainly on the adjacent open hillside behind and to the north of the row of residential buildings. However, the study also identified the need for further evaluation of the geology and groundwater conditions to determine potential risk of impact to the NMWD water supply wells from the development and operation of new onsite wastewater treatment and dispersal facilities. Additionally, at the outset of the current study, NMWD expressed strong concerns about locating any new onsite wastewater treatment and dispersal facilities on the former Coast Guard site, due to the close proximity and their assessment that essentially the entire site was within the water source protection area (Zone A) for their wells. For all of the years the site was occupied by the U.S. Coast Guard, all sanitary sewage waste had been collected, pumped and hauled for processing to the Coast Guard facility in Two Rock. A means of providing wastewater treatment and dispersal is necessary for the continued use of the housing and other facilities on the property.

The work conducted in this study entailed the following:

- **Work Plan and Agency Coordination.** An investigation work plan was prepared and reviewed with NMWD and Marin County Environmental Health Services (MCEHS). Additional meetings and consultation with these agencies and with the San Francisco Bay Regional Water Board and the State Division of Drinking Water were conducted during the course of the study.

- **Monitoring Wells**. Four (4) monitoring wells were installed in December 2020 within the housing area on the Coast Guard site, which included logging of subsurface materials. Two historical monitoring wells on the Coast Guard site installed as part of a prior study for the neighboring EAH project (2000) were recovered and utilized; an updated elevation survey was conducted to tie all monitoring wells to a new, common benchmark.

- **Groundwater Monitoring and Sampling.** Groundwater levels in each of the monitoring wells were measured approximately monthly from December 2020 through January 11, 2021; wells were sampled and analyzed for a suite of mineral constituents and nitrate-nitrogen in April 2021.

- **Hillside Groundwater Observation Wells.** Six (6) 10-ft deep groundwater observation wells were in installed in the open hillside north of the residential buildings in April 2021 and monitored for groundwater levels through the fall and into early January 2022.

- **Entrance Area Leachfield Testing.** Soil profiles, percolation testing and groundwater monitoring was conducted in February 2021, November 2021, and January 2022 in accordance with Marin County procedures to evaluate the site suitability, capacity and design parameters for subsurface wastewater dispersal in the ½-acre Entrance Area.

- **Analysis, Recommendations and Report.** The information from field studies was compiled, analyzed and summarized in this report addressing: (a) groundwater occurrence, flow directions, gradients, velocities and estimated influence of the project site on the NMWD groundwater source; and (b) site suitability of the Entrance Area for subsurface wastewater dispersal.

Section 2 of this report addresses the groundwater investigation, analysis and findings pertaining to the housing area and NMWD wells. Section 3 covers the soils and related field studies and evaluation for wastewater dispersal in the Entrance Area. Conclusions are summarized in Section 4.

SITE CONDITIONS

Geographical Setting

The former Coast Guard housing site is a 22.6-acre property located east of downtown Point Reyes Station. It is bordered along the north and west sides by the Point Reyes Affordable Housing Project on Giacomini Road and other undeveloped land, by Lagunitas Creek on the south and east side, and by commercial development and Mesa Road to the southwest.

The developed portion of the site contains several multi-unit housing buildings, dormitory-style accommodations, offices, dining hall, other support buildings and recreation amenities. The major undeveloped open space features of the site consist of a large meadow, riparian corridor and floodplain adjacent to Lagunitas Creek and a broad grassy hillside on the north side of the housing area. The site is currently being planned for renovation of existing buildings to be used for affordable housing and community oriented activities. New onsite wastewater treatment and dispersal facilities will also be developed as part of the project to serve reestablished housing and other activities on the property.

Elevations are about 5 to 15 feet (above mean sea level) in the floodplain/riparian zone, about 30 feet in the housing area, and range from about 40 to 80 feet in the hillside on the northern portions of the site. Elevations are about 38 feet in the entrance area, which is the site of the former sewage pump-out station that served the Coast Guard facilities.

Drainage

The property is bordered by Lagunitas Creek along the east and south sides of the site; portions of the site are within the 100-yr floodplain of the creek. Lagunitas Creek in this reach is subject to tidal effects from Tomales Bay. Historically, a temporary dam was installed during the summer months on the adjoining downstream property (Giacomini property) to limit salt water intrusion effects on the stream and shallow groundwater in the area. That practice was discontinued in 1997, resulting in more frequent and severe salt water intrusion in recent years.

There are no other streams on the property. Due to the convex landscape, gentle to moderate slopes and relatively permeable soils, a large percentage of the rainfall occurring on the hillside area north of the housing is readily absorbed onsite. Runoff that occurs is mostly in the form of sheet flow that collects in a concrete V-ditch that runs laterally across the slope (southwest to northeast) and discharges to the street drainage system at the Commodore Webster Dr. cul-de-sac. The hillside area is also subject to some amount of subsurface flow and surface runoff from the neighboring (undeveloped) property to the north.

Within the developed portions of the site, runoff from streets, parking, housing and other paved areas is collected in a formal drainage system including gutters, catch basins and buried storm drains up to 24 inches in diameter. There are two primary storm drains with outlets at the edge of the riparian zone: (1) one that runs north-south roughly through the center of the site; and (2) a second that drains the entrance road, western portions of the site, and some runoff from the adjacent Point Reyes Affordable Housing site, with its outlet located at the edge of the meadow to the west of the tennis court.

North Marin Water District Wells

The North Marin Water District has two active water supply wells located on the Coast Guard property adjacent to Lagunitas Creek as indicated in **Figure 2.** The wells provide the primary source of water supply for a service area of more than 20 square miles in the Point Reyes area, with annual water production of more than 100 million gallons. The wells are completed in the alluvium above the bedrock, and draw water mainly from highly permeable sand and gravel deposits that are recharged largely by the stream flow and underflow of Lagunitas Creek and, to a lesser extent, by lateral inflow from the adjacent hills. The wells are approximately 60-feet deep with a 20-foot annular seal and a 40-foot screened section; the casing diameter is 12 inches.

PRIOR INVESTIGATIONS

The following summarizes the scope and relevant findings from prior subsurface investigations on the project site.

Questa Engineering, November 2000

In 2000 Questa Engineering conducted an investigation of groundwater and hydrogeologic conditions on portions of the Coast Guard site in connection with the planning and development of the adjacent EAH Affordable Housing Project. A key objective of the study was to evaluate the potential for impacts on Lagunitas Creek and the NMWD wells from onsite wastewater disposal systems (leachfields) planned for the EAH development. The work included the installation of eight (8) monitoring wells, three of which (MW-5, -6, and -7) were located in the alluvial and riparian portions of the Coast Guard site between the NMWD wells and the tennis court (see **Figure 3**). No subsurface investigation was conducted within the housing area on the Coast Guard site as part of the study.

Based on borehole logging, several months of water level measurements, elevation surveys, water quality analyses and bail tests, Questa developed maps and cross-sections of the subsurface conditions and general (worst case) estimates of groundwater flow patterns and travel times. The study estimated groundwater travel times from the EAH site, at its closest point, to be approximately 1 to 1.25 years to Lagunitas Creek, and 2.3 to 2.8 years to the NMWD wells. Limited by the lack of subsurface information in the housing area, the study concluded, conservatively, that only a small portion of the eastern edge of the EAH site was potentially within the zone of contribution ("recharge area") of the NMWD wells. The three monitoring wells (MW-5, -6, and -7) continued to be monitored by EAH for 10+ years after the project was built. MW-5 and MW-7 are still accessible and were monitored and incorporated as part of the current study. Boring logs for all three wells are included in **Appendix A**.

Tetra Tech, November 2016

As part of the "Environmental Compliance Due Diligence Activities Report" done on behalf of the U.S. Coast Guard for site closure, Tetra Tech completed geotechnical borings and sampling for contaminants associated with the operation of a former in-ground hydraulic lift in the maintenance building/shop area. Initial work conducted in March 2016 encountered groundwater at 22 feet below grade, which was sampled and analyzed for volatile organic compounds, semi-volatile organic compounds, PCBs and total petroleum hydrocarbons, none of which were detected. Due to the detection of arsenic and other metals in the groundwater samples (thought to be associated with the drilling operation), additional borings were made in October 2016 for follow-up sampling. Test borings were drilled with a truck-mounted hollow-stem auger. One boring was completed to 40 feet without encountering any water. The second boring met refusal at 28 feet and, with the use of a larger auger, was subsequently advanced to a depth of 60 feet. No groundwater was encountered to a depth of 60 feet in this boring. Information from the Tetra Tech report is provided in **Appendix A**.

Questa Engineering, December 2016

In August and September 2016 Questa Engineering completed 17 soil profile test pits within the Coast Guard housing area and on the hillside behind Buildings 101 through 104. The work was done on behalf of the County of Marin to evaluate the site conditions, suitability and potential capacity for onsite wastewater disposal in different areas of the Coast Guard site. Test pits were completed to depths ranging from 48 to 96 inches below ground surface. No groundwater was encountered in any of the test pits; bedrock (sandstone) was encountered in two test pits; and restrictive soil zones were found in several test pits in portions of the hillside. A test location map and tabular summary of all soil profiles is provided in **Appendix A**.

Rockridge Geotechnical, July 2022

In 2021 Rockridge Geotechnical conducted a preliminary geotechnical investigation of the former Coast Guard housing area for use in current planning and design of site improvements. A Final Geotechnical Investigation report was issued in July 2022. The work involved the logging of four geotechnical borings completed to depths of 21.5 feet, located as shown on **Figure 3.** All four borings encountered fill, terrace deposits and/or older alluvium overlying residual soil/decomposed rock and bedrock of the Franciscan complex at depths ranging from 5 to 18 feet below ground surface. Groundwater was encountered in two of the test borings at depths of 11 and 12 feet; the other two boreholes had no reported groundwater to the full depth of exploration. The subsurface information from the Rockridge boreholes was incorporated in the current study.

SECTION 2: HOUSING AREA GROUNDWATER STUDY

FIELD INVESTIGATIONS

Installation of Monitoring Wells

Four (4) monitoring wells were installed within the former Coast Guard housing site for use in defining the hydrogeology of the area and evaluating the relationship and potential impacts of the proposed project on the North Marin Water District water supply wells. Monitoring well locations are shown in **Figure 3**, along with the location of other prior boreholes and monitoring previously noted. The monitoring well locations were selected to provide subsurface information for areas of the site previously unexplored and estimated to potentially drain to the North Main Water District wells.

The drilling and monitoring well installation was performed by Pierson Drilling on Dec 3-4, 2020, using a B-53 Drilling Rig with hollow-stem augers, using a 6-inch diameter bit and 4-inch diameter augers. The auger sections are 5-ft long and have inside diameters of 3.25 inches. Samples were taken using standard penetration test (SPT) and California modified (CAM) samplers. The SPT sampler has an inside diameter of 1.37 inches and a length of 1.5 feet. The CAM sampler has three consecutive liners with inside diameters of 2.45 inches and each having a length of 6 inches to complete a full CAM length of 1.5 feet. A combination of SPT and CAM samples were taken throughout the soil profile to characterize the subsurface materials encountered. Blow counts were taken per sampling interval to determine the resistance of the material. The drill cuttings were examined and logged in the field by one of Questa's field geologists; core samples were taken during drilling for subsequent laboratory inspection and review by Questa's Sr. Engineering Geologist. Appropriate well installation permits were obtained from the Marin County Environmental Health Services (MCEHS); monitoring well completion was witnessed by MCEHS staff.

Well logs showing the lithologic characteristics for each boring and the well completion details are included in **Appendix B**. All of the wells consist of two-inch diameter, Schedule 40 PVC pipe with flush-threaded couplings. The screened sections ranged from 5 to 20 feet of 0.020-inch (aperture width) slotted PVC pipe, depending on well depth. The annular space around (extending 1 to 2 feet above) the screened section was backfilled with a filter pack consisting of No. 2 Monterey sand. The wells were completed to the surface with an annular seal consisting of Portland cement and bentonite. A cap and flush-mounted bolt-down lid was installed at the top of each well casing to protect and conceal the well head at ground surface.

An elevation survey was completed by Questa Engineering to establish the location and the well head (top of casing) elevation for each of the monitoring wells. The survey was referenced to the 17.6-foot (NAVD 88) benchmark elevation at the NMWD wells as shown on the CBG topographic survey of the former Coast Guard site, dated March 2, 2021. Well head elevations for MW-5 and MW-7 were included in the survey, updating the prior survey information from 2000, which was based on NGVD 1929 datum. The well head elevation for MW-6 (lost in riparian overgrowth) was corrected to NAVD 88 datum.

Construction details of the monitoring wells are summarized in **Table 1**, along with details for the other monitoring wells previously installed by Questa on the Coast Guard site in 2000.

Table 1
Monitoring Well Summary

Well No.	*Location*	*Well Head Reference Elevation (ft-amsl[1])*	*Total Depth (feet)*	*Screened Interval (feet)*	*Depth to Bedrock[2] (feet)*
CG-1	SW of Bldg.103	35.35	40	19.5-40	10.5
CG-2	SE of Bldg. 205	33.6	24	14-24	NE
CG-3	SE of Bldg. 203	33.5	19.5	14.5-19.5	13.5
CG-4	NE of Bldg. 201	32.8	24	14-24	19
MW-5	Riparian Area 225' S of NMWD Wells	15.22	40	20-40	NE
MW-6	Riparian Area 275' S of MW-5	17.01	34	14-34	25
MW-7	Riparian Area S of Tennis Court	23.99	34	14-34	29
NMWD Well 04	Riparian Area ~275' E of Bldg 205	17.6	60	33.5-60	60

[1] amsl: above mean sea level, NAVD 88
[2] Depth to siltstone/shale bedrock

Subsurface conditions encountered at each monitoring well location are summarized below.

- Monitoring Well CG-1:
  - 0 - 2 ft: Silty sand (dark yellowish brown)
  - 2 - 10.5 ft Silty sand with gravel (dark yellowish brown)
  - 10.5 – 35.5 ft Siltstone (dark greenish gray to greenish gray)
  - 35.5 – 40 ft Shale (dark greenish gray)
    - No groundwater encountered

- Monitoring Well CG-2:
  - 0 - 3.5 ft: Silty sand with gravel (fill) (dark yellowish brown)
  - 3.5 -7 ft Silty sand with gravel (yellowish brown)
  - 7 – 15 ft Clayey sand with gravel (yellowish brown)
  - 15 - 24 ft Clayey gravel with sand (dark yellowish brown)
  - 24 - 25.5 ft Silty sand with gravel (refusal) (dark yellowish brown)
    - Groundwater at 15.7 ft (under pressure)

- Monitoring Well CG-3:
    - 0 - 4 ft Silty sand with gravel (fill) (brown)
    - 4 – 9 ft Silty sand with gravel (dark yellow brown)
    - 9 – 13.5 ft Silty sand with weathered rock fragments (dark yellow brown)
    - 13.5 – 18 ft Siltstone/silty sandstone w/bedding features (dark greenish gray)
    - 18 – 21.5 ft Siltstone/silty sandstone (dark gray)
        - No groundwater encountered

- Monitoring Well CG-4
    - 0 – 3 ft Sandy silt with gravel (fill)
    - 3 – 5.5 ft Silty sand with gravel (dark brown)
    - 5.5 – 11 ft Clayey sand with gravel (strong brown)
    - 11 – 16 ft Clayey sand with gravel (yellowish brown)
    - 16 – 19 ft Clayey sand with gravel (dark greenish grey)
    - 19 – 24 ft Siltstone (dark greenish gray)
    - 24 – 25.5 ft Shale (dark gray)
        - Groundwater at 17.5 feet (under pressure)

Hillside Groundwater Observation Wells

On April 2, 2021 six (6) groundwater observation wells were installed by Questa field personnel in the northern hillside area behind Buildings 101 through 103 (see **Figure** 3). The purpose of these wells was to obtain information on the occurrence and depth of shallow hillside groundwater for use in: (a) evaluating potential wastewater dispersal suitability for portions of the hillside area; and (b) analysis of groundwater flow patterns in areas potentially within or near the contributing recharge area to the NMWD wells. The observation wells were installed to a depth of 8 to 10 feet bgs with the aid of an 8-inch power auger, and consisted of 4-inch slotted ABS pipe and pea gravel annular filter pack. No groundwater was encountered in any of the observation wells at the time of drilling.

Water Level Measurements

Monitoring Wells. Water level measurements (i.e., depth to water from top of well casing) at each of the monitoring wells (CG-1 through CG-4) were made by Questa field personnel at the time of well installation, and multiple times throughout 2021 into early January 2022. Water level readings were also made at MW-5 and MW-7 on most inspection dates. Water level readings were made with the use of an electronic water level probe (*Solinist Model 101*). The results of these readings are presented in **Table 2**.

Using the well head elevation survey completed by Questa Engineering, the groundwater surface elevation corresponding with each depth to groundwater measurement was calculated for each monitoring well and observation date. The resulting information is presented in **Table 3**.

Table 2. Depth to Groundwater at Monitoring Wells (feet, below well head*)

Date	Monitoring Well					
	MW-5	MW-7	CG-1	CG-2	CG-3	CG-4
12/4/2020	4.60	20.10	NE	15.7	NE	17.5
12/22/2020	8.50	18.67	25.72	14.12	NE	7.80
1/7/2021	10.16	16.27	16.86	12.41	17.72	6.92
1/26/2021	9.49	9.66	16.72	12.67	17.34	7.22
2/2/2021	N/A	N/A	16.81	8.99	16.31	6.09
2/7/2021	8.46	8.30	16.24	8.68	16.09	6.15
2/16/2021	8.07	8.63	10.94	8.65	15.77	6.23
2/24/2021	7.69	8.02	10.77	8.82	15.36	6.33
3/19/2021	6.90	8.09	10.73	9.06	14.47	6.42
4/21/2021	7.08	9.16	12.92	9.92	15.46	7.50
5/21/2021	8.38	10.75	11.42	13.04	14.33	8.08
6/22/2021	12.03	N/A	12.10	14.78	13.68	8.99
8/18/2021	11.57	17.22	12.73	16.07	12.14	9.60
11/2/2021	6.15	16.99	12.02	6.71	12.16	5.21
11/15/2021	4.03	7.73	10.86	6.82	11.28	4.76
1/11/2022	2.50	6.90	9.95	6.87	9.38	4.68

*note: well head used as reference point for all water level measurements, typically 0.1 to 0.2 feet below adjacent ground surface.

Table 3. Groundwater at Elevation at Monitoring Wells (feet, amsl*)

Date	Monitoring Well					
	MW-5	MW-7	CG-1	CG-2	CG-3	CG-4
12/4/2020	10.62	3.89	NE	17.9	NE	15.3
12/22/2020	6.72	5.32	9.63	19.48	NE	25.0
1/7/2021	5.06	7.72	18.49	21.19	15.78	25.88
1/26/2021	5.73	14.33	18.63	20.93	16.16	25.58
2/2/2021	N/A	N/A	18.54	24.61	17.19	26.71
2/7/2021	6.76	15.69	19.11	24.92	17.41	26.65
2/16/2021	7.15	15.36	24.41	24.95	17.73	26.57
2/24/2021	7.53	15.97	24.58	24.78	18.14	26.47
3/19/2021	8.32	15.90	24.62	24.54	19.03	26.38
4/21/2021	8.14	14.83	22.43	23.68	18.04	25.30
5/21/2021	6.84	13.24	23.93	20.56	19.17	24.72
6/22/2021	3.19	N/A	23.25	18.82	19.83	23.81
8/18/2021	3.65	6.77	22.62	17.53	21.36	23.20
11/2/2021	9.07	7.00	23.33	26.89	21.34	27.59
11/15/2021	11.19	16.26	24.49	26.78	22.22	28.04
1/11/2022	12.72	17.09	25.40	26.73	24.12	28.12

*amsl: above mean sea level, NAVD 88

Hillside Observations Wells. No groundwater was present in the hillside observation wells at the time of installation or during spot checks made during the summer months. Following the major rainfall event of October 24, 2021 water level readings were made on November 2nd and 15th, and then a final time on January 11, 2022. Groundwater was present in the all of the observation wells on each of these dates, with depth to water measurements as listed in **Table 4** below.

Table 4. Depth to Groundwater, Hillside Observation Wells (feet, bgs)

Date	Observation Well					
	H1	H2	H3	H4	H5	H6
11/2/2021	6.15	5.75	5.62	5.25	6.62	6.23
11/15/2021	6.04	6.11	6.25	6.17	-	6.88
1/11/2022	8.63	6.81	6.44	6.78	7.05	6.44

Water Quality

Water samples were obtained from monitoring wells CG-1 through CG-4 on April 6, 2021 and analyzed for a standard suite of mineral constituents and for nitrate-nitrogen. Samples were also taken from MW-5 and MW-7 for nitrate-nitrogen analysis. Water samples were obtained using clean sampling bailers, and were delivered the same day to Brelje & Race Laboratories (Santa Rosa) for analysis. Copies of laboratory reports are provided in **Appendix C**. The results are presented in **Table 5** along with representative raw water quality data for NMWD Well 04 for the same list of water quality constituents tested. The NMWD well water data were obtained from the State Water Board's, Division of Drinking Water online database for public water systems. Since none of the reported Well 04 sampling times coincide with the April 2021 monitoring well sampling, the online data were reviewed to find the most recent historical results representative of winter and spring sampling periods.

Table 5. Monitoring Well Water Quality Data

Constituent	Units	Monitoring Wells on Coast Guard Site April 6, 2021 Sampling				NMWD (Raw Water)
		CG-1	CG-2	CG-3	CG-4	Well 04*
Total Dissolved Solids	mg/L	660	340	940	220	190
pH	Std units	7.5	7.0	7.3	8.0	7.45
Total Alkalinity as $CaCO_3$	mg/L	220	120	170	130	100
Specific Conductance	µmhos/cm	1,200	560	1,500	380	288
Calculated Hardness as $CaCO_3$	mg/L	180	170	490	88	71
Iron	µg/L	170	210	40,000	6,400	320
Manganese	µg/L	130	43	700	150	190
Calcium	mg/L	27	30	86	17	8.4
Magnesium	mg/L	27	22	68	11	24
Sodium	mg/L	180	55	140	54	34
Nitrate, as N**	mg/L	<0.2	1.1	<0.2	0.31	<0.4

* Data from CA Drinking Water Watch (https://sdwis.waterboards.ca.gov/PDWW/); winter-spring sampling date closest to the April 2021 sampling of Coast Guard Site monitoring wells in winter-spring sampling.

** NO_3-N results for MW-5 and MW-7 on 4/6/21 were 0.74 mg/L and <0.2 mg/L, respectively

Rainfall

Average annual rainfall in Point Reyes Station is approximately 32.6 inches, based on the past 15 to 20 years of recorded data. Rainfall during the study was significantly below this amount during the 2020-21 water year, totaling only 10.64 inches from October 1, 2020 through September 30, 2021. However, from October 1, 2021 through the January 31, 2022, the rainfall was above normal, aided by the unusual "atmospheric river" event of October 24, 2021, and additional normal or above rainfall amounts in November and December. **Table 6** presents the monthly and cumulative rainfall amounts recorded during the study.

Table 6. Recorded Rainfall at Point Reyes Station
October 1, 2020 through January 31, 2022

Year	Month	Monthly Rainfall (inches)	Total Accumulated Rainfall (inches)
2020	October	0.0	0
	November	0.0	1.22
	December	2.17	3.39
2021	January	3.66	7.05
	February	1.46	8.51
	March	1.97	10.48
	April	0.10	10.52
	May	0.0	10.52
	June	0.0	10.52
	July	0.0	10.52
	August	0.0	10.52
	September	0.12	10.64
	Total - October 2020 – September 2021		**10.64**
	October	10.60	10.60
	November	2.88	12.88
	December	8.71	21.59
2022	January	0.83	22.42
	Total - October 2021 – January 2022		**22.42**

ANALYSIS AND DISCUSSION

Geologic Setting

The Project site is within the Coast Range Geomorphic Province of Northern California. Geology of the site consists of Holocene and Pleistocene alluvial soils and Pleistocene terrace deposits overlying bedrock, which is generally characterized as siltstone and shale of the Franciscan mélange. The dark grey siltstone and shale observed underlying the housing site are part of the Franciscan complex mélange bedrock unit as mapped in the area by the U.S. Geological Survey and others. The alluvial soils and terrace deposits consist generally of gravelly loams at the surface followed by inter-bedded layers of gravelly sands and clays of varying thickness and density. The more weathered terrace deposits with broken gravels are consistent with the Millerton Formation, which is prominent along the Tomales Bay east shore.

Based on borehole logs completed by Questa Engineering and Rockridge Geotechnical, the overall thickness of the terrace deposits and older alluvium (above bedrock) ranges from about 5 to 20 feet over most of the housing area, indicating an irregular bedrock surface, grading generally to the east and southeast. The one borehole showing an exception to this was CG-2, which met refusal at 25 feet without any clear evidence of encountering the siltstone bedrock and decomposed bedrock found in other boreholes. Bedrock elevations at each borehole location are displayed in **Figure 4.** Moving off the housing area toward Lagunitas Creek, borehole logs at MW-5, -6 and -7 show a steepening of the bedrock surface and increasing thickness of alluvial deposits. At MW-5 within the creek riparian zone, no bedrock was encountered to a depth of 40 feet below ground surface. At the NMWD wells the alluvium thickness over shale bedrock is reported to be approximately 60 feet (-42 feet below mean sea level).

Figure 5 presents a longitudinal cross-section (X-X^1) depicting the subsurface conditions at CG-1, CG-3 and MW-5, running generally through the center of the housing area, from the base of the northern hillside to the Lagunitas Creek floodplain. Groundwater levels measured at each of the monitoring wells on January 11, 2022 are indicated on the cross-section; this was at the time of highest groundwater conditions encountered during the 13-month study. Section X-X^1 illustrates the geologic relationship between the housing area (bedrock terrace) and the Lagunitas Creek floodplain (deeply incised stream channel), and the distinct differences in groundwater regimes.

Additional hydrogeologic cross-sections illustrating similar subsurface conditions across other parts of the building area are provided in **Appendix D**.

Groundwater Occurrence

Groundwater on the Project site and vicinity occurs principally in three different regimes: (1) alluvial aquifer of Lagunitas Creek; (2) terrace groundwater that forms above the siltstone-shale bedrock beneath the housing area; and (3) hillside groundwater that occurs seasonally in response to rainfall within the upper soil zones on sloping areas behind the housing. The bedrock may have fracture zones that contain or convey small quantities of water, but it is generally considered to be a low or non-water bearing formation for all practical purposes. Bedrock is not identified as a source of water to the NMWD wells in their 2013 Groundwater Source Assessment for Well 04.

Alluvial Aquifer. The NMWD wells are completed in the deep alluvium that underlies Lagunitas Creek. The wells draw water from highly permeable sand and gravel deposits that are recharged largely by the streamflow/underflow of Lagunitas Creek and, to a lesser degree, by lateral inflow from the adjacent hills. The 2013 Groundwater Source Assessment for NMWD Well 04 indicates the aquifer has a very high yield, with a static water level of 11 feet below ground surface, a 1-foot drawdown to 12 feet during pumping, and well capacities of 250 to 300 gallons per minute for the two production wells (02 and 04). A static water level of 11 feet bgs corresponds to an elevation of approximately 7 feet above mean sea level.

The alluvial aquifer extends upstream and downstream following the alignment of the creek, with varying width. Based on subsurface exploration by Questa Engineering and Rockridge, it is estimated that the alluvial aquifer on the Coast Guard site extends laterally to near the toe of slope where the developed building area grades down to the creek riparian zone. There is no indication from boreholes that the alluvial aquifer extends laterally beneath the housing area.

Terrace Groundwater. Outside of the alluvial area, groundwater beneath the project site occurs as a result of percolating rainwater that collects in the soils above the siltstone and shale bedrock. This includes zones of saturation on the hillsides and terrace formation where most of the housing development is located. The groundwater develops seasonally, rising in the rainy season and dropping in the dry season as indicated by water level monitoring at CG-1 and CG-3. There is also evidence from monitoring wells CG-2 and CG-4 that groundwater in underlying bedrock fractures rises under pressure in some portions of the terrace area. The origin of this water is likely percolating rainwater on the adjacent hillside that drains through exposed bedrock fractures. Water level monitoring during the study showed discontinuous groundwater zones across the terrace area, with no consistent water table from which groundwater contours could be approximated and mapped. Water movement is slow due to the irregular and generally flat to gently sloping bedrock surface underlying the site.

Hillside Groundwater. In the hillside area north of the housing, percolating rainwater collects in the more permeable surface soils above restrictive sub-soils and weathered bedrock. The thickness of the saturated zone is relatively thin; it typically develops during the rainy season and drains away readily in the dry season due to the sloping terrain. Compared to the terrace area, the winter groundwater level (water table) tends to be at a shallower depth on the hillsides due to thinner soil development above the bedrock. Groundwater monitoring in the hillside area during the early 2021-22 winter season showed depth to groundwater in the range of about 5.5 to 7 feet. The depth to groundwater was fairly consistent between the different observations points on the hillside on each inspection date, indicating that ground surface topography can be used as a reasonable indicator of the direction of groundwater movement.

Groundwater Levels

The study was conducted during a period of very low rainfall during winter, spring and summer of 2021, followed by a surge of heavy rainfall in late fall and early winter, highlighted by the "atmospheric river" event of nearly 11 inches of recorded rainfall in Point Reyes Station in the month of October, with 6.3 inches on October 24, 2021. **Figure 6** is a graph showing the fluctuations in groundwater levels at the four monitoring wells in the housing area over the full duration of the study, summarized as follows:

- CG-1. This monitoring well is located at the base of the hillside north of the housing and was dry at the time of installation on December 3-4, 2020. There was no water encountered on top of the siltstone bedrock surface (10.5 ft bgs) or within the siltstone and shale bedrock to a depth of 40 feet. Groundwater rose relatively quickly (by 20 to 25 feet) in the monitoring well in response to rainfall during the month following installation. We interpreted this to be percolating rainfall infiltrating and filling the 2-inch casing, and not the reflection of a general rise of groundwater in the area of the monitoring well. By mid-February 2021 in response to additional rainfall, water levels in CG-1 finally reached a depth corresponding with top of the bedrock surface (10 to 11 feet, bgs) and remained fairly constant at that level through March. Water levels dropped slowly from March to the end of summer, with a dip in April attributable to the bailing of water for water quality sampling the first week of April. During the summer the water dropped a few feet, but never drained fully from the casing. Following the October 24th rainfall event water levels rose gradually in November to January, with the final reading of 9.95 feet bgs on January 11, 2022, the highest level observed during the study period. This corresponds to a saturated depth of roughly 0.5 to 1 foot above the bedrock surface.

- CG-2. This monitoring well showed indications of penetrating a zone of confined or semi-confined groundwater (under pressure), as water levels rose immediately following drilling. Through December 2020 and January 2021 the groundwater levels rose a few feet, and then rose another few feet in response to continued and increasing rainfall in February, reaching a depth of 8 to 9 feet bgs. From March through the end of summer groundwater levels dropped by 7+ feet, returning approximately to the groundwater level observed at the time of well installation. There was a strong water level response to October 24th rainfall, rising close to 9.5 feet to a depth of 6.7 feet bgs. This was the highest groundwater level observed at this monitoring well during the study, and remained close to this level through the last reading on January 11, 2022 (6.87 feet, bgs). The rapid water level response to the October 24th rainfall is further evidence that the monitoring well is influence by groundwater under pressure (i.e., recharged from a source at a higher elevation), rather than an indication that the water table in the area of the well rose 9 to 10 feet in response to the rain event.

- CG-3. This monitoring well is located 250 feet from CG-1 in the direction of Lagunitas Creek, and about 75 feet from the top of slope where the terrace area grades down to the creek riparian area. CG-3 was dry at time of installation, and then showed an initial water level rise in December 2020, followed by a gradual rise throughout all of 2021, notably increasing in response to the October 24th rainfall, and reaching its highest level at the last reading on January 11, 2022. The groundwater level reached the top of bedrock surface in summer 2020 and ended with a saturated depth above bedrock of about 4 feet in January 2022.

- CG-4. Similar to monitoring well CG-2, this well penetrated bedrock in a zone exhibiting groundwater under pressure. Groundwater was found at a depth of 17.5 feet at the time of drilling, and rose by 10 feet two weeks later. Water levels continued to rise, reaching a high level of about 6 feet bgs in February 2021. After that the water levels steadily dropped through the spring and summer to a low of 9.6 feet bgs in August. Like CG-2, the water level responded quickly following the October 24th rainfall, rising about 4 feet to a depth of 5.2 feet bgs in early November, and continuing to rise to a final depth of 4.68 feet bgs on January 11, 2022. The water levels at CG-4 were consistently the highest elevations of all four monitoring wells throughout the study.

The groundwater elevations associated with the water levels at the four monitoring wells all reached between 24 to 28 feet above mean sea level (amsl) their highest point in January 2022. In contrast, the groundwater at MW-5 and MW-7 located in the alluvial aquifer reached maximum elevations of 12.72 and 17.09 feet amsl, respectively. The normal static water level at the NMWD wells is reported to be about 7 feet amsl.

Groundwater Time-of-Travel Estimates

Background. Planning and operation of public water systems entails delineation of drinking water source Protection Zones to identify, understand and manage potential risks of contamination from activities within the water source area. Different Protection Zones are delineated based on the type of contamination threat. The highest protection level is Zone A, which is established to protect the drinking water supply from viral, microbial and direct chemical contamination. Zone A is defined by the surface area overlying the portion of the aquifer that contributes water to the drinking water well(s) within a 2-year time-of-travel. The 2-year time-of-travel criterion is used because research indicates that bacteria and viruses survive less than two years in soil and ground water.

According to the California Drinking Water Source Protection Program, the six primary delineation methods used in California, in order of increasing sophistication, are:

1. Arbitrary fixed radius
2. Calculated fixed radius
3. Modified calculated fixed radius
4. Analytical methods
5. Hydrogeologic mapping
6. Numerical flow/transport models

In 2013 NMWD used the calculated fixed radius method to delineate a Water Source Protection Zone A consisting of a radius of 1,600 feet around their wells located on the former Coast Guard property. Limited hydrogeologic information was available to NMWD in 2013. The additional soil, geologic and groundwater information obtained by Questa through this current study, augmented by the Rockridge Geotechnical investigation, permitted a hydrogeologic mapping approach to be used to estimate the 2-year time-of-travel to the NMWD wells as it pertains to the Project site. This was conducted as described below.

Groundwater Flow Estimation. Figure 7 provides a groundwater flow schematic illustrating the normal route of groundwater movement from the adjacent upland areas of the Project site to the well location within the alluvial aquifer. **Figure 8** shows the estimated extent and configuration of the three groundwater regimes in plan view on a topographic map. **Figure 8** also shows a series of nine (9) hypothetical groundwater flow paths, drawn to approximate the expected route of groundwater movement through the site - from the hillside, across the terrace-building area, and finally entering the alluvial aquifer where it is then subject to the drawdown influence of the pumping wells. By calculating the time-of-travel along each of the flow paths - starting at the wells and working "'upstream" – one can estimate where along each flow path percolating water on the land surface would have to start in order to reach the wells within a travel time of two years (730 days). Connecting these points then gives a line representing the approximate 2-year time-of-travel boundary, indicated by the dashed green line in **Figure 8**.

The rate of water movement (velocity) is different in each of the three groundwater regimes, as indicated by the notes and calculations in **Figure 7** and discussed below.

- **Hillside Groundwater Flow.** Water movement in the hillside groundwater regime is governed by the properties of the soils and geologic materials and the slope (gradient) of the water table of the underlying bedrock surface. The pumping of the NMWD wells has no effect on hillside groundwater flow. The direction of groundwater flow in the hillside was estimated to be at right angles to the land surface topography, based on consistent depth to groundwater readings during the November 2021 and January 2022 water level monitoring. The rate of groundwater flow can be estimated by applying Darcy's Law[1], which requires known values or estimates as follows:

    - Horizontal permeability (hydraulic conductivity), K_h: estimated at 6 feet per day based on soil profiles and many dozens of percolation tests on the neighboring EAH Affordable Housing project in an area of similar soils;

    - Slope, i: varies across the hillside from 0.04 in the upper part to 0.20 in the lower part of the hillside; separate calculations were made for the upper and lower slopes using actual slopes determined from topography for each flow path;

    - Effective porosity, π: estimated at 0.10 for predominantly clay loam textured soils (USGS, 1967)

  Per Darcy's Law, velocity, $V = (K_h * i)/\pi$

  Upper slope, $V = (6 * 0.04)/0.10 = \underline{2.4 \text{ ft/day}}$
  Lower slope, $V = (6 * 0.20)/0.10 = \underline{12 \text{ ft/day}}$

- **Terrace Groundwater Flow.** Water movement in the terrace groundwater zone is also governed by the properties of the soils and geologic materials, the slope/gradient and the principles of Darcy's Law. The pumping of the NMWD wells has no effect on groundwater flow within the terrace groundwater zone; the elevation of the bedrock surface is well above the normal water level in the alluvial aquifer, and monitoring of water levels throughout the study showed no water level fluctuations that could be attributed to well operation. As previously noted, the terrace bedrock surface is irregular, without a consistent or definitive slope. There are indications of general gradient to the south (downstream); but, to be conservative, we estimated the flow to be at right angles to top of bank along the creek riparian zone.

  The following assumptions were made for use in the application of Darcy's Law for the terrace groundwater flow:

    - Horizontal permeability (hydraulic conductivity), K_h: estimated at 20 feet per day based on soil profiles and percolation testing at the Entrance Area, having very similar conditions to the housing area.

    - Slope, i: estimated at 0.005 based on water table gradient between CG-1 and CG-

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[1] Darcy's Law is an equation that describes the flow of a fluid through a porous medium; it says that the discharge rate q is proportional to the gradient in hydraulic head and the hydraulic conductivity (q = Q/A = -K*dh/dl).

3 on January 11, 2022, the time of highest groundwater levels during the study.

- Effective porosity, π: estimated at 0.20 for very gravelly silty sands (USGS, 1967); also assumed by NMWD in 2013 calculations for the alluvial aquifer.

Per Darcy's Law, velocity, $V = (K_h * i)/\pi$

$V = (20 * 0.005)/0.20 = 0.5$ ft/day

- **Alluvial Aquifer Groundwater Flow.** For the alluvial aquifer the groundwater velocity was assumed to be as determined by NMWD in their 2013 Water Source Protection Zone analysis using the calculated fixed radius methodology. The groundwater flow calculations indicated a 2-year time-of-travel distance of 1,591 feet, which equates to a groundwater velocity of 2.18 ft/day (1,591f ft/730 days). For the groundwater flow paths indicated in **Figure 8**, it was assumed that the pumping influence of the NMWD wells extends downstream to all reaches of the alluvial aquifer uniformly and on a continuous year-round basis. This is a conservative (safe) assumption, and does not take into account the increase in the opposing downstream groundwater gradient associated with wet season flows in Lagunitas Creek, and the reduction in well usage during the dry season when salinity levels increase.

Using the above assumptions and methodology, calculations were completed as displayed in **Table 7** to determine the estimated 2-yr groundwater travel distance along each of the flow paths shown in **Figure 8**. **Figure 9** shows the estimated 2-year time-of-travel boundary on an overview of the project site, also including the projected flow path from the Entrance Area, where the 2-year time-of-travel boundary is estimated to be at edge of the wetland meadow area.

Table 7. 2-year Time-of-Travel Calculations

Flow Path No.		Alluvial Aquifer @ 2.18 ft/d	Terrace Groundwater @ 0.5 ft/d	Lower Hillside @ 10.2 to 11.3ft/d	Upper Hillside @ 2.5 to 2.6 ft/d	TOTAL	
						Distance	Days
1	Distance, ft	260	215	202	423	677	
	Days	119	430	18	163		730
2	Distance, ft	303	245	215	202	763	
	Days	139	490	20	81		730
3	Distance, ft	313	278	223	22	814	
	Days	144	556	22	9		730
4	Distance, ft	322	291	-	-	613	
	Days	148	582	-	-		730
5	Distance, ft	388	276	-	-	664	
	Days	178	552	-	-		730
6	Distance, ft	598	228	-	-	826	
	Days	274	456	-	-		730
7	Distance, ft	765	190	-	-	955	
	Days	351	379	-	-		730
8	Distance, ft	1,070	120	-	-	1,190	
	Days	491	239	-	-		730
9	Distance, ft	1,313	64	-	-	1,377	
	Days	602	128	-	-		730

SECTION 3: ENTRANCE AREA LEACHFIELD SITE EVALUATION

SITE DESCRIPTION

The “Entrance Area” is an approximately ½-acre area located at the west end of Commodore Webster Dr. It was identified as a potential site for onsite wastewater dispersal based on known favorable soil conditions in this area of Point Reyes Station, and because it is the farthest distance from the NMWD water supply wells of any area on the former Coast Guard property.

This area of the site formerly served as the sewage collection point for the Coast Guard housing facilities, where tanker trucks would regularly pump and haul raw sewage to the Coast Guard wastewater treatment facility located in Two Rock. Three large sewage holding tanks and associated piping and other equipment are still located on the east end of the Entrance Area adjacent to the circular drive that was used by the pump trucks.

The site is level to very gently sloping, mostly covered in grasses with a prominent row of cypress trees, a large eucalyptus and a scattering of pines and other trees. There are no watercourses or drainage channels within the site. Lagunitas Creek is located approximately 450 feet to the east of the Entrance Area at its closest point. Additionally, the site is bordered on the east side by wetlands and hillside seeps, located where the land slopes down to a broad meadow. A 100-foot horizontal setback would need to be maintained between these wetlands and any wastewater treatment or dispersal facilities located in the Entrance Area. The former sewage holding tanks and associated equipment all lie within the 100-foot wetland setback area and, presumably, would need to be decommissioned and removed.

Field investigations of the Entrance Area were conducted by Questa in February 2021 to evaluate soils, percolation, and groundwater conditions for onsite wastewater suitability. The work conducted and results are presented below. **Figure 10** is a map showing the test locations.

FIELD INVESTIGATIONS

Soils

Soil conditions were initially investigated on February 2, 2021 with 3-inch diameter hand-augur pilot test holes to depths ranging from about 5 to 8 feet. Test holes were made in five locations spread across the site, all located on the south side of Commodore Webster Drive (see **Figure 10)**. Temporary observation pipes were installed in each pilot hole. On February 23rd the pilot holes were advanced to a depth of 10 feet with the aid of an 8-inch power auger, and converted to groundwater observation wells using 4-inch slotted ABS pipe and pea gravel annular filter pack.

Logs of soil conditions encountered in these augur test holes/observation wells are summarized in **Table 8** below. As indicated, the test holes showed very consistent soil conditions across the site and throughout the 10-foot exploration depth. Gravelly and very gravelly loam, sandy loam and sandy clay loam soils were common in surface soils and sub-soils, with no evidence of any restrictive layer (e.g., clay, hard pan, or bedrock). No groundwater was encountered at the time of pilot test auguring or during observation well installation in February 2021. See discussion below under Groundwater Observations for results of additional groundwater monitoring of these test holes through the end of 2021 and early 2022.

Table 8. Soil Auger Boring Logs – Entrance Area

Test Hole #	Depth (inches, bgs*)	Description	Ground Slope
A-1	0 - 30"	Dark brown gravelly loam; moist from recent rains to 22"	3.5%
	30 - 54"	Light brown very gravelly loam; dry; no groundwater	
	54 - 120"	Gravelly sandy clay loam; dry; no groundwater	
A-2	0 - 30"	Dark brown, very gravelly loam; moist; no groundwater	4%
	30 - 120"	Light brown very gravelly loam; dry; no groundwater	
A-3	0 - 40"	Dark brown very gravelly loam; moist; no groundwater	14%
	40-120"	Light brown very gravelly loam; dry; no groundwater	
A-4	0 - 56"	Dark brown fine sandy clay loam; moist, no groundwater	<2%
	56 - 120"	Medium brown gravelly loam; dry; no groundwater	
A-5	0 - 56"	Dark brown fine sandy clay loam; moist; no groundwater	<2%
	56-66"	Dark brown fine sandy loam; moist; no groundwater	
	66-120"	Medium brown gravelly loam; dry; no groundwater	

bgs: below ground surface

Formal soil profile test pits were excavated by backhoe and logged by one of Questa's staff geologists on February 23, 2021. This work was conducted in coordination with Marin County Environmental Health Services (MCEHS), who were present to witness the work and review the observed soil conditions first hand. Six test pits were excavated and located as indicated in **Figure 10**. Test pits T-1 through T-4 were located on the south side of Commodore Webster Dr., and T-5 and T-6 were in the narrow strip of land on the north side of the street. One additional hand-augur test hole was also completed on the north side of the street. Soil profile logs are included in **Appendix E** and summarized briefly as follows:

- **T-1 through T-4**. Test pits T-1 through T-4 were all very similar, showing typically clay loam to silty clay loam surface soils to a depth of 36 to 53 inches, underlain by sandy clay loam and gravelly clay loam sub-soils to a depth of 96 to 98 inches. Structure was typically moderate to strong, sub-angular blocky. Gravel/rock content (sandstone fragments) was generally <15% in surface soils, and 15% to 35% in sub-soils. No mottling (i.e., indicator of seasonal groundwater) was observed in any of these four test pits over the full depth of exploration. All soil test pits in this area exhibited very favorable soil conditions for subsurface wastewater dispersal.

- **T-5 and T-6**. Test pits T-5 and T-6, located on the in the landscaping strip along the north side of Commodore Webster Dr, were distinctly different from each other. T-6, located to the west near the entrance gate, was excavated to a depth of 5 feet and showed similar soil conditions to those found in test pits A-1 through A-4. The surface soils consisted of 37 inches of clay loam, underlain by gravelly clay loam to 61 inches (bottom of test pit). In contrast, T-5, located directly across the street from the circular drive entrance, showed 9 inches of topsoil over clay subsoil. The clay soil extended to the bottom of the 54-inch deep test pit and exhibited mottling throughout. An additional augur hole (AX-6.5) was completed midway between T-5 and T-6 and found to have similar conditions to T-6. It showed 36 inches of clay loam surface soils, underlain by gravelly clay loam to a depth of 77 inches. Any wastewater dispersal fields developed on the north side of Commodore Webster Dr should be confined to the areas represented by T-6 and augur boring AX-6.5; soils in the area of T-5 are unsuitable.

Percolation Testing

Questa conducted percolation testing of soils at the Entrance Area site on February 24, 2021, which included thirteen (13) percolation holes installed at depths of 12, 24, 36, 40 and 48 inches. The test hole locations are shown in **Figure 10**; percolation test data sheets are provided in **Appendix E.** The testing was conducted in accordance with MCEHS procedures, and MCEHS staff was present to observe the testing and measurements, as well as the preparation and pre-soaking of test holes the day prior to running the tests. Percolation test results are summarized in **Table 9** showing very consistent and favorable rates at all depths. As indicated, the results ranged from 1.7 to 16.8 minutes per inch (mpi), with an overall average rate of 6.3 mpi.

Table 9. Entrance Area Percolation Test Results – February 24, 2021

Test Hole #	Test Hole Depth (inches)	Adjusted Stabilized Rate (minutes per inch, mpi)
P1	48	16.8
P2	40	6.6
P3	48	7.0
P4	48	7.2
P5	36	9.0
P6	24	11.5
P7	6	2.9
P8	40	2.3
P9	24	4.3
P10	12	5.1
P11	24	1.7
P12	24	5.9
P13	40	1.9
Average Rate at 12” – 24” Depth		5.7
Average Rate at 36” – 48” Depth		6.7
Overall Average Percolation Rate		6.3

Groundwater Observations

The 10-foot deep groundwater observation wells A-1 through A-5 (mentioned above) were monitored periodically during the 2021 calendar year through early January 2022. The results are listed in **Table 10** and discussed below.

Table 10. Depth to Groundwater - Entrance Area*
February 24, 2021 - January 11, 2022

Date	Groundwater Observation Wells, 10-ft deep				
	A1	A2	A3	A4	A5
2/24/2021	>10	>10	>10	>10	>10
3/19/2021	>10	>10	>10	>10	>10
4/21/2021	>10	>10	>10	>10	>10
5/27/2021	>10	>10	>10	>10	>10
8/18/2021	>10	>10	>10	>10	>10
11/2/2021	7.87	8.07	8.01	>10	9.48
11/15/2021	8.38	8.65	8.68	>10	9.41
1/11/2022	8.92	9.24	9.26	>10	9.46

*Feet below ground surface

As indicated, no groundwater appeared in any of the observation wells from the time of installation (February 2021) through the end of summer. Groundwater was first observed in four of the five wells (all but A-4) in direct response to the “atmospheric river” rainfall event that occurred on October 24, 2021 in the Bay Area, when a total 6.3 inches of rain was recorded at Point Reyes Station. Allowing time for the groundwater to develop and stabilize, the observation wells were checked the week after the atmospheric river event on November 2nd and two weeks after that on November 15th. Final groundwater measurements were made on January 11, 2022. Briefly, the results showed the following:

- Groundwater rose the highest in A-1, A-2 and A-3 to depths of 7.87 to 8.07 feet bgs, all located on the west side of the circular drive.

- Subsequent monitoring on November 15th showed a water table drop of about 0.5 feet in A-1, A-2 and A-3, and continued decline to about 9 to 9.25 feet bgs at the last observation on January 11, 2022.

- No groundwater appeared in A-4 in response to the massive October 24th rain event or at any subsequent observation times.

- At A-5 the groundwater rose to 9.48 feet bgs on November 2, 2021, and rose very slightly by a few hundredths of a foot later in November, ending at 9.46 feet bgs at the last reading on January 11th.

The total rainfall recorded at Point Reyes Station between October 1, 2021 and January 11, 2022 was 22.42 inches, which is equal to about 69 percent of the total average annual rainfall (32.64

inches) for the area (**Table 6**). This exceeds the minimum criterion of 50 percent of annual average rainfall used by Marin County EHS as the threshold for groundwater measurements in wastewater dispersal field site suitability evaluations. Therefore, although the heavy rainfall came very early in the season, the groundwater readings are a fair representation of wet weather conditions at the site and can be used as a basis of design for wastewater dispersal fields in the Entrance Area as follows:

- A depth to groundwater of 8 feet bgs would be appropriate on the west side of the circular drive in the area of A-1, A-2 and A-3.

- A depth to groundwater of 10 feet bgs would be appropriate in the area of A-4, within the circular drive area.

- The area represented by observation well A-5, which lies within the 100-foot wetland setback area, would be excluded from any use for wastewater dispersal.

- The road shoulder on the north side of Commodore Webster Dr. was explored to a depth of 5 feet with a soil test pit and hand-auger, indicating conditions similar to A-2, located 50 feet away on the south side of the street. A depth to groundwater of at least 5 feet can be assumed in this area. If a design requiring greater separation to groundwater is required additional wet weather testing is recommended.

ONSITE WASTEWATER SUITABILITY

The Entrance Area has suitable conditions for onsite wastewater disposal, which can be summarized as follows.

General site features

- Gently sloping site, typically 2% to 5%
- No drainages or water courses
- 100-foot setback to adjacent wetland area
- 450-foot horizontal setback distance to Lagunitas Creek
- >¼-mile from North Marin Water District municipal supply wells

Soil and Groundwater Conditions

- Deep, well-drained gravelly loam to gravelly sandy clay loam soils
- No evidence of a restrictive layer to a depth of 10 feet or more
- Good percolation, averaging 6 mpi at 12-inch to 48-inch testing depths
- Wet weather groundwater at 8 to 10 feet below ground surface

Design Considerations

The site can support any type of wastewater dispersal system in common use in Marin County, including conventional gravity leaching trenches, pressure distribution system, sub-surface drip dispersal, or above-ground fill or mound systems. Wastewater application rate(s) for design would depend on the level of wastewater treatment provided, the type of dispersal system, and the proposed dispersal system depth. An application rate within the range of 1.0 to 2.0 gallons per day per square foot of infiltrative surface (gpd/ft^2) would be appropriate.

SECTION 4. CONCLUSIONS

1. The former Coast Guard housing area is located on older alluvium and terrace deposits overlying bedrock, which is generally characterized as siltstone and shale of the Franciscan mélange. The bedrock surface, which averages about 15 to 20 feet below ground surface, is elevated above the adjacent alluvial aquifer and riparian zone of Lagunitas Creek. The more weathered terrace deposits with broken gravels are consistent with the Millerton Formation, which is prominent along the Tomales Bay east shore.

2. The NMWD wells are located in a highly productive alluvial aquifer consisting of sands, silts, clay and gravel deposits in the deeply incised channel of Lagunitas Creek. The primary source of recharge to the alluvial aquifer is percolating streamflow from Lagunitas Creek, with a small contribution of lateral inflow from adjacent uplands. The bedrock is generally considered to be a low or non-water bearing formation for all practical purposes. Subsurface investigation of the housing area indicates the alluvial aquifer does not extend under the housing area.

3. There are three basic groundwater regimes on the former Coast Guard site: (a) the Lagunitas Creek alluvial aquifer; (b) terrace groundwater that occurs as a result of percolating rainfall that collects in the soils above the siltstone shale bedrock; and (c) hillside groundwater that consists of percolating rainwater that collects in the more permeable surface soils above restrictive sub-soils and weathered bedrock. The general path of groundwater across the Project site is from the hillsides, to the terrace groundwater, to the alluvial aquifer.

4. The rate of flow (velocity) is different for each of the three groundwater regimes. From Darcy's Law, soil/geologic conditions and topography: (a) hillside groundwater velocity is estimated at about 2.4 to 12 feet per day, dependent on ground slope; and (b) terrace groundwater velocity is estimated at 0.5 feet per day. Groundwater velocity in the alluvial aquifer is a function of the pumping of NMWD wells, estimated at 2.18 feet per day.

5. Using the calculated groundwater velocities and conservatively estimated groundwater flow paths, the boundary of the 2-yr time-of-travel to the NMWD wells was determined and mapped. The mapped boundary, based on the hydrogeology of the site, provides a refinement of the calculated fixed radius of 1,600 feet developed by NMWD in 2013 for Well 04.

6. Investigation of the Entrance Area shows it has suitable conditions for onsite wastewater disposal, with well-drained soil depths of 8+ feet, average percolation rates of 6 minutes per inch, and wet weather depth to groundwater of 8 to 10 feet. The site can support any type of wastewater dispersal system in common use in Marin County, including conventional gravity leaching trenches, pressure distribution system, sub-surface drip dispersal, or above-ground fill or mound systems.

SECTION 5. REFERENCES

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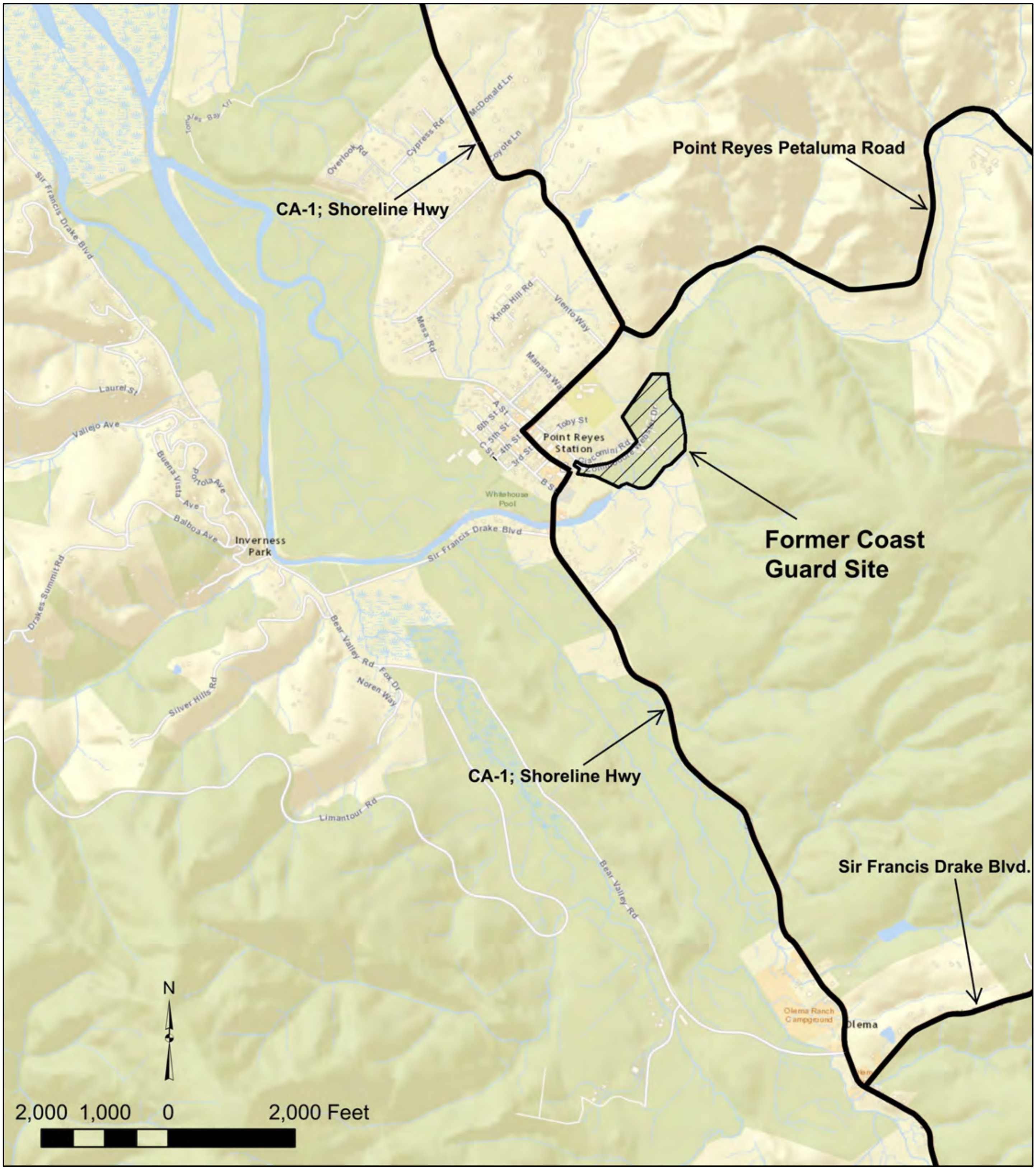
11. U.S. Geological Survey, "Specific Yield - Compilation of Specific Yields for Various Materials", Water Supply Paper 1662-D, 1967. Prepared in Cooperation with California Department of Water Resources.

Report Figures



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Drawn: PS
Checked: NH
Appr'd: NH

LOCATION MAP

FORMER COAST GUARD SITE, POINT REYES STATION, CA

FIGURE
1

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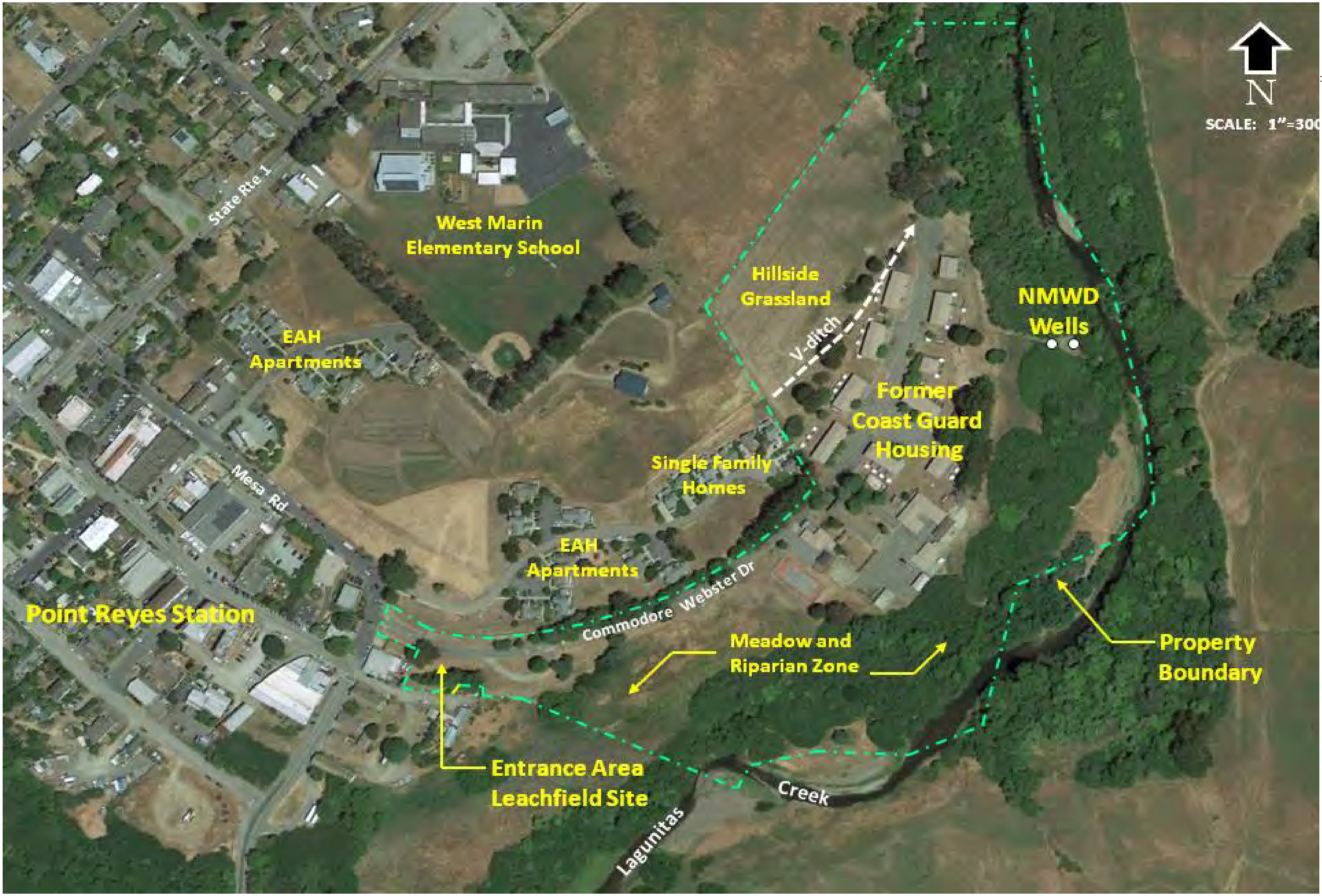

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PROJECT SITE

FIGURE
2

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE – ADJUST ACCORDINGLY

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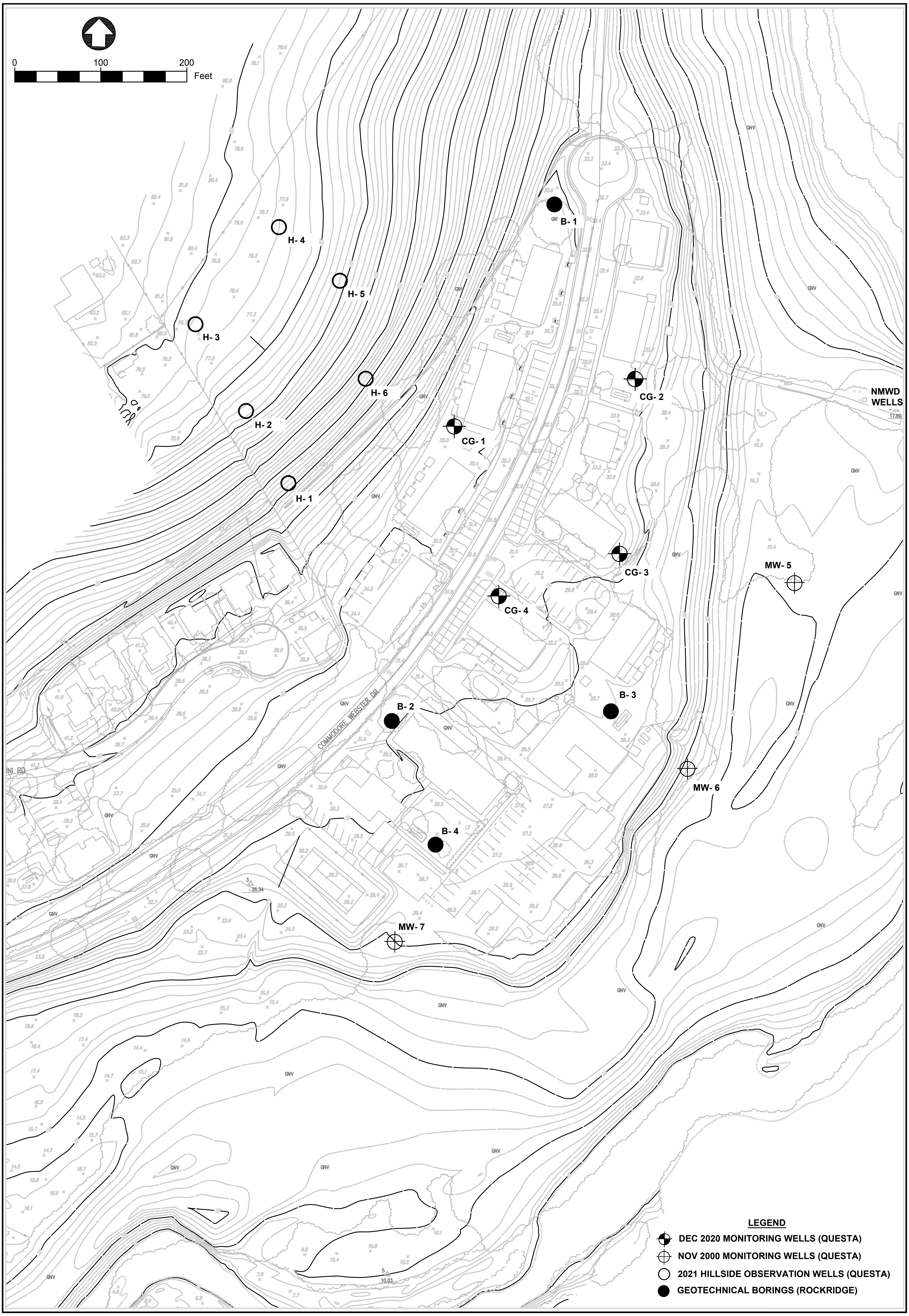

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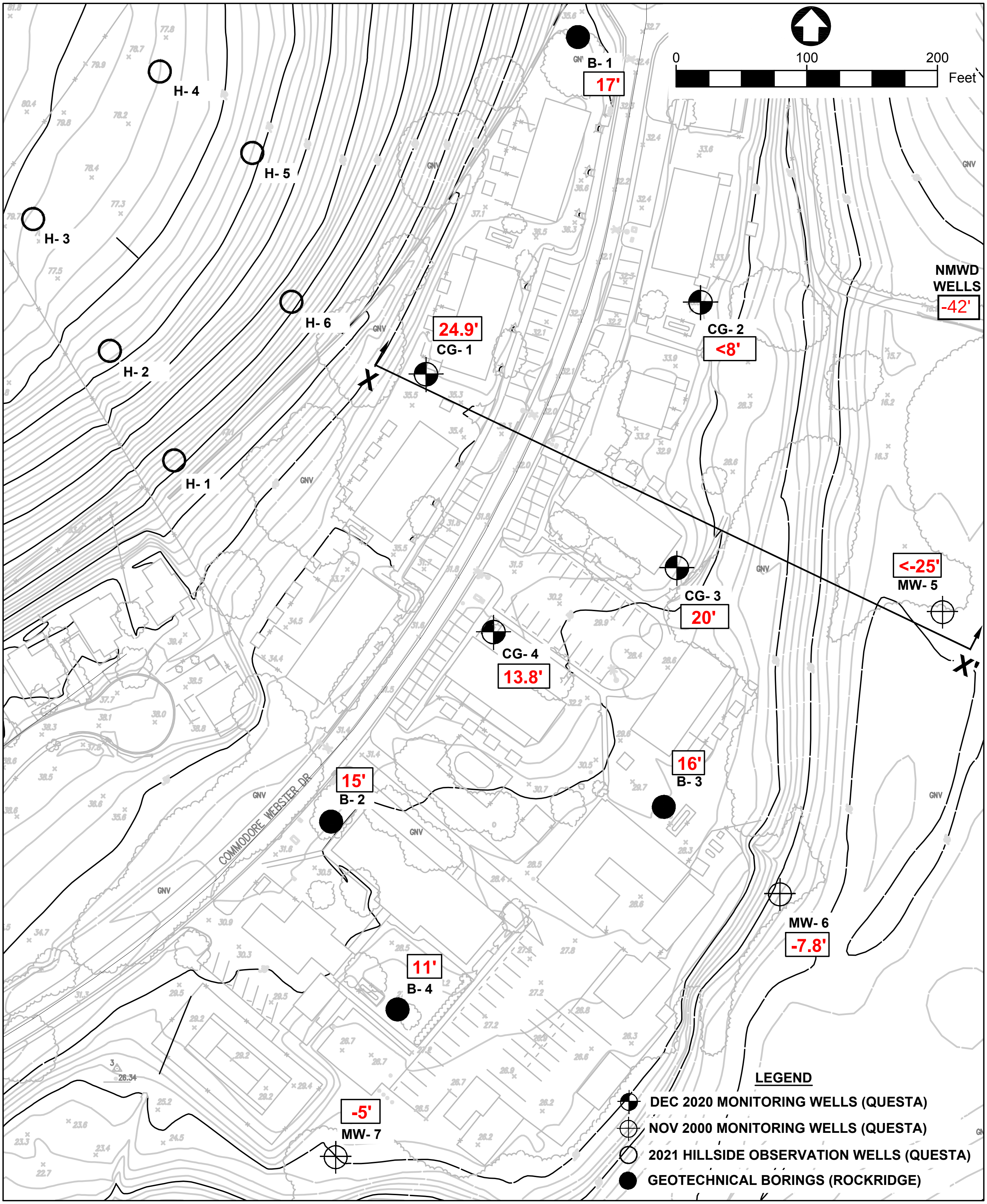
MONITORING WELLS
AND GEOTECHNICAL BORINGS

FIGURE
3



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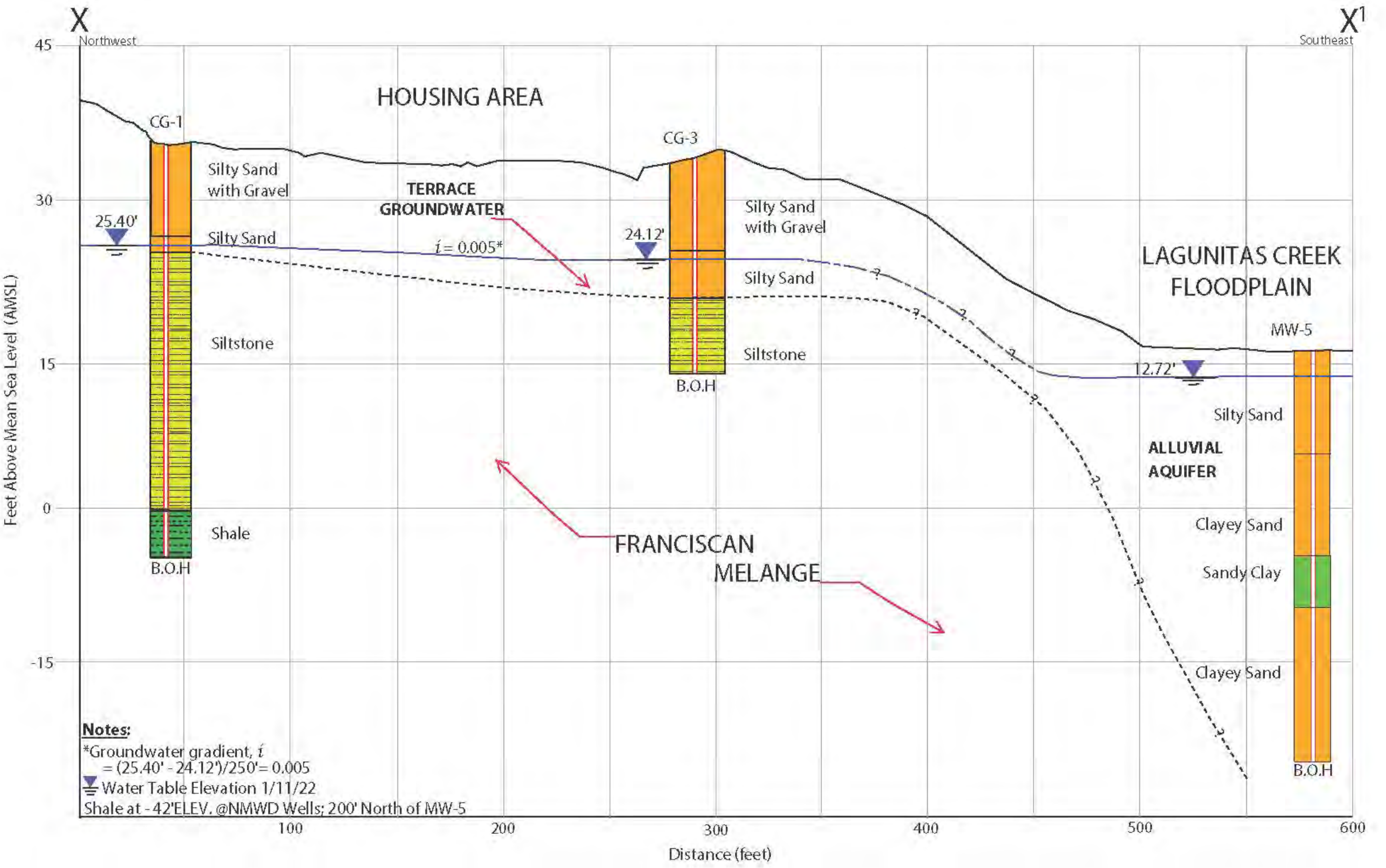
BEDROCK ELEVATIONS
(FEET, AMSL)

FORMER COAST GUARD SITE, POINT REYES STATION, CA

FIGURE
4



DATE:	4/28/22
PROJECT:	Former Coast Guard Site, Point Reyes Station
PROJECT NO.:	2000131
DRAWN:	NXH
APPROVED:	NH

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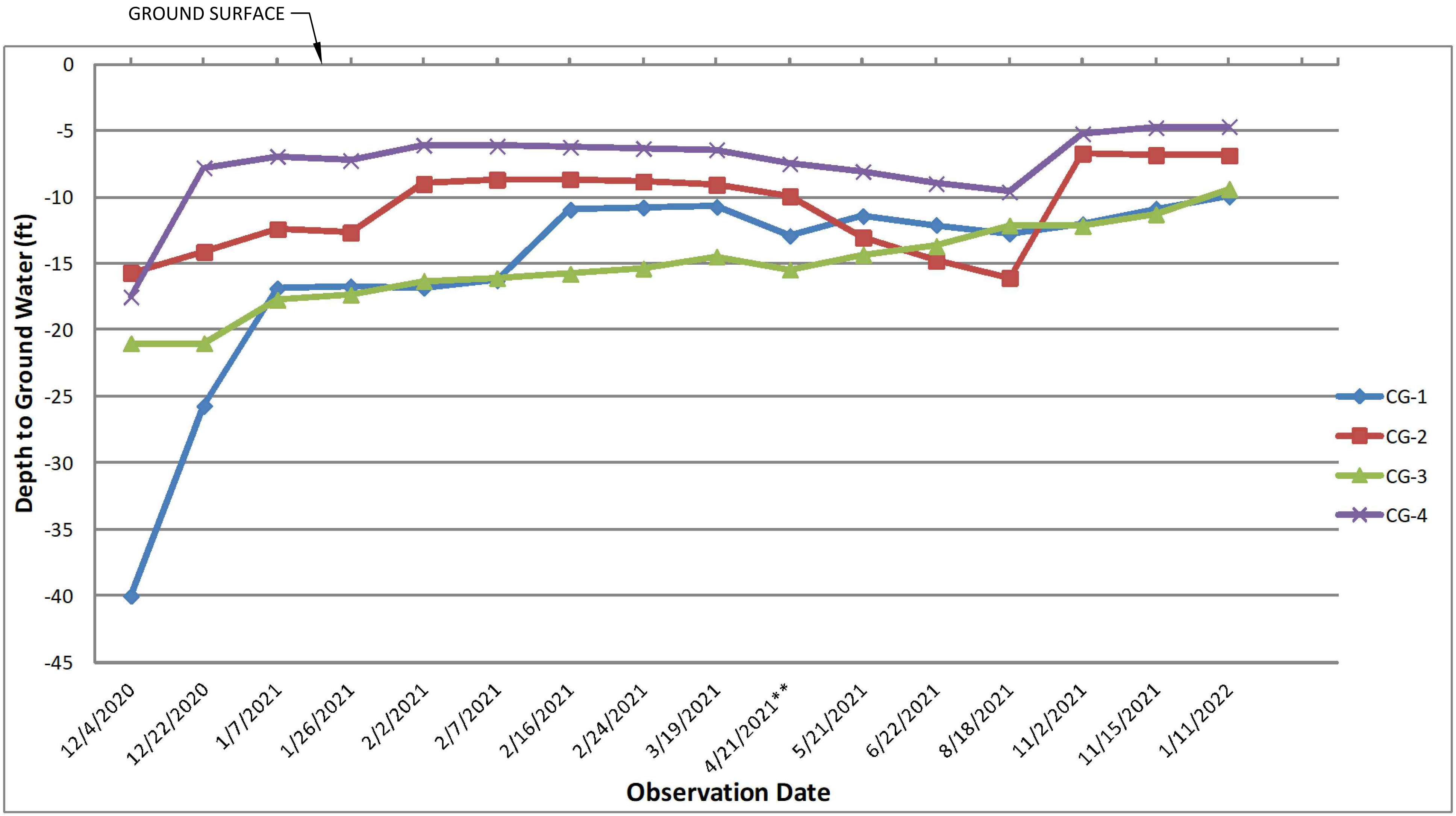
HYDROGEOLOGIC X-SECTION X – X^1

JANUARY 11, 2022 GROUNDWATER LEVELS

FIGURE

5



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DEPTH TO GROUNDWATER
HOUSING AREA MONITORING WELLS
DEC 2020 TO JAN 2022

FIGURE
6

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE – ADJUST ACCORDINGLY

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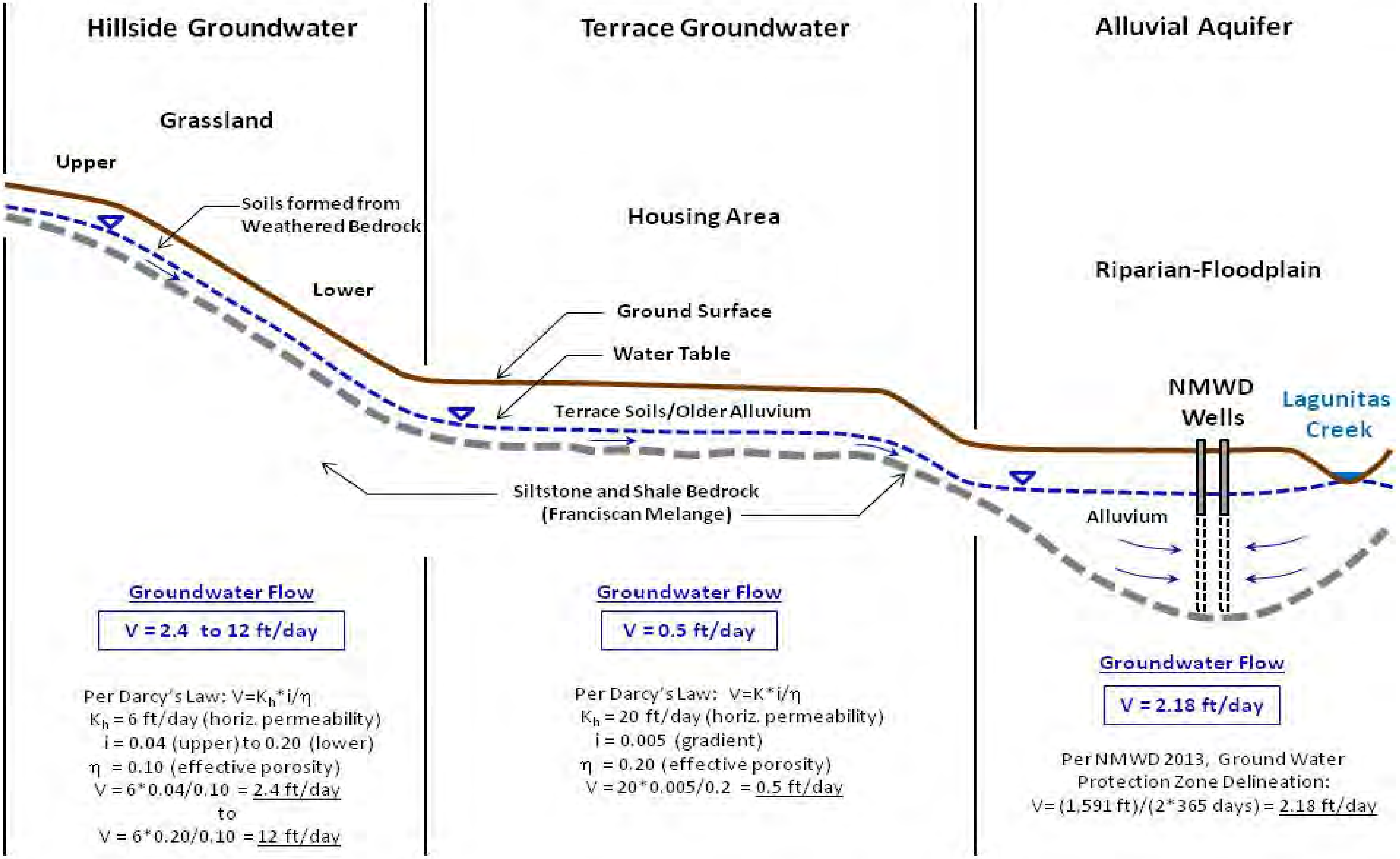

Groundwater Flow

V = 2.4 to 12 ft/day

Per Darcy's Law: $V=K_h*i/\eta$
$K_h = 6$ ft/day (horiz. permeability)
$i = 0.04$ (upper) to 0.20 (lower)
$\eta = 0.10$ (effective porosity)
$V = 6*0.04/0.10 = \underline{2.4\ \text{ft/day}}$
to
$V = 6*0.20/0.10 = \underline{12\ \text{ft/day}}$

Groundwater Flow

V = 0.5 ft/day

Per Darcy's Law: $V=K*i/\eta$
$K_h = 20$ ft/day (horiz. permeability)
$i = 0.005$ (gradient)
$\eta = 0.20$ (effective porosity)
$V = 20*0.005/0.2 = \underline{0.5\ \text{ft/day}}$

Groundwater Flow

V = 2.18 ft/day

Per NMWD 2013, Ground Water Protection Zone Delineation:
$V= (1{,}591\ \text{ft})/(2*365\ \text{days}) = \underline{2.18\ \text{ft/day}}$

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GROUNDWATER FLOW SCHEMATIC

FIGURE
7

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE – ADJUST ACCORDINGLY

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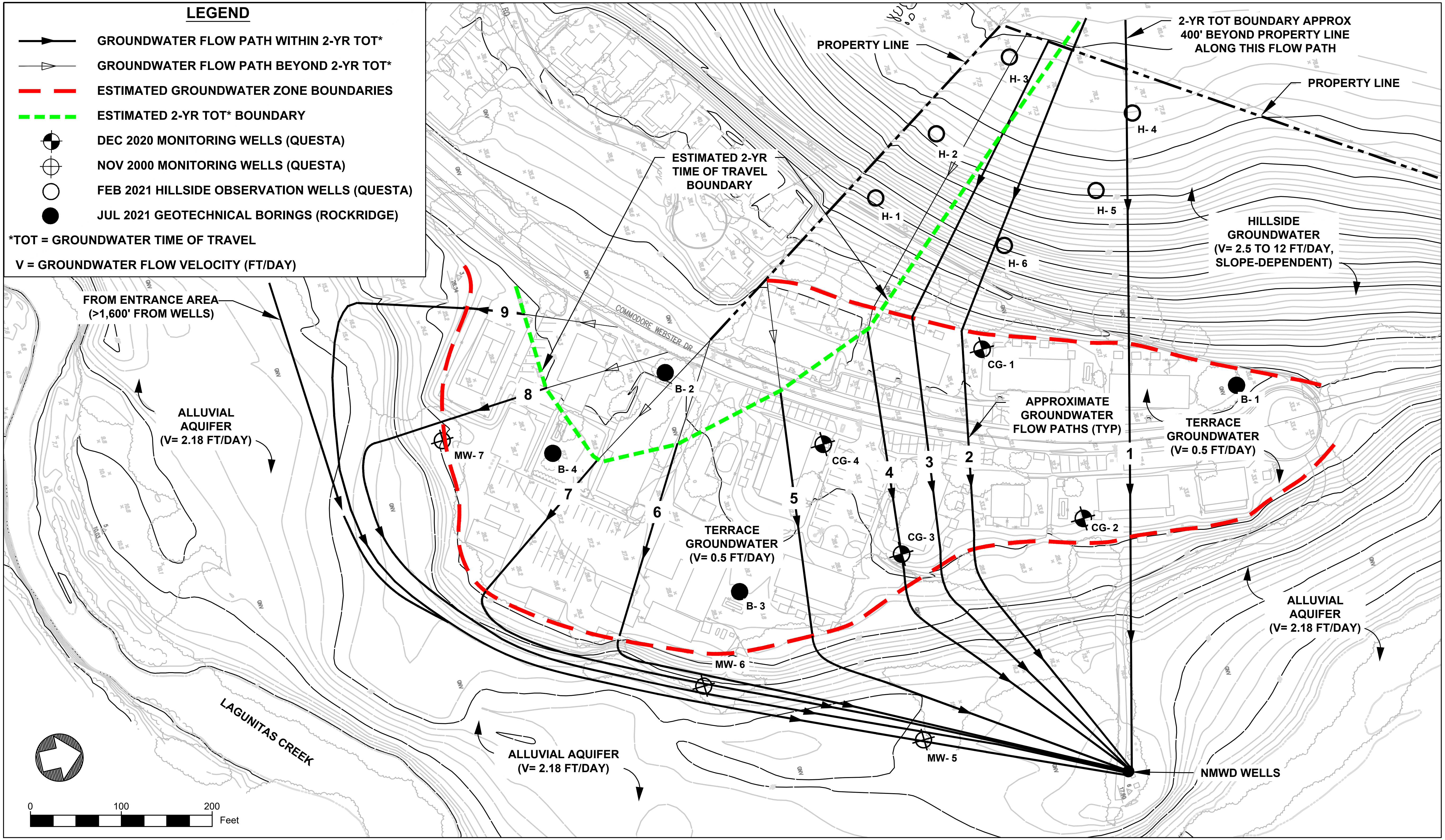

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ESTIMATED GROUNDWATER FLOW PATHS AND 2-YEAR TIME OF TRAVEL

FIGURE
8

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE – ADJUST ACCORDINGLY

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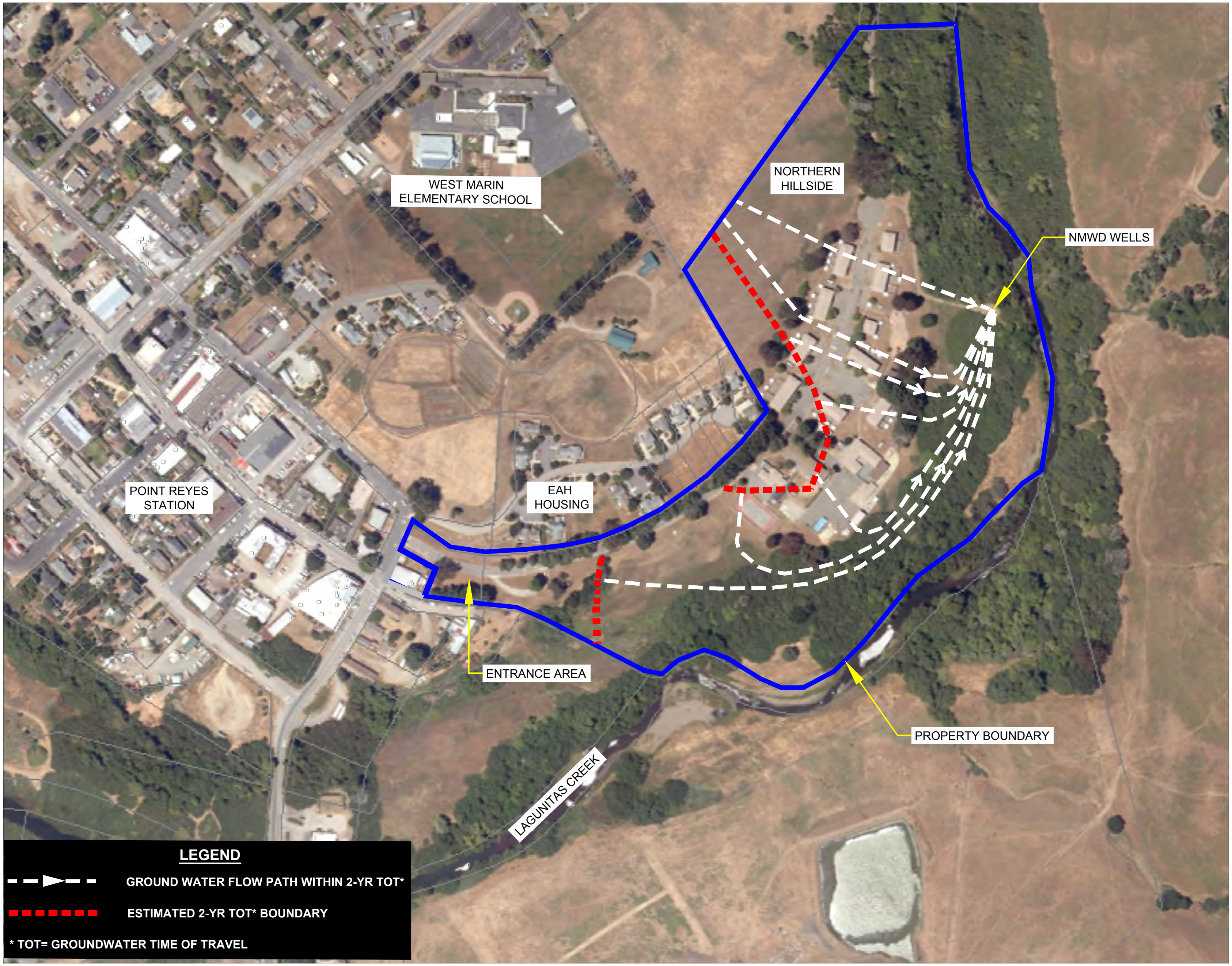

APPROX SCALE:
1" = 420'

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PROJECT SITE GROUNDWATER ESTIMATED 2-YR TIME OF TRAVEL

FIGURE
9

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE – ADJUST ACCORDINGLY

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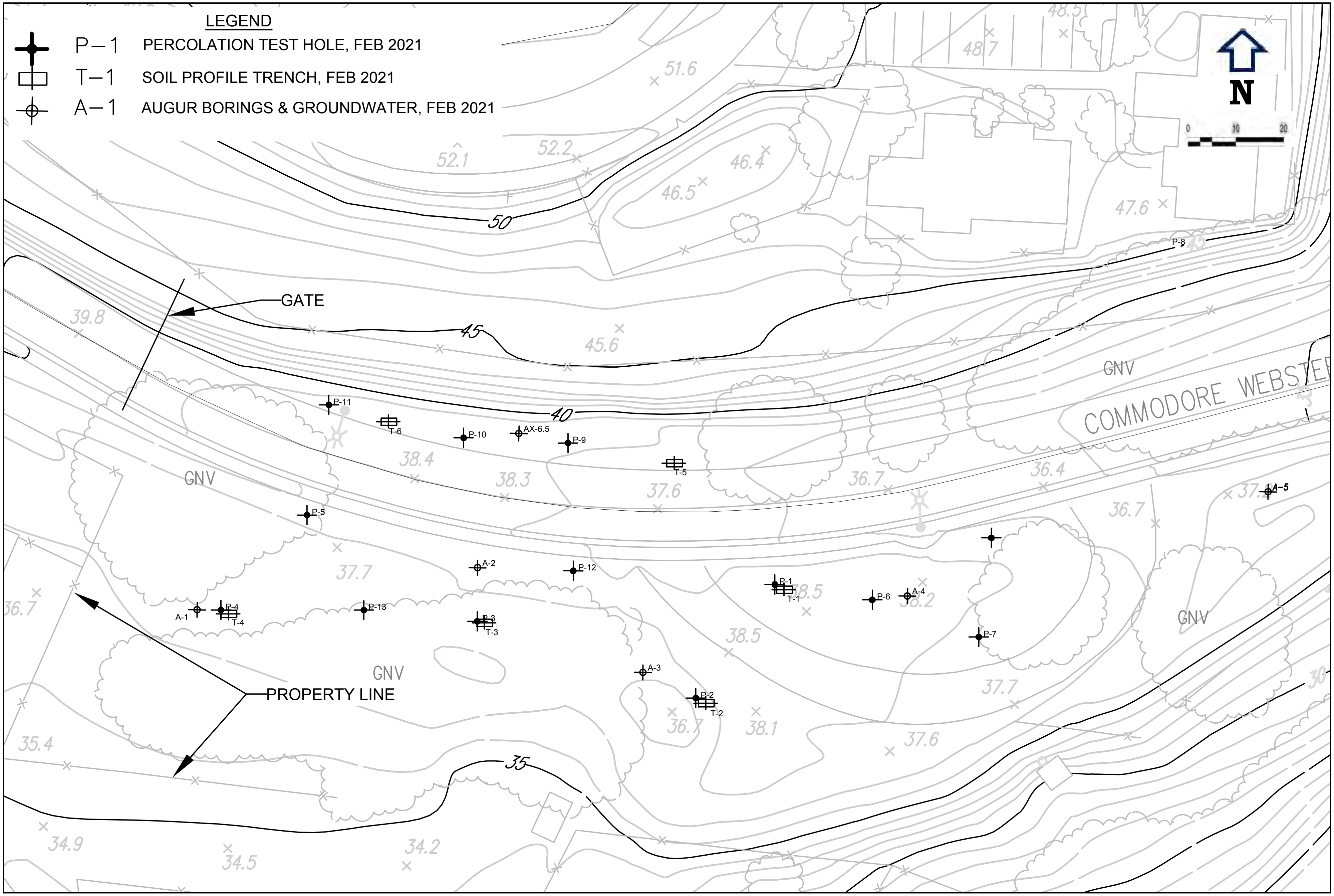

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ENTRANCE AREA SOILS AND GROUNDWATER TEST LOCATIONS

FIGURE
10

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE – ADJUST ACCORDINGLY

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Appendix A

Information from Prior Investigations

Hydrogeolgic Investigation

for

Point Reyes Affordable Housing Project

Point Reyes Station
Marin County, California

Prepared for

Point Reyes Affordable Homes, Inc.
2169 E. Francisco Boulevard, Suite B
San Rafael, California 94901

Project #99190

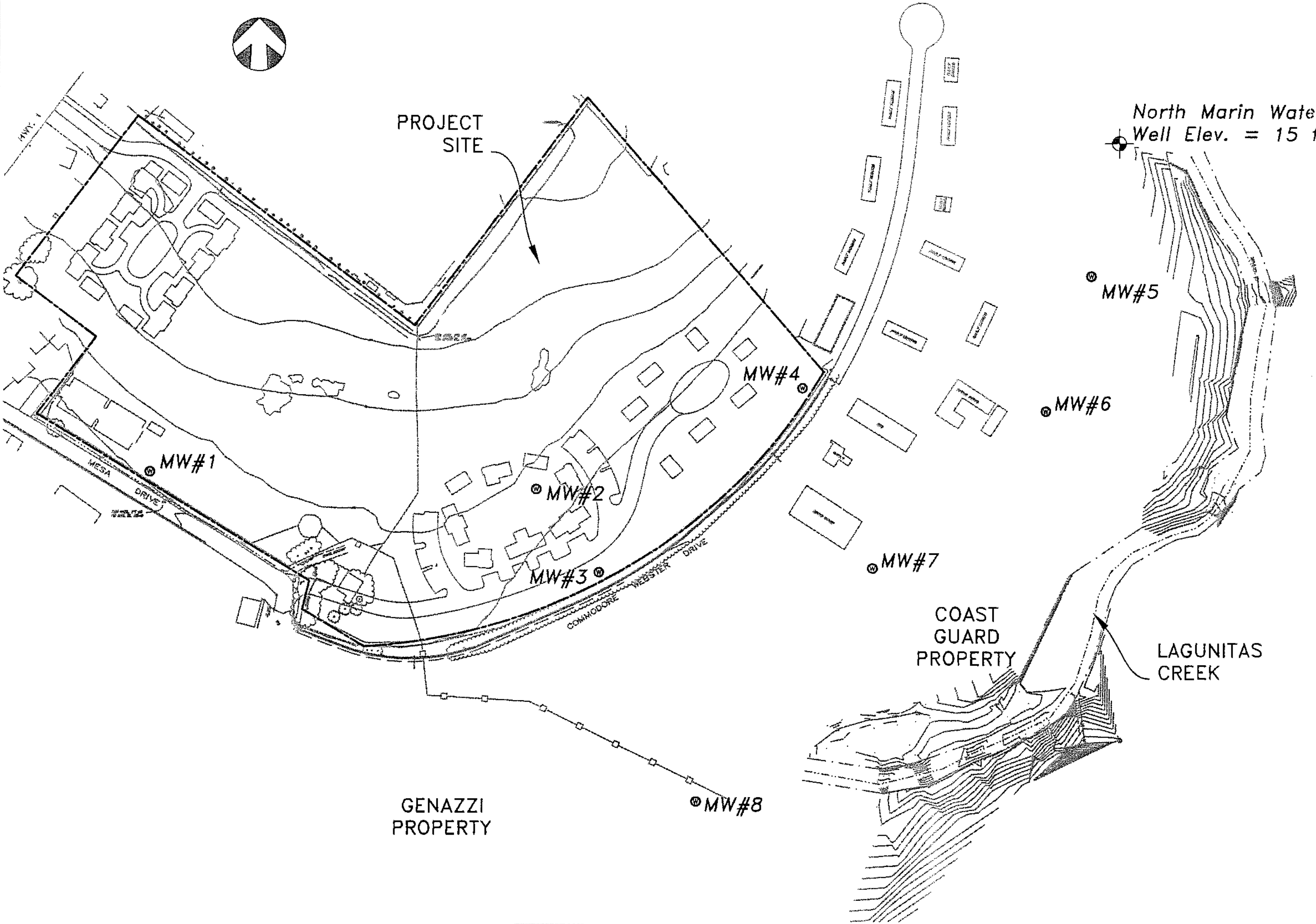
Prepared by

Questa Engineering Corporation
1220 Brickyard Cove Road, Suite 206
Point Richmond, California 94807
(510) 236-6114

November 22, 2000

Norman N. Hantzsche, P.E.
Principal/Managing Engineer

Willard N. Hopkins, C.E.G.
Sr. Engineering Geologist



WELL NO.	LOCATION	WELL HEAD ELEVATION (ft, msl)	GROUND SURFACE ELEVATION (ft, msl)	TOTAL DEPTH (ft)	SCREENED INTERVAL	DEPTH TO BEDROCK* (ft)
MW-1	Project Site (West)	41.79	42.0	33	13-33	28
MW-2	Project Site (Center)	47.11	47.6	35	20-35	32
MW-3	Project Site (Center)	32.27	32.6	34	14-34	16
MW-4	Project Site (East)	30.07	30.2	26.5	13-26.5	22
MW-5	CG (East)	12.39	12.5	40	20-40	>40
MW-6	CG (Center)	14.18	14.4	34	14-34	25
MW-7	CG (West)	21.16	21.4	34	14-34	29
MW-8	Genazzi (West)	12.94	13.2	13 (Caving)	3-10	>38

* Shale - Siltstone

Date: 11/22 / 00
Drawn: M.M.M.
Appr'd: N.H.
Dwg. No: 99190_11x17.DWG

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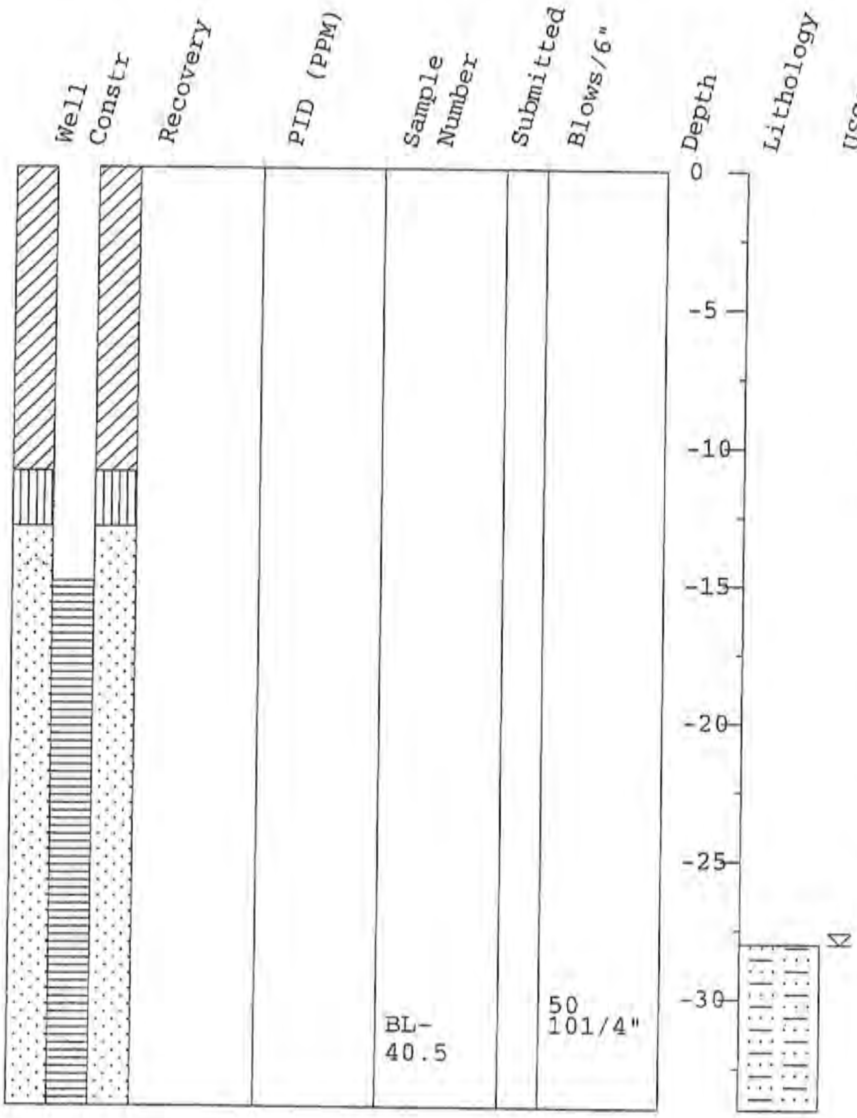
MONITORING WELL LOCATIONS
POINT REYES AFFORDABLE HOUSING PROJECT
POINT REYES STATION, CALIFORNIA

FIGURE
2



USCS Symbol	Soil Description / Field Notes
SM	GRAVELLY LOAM: brown, loose, damp; change in color to reddish-brown and increase in sand with depth
CL	SANDY CLAY: reddish-brown, medium stiff, damp; change in color to yellow-brown and increase in gravel with depth
SP	LOAMY GRAVEL: grey-brown, medium dense, moist
CL	GRAVELLY SANDY CLAY: grey-brown, stiff, increase in sand to 25 feet
GC	CLAYEY GRAVEL: grey, moist, dense,
	SILTSTONE: grey, very hard. Groundwater @ 28 feet

Date: 11-15-2000
Job Name : EAH- Pt. Reyes
Job No. 99190

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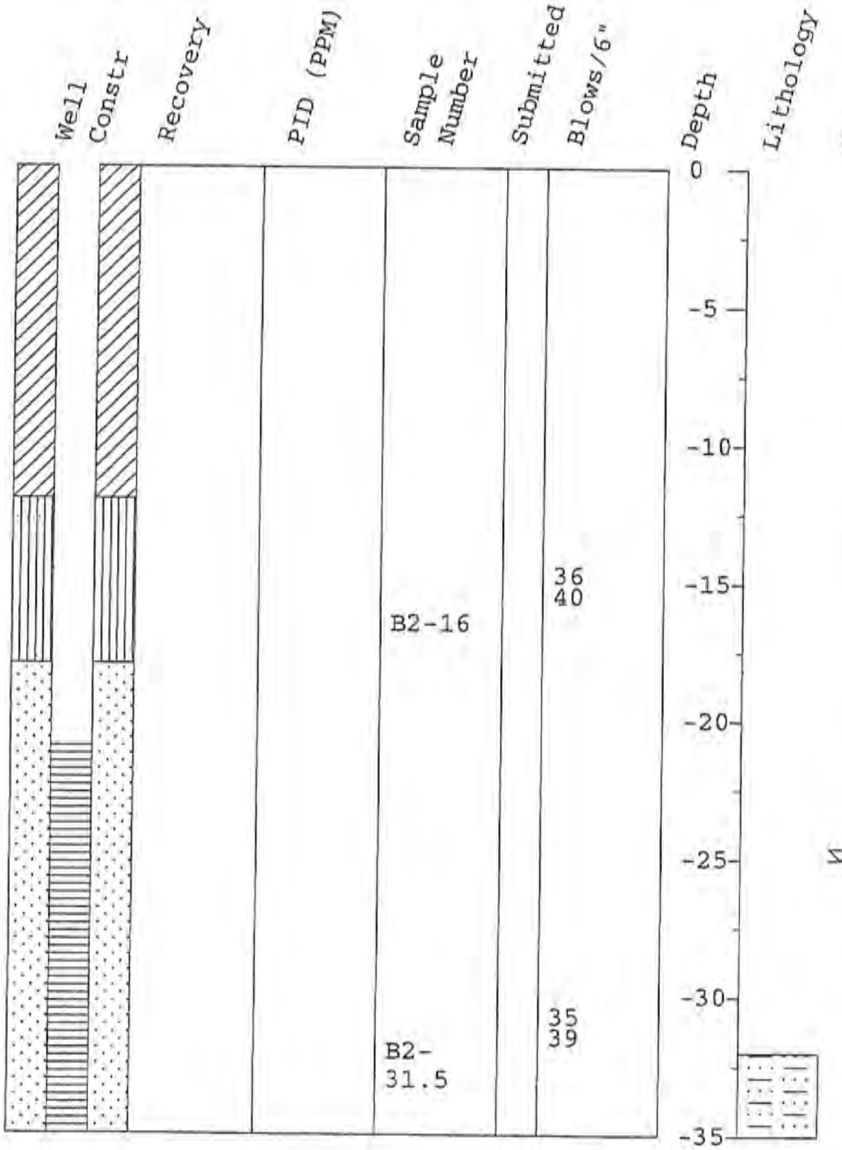
Log of Monitoring Well 1
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-1



USCS Symbol	Soil Description / Field Notes
SM	GRAVELLY LOAM: dark brown, loose, damp; change in color to brown at 1.5 -2.0 feet
SM	CLAY LOAM w/GRAVEL: reddish-brown, damp, slightly sticky
SM	GRAVEL LOAM: light brown, medium dense, damp; some blue-grey rock
GP	SANDY GRAVEL: brown, dense
CL	SANDY CLAY: brown, damp, medium stiff, slightly plastic
∇ SC	CLAYEY SAND: dark to medium brown, dense, moist; increase in moisture @ 25-27 feet
GW	SANDY GRAVEL: yellow-brown(some orange-brown), wet, dense
	SILTSTONE: dark gray

Date:	11-15-2000
Job Name :	EAH- Pt. Reyes
Job No.	99190

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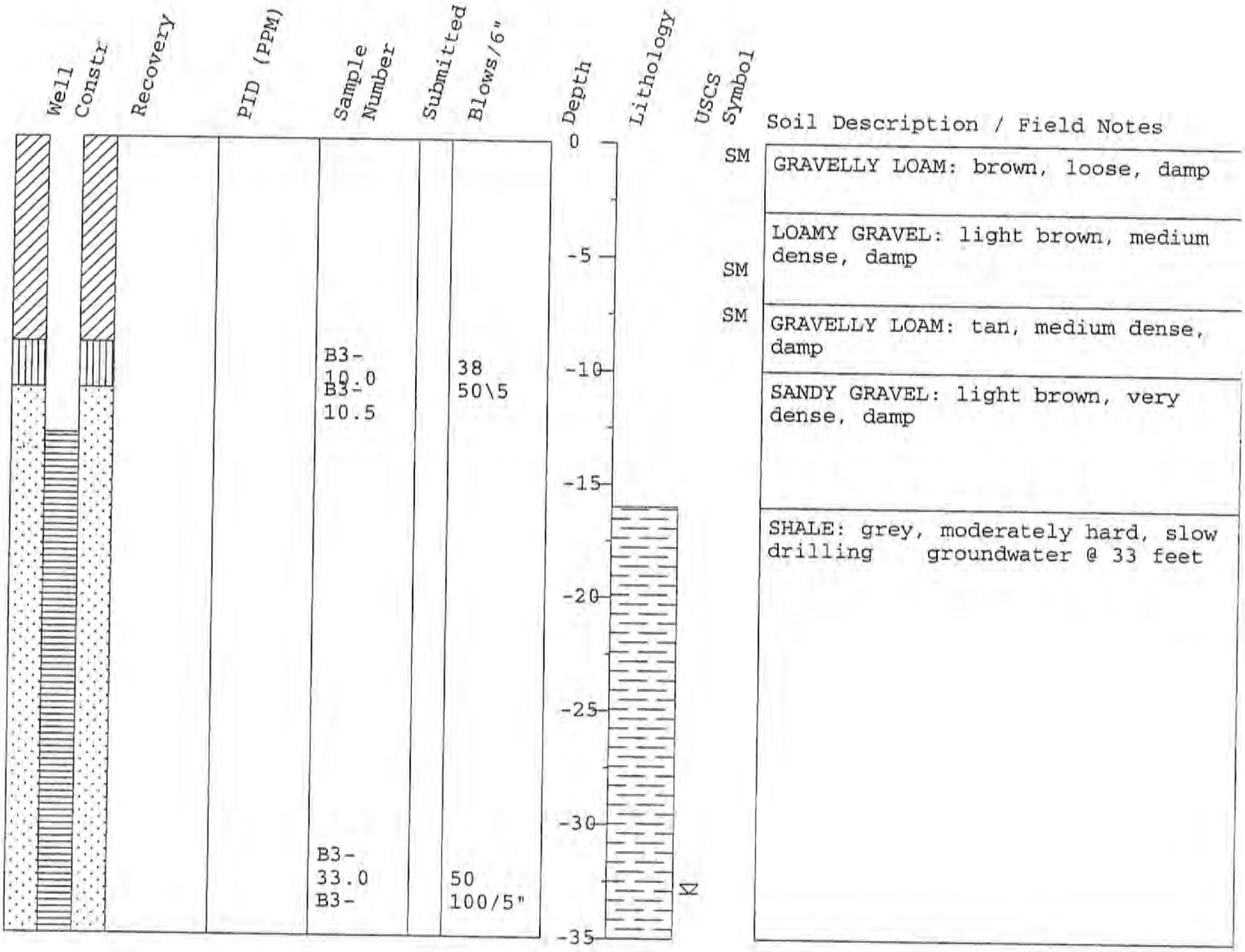
Log of Monitoring Well 2
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-2



Soil Description / Field Notes

SM GRAVELLY LOAM: brown, loose, damp

SM LOAMY GRAVEL: light brown, medium dense, damp

SM GRAVELLY LOAM: tan, medium dense, damp

SANDY GRAVEL: light brown, very dense, damp

SHALE: grey, moderately hard, slow drilling groundwater @ 33 feet

Date: 11-15-2000
Job Name: EAH- Pt. Reyes
Job No. 99190

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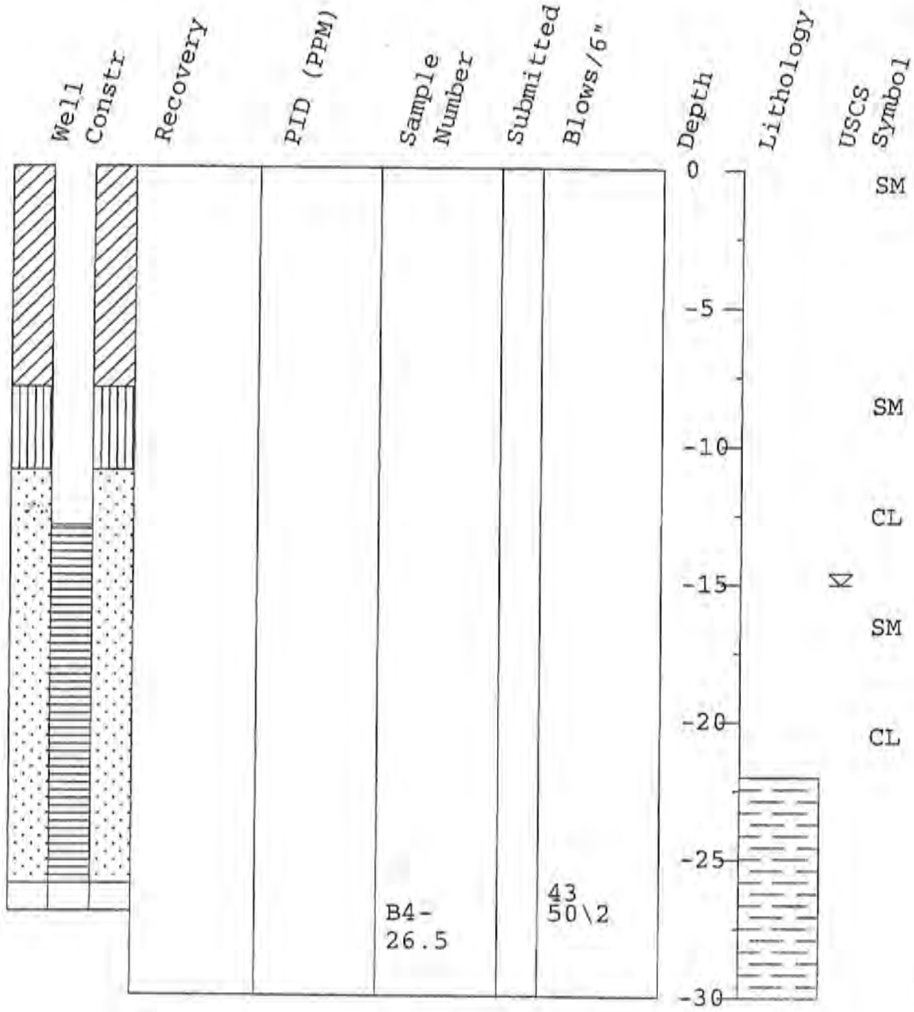
Log of Monitoring Well 3
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-3



USCS Symbol	Soil Description / Field Notes
SM	GRAVELLY LOAM: brown, loose, damp
	LOAMY GRAVEL: light brown, medium dense, damp
SM	GRAVELLY LOAM: tan, medium dense,
CL	SANDY CLAY: brown to reddish brown, medium stiff, moist, low to no plasticity
SM	GRAVELLY LOAM ground water @ 15-20 feet: light brown, damp, dense
CL	SANDY CLAY: brown, stiff, moist; some gravel
	SHALE: grey, hard

Date:	11-15-2000
Job Name :	EAH- Pt. Reyes
Job No.	99190

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& Water Resources

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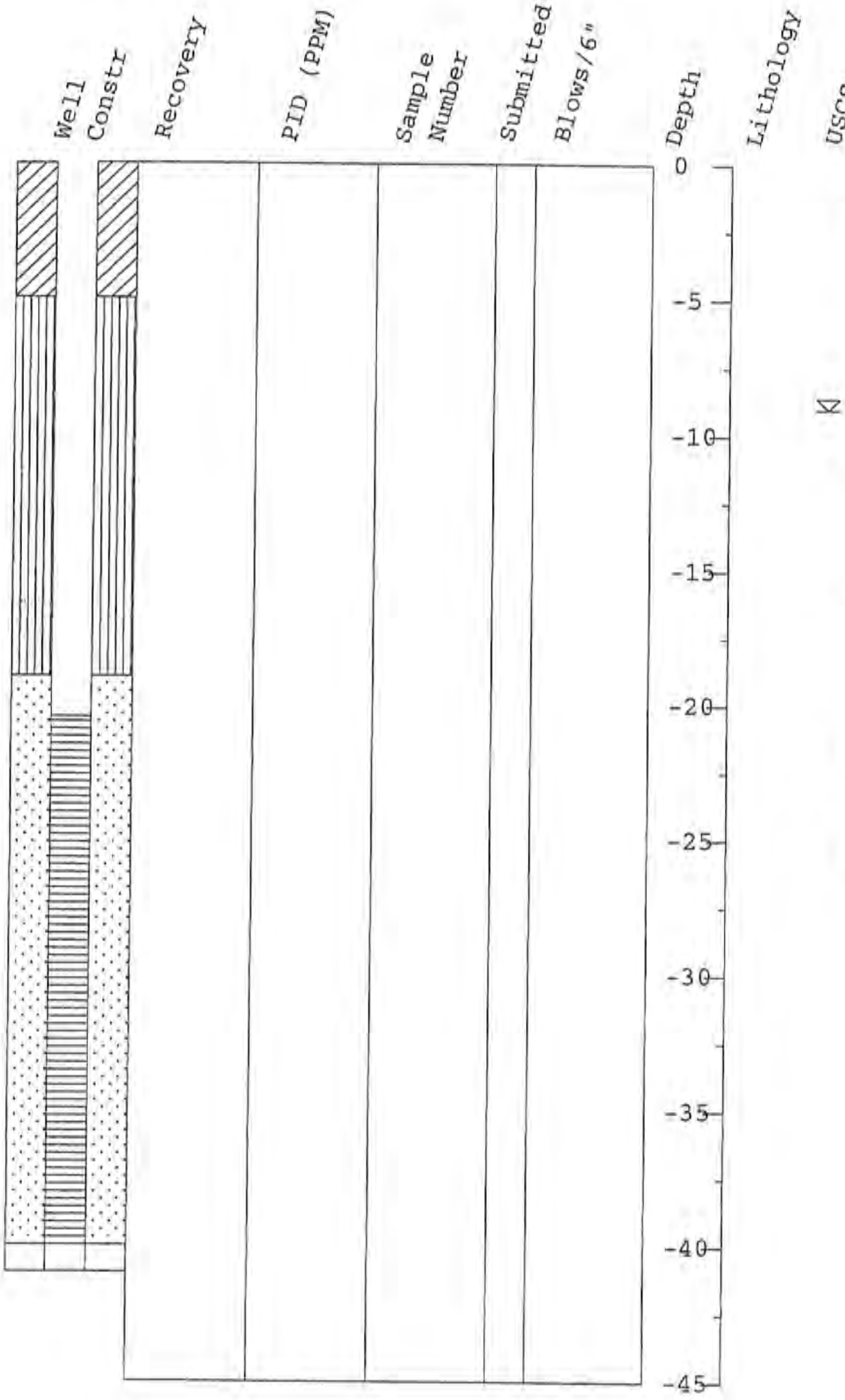
Log of Monitoring Well 4
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-4



USCS Symbol	Soil Description / Field Notes
SM	SANDY LOAM: reddish-brown, loose,
SM	SILTY SANDY LOAM: brown, medium dense(soft), very moist
SM	SILTY SANDY LOAM to CLAYEY SILTY SAND: brown to dark brown, medium dense, very moist to wet groundwater @ 9-10 feet
SC SC	CLAYEY SAND: dark brown to dark grey, wet, sticky, very soft(flowing); interbeds of sand and clayey sand with depth, becomes denser at 18 to 19.5 feet.
CL	SANDY CLAY: grey, very moist, sticky and plastic, relativelt soft-firms up with depth
SC	CLAYEY SAND: dark grey-brown, very moist to wet

Date: 11-15-2000
Job Name : EAH- Pt. Reyes
Job No. 99190

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& Water Resources

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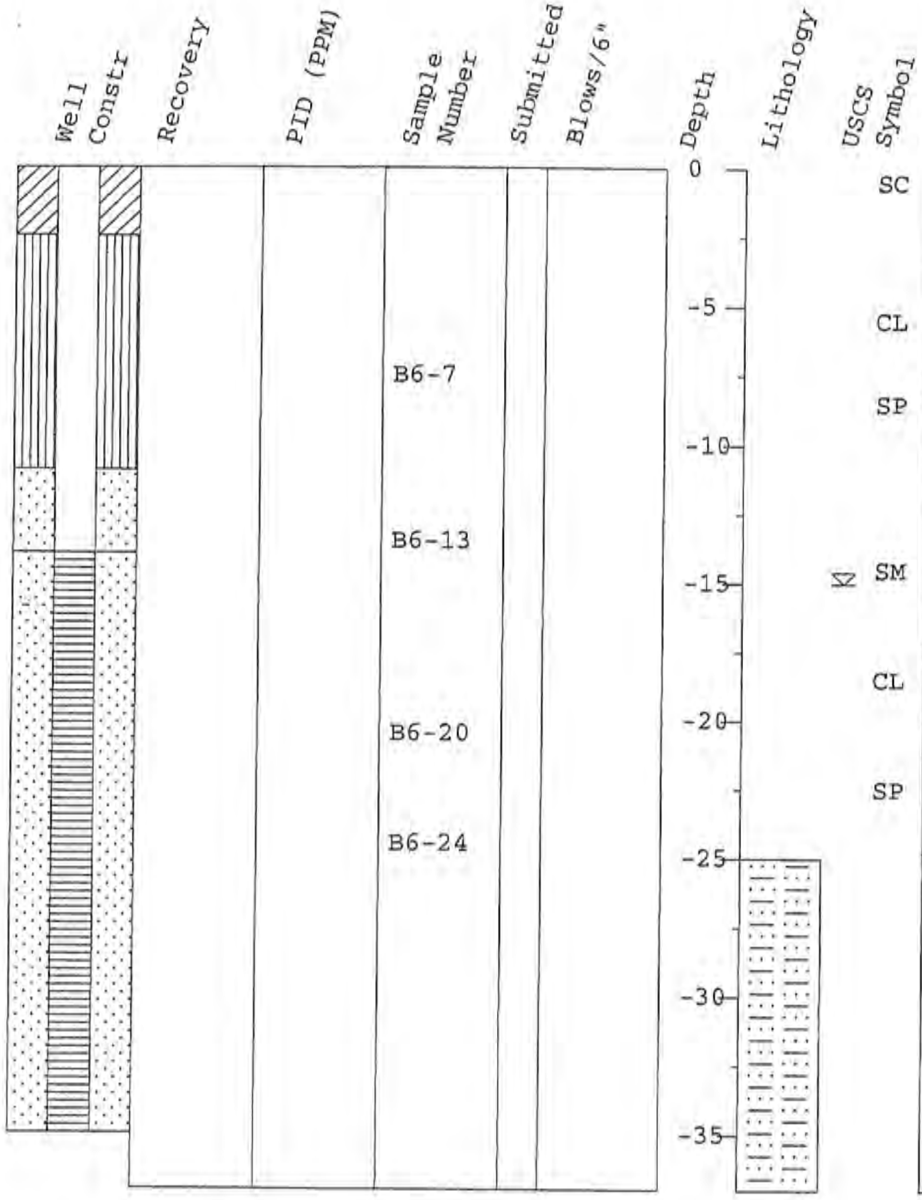
Log of Monitoring Well 5
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-5



USCS Symbol	Soil Description / Field Notes
SC	SANDY CLAY LOAM: reddish-grey brown, loose, damp; more dense with depth
CL	CLAY LOAM: reddish-brown, medium dense, damp
SP	SAND TO LOAMY SAND: orange-yellow, loose, damp;becomes clayey with
SM	GRAVELLY SANDY LOAM: light brown, loose, damp; increaseing fines with depth; some gravel smooth and rounded, some angular
CL	SANDY CLAY: dark brown, medium
SP	GRAVELLY SAND: grey, very fine, damp, medium dense
	SILTSTONE: grey, very hard

Date:	11-15-2000
Job Name :	EAH- Pt. Reyes
Job No.	99190

QUESTA
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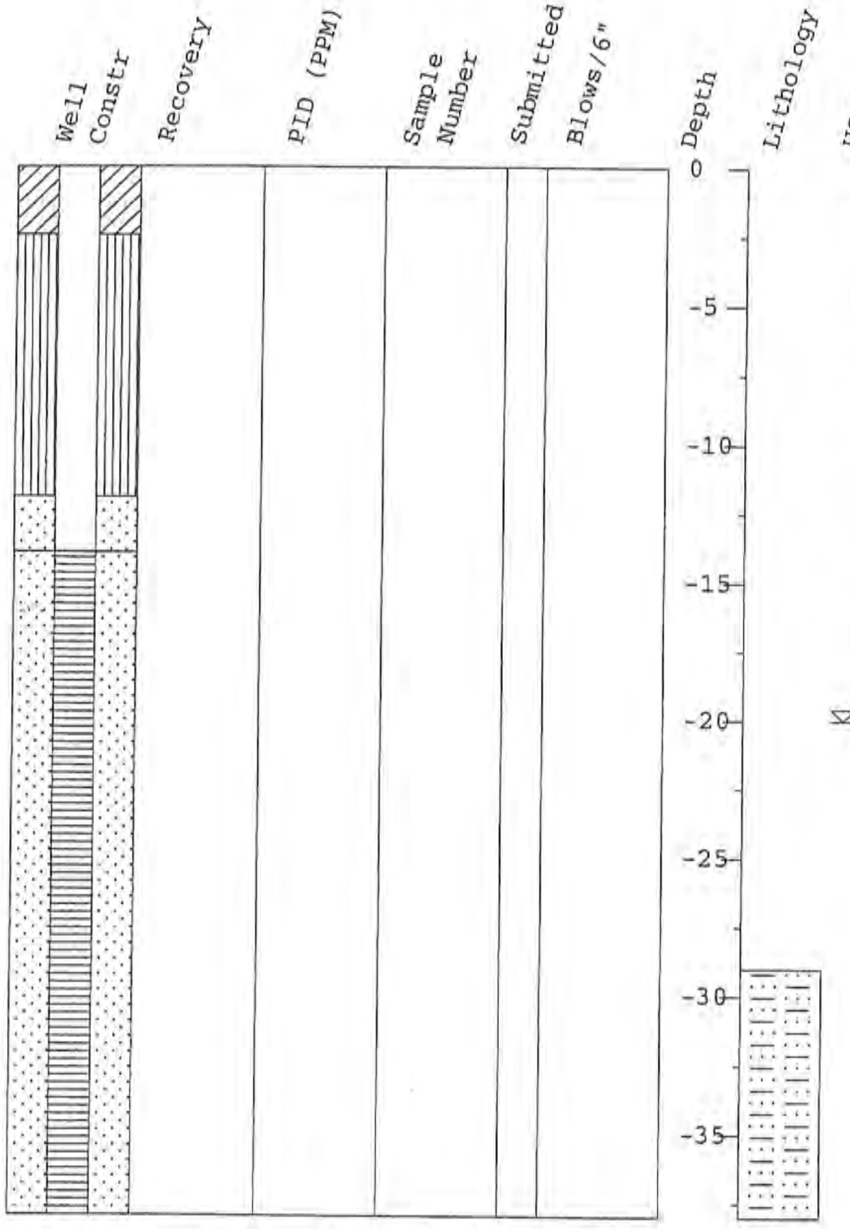
Environmental
& Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

Log of Monitoring Well 6
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-6



USCS Symbol	Soil Description / Field Notes
SM	SANDY LOAM: brown, loose, damp
SC	SANDY CLAY LOAM: light brown, damp; increase in clay content to almost sandy clay with depth
SC	CLAY LOAM: orange brown, loose to medium dense, damp; has 4-6 inch sand lenses
SP	LOAMY SAND: grey-brown, loose, damp;some gravel with depth
SC	SANDY CLAY LOAM: grey brown, damp
SM	SANDY LOAM: grey brown, loose, damp
GP	GRAVELLY SAND: grey-brown, very dense, wet; interbeds of sand and gravelly san, some fractured siltstone with depth
	SILTSTONE: grey, hard

Date:	11-15-2000
Job Name :	EAH- Pt. Reyes
Job No.	99190

QUESTA

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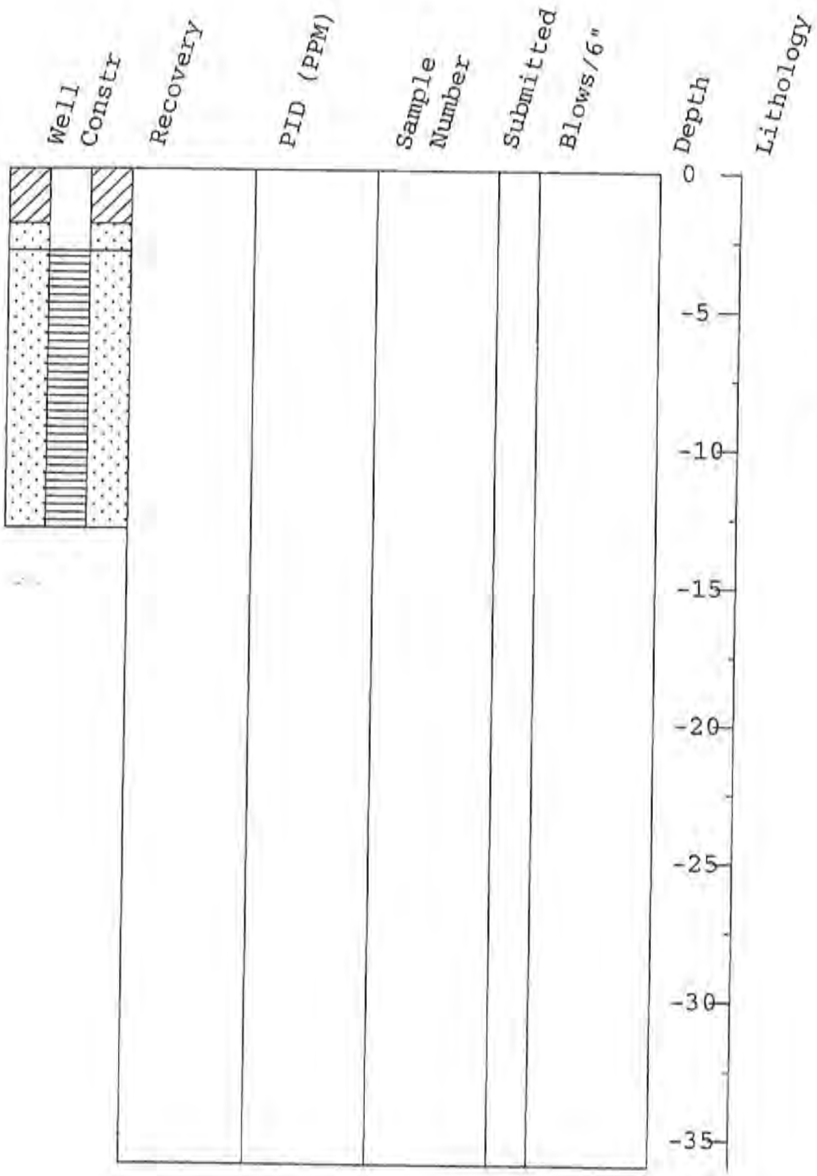
& Water Resources

P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

Log of Monitoring Well 7
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-7



USCS Symbol	Soil Description / Field Notes
SM	SANDY LOAM: light reddish-brown, loose, damp
SC	SANDY CLAY LOAM: dark reddish-brown, moist, soft
▽ CL	SANDY CLAY: brown, soft, low plasticity, moist to wet
SM	SILTY SAND: grey, very loose, wet; becomes flowing sands
SC	SANDY CLAY LOAM: grey brown, damp
	SANDY LOAM: grey brown, loose, damp; denser with depth-21-22 feet
SP	GRAVELLY SAND: grey, interspersed with silty sands, grey wet, sticky
GP	SANDY GRAVEL: grey-brown, larger pieces of fractured bedrock at 35-36 feet

Date: 11-15-2000
Job Name: EAH- Pt. Reyes
Job No. 99190

QUESTA
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Environmental
& Water Resources
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Log of Monitoring Well 8
Pt. Reyes Affordable Housing Proj.
Point Reyes, California

FIGURE
A-8

Onsite Wastewater Feasibility Evaluation
U.S. Coast Guard Housing Site
Point Reyes Station

Prepared for:

County of Marin
Community Development Agency

Project #1500193

Prepared by:

Questa Engineering Corporation
1220 Brickyard Cove Road, Suite 206
P. O. Box 70356
Point Richmond, California 94807
(510) 236-6114

December 15, 2016

Norman N. Hantzsche, PE

No. C24750
Exp. 12/31/17

DATE:	12/5/2016
PROJECT:	USCG HOUSING
PROJECT NO.:	1500193
DRAWN:	DD
APPROVED:	NH

QUESTA ENGINEERING CORP

Soil Profile Test Locations

FIGURE
3

Table 1. US Coast Guard Housing Site - Soil Profile Summary

Profile #	Topsoil Type & Depth	Subsoil Type & Depth	Limiting Layer Type & Depth	Estimated GW
Building Area				
T-1	0-9" Gravelly topsoil	9-58": Very gravelly clay loams	58"+ Very weathered sandstone, textures to fine sandy loam	> 58"
T-2	0-20" Very gravelly silty clay loam	20-72" Very gravelly, coarse sandy clay loam	72-84" Dense clay 84"+ Hard sandstone	Perches at 72"
T-3	0-12" Very gravelly fill, loam	12-36" Silty clay loam, gravelly 36-96" Very gravelly clay loam	None to 96"	> 96"
Upper Leachfield				
T-4	0-20" Silt loam	20-84"+ Very gravelly, with loam to light clay loam matrix	None to 84"	> 84"
T-5	0-23" Silt loam	23-33" Gravelly,light to medium clay 33-52" Sandy loam 52-84" Very gravelly, sandy loam to clay loam	None to 84"	> 84"
T-6	0-20" Silt loam	20-40" Very fine compacted gravels 40-53" Weathered sandstone	53"+ Stiff clay	Perches at 53"
T-7	0-22" Silt loam	22-57" Very gravelly, sandy loam to clay loam 57-67" Gravelly loams to sandy clay loams	67"+ Stiff clay	> 58"
Lower Leachfield				
T-8	0-27" Silt loam	27-96" Gravelly, sandy clay loam	None to 96"	> 96"
T-9	0-24" Silt loam	24-96" Gravelly, fine sandy clay loam	None to 96"	> 96"
T-17	0-29" Light silty clay loam w/gravels	29-50" Fine sandy loam 50-65" Silty clay loam 65-96" Very gravelly, sandy loam	None to 96"	> 96"
Upper Hillside Dripfield Area				
T-10	0-17" Light silty clay loam w/gravels	17-21" Clay loam transition	21-48" Dense clay	Perches at 21"
T-11	0-7" Light silty clay loam w/gravels	7- 36" Heavy sandy clay loam	7-36" Heavy sandy clay loam	Perches at 36"
T-12	0-9" Light silty clay loam w/gravels	9-33" Medium sand	33-96" Weathered sandstone, light sandy clay matrix	Perches at 33"
T-13	0-29" Light silty clay loam w/gravels	29-60"+ Medium dense sandy clay loam	29"+ Medium dense sandy clay loam	Perches at 29"
T-14	0-25" Light silty clay loam w/gravels	25-60" Very gravelly, medium sandy clay loam	60-96" Light gray brown, dense fine sandy clay	Perches at 60" Mottling at 54"
T-15	0-25" Light silty clay loam w/gravels	25-75" Very gravelly, light sandy clay loam	75-96" Dense fine sandy clay	Perches at 75"
T-16	0-21" Light silty clay loam w/gravels	21-37" Very gravelly sandy loam	37-51" Gravelly medium dense clay	Perches at 37"

United States Coast Guard
U.S. Department of Homeland Security

TETRA TECH

FINAL

Environmental Compliance Due Diligence Activities Report

U.S. Coast Guard Point Reyes Station, California Housing Units

USCG Communications Area Master Station Pacific Housing Facility
Point Reyes Station, California 94956
Contract No. GS-00P-14-CY-A-0002/Award No. GS-P-00-14-CY-5028

November 2016

The locations of the soil borings were consistent with the work plan authorized by GSA. During investigation activities on October 17, 2016, SB-6 was advanced to a depth of 40 feet bgs; however, soil boring SB-5 encountered refusal at a depth of 28 feet bgs. A temporary 1" PVC monitoring well with 10 feet of 0.010-inch slotted screen and the remaining interval PVC riser was installed in soil boring SB-6 on October 17, 2016 and left in place for approximately 4 hours in an attempt to obtain a groundwater sample. Based on the lack of groundwater encountered in SB-6 and because SB-5 did not reach the proposed depth of 40 feet bgs, with GSA approval, a larger hollow stem auger rig was used to advance SB-5 to a depth of 60 feet bgs on October 19, 2016. A temporary 1" PVC monitoring well with 10 feet of 0.010-inch slotted screen and the remaining interval PVC riser was installed in soil boring SB-5 on October 19, 2016 and left in place for approximately 3 hours in an attempt to obtain a groundwater sample. A Solinest water level indicator was used to evaluate the water level in the temporary monitoring wells; however, groundwater was not observed in either well. Boring locations were backfilled with hydrated bentonite pellets once sampling activities had concluded. The boreholes were then finished with concrete to match pre-existing conditions.

Soil lithologies encountered at the boring locations consisted of dark brown to light brown and gray, sandy silts and clays with 0 to 30 percent gravel from the surface soils to approximately 60 feet bgs. Elevated PID readings of total VOC vapors were not encountered during the completion of either of the soil borings. Logs of the soil borings are included in **Attachment O**. Soil and groundwater sampling photographs are included in **Attachment P**.

9.4 GROUNDWATER INVESTIGATION CONCLUSIONS

Based on the field activities conducted on October 17 and 19, 2016, no groundwater was encountered at the Site from the two temporary monitoring wells installed to a depth of 40 feet and 60 feet bgs. Although groundwater was collected during initial Phase II ESA activities conducted on March 15, 2016 with identified metals exceedances, Tetra Tech considers the groundwater to be likely from a perched layer exhausted during the first groundwater sampling event. Tetra Tech understands the Site is serviced by a municipal water system and no potable water wells are present on the Site. Based on the depth of groundwater at the Site at a depth greater than 60 feet bgs and a lack of potential exposure to groundwater by on-site personnel based on groundwater depth and presence of a municipal water system, Tetra Tech does not consider the initial exceedance of metals in groundwater to be a concern. In addition, the soil samples collected during the initial sampling event completed on March 15, 2016 yielded results indicating that analyzed constituents of concern were below applicable regulatory levels. Therefore, Tetra Tech does not consider the historical use of the in-ground hydraulic lift and the automotive and equipment repair activities formerly performed at the Site to be a REC.

9.0 GROUNDWATER SAMPLING ACTIVITIES OCTOBER 2016

9.1 INTRODUCTION

Based on the exceedance of metals in groundwater above regulatory screening levels in the March 15, 2016 soil and groundwater sampling event completed by Tetra Tech, GSA requested an additional round of groundwater sampling completed at the Site. The additional evaluation of the potential for environmental impacts at the Site was undertaken at the request of GSA in accordance with the ASTM International E1903-11 (2011) Standard Guide for Environmental Site Assessments: Phase II ESA Process. The objective of the second round of groundwater sampling associated with this investigation was to further evaluate if the subsurface of the Site has been adversely affected by the use of the suspected, former in-ground hydraulic lift and from maintenance activities at the Site. Specific terms and conditions were detailed in the Tetra Tech Proposal for Additional Phase II Site Investigation dated August 15, 2016, which was authorized by GSA.

Based on the minimal amount of groundwater obtained in the temporary groundwater well advanced during the March 15, 2016 activities and the refusal encountered using a direct-push drill rig, GSA requested the use of a hollow-stem auger rig to ensure that a depth of 40 feet bgs was obtained during the second round of groundwater sampling activities. The proposed depth potentially allowed further advancement of temporary monitoring wells into the aquifer, which would allow greater groundwater sample recovery. The scope of the second Site investigation was to complete two soil borings, SB-5 and SB-6, adjacent to the maintenance building of the Site to a depth of 40 feet bgs for the collection of groundwater samples. In accordance with the approved work plan, groundwater at the Site was analyzed for the following parameters:

- VOC per USEPA Method 8260B;
- SVOC per USEPA Method 8270C;
- CAM-17 per USEPA Method 6010;
- PCB per EPA Method 8082;
- TPH-ERO California LUFT per USEPA Method 8015;
- TPH-GRO California LUFT per USEPA Method 8015; and
- TPH-DRO California LUFT per USEPA Method 8015.

As discussed in Section 8.0, groundwater concentrations of several CAM 17 Metals including arsenic, barium, beryllium, chromium, cobalt, copper, lead, mercury, nickel, thallium, vanadium, and zinc were detected at concentrations above laboratory MDLs in the groundwater sample collected from soil boring SB-4 on March 15, 2016. Each of the detections were above the associated SFRWQCB ESL and the associated USEPA Region 9 RSLs, with the exception of mercury and zinc.

Phase II ESA assessment activities were completed in conformance with the work plan submitted to GSA on August 15, 2016. There were no significant deviations from the work plan with the exception that groundwater was not encountered during the advancement of soil borings during the second hollow-stem auger drilling event; therefore, no laboratory samples were collected or analyzed for Site groundwater. In addition, SB-5 was advanced to a depth of 60 feet bgs rather than the planned 40 feet bgs. Prior to the mobilization to the Site, Tetra Tech prepared two Monitoring Well Drilling Permits for review and approval by Marin County EHS. The permits were accepted prior to the initiation of field activities. The Monitoring Well Drilling Permits are presented in **Attachment M**.

The findings and conclusions of this report are not scientific certainties, but rather, probabilities based on professional judgment derived from the data gathered during the course of this Phase II ESA. Tetra Tech is not able to verify that the Site or adjoining land does not contain hazardous substances, petroleum products, or other latent conditions beyond that detected or observed during this Phase II ESA assessment. The possibility exists that contaminants detected in soil and groundwater have migrated through soil or groundwater. However, identifying the origin of the contaminants is not within the scope of this project. In addition, the ability to accurately assess the environmental risks associated with transport in these media is beyond the scope of this assessment. The opinions expressed by Tetra Tech with reference to the Site only pertain to conditions that existed at the Site during the time that the Phase II ESA was conducted. No guarantees or warranties are either expressed or implied.

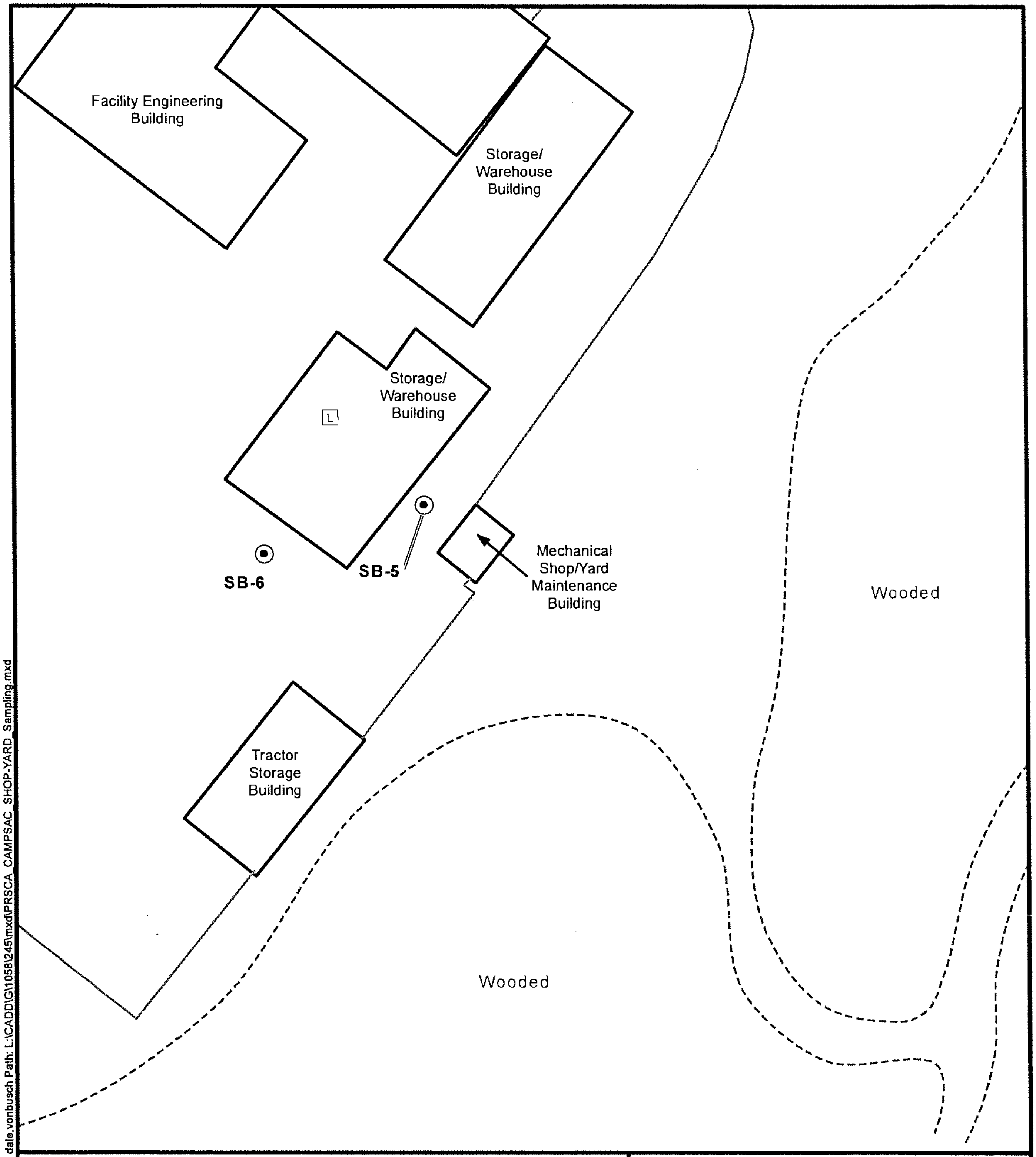
9.2 UTILITY LOCATION

Prior to conducting the subsurface assessment, Tetra Tech contacted 811 Dig Alert (Call Before You Dig) utility locator service to request identification of buried utilities on and around the Site. Utility markings were observed to be present prior to the advancement of the soil borings at the Site. In addition, Tetra Tech contracted Ground Penetrating Radar Systems (GPRS) to assist in the location of soil borings at the Site. No utilities were encountered during the investigation.

9.3 TEMPORARY MONITORING WELL ADVANCEMENT ACTIVITIES

On October 17 and 19, 2016, two (2) soil borings (SB-5 and SB-6) were advanced at the Site (**Attachment N**). The soil borings were advanced by Penecore Drilling, Inc., using a CME 75 hollow-stem auger soil probing rig to obtain the depth of 40 feet bgs. The locations of the soil borings are described below:

- SB-5: Downgradient of the suspected, former in-ground hydraulic lift, in proximity to the southeastern side of the mechanical shop and yard maintenance building.
- SB-6: Downgradient of the suspected, former in-ground hydraulic lift, in proximity to the southwestern side of the mechanical shop and yard maintenance building.



Legend

Approximate Property Boundary

L Supsected Former In-Ground Hydraulic Lift

● Boring Location

N W E S

0 15 30

Feet

SOURCE: MODIFIED FROM BING IMAGERY, 2010-2012.

FIGURE 2

SAMPLE LOCATION MAP - OCTOBER 2016

US COAST GUARD HOUSING UNITS
POINT REYES STATION
MECHANICAL SHOP/YARD MAINTENANCE BUILDING
POINT REYES, CALIFORNIA 94956

United States Coast Guard
U.S. Department of Homeland Security

TETRA TECH

Date Saved: 10/13/2015 7:32:40 PM User: dale.vonbusch Path: L:\CADD\G\1058\245\mxd\PRSCA_CAMPSAC_SHOP-YARD_Sampling.mxd

ATTACHMENT O:
SOIL BORING LOGS – OCTOBER 2016

TETRA TECH

Project: GSA Point Reyes
Project Number: 103G3995011
Site: U.S. Coast Guard Point Reyes Station, California Housing Units
Address: Point Reyes Station, California 94956

BORING ID
SB-6

Start Date: 10/17/16 Time: 10:45
Completion Date: 10/17/16 Time: 13:50
Geologist: Vladimir Prilepin, PG
Completion Depth (ft. bgs.): 40.0
Groundwater Elev. (ft. bgs.): N/A

Drilling Co.: Penecore Drilling, Inc.
Driller: Jorge Ornelas, Norman Doherty
Drilling Method: HSA
Bit Size: 8.0"
Drilling Equipment: Geoprobe CME85
Core Barrel(s): 8.0"
Sampling Method: soil cuttings
Sampler Type: Dual Tube Sampling System; N/A
Sample Hammer: N/A
Drop: N/A

Depth (feet bgs)	Sample Number	Blow Counts	Recovery (%)	PID Reading (ppm)	USCS Classification	SOIL DESCRIPTION	NOTES
1			20%	0.0		**Concrete 6", base rock, medium sand and gravel**	No groundwater encountered throughout the boring
2					SM	1 - 10': **Silty Sand with Gravel**, yellowish brown, 15% silt, 60% very fine to fine sand, 10% gravel; dry, loose. A thin bed of brown clay between 4.5 and 5.0' bgs.	
3							
4							
5							
6			40%	0.0			
7							
8							
9							
10							
11			80%	0.0	ML	**Clayey Silt,** dark gray to gray; 80% silt, 20% clay, medium dense; dry.	
12							
13							
14					ML	Clayey Silt. Color changes to strong brown at 15' bgs. Clay content increases with depth.	
15							
16			90%	0.0			
17						Becomes very dense.	
18							
19							
20							

TETRA TECH

Project: GSA Point Reyes
Project Number: 103G3995011
Site: U.S. Coast Guard Point Reyes Station, California Housing Units
Address: Point Reyes Station, California 94956

BORING ID
SB-6

Start Date: 10/17/16 | Time: 10:45
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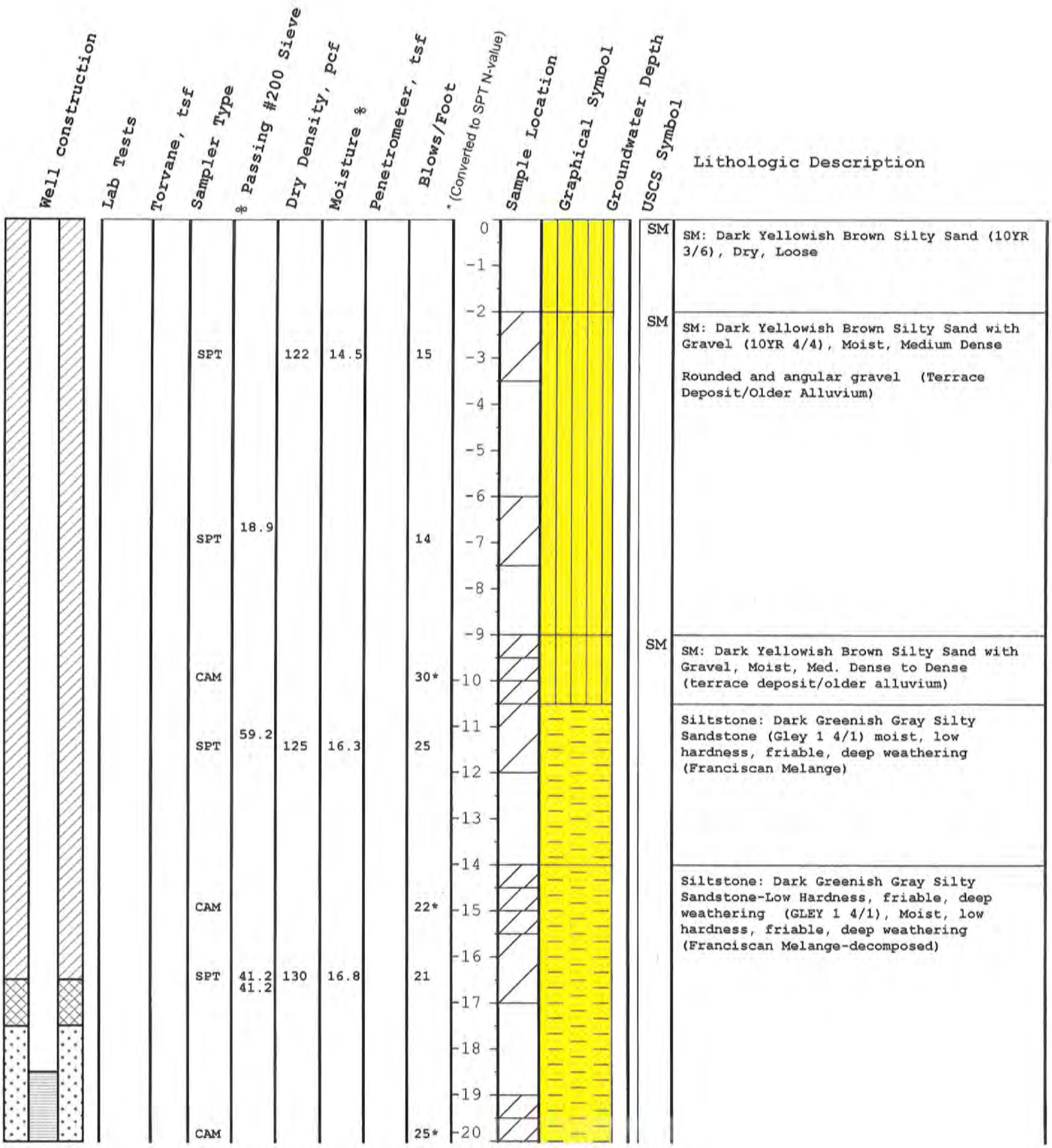
Bit Size: 8.0"
Drilling Equipment: Geoprobe CME85
Core Barrel(s): 8.0"
Sampling Method: soil cuttings
Sampler Type: Dual Tube Sampling System; N/A
Sample Hammer: N/A
Drop: N/A

Depth (feet bgs)	Sample Number	Blow Counts	Recovery (%)	PID Reading (ppm)	USCS Classification	SOIL DESCRIPTION	NOTES
			100%	0.0	CL	**Silty Clay**, mottled: abundunt redox features of dark gray to rust color, medium plasticity,	
21							
22							
23							
24							
25						Becomes massive, dense, no plasticity at 25' bgs.	
26							
27						**Clayey, Sandy Silt**. Some gravel, dark gray, hard, dry.	
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							End boring at 40'

Appendix B

Monitoring Well Borehole Logs



	Sampler Type	% Passing #200 Sieve	Dry Density, pcf	Moisture %	Blows/Foot
-3	SPT		122	14.5	15
-7	SPT	18.9			14
-10	CAM				30*
-11	SPT	59.2	125	16.3	25
-15	CAM				22*
-16.5	SPT	41.2 41.2	130	16.8	21
-20	CAM				25*

Lithologic Description

SM — SM: Dark Yellowish Brown Silty Sand (10YR 3/6), Dry, Loose

SM — SM: Dark Yellowish Brown Silty Sand with Gravel (10YR 4/4), Moist, Medium Dense

Rounded and angular gravel (Terrace Deposit/Older Alluvium)

SM — SM: Dark Yellowish Brown Silty Sand with Gravel, Moist, Med. Dense to Dense (terrace deposit/older alluvium)

Siltstone: Dark Greenish Gray Silty Sandstone (Gley 1 4/1) moist, low hardness, friable, deep weathering (Franciscan Melange)

Siltstone: Dark Greenish Gray Silty Sandstone-Low Hardness, friable, deep weathering (GLEY 1 4/1), Moist, low hardness, friable, deep weathering (Franciscan Melange-decomposed)

Drilling Performed by Pearson Drilling Using a B-53 Drill Rig

QUESTA ENGINEERING CORP.

LOG OF BOREHOLE CG-1

Coast Guard 2020

Point Reyes Station

Figure

B-1

Well construction	Lab Tests	Torvane, tsf	Sampler Type	% Passing #200 Sieve	Dry Density, pcf	Moisture %	Penetrometer, tsf	Blows/Foot * (Converted to SPT N-value)		Sample Location	Graphical Symbol	Groundwater Depth	USCS Symbol	Lithologic Description
			SPT		131	16.1		31	20 21					
									22 23					Siltstone: Greenish Gray Sandy Siltstone (GLEY 1 5/1), Moist, low hardness, friable, Rare sandstone fragments, Franciscan Melange (decomposed)
			CAM					23*	24 25					Siltstone: Greenish Gray Sandy Siltstone (GLEY 1 5/1), Moist, low hardness, friable, yellow brown sandstone fragments, deep weathering
	LL25 PL18 PI6		SPT		134	15.8		28	26 27 28 29 30 31					
			SPT	80.6 80.6	123	15.9		29	32 33 34 35					Siltstone: Greenish gray Sandy Siltstone (GLEY 1 5/1), Moist, Low hardness, friable, deep weathering, (Franciscan Melange), Yellow Brown Sandstone Inclusions
			CAM					39*	36 37 38 39 40					Shale: Dark greenish gray Clayey Shale Melange (decomposed) with light gray spots, Low hardness, Friable, Deep weathering Bottom of Hole at 40' BGS. No Groundwater Found.

Drilling Performed by Pearson Drilling Using a B-53 Drill Rig

QUESTA ENGINEERING CORP

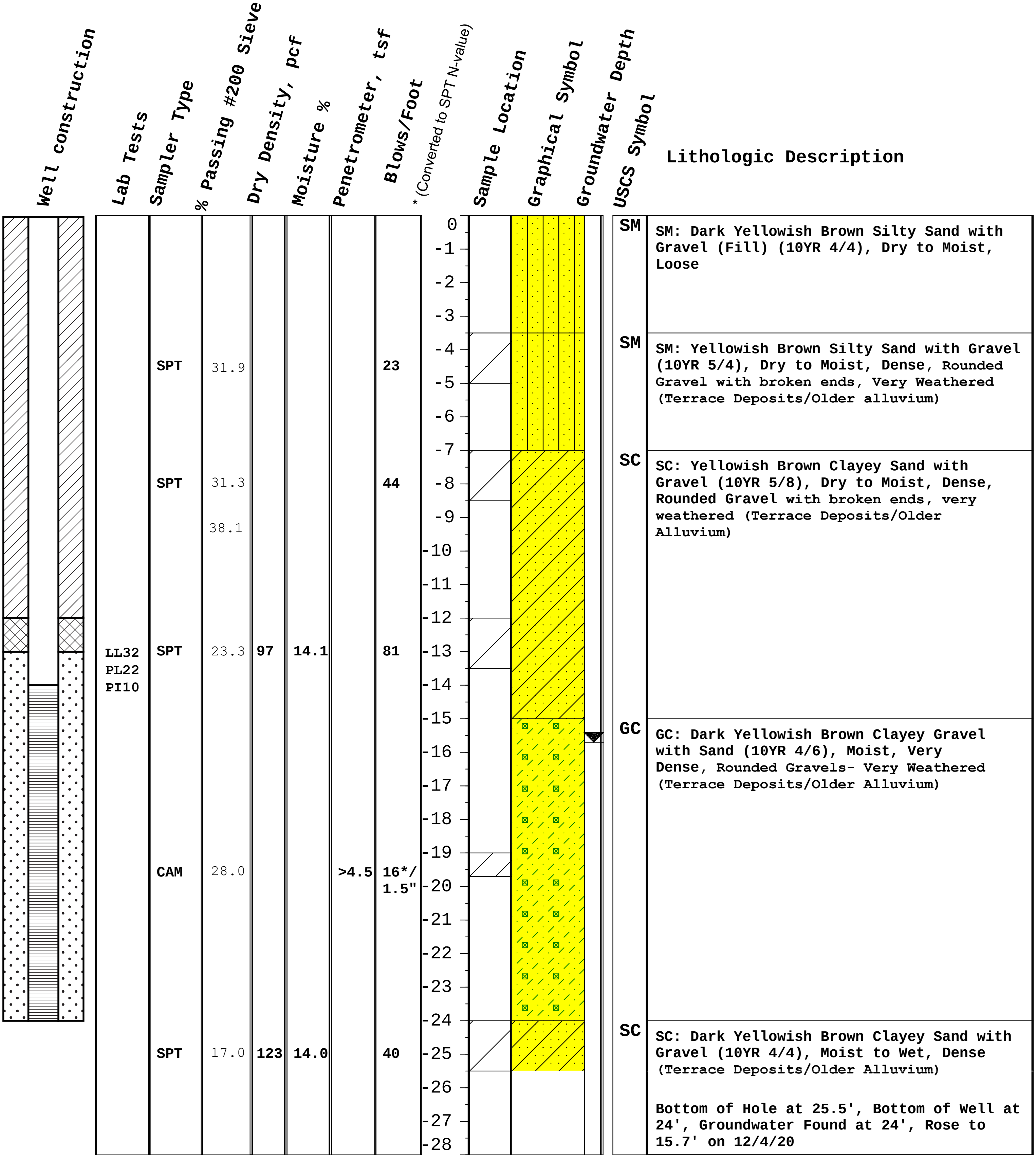
LOG OF BOREHOLE CG-1

Coast Guard 2020

Point Reyes Station

Figure

B-1



Lab Tests	Sampler Type	% Passing #200 Sieve	Dry Density, pcf	Moisture %	Penetrometer, tsf	Blows/Foot * (Converted to SPT N-value)
	SPT	31.9				23
	SPT	31.3				44
		38.1				
LL32 PL22 PI10	SPT	23.3	97	14.1		81
	CAM	28.0			>4.5	16*/ 1.5"
	SPT	17.0	123	14.0		40

USCS Symbol	Lithologic Description
SM	SM: Dark Yellowish Brown Silty Sand with Gravel (Fill) (10YR 4/4), Dry to Moist, Loose
SM	SM: Yellowish Brown Silty Sand with Gravel (10YR 5/4), Dry to Moist, Dense, Rounded Gravel with broken ends, Very Weathered (Terrace Deposits/Older alluvium)
SC	SC: Yellowish Brown Clayey Sand with Gravel (10YR 5/8), Dry to Moist, Dense, Rounded Gravel with broken ends, very weathered (Terrace Deposits/Older Alluvium)
GC	GC: Dark Yellowish Brown Clayey Gravel with Sand (10YR 4/6), Moist, Very Dense, Rounded Gravels- Very Weathered (Terrace Deposits/Older Alluvium)
SC	SC: Dark Yellowish Brown Clayey Sand with Gravel (10YR 4/4), Moist to Wet, Dense (Terrace Deposits/Older Alluvium)

Bottom of Hole at 25.5', Bottom of Well at 24', Groundwater Found at 24', Rose to 15.7' on 12/4/20

Drilling Performed by Pearson Drilling Using a B-53 Drill Rig

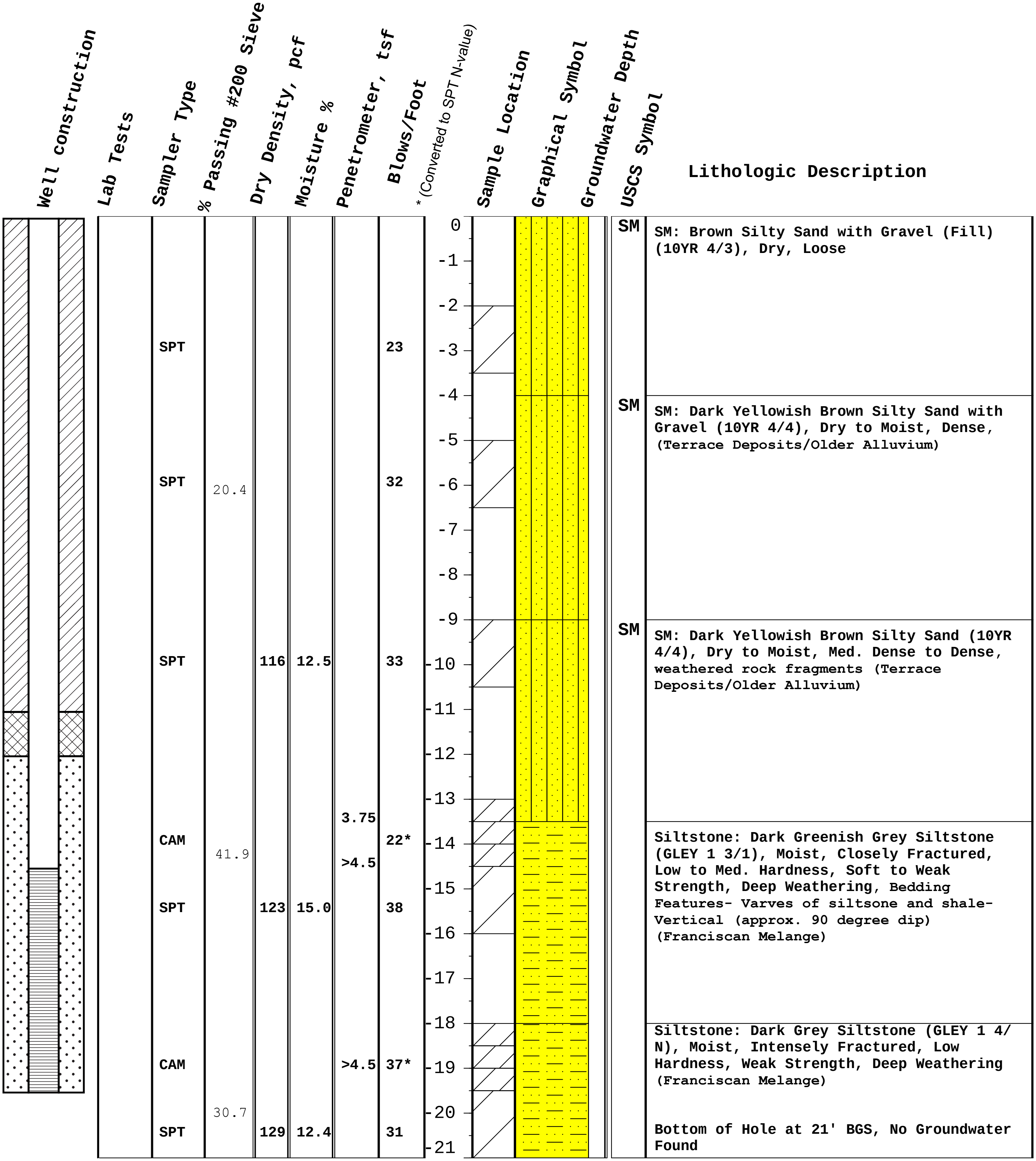
QUESTA ENGINEERING CORP.
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

LOG OF BOREHOLE CG-2

Coast Guard 2020

Point Reyes Station

Figure B-2



	Lab Tests	Sampler Type	% Passing #200 Sieve	Dry Density, pcf	Moisture %	Penetrometer, tsf	Blows/Foot
-3		SPT					23
-6		SPT	20.4				32
-10		SPT		116	12.5		33
-13.5						3.75	
-14		CAM	41.9				22*
-14.5						>4.5	
-15.5		SPT		123	15.0		38
-19		CAM				>4.5	37*
-20			30.7				
-20.5		SPT		129	12.4		31

USCS Symbol	Lithologic Description
SM	SM: Brown Silty Sand with Gravel (Fill) (10YR 4/3), Dry, Loose
SM	SM: Dark Yellowish Brown Silty Sand with Gravel (10YR 4/4), Dry to Moist, Dense, (Terrace Deposits/Older Alluvium)
SM	SM: Dark Yellowish Brown Silty Sand (10YR 4/4), Dry to Moist, Med. Dense to Dense, weathered rock fragments (Terrace Deposits/Older Alluvium)
	Siltstone: Dark Greenish Grey Siltstone (GLEY 1 3/1), Moist, Closely Fractured, Low to Med. Hardness, Soft to Weak Strength, Deep Weathering, Bedding Features- Varves of siltsone and shale- Vertical (approx. 90 degree dip) (Franciscan Melange)
	Siltstone: Dark Grey Siltstone (GLEY 1 4/N), Moist, Intensely Fractured, Low Hardness, Weak Strength, Deep Weathering (Franciscan Melange) Bottom of Hole at 21' BGS, No Groundwater Found

Drilling Performed by Pearson Drilling Using a B-53 Drill Rig

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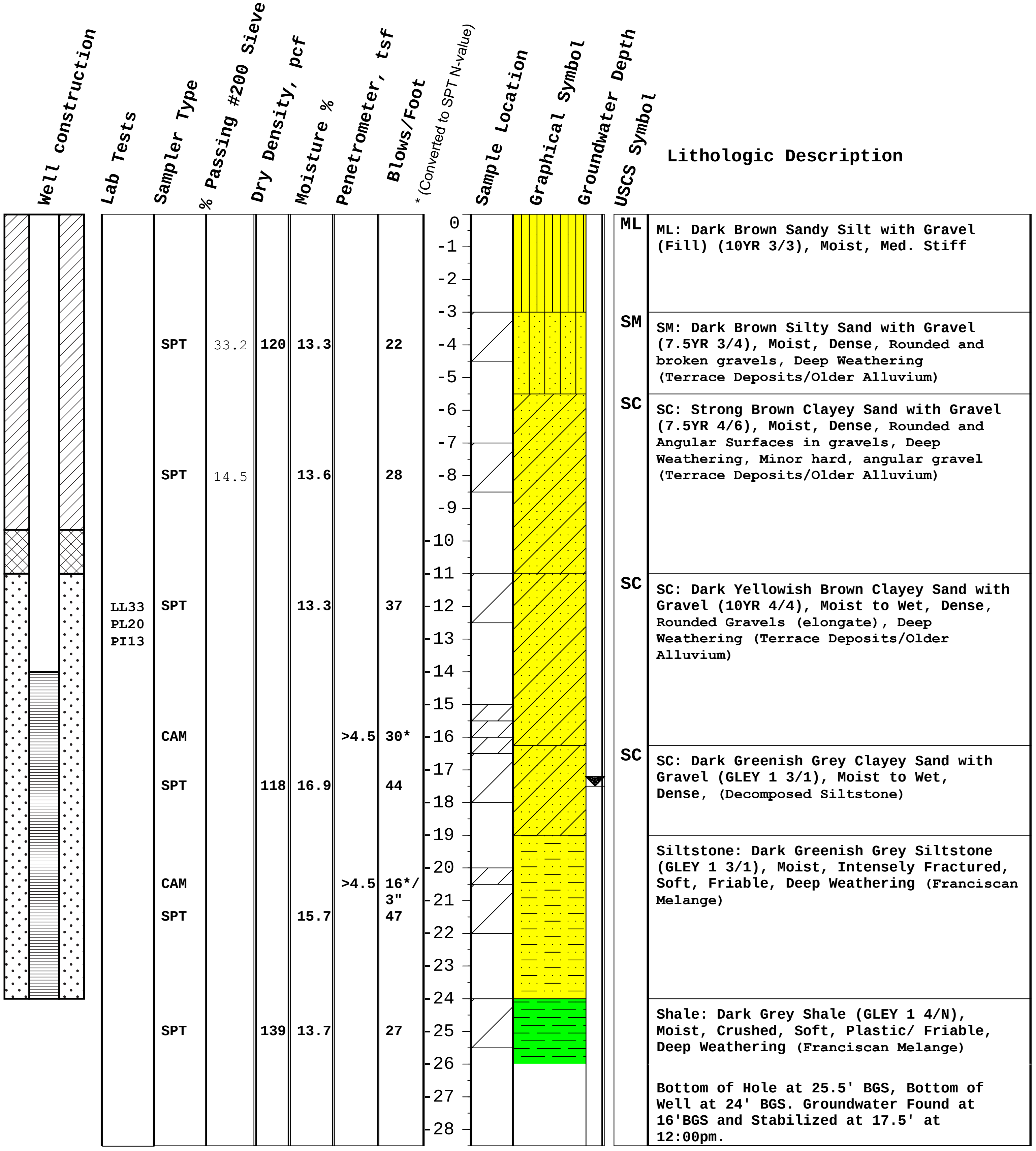
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

LOG OF BOREHOLE CG-3

Coast Guard 2020

Point Reyes Station

Figure B-3



Lab Tests	Sampler Type	% Passing #200 Sieve	Dry Density, pcf	Moisture %	Penetrometer, tsf	Blows/Foot * (Converted to SPT N-value)
	SPT	33.2	120	13.3		22
	SPT	14.5		13.6		28
LL33 PL20 PI13	SPT			13.3		37
	CAM				>4.5	30*
	SPT		118	16.9		44
	CAM				>4.5	16*/ 3"
	SPT			15.7		47
	SPT		139	13.7		27

USCS Symbol	Lithologic Description
ML	ML: Dark Brown Sandy Silt with Gravel (Fill) (10YR 3/3), Moist, Med. Stiff
SM	SM: Dark Brown Silty Sand with Gravel (7.5YR 3/4), Moist, Dense, Rounded and broken gravels, Deep Weathering (Terrace Deposits/Older Alluvium)
SC	SC: Strong Brown Clayey Sand with Gravel (7.5YR 4/6), Moist, Dense, Rounded and Angular Surfaces in gravels, Deep Weathering, Minor hard, angular gravel (Terrace Deposits/Older Alluvium)
SC	SC: Dark Yellowish Brown Clayey Sand with Gravel (10YR 4/4), Moist to Wet, Dense, Rounded Gravels (elongate), Deep Weathering (Terrace Deposits/Older Alluvium)
SC	SC: Dark Greenish Grey Clayey Sand with Gravel (GLEY 1 3/1), Moist to Wet, Dense, (Decomposed Siltstone)
	Siltstone: Dark Greenish Grey Siltstone (GLEY 1 3/1), Moist, Intensely Fractured, Soft, Friable, Deep Weathering (Franciscan Melange)
	Shale: Dark Grey Shale (GLEY 1 4/N), Moist, Crushed, Soft, Plastic/ Friable, Deep Weathering (Franciscan Melange)

Bottom of Hole at 25.5' BGS, Bottom of Well at 24' BGS. Groundwater Found at 16'BGS and Stabilized at 17.5' at 12:00pm.

Drilling Performed by Pearson Drilling Using a B-53 Drill Rig

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questa@questaec.com
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LOG OF BOREHOLE CG-4

Coast Guard 2020

Point Reyes Station

Figure

B-4

Appendix C

Water Quality Laboratory Reports

BRELJE AND RACE LABORATORIES, INC.
Providing quality laboratory analysis since 1967

April 29, 2021

Sample Collected: 04/06/21
Sample Received: 04/06/21
Collected By : MW
Cc: e-mail

Questa Engineering
P.O. Box 70356
Point Richmond, CA. 94807
Attention: Tom Hawbaker

United States Coast Guard
Pt. Reyes

LOG NUMBER:	**421-6609-11**
Sample Description:	CG – 1
ANALYSIS	
Total Dissolved Solids mg/L (Std. Mthds. 2540 C, 2011)	660.
pH Std. units (Std. Mthds. 4500-H$^+$ B, 2011)	7.5
Total Alkalinity as CaCO$_3$ mg/L (Std. Mthds. 2320 B, 2011)	220.
Specific Conductance µmhos/cm @ 25°C (Std. Mthds. 2510 B, 2011)	1200.
Boron mg/L (EPA Mthd. 200.8)	2.5
Calculated Hardness as CaCO$_3$ mg/L (Std. Mthds. 2340 B, 2011)	180.
Iron µg/L (EPA Mthd. 200.7)	170.
Manganese µg/L (EPA Mthd. 200.8)	130.
Calcium mg/L (EPA Mthd. 200.7)	27.
Magnesium mg/L (EPA Mthd. 200.7)	27.
Sodium mg/L (EPA Mthd. 200.7)	180.
Sodium Absorption Ratio	5.9

BRELJE AND RACE LABORATORIES, INC.

JAMIE LYNCH, LABORATORY DIRECTOR
JL:lja

BRELJE AND RACE LABORATORIES, INC.
Providing quality laboratory analysis since 1967

April 29, 2021

Sample Collected: 04/06/21
Sample Received: 04/06/21
Collected By : MW
Cc: e-mail

Questa Engineering
P.O. Box 70356
Point Richmond, CA. 94807
Attention: Tom Hawbaker

United States Coast Guard

Pt. Reyes

LOG NUMBER:	**421-6612-4**
Sample Description:	CG – 2
ANALYSIS	
Total Dissolved Solids mg/L (Std. Mthds. 2540 C, 2011)	340.
pH Std. units (Std. Mthds. 4500-H^+ B, 2011)	7.0
Total Alkalinity as $CaCO_3$ mg/L (Std. Mthds. 2320 B, 2011)	120.
Specific Conductance µmhos/cm @ 25°C (Std. Mthds. 2510 B, 2011)	560.
Boron mg/L (EPA Mthd. 200.8)	0.10
Calculated Hardness as $CaCO_3$ mg/L (Std. Mthds. 2340 B, 2011)	170.
Iron µg/L (EPA Mthd. 200.7)	210.
Manganese µg/L (EPA Mthd. 200.8)	43.
Calcium mg/L (EPA Mthd. 200.7)	30.
Magnesium mg/L (EPA Mthd. 200.7)	22.
Sodium mg/L (EPA Mthd. 200.7)	55.
Sodium Absorption Ratio	1.9

BRELJE AND RACE LABORATORIES, INC.

JAMIE LYNCH, LABORATORY DIRECTOR
JL:lja

BRELJE AND RACE LABORATORIES, INC.
Providing quality laboratory analysis since 1967

April 29, 2021

Sample Collected: 04/06/21
Sample Received: 04/06/21
Collected By : MW
Cc: e-mail

Questa Engineering
P.O. Box 70356
Point Richmond, CA. 94807
Attention: Tom Hawbaker

United States Coast Guard
Pt. Reyes

LOG NUMBER:	**421-6615-7**
Sample Description:	CG – 3
ANALYSIS	
Total Dissolved Solids mg/L (Std. Mthds. 2540 C, 2011)	940.
pH Std. units (Std. Mthds. 4500-H^+ B, 2011)	7.3
Total Alkalinity as $CaCO_3$ mg/L (Std. Mthds. 2320 B, 2011)	170.
Specific Conductance µmhos/cm @ 25°C (Std. Mthds. 2510 B, 2011)	1500.
Boron mg/L (EPA Mthd. 200.8)	0.55
Calculated Hardness as $CaCO_3$ mg/L (Std. Mthds. 2340 B, 2011)	490.
Iron µg/L (EPA Mthd. 200.7)	40,000.
Manganese µg/L (EPA Mthd. 200.8)	700.
Calcium mg/L (EPA Mthd. 200.7)	86.
Magnesium mg/L (EPA Mthd. 200.7)	68.
Sodium mg/L (EPA Mthd. 200.7)	140.
Sodium Absorption Ratio	2.7

BRELJE AND RACE LABORATORIES, INC.

JAMIE LYNCH, LABORATORY DIRECTOR
JL:lja

BRELJE AND RACE LABORATORIES, INC.
Providing quality laboratory analysis since 1967

April 29, 2021

Sample Collected: 04/06/21
Sample Received: 04/06/21
Collected By : MW
Cc: e-mail

Questa Engineering
P.O. Box 70356
Point Richmond, CA. 94807
Attention: Tom Hawbaker

United States Coast Guard
Pt. Reyes

LOG NUMBER:	**421-6618-20**
Sample Description:	CG – 4
ANALYSIS	
Total Dissolved Solids mg/L (Std. Mthds. 2540 C, 2011)	220.
pH Std. units (Std. Mthds. 4500-H$^+$ B, 2011)	8.0
Total Alkalinity as $CaCO_3$ mg/L (Std. Mthds. 2320 B, 2011)	130.
Specific Conductance µmhos/cm @ 25°C (Std. Mthds. 2510 B, 2011)	380.
Boron mg/L (EPA Mthd. 200.8)	0.17
Calculated Hardness as $CaCO_3$ mg/L (Std. Mthds. 2340 B, 2011)	88.
Iron µg/L (EPA Mthd. 200.7)	6400.
Manganese µg/L (EPA Mthd. 200.8)	150.
Calcium mg/L (EPA Mthd. 200.7)	17.
Magnesium mg/L (EPA Mthd. 200.7)	11.
Sodium mg/L (EPA Mthd. 200.7)	54.
Sodium Absorption Ratio	2.5

BRELJE AND RACE LABORATORIES, INC.

JAMIE LYNCH, LABORATORY DIRECTOR
JL:lja

BRELJE AND RACE LABORATORIES, INC.
Providing quality laboratory analysis since 1967

April 22, 2021

Sample Collected: 04/06/21
Sample Received: 04/06/21
Collected By : MW
Cc: e-mail

Questa Engineering
P.O. Box 70356
Point Richmond, CA. 94807
Attention: Tom Hawbaker

United States Coast Guard
Pt. Reyes

LOG NUMBER	**Sample Description**	**Nitrate N mg/L**
421-6649	CG 1	<0.20
421-6650	CG 2	1.1
421-6651	CG 3	<0.20
421-6652	CG 4	0.31
421-6653	MW 5	0.74
421-6654	MW 7	<0.20

(EPA Mthd. 352.1)

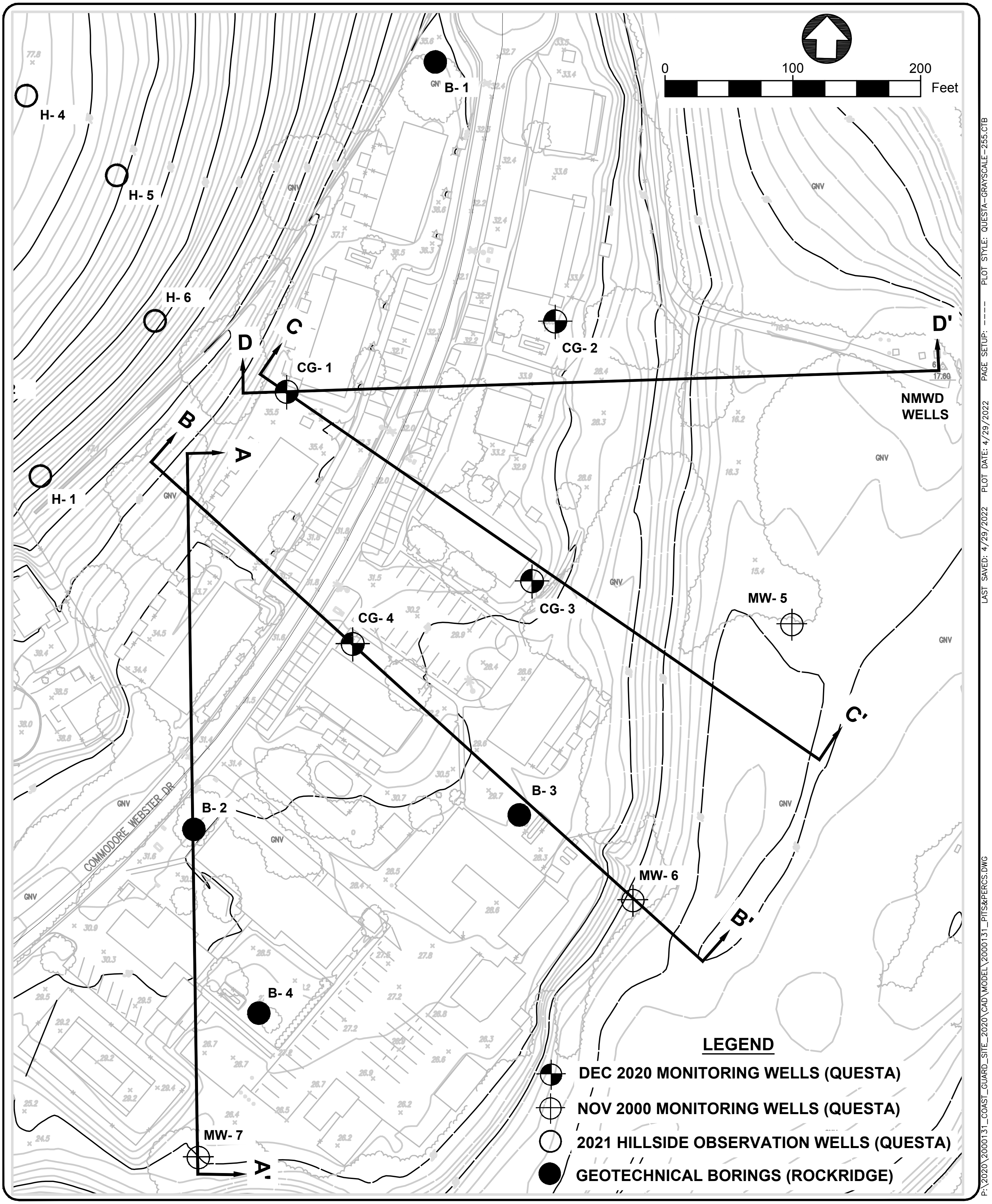
BRELJE AND RACE LABORATORIES, INC.

Jamie Lynch

JAMIE LYNCH, LABORATORY DIRECTOR
JL:lja

Appendix D

Hydrogeologic X-Sections



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P:\2020\2000131_COAST_GUARD_SITE_2020\CAD\MODEL\2000131_PITS&PERCS.DWG

QUESTA
ENGINEERING CORP.
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

Civil
Environmental
& Water Resources

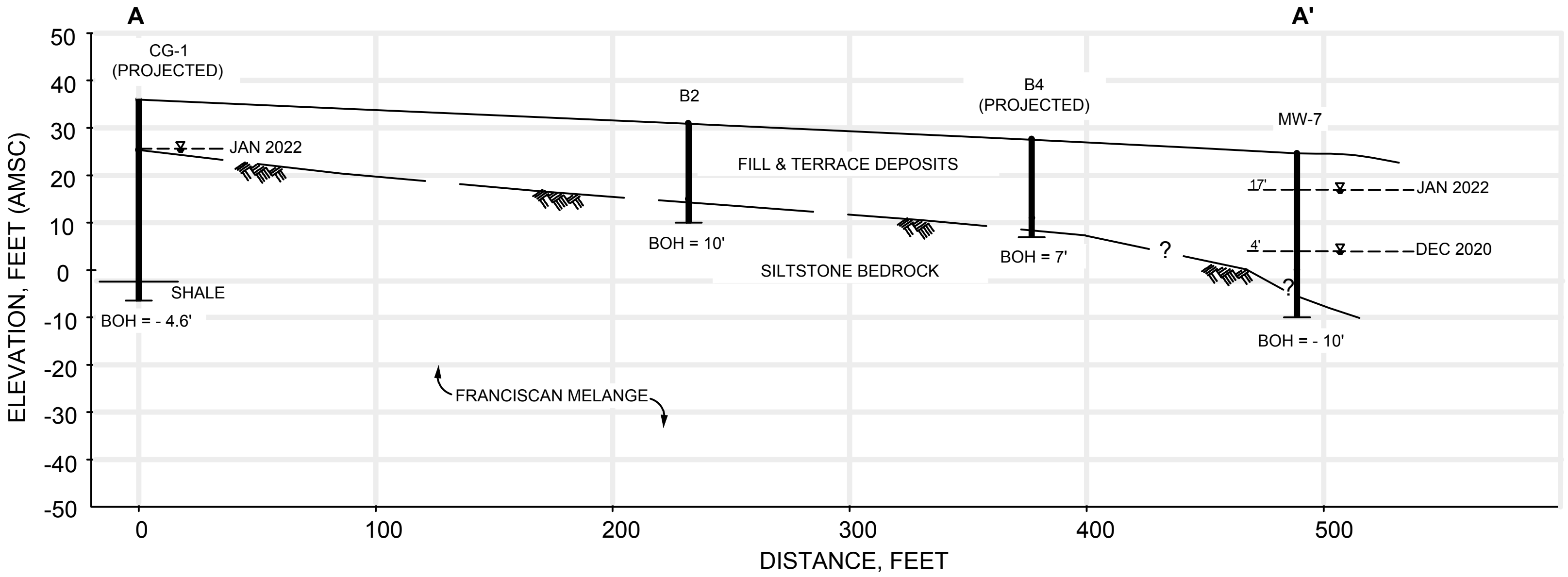
(510) 236-6114
FAX (510) 236-2423
questa@questaec.com

Design:	NH
Drawn:	PS
Checked:	NH
Appr'd:	NH

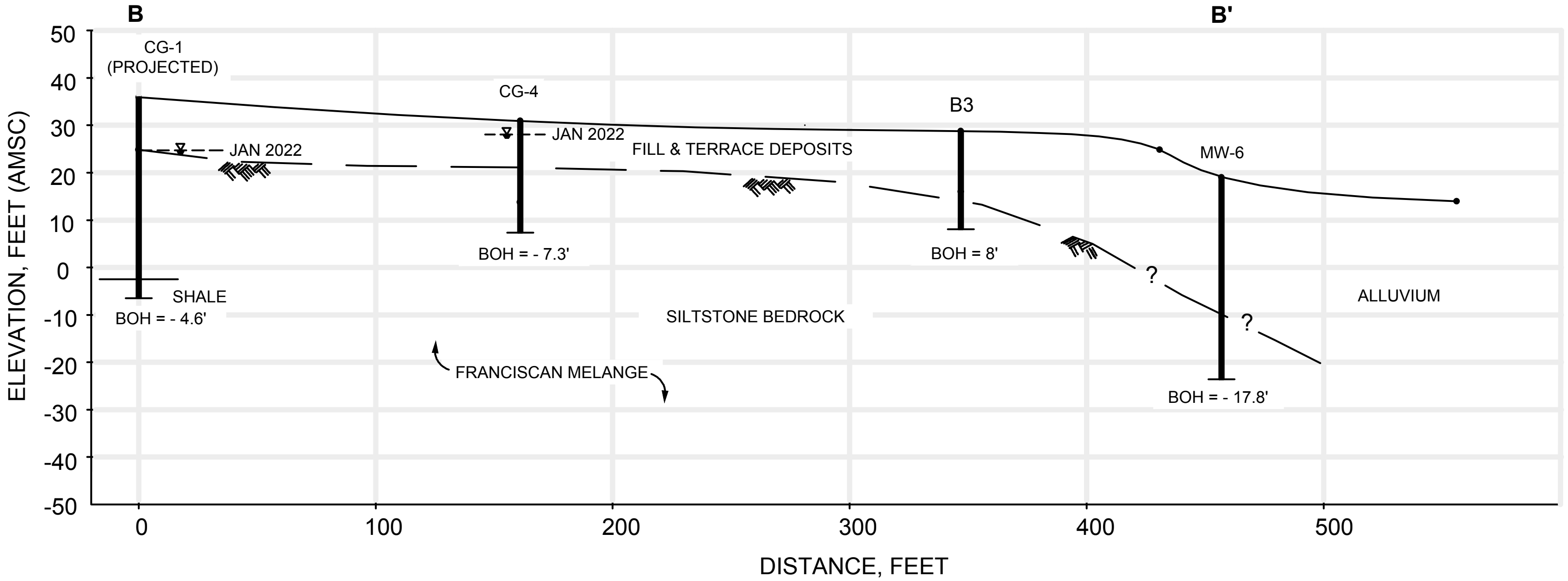
HYDROGEOLOGIC X-SECTION LOCATIONS

FORMER COAST GUARD SITE, POINT REYES STATION, CA

FIGURE
D-1



SECTION A - A'



SECTION B - B'

FORMER COAST GUARD SITE
POINT REYES STATION

QUESTA
ENGINEERING CORP.
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& Water Resources
(510) 236-6114
FAX (510) 236-2423
questa@questaec.com
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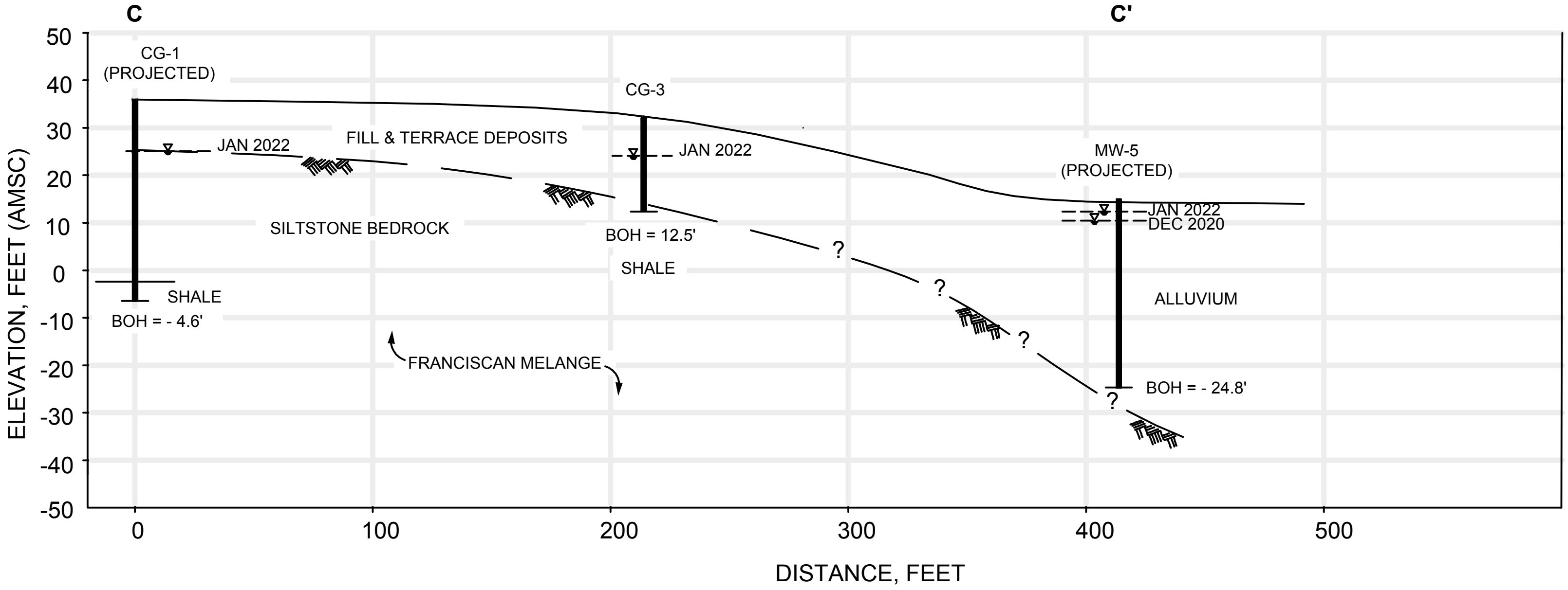
Design:	NH
Drawn:	PS
Checked:	NH
Appr'd:	NH

HYDROGEOLOGIC X-SECTIONS
A - A' AND B - B'

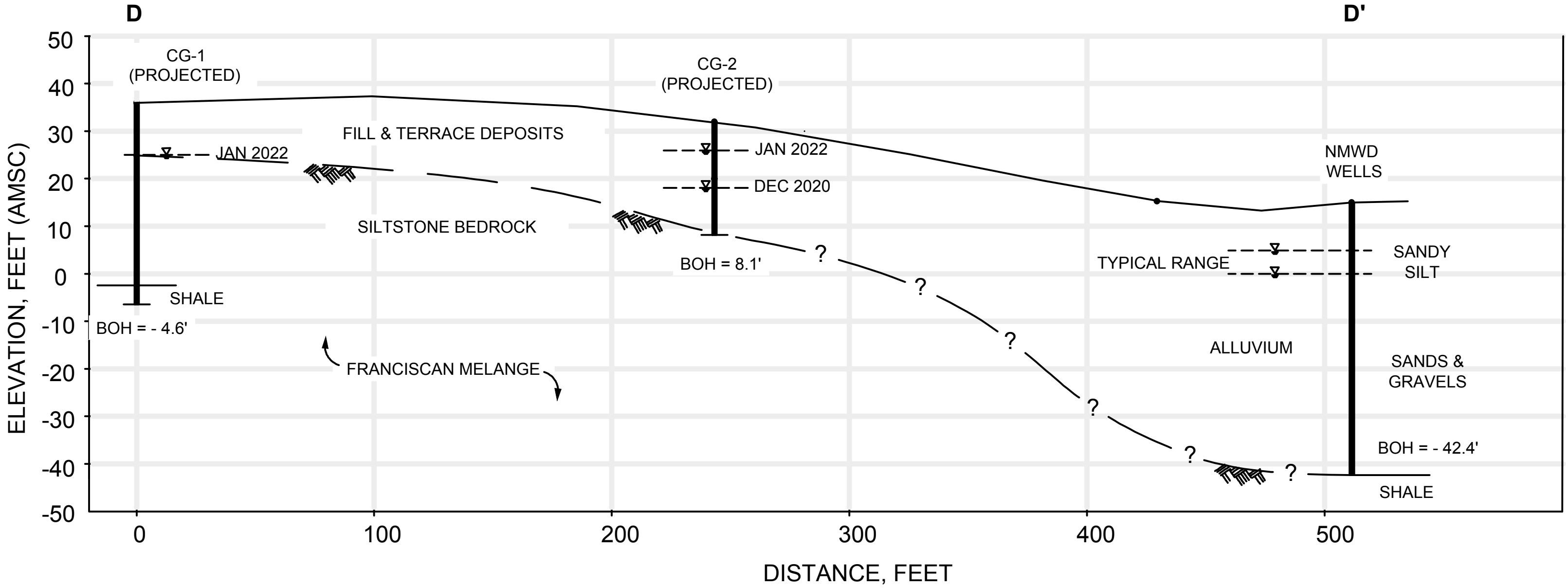
FIGURE
D-2

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE – ADJUST ACCORDINGLY

PLOT STYLE: ----
PLOT DATE: 4/29/2022
LAST SAVED: 4/29/2022
P:\2020\2000131_COAST_GUARD_SITE_2020\CAD\MODEL\2000131_PITS&PERCS.DWG



SECTION C - C'



SECTION D - D'

FORMER COAST GUARD SITE
POINT REYES STATION

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& Water Resources
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FAX (510) 236-2423
questa@questaec.com
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807

Design: NH
Drawn: PS
Checked: NH
Appr'd: NH

HYDROGEOLOGIC X-SECTIONS
C - C' AND D - D'

FIGURE
D-3

PLOT STYLE: ----
PLOT DATE: 4/29/2022
LAST SAVED: 4/29/2022
P:\2020\2000131_COAST_GUARD_SITE_2020\CAD\MODEL\2000131_PITS&PERCS.DWG

IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE – ADJUST ACCORDINGLY

Appendix E

Entrance Area Soil Logs and Percolation Test Data

QUESTA
ENGINEERING CORP.

SOIL PROFILE DESCRIPTION

Project Number: 2000131
Project Name: Coast Guard 2020
Date: 2/23/2021
Project Location: Pt. Reyes Station, Ca
Boring Method: Backhoe
Logged By: ERW
Notes:

Test Hole No: T-1
Water Table: NE
Slope: **<2%**

Graphic Log	Depth (inches)	Texture	Structure	Color	Rock	Pores	Consistency	Remarks
/ - + / - + / - + / - - + / - + / - + / - + / - + / - + / - + / - - + / - + / - + / - +	0" - 53"	Light Clay Loam	weak-moderate sbk	Dark Grayish Brown	<15% sandstone	Many very fine, fine, and medium, common coarse. No mottles.	so, vy frb/frm, ss, np	Many very fine, fine, and medium, common coarse. Contact is gradual. No mottling.
/ - + / - + / - + / - - + / - + / - + / - + / - + / - + / - + / - - + / - + / - + / - +	53" - 68"	Light Silty Clay Loam	weak-moderate,sbk	Dark Grayish Brown	<15% sandstone	Many very fine, fine, common medium, few coarse. No mottles.	so, vy frb/frm, ss, np	Many very fine, fine, common medium, few coarse. Contact is gradual. No mottling.
+ -- : + -- : + -- : -- : + -- : + -- : + -- + -- : + -- : + -- : -- : + -- : + -- : + --	68" - 96"+	Sandy Clay Loam	moderate-strong, sbk	Light Reddish Brown		Common very fine, fine, and medium, few coarse.	sh, frb/frm, ns, np	Common very fine, fine, and medium, few coarse. No mottling.

Notes: No groundwater encountered.

Test Hole No: T-2
Water Table: NE
Slope: **10%**

Graphic Log	Depth (inches)	Texture	Structure	Color	Rock	Pores	Consistency	Remarks
o : * . o : * o : * : * . o : *o : *o o : * . o : * o : * : * . o : *o : *o	0 - 32"	Sandy Gravel	weak, granular	Brown	15-35% Variety	Common vy fine, fine, and medium, few coarse.	so, lo, ns, np	Common vy fine, fine, and medium, few coarse. Contact is abrupt. No mottling.
+ -- +-- + -- + -- + + -- + -- + -- + -- + + -- + -- + -- + -- + --+ -- + -- + -- +	32" - 75"	Light Clay Loam	moderate, sbk	Dark Grayish Brown	<15% sandstone	Common vy fine, fine, medium, and coarse.	so, vy frb/frm, ss, sp	Common vy fine, fine, medium, and coarse. Contact is gradual. No mottling.
+ -- : + -- : + -- : -- : + -- : + -- : + -- + -- : + -- : + -- : -- : + -- : + -- : + --	75" - 89"	Light Sandy Clay Loam	moderate, sbk	Light Reddish Brown	<15% sandstone	Common vy fine, fine, and medium, few coarse.	h, frb/frm, ns, np	Common vy fine, fine, and medium, few coarse. Contact is abrupt. No mottling.
o + * . o + * o + * o+ *. o + *o +*o o+ *. o + *o +*o o+ *. o + *o +*o	89" - 96"+	Gravelly Sandy Clay Loam	strong, sbk	Light Reddish Brown	>35% sandstone	Common vy fine, fine, medium and coarse.	h, frb/frm, ns, np	Common vy fine, fine, medium and coarse. No mottling.

Notes: NE: No groundwater encountered.

QUESTA
ENGINEERING CORP.

SOIL PROFILE DESCRIPTION

Project Number: 2000131
Project Name: Coast Guard 2020
Date: 2/23/2021
Project Location: Pt. Reyes Station, Ca
Boring Method: Backhoe
Logged By: ERW
Notes:

Test Hole No: T-3
Water Table: NE
Slope: **3%**

Graphic Log	Depth (inches)	Texture	Structure	Color	Rock	Pores	Consistency	Remarks
/ - + / - + / - + / - - + / - + / - + / - + / - + / - + / - + / - - + / - + / - + / - +	0" - 36"	Light Silty Clay Loam	weak-moderate, sbk	Dark Grayish Brown	<15% sandstone	Common vy fine, fine, medium, and coarse.	so-sh, vy frb, ns, np	Common vy fine, fine, medium, and coarse. Contact is gradual. No mottling.
+ -- : + -- : + -- : -- : + -- : + -- : + -- + -- : + -- : + -- : -- : + -- : + -- : + --	36" - 65"	Sandy Clay Loam	strong, sbk	Brown	15-35% sandstone	Common vy fine, fine, medium, and coarse.	sh, vy frb/firm, ss, np	Common vy fine, fine, medium, and coarse. Contact is gradual. No mottling.
o + * . o + * o + * o+ *. o + *o +*o o+ *. o + *o +*o o+ *. o + *o +*o	65" - 98"+	Gravelly Sandy Clay Loam	strong, sbk	Reddish Brown	>35% sandstone	Many vy fine, fine, medium and coarse.	so-sh, vy frb/frm, ns, np	Many vy fine, fine, medium and coarse. No mottling.

Notes: No groundwater encountered.

Test Hole No: T-4
Water Table: NE
Slope: **3%**

Graphic Log	Depth (inches)	Texture	Structure	Color	Rock	Pores	Consistency	Remarks
/ - + / - + / - + / - - + / - + / - + / - + / - + / - + / - + / - - + / - + / - + / - +	0 - 36"	Light Silty Clay Loam	weak-moderate, sbk	Dark Grayish Brown	<15% sandstone	Common vy fine, fine, medium, and coarse.	so-sh, frb/frm, ss, np	Common vy fine, fine, medium, and coarse. Contact is gradual. No mottling.
o + * . o + * o + * o+ *. o + *o +*o o+ *. o + *o +*o o+ *. o + *o +*o	36" - 60"	Gravelly Sandy Clay Loam	moderate, sbk	Brown	15-35% sandstone	Common vy fine, fine, and medium, few coarse.	sh, frb/frm, ss, np	Common vy fine, fine, and medium, few coarse. Contact is clear. No mottling.
o + * . o + * o + * o+ *. o + *o +*o o+ *. o + *o +*o o+ *. o + *o +*o	60" - 96"	Gravelly Sandy Clay Loam	moderate-strong, sbk	Light Reddish Brown	15-35% sandstone	Common vy fine, fine, medium, and coarse.	sh-h, vy frb/frm, ns, np	Common vy fine, fine, medium, and coarse. No mottling.

Notes: NE: No groundwater encountered.

QUESTA ENGINEERING CORP.

SOIL PROFILE DESCRIPTION

Project Number: 2000131
Project Name: Coast Guard 2020
Date: 2/23/2021
Project Location: Pt. Reyes Station, Ca
Boring Method: Backhoe
Logged By: ERW
Notes:

Test Hole No: T-5
Water Table: NE
Slope: 5%

Graphic Log	Depth (inches)	Texture	Structure	Color	Rock	Pores	Consistency	Remarks
▥	0" - 9"	Topsoil	weak, granular	Dark Grayish Brown	<15% sandstone	Many vy fine, fine, medium, common	so, vy frb/frm, ss, sp	Topsoil. Contact is clear.
--- __ --- __ ---	9" - 36"	Clay	moderate, sbk	Brown	<15% sandstone	Few vy fine and fine	so,frb/frm, s sp	Few vy fine and fine. Many (>20% mottles), large (>15mm). Contact is gradual.
--- __ --- __ ---	36" - 54"	Clay	strong, sbk	Dark Grayish Brown	<15% sandstone	Few vy fine	sh, v frm, s, sp	Few vy fine. Common mottles (2-20%), medium (5-15mm).

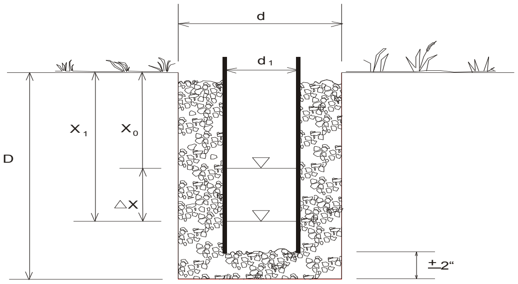
Notes: No groundwater encountered.

Test Hole No: T-6
Water Table: NE
Slope: 5%

Graphic Log	Depth (inches)	Texture	Structure	Color	Rock	Pores	Consistency	Remarks
+ -- + -- + -- +	0 - 37"	Clay loam	moderate, sbk	Dark Grayish Brown	<15% sandstone	Common vy fine and fine, few medium.	so-sh, frb/frm, ss, sp	Common vy fine and fine, few medium. Contact is gradual. No mottling.
0 + * 0 + * 0 + *	37" - 61"	Gravelly Clay Loam	moderate, sbk	Brown	>35% sandstone	Many vy fine, fine, medium and coarse.	h, frb, s, sp	Many vy fine, fine, medium and coarse. No mottling.

Notes: NE: No groundwater encountered.

QUESTA
ENGINEERING CORP.



PERCOLATION TEST DATA

Project Number: **2000131**
Project Name: **Coast Guard 2020**
Location: **Pt. Reyes, Ca**

Date: **2/24/2021**
Test by: **MFW, ERW**
Checked by: **BG (EHS)**

Test Hole: **P1** Hole Diameter (d): **9** Pipe Diameter (d_1): **4** Depth (D): **48"** Soil Type: **Clay Loam**

Trial Number	Start Time (T_0)	Initial Water Level (inches) (X_0)	Time Read (T_1)	Final Water Level (Inches) (X_1)	Time Interval (minutes) (T)	Water Drop (inches) (ΔX)	Percolation Rate	
							Inches per Hour	Minutes per Inch
1	11:44:00 AM	9.250	12:18:00 PM	14.250	34.00	5.000	8.82	6.8
2	12:19:00 PM	10.000	12:49:00 PM	12.500	30.00	2.500	5.00	12.0
3	12:50:00 PM	10.000	1:20:00 AM	12.500	30.00	2.500	5.00	12.0
4	1:20:00 AM	10.000	1:50:00 AM	12.000	30.00	2.000	4.00	15.0
5	1:50:00 AM	10.000	2:20:00 AM	11.875	30.00	1.875	3.75	16.0
6	2:20:00 AM	10.000	2:50:00 AM	12.675	30.00	2.675	5.35	11.2
7	2:50:00 AM	10.000	3:20:00 AM	11.875	30.00	1.875	3.75	16.0
8								
9								
10								
11								
12								

Adjustment Factor: **1.05** Adjusted Stabilized Rate: **16.8** Maximum Application Rate:

Adjustment Rate Method: **Plavel pack** Notes: **Starting at 16"**

Remaining Presoak:

Test Hole: **P2** Hole Diameter (d): **9** Pipe Diameter (d_1): **4** Depth (D): **40"** Soil Type: **Light Clay Loam**

Trial Number	Start Time (T_0)	Initial Water Level (inches) (X_0)	Time Read (T_1)	Final Water Level (Inches) (X_1)	Time Interval (minutes) (T)	Water Drop (inches) (ΔX)	Percolation Rate	
							Inches per Hour	Minutes per Inch
1	11:46:00 AM	3.000	12:21:00 PM	9.000	35.00	6.000	10.286	5.8
2	12:22:00 PM	2.500	12:52:00 PM	8.500	30.00	6.000	12.000	5.0
3	12:53:00 PM	3.000	1:23:00 AM	7.750	30.00	4.750	9.500	6.3
4	1:23:00 AM	3.000	1:53:00 AM	9.000	30.00	6.000	12.000	5.0
5	1:53:00 AM	3.000	2:23:00 AM	8.675	30.00	5.675	11.350	5.3
6	2:25:00 AM	3.000	2:55:00 AM	7.500	30.00	4.500	9.000	6.7
7	2:59:00 AM	2.750	3:29:00 AM	7.500	30.00	4.750	9.500	6.3
8								
9								
10								
11								
12								

Adjustment Factor: **1.05** Adjusted Stabilized Rate: **6.6** Maximum Application Rate:

Adjustment Rate Method: **Plavel pack** Notes: **Starting at 9"**

Remaining Presoak:

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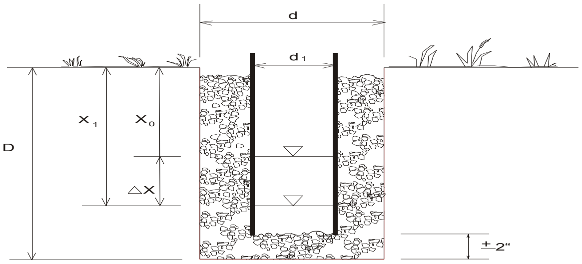
PERCOLATION TEST DATA



Project Number: **2000131**
Project Name: **Coast Guard 2020**
Location: **Pt. Reyes, Ca**

Date: **2/24/2021**
Test by: **MFW, ERW**
Checked by: **BG (EHS)**

Test Hole: **P3** Hole Diameter (d): **8** Pipe Diameter (d_1): **4** Depth (D): **48"** Soil Type: **Sandy Clay Loam**

Trial Number	Start Time (T_0)	Initial Water Level (inches) (X_0)	Time Read (T_1)	Final Water Level (Inches) (X_1)	Time Interval (minutes) (T)	Water Drop (inches) (ΔX)	Percolation Rate Inches per Hour	Percolation Rate Minutes per Inch
1	12:01:00 PM	2.000	12:31:00 PM	7.125	30.00	5.13	10.250	5.9
2	12:32:00 PM	1.500	1:02:00 AM	6.125	30.00	4.63	9.250	6.5
3	1:03:00 AM	2.000	1:33:00 AM	6.250	30.00	4.25	8.500	7.1
4	1:35:00 AM	2.000	2:06:00 AM	6.500	31.00	4.50	8.710	6.9
5	2:07:00 AM	2.000	2:37:00 AM	6.500	30.00	4.50	9.000	6.7
6								
7								
8								
9								
10								
11								
12								

Adjustment Factor: **1.05** Adjusted Stabilized Rate: **7.0** Maximum Application Rate:

Adjustment Rate Method: **Plavel pack** Notes: **Start at 8"**

Remaining Presoak:

Test Hole: **P4** Hole Diameter (d): **8** Pipe Diameter (d_1): **4** Depth (D): **48"** Soil Type: **Gravelly Sandy Clay Loam**

Trial Number	Start Time (T_0)	Initial Water Level (inches) (X_0)	Time Read (T_1)	Final Water Level (Inches) (X_1)	Time Interval (minutes) (T)	Water Drop (inches) (ΔX)	Percolation Rate Inches per Hour	Percolation Rate Minutes per Inch
1	11:55:00 AM	6.000	12:25:00 PM	11.500	30.00	5.500	11.000	5.5
2	12:26:00 PM	5.750	12:56:00 PM	10.875	30.00	5.125	10.250	5.9
3	12:56:00 PM	5.750	1:26:00 AM	10.875	30.00	5.125	10.250	5.9
4	1:27:00 AM	6.000	1:57:00 AM	10.625	30.00	4.625	9.250	6.5
5	1:58:00 AM	5.875	2:12:00 AM	8.125	14.00	2.250	9.643	6.2
6	2:15:00 AM	6.000	2:45:00 AM	10.375	30.00	4.375	8.750	6.9
7								
8								
9								
10								
11								
12								

Adjustment Factor: **1.05** Adjusted Stabilized Rate: **7.2** Maximum Application Rate:

Adjustment Rate Method: **Plavel pack** Notes: **Start at 12"**

Remaining Presoak:

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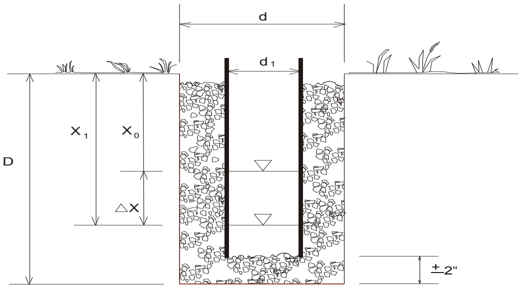

PERCOLATION TEST DATA

Project Number: **2000131** Date: **2/24/2021**
Project Name: **Coast Guard 2020** Test by: **MFW, ERW**
Location: **Pt. Reyes, Ca** Checked by: **BG (EHS)**

Test Hole: **P5** Hole Diameter (d): **8** Pipe Diameter (d_1): **4** Depth (D): **36"** Soil Type: **Clay Loam**

Trial Number	Start Time (T_0)	Initial Water Level (inches) (X_0)	Time Read (T_1)	Final Water Level (Inches) (X_1)	Time Interval (minutes) (T)	Water Drop (inches) (ΔX)	Percolation Rate	
							Inches per Hour	Minutes per Inch
1	11:57:00 AM	6.750	12:27:00 PM	11.500	30.00	4.750	9.500	6.3
2	12:29:00 PM	6.750	12:39:00 PM	10.375	10.00	3.625	21.750	2.8
3	12:59:00 PM	6.875	1:29:00 AM	10.750	30.00	3.875	7.750	7.7
4	1:29:00 AM	7.000	1:59:00 AM	10.625	30.00	3.625	7.250	8.3
5	2:00:00 AM	7.000	2:30:00 AM	10.500	30.00	3.500	7.000	8.6
6								
7								
8								
9								
10								
11								
12								

Adjustment Factor: **1.05** Adjusted Stabilized Rate: **9.0** Maximum Application Rate:

Adjustment Rate Method: **Plavel pack** Notes: **Started at 13"**

Remaining Presoak:

Test Hole: **P6** Hole Diameter (d): **8** Pipe Diameter (d_1): **4** Depth (D): **24"** Soil Type: **Light Clay Loam**

Trial Number	Start Time (T_0)	Initial Water Level (inches) (X_0)	Time Read (T_1)	Final Water Level (Inches) (X_1)	Time Interval (minutes) (T)	Water Drop (inches) (ΔX)	Percolation Rate	
							Inches per Hour	Minutes per Inch
1	11:43:00 AM	3.000	12:15:00 PM	8.750	32.00	5.750	10.781	5.6
2	12:16:00 PM	3.000	12:46:00 PM	7.375	30.00	4.375	8.750	6.9
3	12:46:00 PM	3.000	1:16:00 AM	6.875	30.00	3.875	7.750	7.7
4	1:16:00 AM	3.000	1:46:00 AM	6.875	30.00	3.875	7.750	7.7
5	1:46:00 AM	3.000	2:16:00 AM	5.875	30.00	2.875	5.750	10.4
6	2:16:00 AM	3.000	2:46:00 AM	5.750	30.00	2.750	5.500	10.9
7								
8								
9								
10								
11								
12								

Adjustment Factor: **1.05** Adjusted Stabilized Rate: **11.5** Maximum Application Rate:

Adjustment Rate Method: **Plavel pack** Notes: **Started at 9"**

Remaining Presoak:

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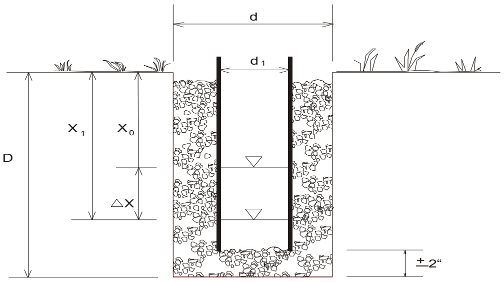
PERCOLATION TEST DATA



Project Number:	**2000131**	Date:	**2/24/2021**
Project Name:	**Coast Guard 2020**	Test by:	**MFW, ERW**
Location:	**Pt. Reyes, Ca**	Checked by:	**BG (EHS)**

Test Hole: **P7** Hole Diameter (d): **9** Pipe Diameter (d_1): **4** Depth (D): **36"** Soil Type: **Light Clay Loam**

Trial Number	Start Time (T_0)	Initial Water Level (inches) (X_0)	Time Read (T_1)	Final Water Level (Inches) (X_1)	Time Interval (minutes) (T)	Water Drop (inches) (ΔX)	Percolation Rate	
							Inches per Hour	Minutes per Inch
1	11:42:00 AM	3.000	12:12:00 PM	8.750	30.00	5.750	11.500	5.2
2	12:14:00 PM	3.000	12:44:00 PM	7.500	30.00	4.500	9.000	6.7
3	12:44:00 PM	3.000	1:14:00 AM	6.875	30.00	3.875	7.750	7.7
4	1:14:00 AM	2.000	1:44:00 AM	6.875	10.00	4.875	29.250	2.1
5	1:44:00 AM	3.000	2:14:00 AM	6.625	10.00	3.625	21.750	2.8
6	2:14:00 AM	3.000	2:44:00 AM	6.625	10.00	3.625	21.750	2.8
7								
8								
9								
10								
11								
12								

Adjustment Factor: **1.05** Adjusted Stabilized Rate: **2.9** Maximum Application Rate:

Adjustment Rate Method: **Plavel pack** Notes: **Starting at 9"**

Remaining Presoak:

Test Hole: **P8** Hole Diameter (d): **9** Pipe Diameter (d_1): **4** Depth (D): **40"** Soil Type: **Light Clay Loam**

Trial Number	Start Time (T_0)	Initial Water Level (inches) (X_0)	Time Read (T_1)	Final Water Level (Inches) (X_1)	Time Interval (minutes) (T)	Water Drop (inches) (ΔX)	Percolation Rate	
							Inches per Hour	Minutes per Inch
1	11:41:00 AM	3.000	12:11:00 PM	DRY	31.00	6.000	11.613	5.2
2	12:12:00 PM	3.000	12:42:00 PM	DRY	30.00	6.000	12.000	5.0
3	12:43:00 PM	3.000	1:13:00 AM	DRY	31.00	6.000	11.613	5.2
4	1:13:00 AM	3.000	1:23:00 AM	8.375	20.00	5.375	16.125	3.7
5	1:24:00 AM	3.000	1:34:00 AM	7.625	20.00	4.625	13.875	4.3
6	1:35:00 AM	3.000	1:45:00 AM	7.625	10.00	4.625	27.750	2.2
7								
8								
9								
10								
11								
12								

Adjustment Factor: **1.05** Adjusted Stabilized Rate: **2.3** Maximum Application Rate:

Adjustment Rate Method: **Plavel pack** Notes: **Starting at 9"**

Remaining Presoak:

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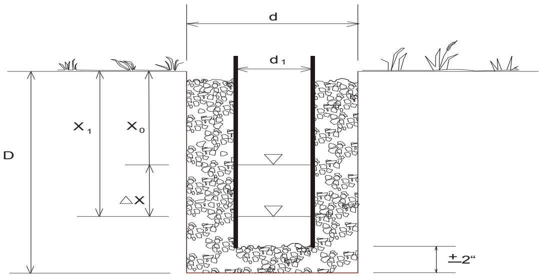
PERCOLATION TEST DATA

Project Number: **2000131**
Project Name: **Coast Guard 2020**
Location: **Pt. Reyes, Ca**

Date: **2/24/2021**
Test by: **MFW, ERW**
Checked by: **BG (EHS)**



Test Hole: **P9** Hole Diameter (d): **9** Pipe Diameter (d_1): **4** Depth (D): **24"** Soil Type: **Clay Loam**

Trial Number	Start Time (T_0)	Initial Water Level (inches) (X_0)	Time Read (T_1)	Final Water Level (Inches) (X_1)	Time Interval (minutes) (T)	Water Drop (inches) (ΔX)	Percolation Rate	
							Inches per Hour	Minutes per Inch
1	12:07:00 PM	8.000	12:38:00 PM	DRY	31.00	6.000	11.613	5.2
2	12:39:00 PM	8.000	1:09:00 AM	13.875	30.00	5.875	11.750	5.1
3	1:10:00 AM	8.000	1:41:00 AM	14 (WET/DRY	31.00	6.000	11.613	5.2
4	1:41:00 AM	8.000	2:01:00 AM	13.000	20.00	5.000	15.000	4.0
5	2:03:00 AM	8.000	2:23:00 AM	12.875	20.00	4.875	14.625	4.1
6								
7								
8								
9								
10								
11								
12								

Adjustment Factor: **1.05** Adjusted Stabilized Rate: **4.3** Maximum Application Rate:

Adjustment Rate Method: **Plavel pack** Notes: **Started at 14"**

Remaining Presoak:

Test Hole: **10** Hole Diameter (d): **9** Pipe Diameter (d_1): **4** Depth (D): **12"** Soil Type: **Clay Loam**

Trial Number	Start Time (T_0)	Initial Water Level (inches) (X_0)	Time Read (T_1)	Final Water Level (Inches) (X_1)	Time Interval (minutes) (T)	Water Drop (inches) (ΔX)	Percolation Rate	
							Inches per Hour	Minutes per Inch
1	12:06:00 PM	3.000	12:36:00 PM	9 (wet/dry)	30.00	6.000	12.000	5.0
2	12:37:00 PM	1.250	1:07:00 AM	8.938	30.00	7.688	15.376	3.9
3	1:07:00 AM	3.000	1:37:00 AM	8.875	30.00	5.875	11.750	5.1
4	1:40:00 AM	2.000	2:00:00 AM	8.125	20.00	6.125	18.375	3.3
5	2:02:00 AM	2.750	2:32:00 AM	8.875	30.00	6.125	12.250	4.9
6	2:33:00 AM	2.750	3:03:00 AM	8.875	30.00	6.125	12.250	4.9
7								
8								
9								
10								
11								
12								

Adjustment Factor: **1.05** Adjusted Stabilized Rate: **5.1** Maximum Application Rate:

Adjustment Rate Method: **Plavel pack** Notes:

Remaining Presoak:

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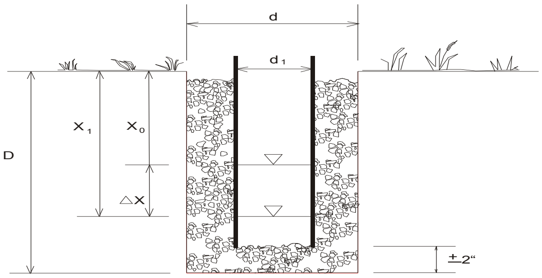
PERCOLATION TEST DATA

Project Number: **2000131** Date: **2/24/2021**
Project Name: **Coast Guard 2020** Test by: **MFW, ERW**
Location: **Pt. Reyes, Ca** Checked by: **BG (EHS)**



Test Hole: **P11** Hole Diameter (d): **8** Pipe Diameter (d_1): **4** Depth (D): **24"** Soil Type: **Gravelly Clay Loam**

Trial Number	Start Time (T_0)	Initial Water Level (inches) (X_0)	Time Read (T_1)	Final Water Level (Inches) (X_1)	Time Interval (minutes) (T)	Water Drop (inches) (ΔX)	Percolation Rate	
							Inches per Hour	Minutes per Inch
1	12:04:00 PM	3.000	12:34:00 PM	9 (DRY)	30.00	6.000	12.000	5.0
2	12:34:00 PM	3.000	1:04:00 AM	9 (DRY)	30.00	6.000	12.000	5.0
3	1:04:00 AM	3.000	1:17:00 AM	9 (DRY)	13.00	6.000	27.692	2.2
4	1:18:00 AM	3.000	1:32:00 AM	9 (DRY)	14.00	6.000	25.714	2.3
5	1:32:00 AM	3.000	1:46:00 AM	9 (DRY)	14.00	6.000	25.714	2.3
6	1:46:00 AM	3.000	1:56:00 AM	9 (DRY)	10.00	6.000	36.000	1.7
7	1:57:00 AM	3.000	2:08:00 AM	9 (DRY)	11.00	6.000	32.727	1.8
8	2:09:00 AM	3.000	2:18:00 AM	9 (DRY)	9.00	6.000	40.000	1.5
9	2:18:00 AM	3.000	2:26:00 AM	9 (DRY)	8.00	6.000	45.000	1.3
10	2:28:00 AM	2.250	2:40:00 AM	9 (DRY)	12.00	6.750	33.750	1.8
11	2:41:00 AM	2.500	2:51:00 AM	8.750	10.00	6.250	37.500	1.6
12	2:53:00 AM	2.500	3:03:00 AM	8.750	10.00	6.250	37.500	1.6

Adjustment Factor: **1.05** Adjusted Stabilized Rate: **1.7** Maximum Application Rate:

Adjustment Rate Method: **Plavel pack** Notes: **Starting at 9"**

Remaining Presoak:

Test Hole: **P12** Hole Diameter (d): **9** Pipe Diameter (d_1): **4** Depth (D): **24"** Soil Type: **Light Sily Clay Loam**

Trial Number	Start Time (T_0)	Initial Water Level (inches) (X_0)	Time Read (T_1)	Final Water Level (Inches) (X_1)	Time Interval (minutes) (T)	Water Drop (inches) (ΔX)	Percolation Rate	
							Inches per Hour	Minutes per Inch
1	11:47:00 AM	1.500	12:23:00 PM	8.000	36.00	6.500	10.833	5.5
2	12:24:00 PM	2.000	12:54:00 PM	8.000	30.00	6.000	12.000	5.0
3	12:55:00 PM	2.000	1:25:00 AM	8.000	30.00	6.000	12.000	5.0
4	1:25:00 AM	2.000	1:55:00 AM	DRY	30.00	6.000	12.000	5.0
5	1:55:00 AM	2.000	2:05:00 AM	5.500	10.00	3.500	21.000	2.9
6	2:06:00 AM	2.000	2:35:00 AM	7.250	29.00	5.250	10.862	5.5
7	2:36:00 AM	2.000	3:06:00 AM	7.375	30.00	5.375	10.750	5.6
8								
9								
10								
11								
12								

Adjustment Factor: **1.03** Adjusted Stabilized Rate: **5.9** Maximum Application Rate:

Adjustment Rate Method: **Plavel pack** Notes: **Starting at 8"**

Remaining Presoak:

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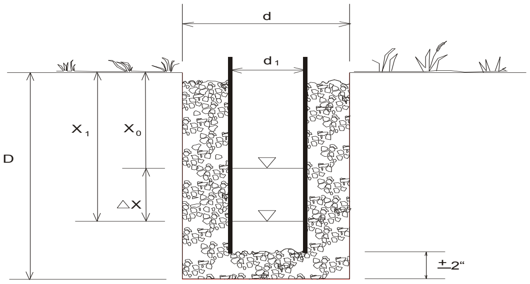
PERCOLATION TEST DATA

Project Number: **2000131**
Project Name: **Coast Guard 2020**
Location: **Pt. Reyes, Ca**

Date: **2/24/2021**
Test by: **MFW, ERW**
Checked by: **BGT (EHS)**



Test Hole: **P13** Hole Diameter (d): Pipe Diameter (d_1): **4** Depth (D): **40"** Soil Type: **Sandy Clay Loam**

Trial Number	Start Time (T_0)	Initial Water Level (inches) (X_0)	Time Read (T_1)	Final Water Level (Inches) (X_1)	Time Interval (minutes) (T)	Water Drop (inches) (ΔX)	Percolation Rate	
							Inches per Hour	Minutes per Inch
1	11:59:00 AM	9.000	12:29:00 PM	DRY	30.00	6.000	12.000	5.0
2	12:30:00 PM	8.500	1:00:00 AM	DRY	30.00	7.000	14.000	4.3
3	1:00:00 AM	9.000	1:20:00 AM	3 (WET/DRY)	20.00	8.000	24.000	2.5
4	1:22:00 AM	9.000	1:42:00 AM	2.750	20.00	9.000	27.000	2.2
5	1:43:00 AM	9.000	2:04:00 AM	2.625	21.00	10.000	28.571	2.1
6	2:05:00 AM	9.000	2:25:00 AM	3.375	20.00	11.000	33.000	1.8
7	2:26:00 AM	9.000	2:48:00 AM	2.500	22.00	12.000	32.727	1.8
8								
9								
10								
11								
12								

Adjustment Factor: **1.05** Adjusted Stabilized Rate: **1.9** Maximum Application Rate:

Adjustment Rate Method: **Plavel pack** Notes: **Starting at 15"**

Remaining Presoak:

Test Hole: Hole Diameter (d): Pipe Diameter (d_1): Depth (D): Soil Type:

Trial Number	Start Time (T_0)	Initial Water Level (inches) (X_0)	Time Read (T_1)	Final Water Level (Inches) (X_1)	Time Interval (minutes) (T)	Water Drop (inches) (ΔX)	Percolation Rate	
							Inches per Hour	Minutes per Inch
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

Adjustment Factor: Adjusted Stabilized Rate: **#N/A** Maximum Application Rate:

Adjustment Rate Method: Notes:

Remaining Presoak:

APPENDIX H

WASTEWATER BASIS OF DESIGN REPORT

SHERWOOD
DESIGN ENGINEERS

1525 SEABRIGHT AVENUE, SANTA CRUZ, CA 95062
(831) 426-9054 | WWW.SHERWOODENGINEERS.COM

Pt. Reyes Coast Guard Housing Site Redevelopment
Onsite Wastewater Basis of Design Report

June 9, 2022

To: Jeremy Hoffman
Eden Housing
Associate Director of Real Estate Development
Jeremy.Hoffman@edenhousing.org

Stacey Laumann
Community Land Trust Association of West Marin
Deputy Director
stacey@clam-ptreyes.org

Prepared By: Kelly Archer, EIT
Reviewed By: Allison Good, MS, PE; Carina Chen, MS, PE

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1.0 PROJECT DESCRIPTION

This basis of design (BOD) report is intended to outline the design criteria for a water reuse facility (WRF) at the Pt. Reyes Coast Guard Housing Site Redevelopment project (Project) in Pt. Reyes Station, CA. The Point Reyes Former Coast Guard Station is in the process of being redeveloped to support an affordable housing project, a community-based center, and administrative offices for property management and resident services.

Sherwood Design Engineers (SDE) has prepared a proposed wastewater management approach for the project that would include the installation of a new enhanced wastewater treatment system to produce high-quality effluent that can be reused for landscape irrigation around the site. The plan would also utilize new leach fields that would be used as a backup disposal system during periods of rainfall or when the irrigation system is being maintained.

2.0 WASTEWATER SUPPLY

SDE prepared a flow analysis memorandum (Appendix A) that outlines the historical water usage at the site, the proposed program, and the projected wastewater flow for the maximum occupancy day. The proposed program was provided by CLAM and Eden Housing and wastewater unit flow rates for each type of occupancy (residential, staff, visitors, meals) were sourced from the Marin County Regulations, or in the case of residential water demand, was negotiated with the County.

Based on proposed programming, approximately 8,600 gallons per day (gpd) and 8,800 gallons per day (gpd) of wastewater will be generated at the site under normal and full occupancy conditions, respectively. As a precautionary measure, the treatment and disposal systems will be sized for a 10,000 gpd daily flow, which represents a factor of safety of 1.1.

A wastewater treatment capacity of 10,000 gpd will provide enough capacity for all residents and staff as well as up to 180 visitors. During large special events, when the number of visitors is anticipated to exceed 180, portable toilets are proposed to be brought on site to manage additional sanitary waste and maintain wastewater flow to stay at or below 10,000 gpd.

3.0 TREATMENT GOALS

To protect groundwater at the site and create a reliable supply of non-potable water for irrigation needs, the wastewater treatment system will be designed to meet the State’s Recycled Water Standards established in California Code of Regulations, Title 22 for disinfected tertiary treatment. The treatment system will be designed to produce disinfected tertiary treated recycled water that will have a biochemical oxygen demand (BOD), total suspended solids (TSS), and total nitrate level to less than 10 mg/L. 10 mg/L is the primary drinking water standard for nitrates, a pollutant of concern for groundwater. In addition, SDE recommends advanced oxidation to remove trace contaminants including pharmaceuticals and other contaminants of emerging concern.

With tertiary treatment proposed for beneficial reuse, the San Francisco Bay Regional Water Quality Control Board (Regional Board) is the lead regulatory agency that would oversee and permit this project. The proposed wastewater system will require a Report of Waste Discharge and Form 200 and a Title 22 Engineering Report as part of the application process to meet the Waste Discharge Requirements of the State. Additionally, the recycled water must meet effluent limits set by the State Water Resources Control Board Order WQ 2014-0153-DWQ “General Waste Discharge Requirements for Small Domestic Wastewater Treatment Systems” (2014 WDR General Order). The treatment goals for the proposed system included in Table 1.

Table 1. Treatment Goals

Parameter	Unit	Treatment Goal
BOD	mg/L	10
TSS	mg/L	10
Total Nitrate	mg/L	10
Bacteria	-	5-log removal (99.999%)
Cysts (Giardia/Cryptosporidium)	-	5-log removal (99.999%)
Viruses	-	5-log removal (99.999%)

4.0 PROPOSED APPROACH AND CONCEPT PLAN

SDE prepared a conceptual water reuse facility design for the anticipated wastewater characterization, flow, and treatment requirements. Conceptual design plans for the proposed system are included as Appendix B.

4.1 Influent Characterization and Flow

Based on the wastewater supply calculations found in Section 2, the wastewater treatment system and reuse and disposal systems are sized for design flow of 10,000 gpd.

Characterization of the raw wastewater is critical to designing primary and secondary treatment processes. The existing buildings will be upgraded to meet water efficiency standards, leading to higher strength wastewater than what is existing. The anticipated raw wastewater characterization is presented in Table 2.

Table 2. Influent Characterization of Residential Wastewater

Water Quality Parameter	Raw Wastewater Concentration (mg/L)[1]
BOD	400
TSS	350
TKN	85

1. Crites and Tchobanoglous (1998) *Small & Decentralized Wastewater Management Systems.* Table 4-14.

4.2 Collection System

A Closed-Circuit Television Video (CCTV) survey of the existing collection system is underway to provide a comprehensive assessment of the system's health. If any issues are observed, appropriate improvements will be included in future design plans. For example, if the CCTV indicates evidence of inflow and infiltration, either the collection system will be replaced, or the wastewater treatment plant and dispersal/disposal areas will be expanded. These alternatives will need to be evaluated at a later date.

Depth to groundwater measurements in monitor well CG-4 shows that groundwater is higher than the manhole #2 invert elevation for at least part of the year, suggesting inflow and infiltration (I&I) is possible. However, construction drawings show that in 2009 the main sewer line was replaced with high-density polyethylene (HDPE) pipe and the manholes were replaced. The 2009 drawings include a detail of the sump manhole and specifies construction with waterproof interior and exterior coatings, watertight connections to pipes, and Thorosealed seams, all of which reduce I&I. This type of manhole construction was likely the standard practice at this site during this time period.

SDE recommends continued monitoring of DTW in monitor wells for use in evaluating the potential for I&I into sewer pipes and manholes.

4.3 Wastewater Treatment

The proposed treatment train is designed to provide a very high level of treatment to protect groundwater resources at the site, to allow for reuse of the water, and ensure reliable effluent quality. A schematic of the proposed treatment train is included in
Figure 1.

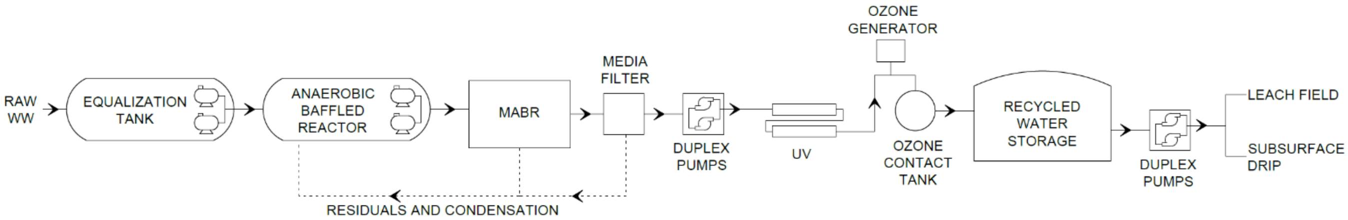

Figure 1. Proposed WRF Treatment Schematic

Equalization

An equalization (EQ) tank is proposed to equalize the variable flows coming into the treatment system to provide a constant flow rate to the downstream treat units. A duplex submersible pump system will be inside the EQ tank to pump wastewater into the next treatment process at a metered, equalized rate. The EQ tank is sized to store up to 8 hours of influent if the treatment system is down. Using a typical residential hourly wastewater flow pattern, the maximum 8-hr inflow is 4,350 gallons, which occurs between the hours of 2 pm and 10 pm. A 5,000-gallon, 8-ft diameter underground fiberglass tank was selected to store this volume. This tank will be double-walled to provide secondary containment.

Anaerobic Baffled Reactor

The first step in the treatment process is an anaerobic baffled reactor (ABR). An ABR is an improved septic tank with a series of baffles under which the wastewater flow is vertical through the last three chambers. In this flow configuration the wastewater is in direct contact with the active biomass (sludge) results in improved treatment. The ABR is designed to have a total hydraulic residence time of 48 hours and four chambers with an upflow velocity of no more than 1.5 feet per hour in the last three chambers. A 20,000-gallon, 10-ft diameter underground fiberglass tank was selected to accommodate average and maximum occupancy wastewater flows. This tank will be double-walled to provide secondary containment.

Secondary Biological Treatment

After primary treatment in the ABR, secondary treatment is accomplished through biological treatment. A membrane aerated biofilm reactor (MABR) treatment system is a high rate, compact biological treatment system that can provide a very high level of treatment. MABRs can be constructed and delivered in shipping containers that minimize the total equipment footprint. Waste activated sludge from the MABR will be discharged into the ABR.

The MABR system is designed to reduce the carbonaceous and nitrogenous compounds in the wastewater. The MABR system selected is manufactured by Fluence Corporation and is sized to reduce the biochemical oxygen demand (BOD), the total suspended solids (TSS) and total nitrogen (TN) to less than 10 mg/L, respectively.

The MABR, which will have an approximate footprint of 8-ft by 40-ft, does not need to be protected by a building. A screen or fence can be constructed around the MABR for security and aesthetic purposes.

Tertiary Filtration and Disinfection

Effluent from the MABR will flow through a deep bed multi-media filter for final tertiary filtration. The tertiary filter will include a polymer feed system to enhance remove of solids in the wastewater. Tertiary filtration will remove fine and suspended solids to improve the disinfection of the effluent through the UV disinfection system and ozone oxidation system. The media filter is included in the MABR skid.

To provide the maximal protection to the local groundwater, SDE is proposing two levels of disinfection and oxidation to the treatment train. After the multi-media filter, effluent will flow through two closed-vessel ultraviolet (UV) light disinfection units and an ozone contactor. The two UV units will be plumbed in series with the ability to take one unit offline for maintenance while keeping the other unit in operation. Advanced oxidation will be provided by ozone treatment system that is sized to remove trace contaminants, including pharmaceuticals and other emerging contaminants of concern. If the ozone system if offline for maintenance, the system can be manually programmed to send flows to the leach fields instead of the irrigation system.

It is recommended that the tertiary filtration and disinfection equipment be housed in a treatment building for security and protection from the elements. The treatment building can also house the control panel.

Storage

SDE is proposing that the treated effluent be stored in an above ground tank (called the “recycled water storage tank”). From this tank, the effluent can either flow via gravity to the new leach fields or be pumped into the subsurface drip irrigation system. The storage capacity is sized to provide one day of recycled water storage, which equates to 10,000 gallons. SDE is recommending a 10,000-gallon above ground HDPE storage tank.

4.4 Recycled Water Reuse and Disposal

For reuse and disposal of the treated wastewater, SDE recommends that the site include 100% dispersal of the maximum day flow via subsurface drip dispersal (SSD) as the primary means of water reuse and 100% disposal via leach fields as secondary disposal. This would provide 200% disposal for the site as required by Marin County Environmental Health Services (MCEHS) code.

Primary Dispersal – Recycled Water Reuse via Subsurface Drip

Landscape irrigation via subsurface drip (SSD) is currently proposed for primary method of irrigation and reuse of recycled water. The SSD system will comply with the setbacks established by the MCEHS including setbacks from buildings, water lines, paved areas, and culverts. The subsurface drip dispersal areas will not encroach within the biological resource setback/buffer areas.The MCEHS requires a minimum setback of 150 ft from municipal wells. Due to adjacent riparian and wetland setbacks, the drip dispersal system design on this project will exceed this requirement, with a setback of at least 200 ft from the nearby NMWD municipal wells. SSD systems can be used year-round except during rain events.

The minimum depth to groundwater in the proposed irrigated areas was greater than 4.5 feet below ground surface.[1] SSD systems are placed at approximately 1.5 ft below ground surface which results in greater than 3-ft separation between the SSD to groundwater. The site has soils with an average percolation rate of greater than 5 minutes per inch[1] and Marin County septic regulations allow a minimum depth to groundwater of 3 feet for a conventional septic system with these soil characteristics. The water being used for irrigation at this site is also provided supplemental treatment, for which Marin County regulations allow minimum depth to seasonal high groundwater of 2 ft for SSD.

Sizing the SSD system can be determined either by soil application rates (SAR) or irrigation demand. The two approaches are discussed below. Additional coordination with the landscape architect and irrigation designer will be required prior to finalizing the design of this system.

a. Soil Application Rate

SSD systems are typically designed based on the local soil conditions using a soil application rate (SAR). Soils investigation of the site indicate a SAR of 0.4 gpd per square foot (gpd/sf) for the soils in the building area. An SSD system sized to accommodate the maximum occupancy day flow of 10,000 gpd using a SAR of 0.4 gpd/sf would require 25,000 sf.

Detail 1 of Sheet WW2.0 in Appendix B includes a conceptual layout of the SSD fields using this approach. Given the ample landscaped area on the site, this approach is considered achievable. The vegetation plants within SSD fields must be able to tolerate the level of soil saturation expected equivalent to 0.4 gpd/sf.

b. Irrigation Demand

Recycled water can be used for landscaping irrigation to reuse the treated water in a beneficial manner and to reduce potable water demand onsite. A conceptual landscape plan was prepared by Bay Tree Design, which identified a total of 121,000 sf of planting areas. This area is included in Detail 2 of Sheet WW2.0 in Appendix B.

Irrigation demand is estimated using historical precipitation reference evapotranspiration (ET_0) data. The closest climate station with daily precipitation data is the National Oceanic and Atmospheric Administration's (NOAA) station in Bolinas, CA, which dates to 2014. The closest climate station with daily ET_0 is in Black Point, CA, near Novato, and is run by the California Department of Water Resources through their California Irrigation Management Information System (CIMIS). ET_0 is determined using the Modified Penman Equation which uses climate information such as temperature, vapor pressure, and wind speed.

Reference irrigation demand is determined by subtracting ET_0 from precipitation on a daily time step. If precipitation is greater than ET_0, then irrigation is zero. The sum of reference irrigation demand for each month between the December 2014 and February 2022 was calculated and the average for each month is used to project irrigation demand at the Site. Monthly irrigation demand is included in Table 3.

Reference irrigation demand is multiplied by a plant factor to determine the irrigation demand. A plant factor of 1.0 was used in this analysis, which represents water demand for turf grass and other similar plant species. (The plant factor will likely be adjusted based on the final landscape plan that has not yet been prepared for the site.)

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[1] Questa Engineering Corp., May 2, 2022. "Draft Groundwater and Soils Investigation for Onsite Wastewater Facilities"

Table 3. Monthly Irrigation Demand

Month	**Reference Irrigation Demand (in/month)**	**Irrigation Demand (gal/month)**	**Average Daily Irrigation Demand (gpd)**	**Percent of Design Flow (%)**	**Equivalent SAR (gpd/sf)**
January	1.00	75,140	2,424	24%	0.02
February	0.91	68,635	2,451	25%	0.02
March	1.43	107,963	3,483	35%	0.03
April	2.50	188,558	6,285	63%	0.05
May	4.01	302,124	9,746	97%	0.08
June	5.54	417,738	13,925	139%	0.12
July	6.76	509,754	16,444	164%	0.14
August	6.89	519,451	16,756	168%	0.14
September	6.22	469,241	15,641	156%	0.13
October	5.16	389,184	12,554	126%	0.10
November	3.57	269,477	8,983	90%	0.07
December	1.73	130,105	4,197	42%	0.03
Annual Total	**45.71 in**	**3,447,372 gal**	-		

In the summer, 100% of recycled water supply will be used for irrigation and potable water may be needed to supplement depending on the final landscape plan and plants selected. In the winter months, irrigation will only consume 25% of the recycled waters supply and the excess recycled water would be sent to the leach fields for disposal.

As noted above, the SAR determined by investigation of the site is 0.4 gpd/sf. Using the above irrigation analysis, the maximum equivalent SAR is 0.14 gpd/sf, 65% less than the allowable SAR. In addition to recycled water being lost to evapotranspiration, which is calculated as the irrigation demand, water will infiltrate into the soil below the root zone. This means more water can be applied to the landscape than what is calculated above.

It is assumed that the landscaped areas will be irrigated using a subsurface drip system, but other forms of irrigation can be used such that they comply with Title 22 recycled water requirements. Monthly irrigation water demand is listed in Table 3. During dry or drought year conditions the irrigation demand will increase.

c. Summary of Water Balance Analysis

The results of the water balance calculations indicate that under normal and dry water years conditions approximately 65% of the recycled water generated on site will be used to meet the landscape irrigation demand for the site. The remaining 35% will be discharged to the leachfield disposal system. Table 4 shows the total amount of recycled water generated at the site, the total amount of water used for landscape irrigation uses, and the amount discharged to the leachfields.

Table 4. Monthly Recycled Water Flows, Irrigation Demands and Leachfield Discharges

Month	**Total Monthly Flow (gallons)**	**Total Monthly Recycled Water Irrigation Demand (Gallons)**	**Total Monthly Discharge to Leachfields (gallons)**
Jan	272,800	75,140	197,660
Feb	246,400	68,635	177,765
Mar	272,800	107,963	164,837
April	264,000	62,036	201,964
May	272,800	127,991	144,809
Jun	264,000	193,919	70,081
Jul	272,800	272,800	0
Aug	272,800	272,800	0
Sep	264,000	264,000	0
Oct	272,800	272,800	0
Nov	264,000	264,000	0
Dec	272,800	130,105	142,695
Total	**3,212,000**	**2,112,189**	**1,099,811**

Secondary Disposal - Leach fields

Leach fields will serve as the secondary disposal system and will be sized to accommodate 100% of the design flow. The leach fields will be used during periods of low irrigation demand, rain events and when the subsurface drip system needs maintenance.

It is recommended the new leach fields be installed near the entrance area and placed outside the water protection zone to the maximum extent possible. Soil investigations indicate high infiltration rates in the entrance area and a SAR of 1.2 gpd/sf is used to size the leach field trenches. Assuming a depth of 24 inches and a width of 24 inches, the leach lines will have six square feet per linear foot of infiltrative area. Based on these assumptions, a total of 1,390 linear feet of leach lines are required. Trenches will be spaced at 6 ft on-center. The total required area of leach fields is 8,330 sf.

The leach lines are placed outside of applicable setbacks specified in Section 401 of the Marin County Regulations for Design, Construction and Repair of Individual Sewage Disposal Systems (Marin County Regulations). A 5 ft setback is required between adjoining property lines and the edge of the leach field. In the case of downslope property lines, the minimum horizontal distance is 25 ft. The property line south of the proposed leach field is downslope by approximately 2.5%, so a 25 ft setback is applied. All other edges of the leach field are setback by at least 5 ft from adjoining property lines.

SDE does not anticipate leach field saturation or ponding given the high quality of recycled water, which will minimize biological growth and clogging in leach trench, and the depth of groundwater (between 8' and >10' below ground surface).

Alternative Recycle Water Reuse Opportunities

In addition to using recycled water for landscape irrigation purposes, Sherwood has identified several alternative methods to reuse the recycled water on and potential off site including:

- Grassland irrigation – The hillside north of the housing has grasses, including the California native purple needlegrass. Recycled water may be used to seasonally irrigate this grassland to support its ecosystem health.
- Supplemental water for enhancement of wetland habitat(s) on the site.
- Recycled water refill station – Similar to the recycled water refill station operated by NMWD in Novato, recycled water produced at the site can be reused for beneficial purposes offsite. Operation of a fill station requires training for both the operator and the recipients per NMWD regulations.
- Toilet flushing in community area restrooms – Any new public restrooms could be dual-plumbed to use recycled water for toilet flushing, which would be readily available from the recycled water distribution main. This would represent a recycled water demand of approximately 300 to 400 gpd.
- Future recycled water supply to Pt. Reyes Station public restroom – The public restroom in Pt. Reyes Station is approximately 850 feet away from the WRF. Recycled water could potentially be used for toilet flushing at the public restroom and irrigate the landscaping around it, but NMWD does not currently allow dual plumbing in public spaces due to limited benefit and burden on testing and reporting.

Setback Requirements

Per the 2014 WDR General Order and Marin County Regulations, dispersal and disposal of disinfected tertiary recycled water must adhere to certain setbacks. All subsurface drip dispersal areas and leach fields must comply with the setbacks included in Table 5. Tanks must be setback from downslope property lines by 10’.

Table 5. Setback Requirements

Reference	Disposal Area Setback Requirements		Proposed Setback
	2014 WDR General Order[1]	Marin County Regulations[2]	
Domestic Well	100’	150’	200’
Flowing Stream	100’	100’	100’
Ephemeral Stream Drainage	50’	50’	50’
Intermittent Watercourse or Seasonal Wetland	-	75’	75’
Property Line	5’	5’	5’
Downslope Property Line	-	25’	25’
Lake or Reservoir	200’		200’
Building	-	10’	10’
Domestic Water Line	-	10’	10’
Driveway or Paved Surface	-	5’	5’
Roadside Ditch	-	25’	25’
Culvert	-	15’	15’

1. Setbacks featured are applicable to leachfields. SSD fields are not specified in the 2014 WDR General Order setback tables, so SDE is assuming SSD fields would be treated the same as leach fields.
2. Section 401 of the Marin County Regulations for Design, Construction and Repair of Individual Sewage Disposal Systems

4.5 Other Considerations

Noise Control

Noise from pumps, aeration blowers, and operations activities may need to be mitigated to meet project expectations. Depending on acoustic requirements provided by others, noise output from specific equipment can be damped using acoustic enclosures.

Solids Management

Primary solids are intended to accumulate in the ABR, although some will also accumulate in the EQ tank. All waste lines from the MABR and media filter will be sent to the ABR. Regular sludge monitoring of the EQ and ABR tanks will be conducted by the operator. The EQ and ABR tanks will be pumped as needed by a certified septic hauler registered with Marin County Environmental Health and Safety. SDE anticipates the ABR will need to be pumped once or twice a year.

Electrical Loads

The new facility will likely require a new 100-amp three-phase service for the treatment and pumping equipment. Further analysis will be required to determine the size of the new service for the system. SDE also assumes that a backup generator will be required to maintain the system operational during periodic power outages.

4.6 Operations and Monitoring

Eden Housing and CLAM will employ a certified wastewater operator to operate, monitor, maintain the WRF. Operations of the WRF will require routine visits and checks on daily basis.

Daily Visits and Inspections – A visual check of the WRF will occur daily. The operator will also remotely review the SCADA system daily.

Water Quality Monitoring – The water quality monitoring program must comply with monitoring and reporting requirements included in the State Water Resources Control Board Order WQ 2016-0068-DDW Water Reclamation Requirements for Recycled Water Use and Title 22 of the California Code of Regulations and any updates therein.[2] The operator will conduct water quality sampling on a daily and monthly basis based on the monitoring requirements listed in Table 6.

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[2] State Water Resources Control Board Order WQ 2016-0068-DDW Water Reclamation Requirements for Recycled Water Use
https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2016/wqo2016_0068_ddw.pdf

Table 6. Recycled Water Monitoring Requirements

Constituent	**Units**	**Sample Type**	**Sample Frequency**	**Reporting Frequency**
Influent TN (Influent)	mg/L	Grab	Monthly	Quarterly
Flow Rate (Effluent)	gpd	Meter	Continuous	Quarterly
BOD (Effluent)	mg/L	Grab	Monthly	Quarterly
Nitrogen Series (Effluent)[1]	mg/L	Grab	Monthly	Quarterly
Total Suspended Solids (Effluent)	mg/L	Grab	Monthly	Quarterly
Total Coliform Bacteria (downstream of disinfection units)	MPN/100 mL	Grab	Daily[2]	Quarterly
Turbidity (downstream of disinfection units)	NTU	Meter	Continuous[2]	Quarterly
UV Transmittance	mJ/cm^2	Meter	Continuous	Quarterly
Contaminants of Emerging Concern (CECs)[3]	TBD	TBD	TBD	TBD
Priority Pollutants[4]			5 years	Next annual report

1. Nitrogen series includes ammonia, Total Kjeldahl Nitrogen (TKN), Total Nitrogen (TN), nitrate, and nitrite.
2. Sampling frequency shall be specified in the Notice of Applicability or as required California Code of Regulations, Title 22 Section 60321.
3. TBD = To be determined. CEC monitoring may be required depending on results of the pending groundwater study and discussions with North Marin Water District.
4. Priority pollutants are listed in Appendix A of 40 Code of Federal Regulations (CFR) Part 423.

Reporting

A self-monitoring report that presents the results of the daily and monthly water quality test results and flow data must be submitted to Regional Water Quality Control Board on a quarterly basis. The quarterly report will be submitted no later than the fifteenth day of the following month after each quarter. In accordance with State Water Resources Control Board Order WQ 2016-0068-DDW, an Annual Report shall be submitted to the Regional Water Board by April 1st following the monitoring year. All reporting must be prepared and submitted by a certified operator.

If at any point the treatment system fails and any one of the key parameters does not meet the discharge requirements, the alarm system will notify the treatment plant operator(s) and the issue will be promptly corrected. Alarms will be installed on all major treatment steps and will be powered independently from the normal treatment plant power supply.

To protect public safety, all areas that utilize recycled tertiary water for landscape irrigation will be well marked with signage that clearly indicates as such. Signs will be posted that read, “RECYCLED WATER – DO NOT DRINK”, and combined with an internationally understood “do not drink” symbol.

Groundwater Monitoring

SDE recommends groundwater sampling and water quality analysis between the irrigated areas and NMWD wells using the existing wells CG-2 and CG-3, and two additional monitor wells CG-5 and CG-6 (see Figure 3, WW2.0, Appendix B). Groundwater in alluvium will also be monitored by collection and analysis of water samples from MW-5.

The WRF and some of the leach fields are within the 1,600-ft NMWD water protection zone. Based on recent hydrogeology findings by Questa, the WRF and leach fields are outside of the two-year time of travel boundary.[3] This boundary represents the distance from which groundwater takes 2-yrs to travel to the NMWD municipal groundwater wells.

5.0 OPINION OF PROBABLE COSTS

The Engineer's Opinion of Probable Cost is included as Appendix C. The proposed system is estimated to cost $2.26 million.

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[3] Questa Engineering Corp., May 2, 2022. "Draft Groundwater and Soils Investigation for Onsite Wastewater Facilities"

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Appendix A
Technical Memorandum

Subject: Basis for Wastewater Design Flow
Former US Coast Guard Station Housing Redevelopment
Point Reyes Station, CA

Sherwood Design Engineers (SDE) has prepared this memorandum to document the basis for the wastewater treatment system capacity for the proposed redevelopment at the Former US Coast Guard Station housing redevelopment project (the site).

Historical Water Use

A wastewater assessment completed in 1998 reported an approximate wastewater generation rate of 6,500 gpd; however, the report noted that this flow did not represent the site under full occupancy conditions.[1] This wastewater generation rate is equivalent to 54 gpd/bedroom.

The North Marin Water District (NMWD) provided historical water data for the site for the years 1986 through 2020. Electronic water use data from 2004 to 2020 is summarized in Figure 1. The historical data shows a significant reduction in water use near the year 2012, indicating a reduction in occupancy or use at the site. Therefore, this analysis uses data collected between 2004 through 2012 to estimate average and peak water demands on the site.

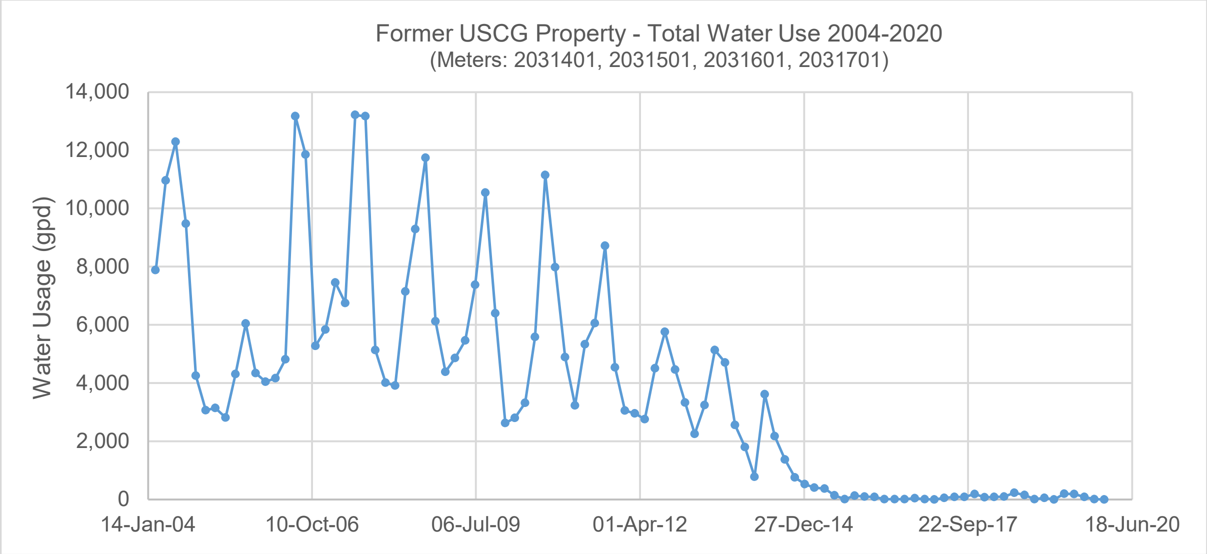

Figure 1. Historical Water Use Data

The average water usage at the site between 2004 and 2012 was 6,253 gallons per day (gpd) and the maximum water demand was approximately 13,000 gpd for this period of record. Seasonal variations exist in the historical data, with lower water demand occurring during the winter months and highest demand in summer months. The average and maximum winter (December – March) water demand between 2004 and 2012 was 4,252 gpd and 7,880 gpd, respectively. These values can be used to

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[1] Environmental Science Associates, March 1998 "U.S. Coast Guard Maintenance and Logistics Command Pacific – CAMSPAC Housing Site Wastewater System Upgrade Environmental Assessment"

provide a correlation between indoor water demand and wastewater production for the site. Based on a historic bedroom count of 130, this is equivalent to 33 gpd/bedroom on average and 61 gpd/bedroom in the maximum year.[2]

Projected Water Use and Design Wastewater System Capacity

SDE prepared a water use projection to estimate the water demand and wastewater production of the Point Reyes Housing project. The projections are based on the proposed site program and occupancies provided by CLAM and Eden Housing. The proposed project will include housing, a community center, and administrative offices. Table 1 includes a summary the program of the Project.

Table 1. Pt. Reyes Coast Guard Housing Program

Program Element	Unit	Maximum Day Occupancy
Residential[1]		
Apartments	bedroom	15
Townhomes[2]	bedroom	106
Total	bedroom	121
Staff and Community Facilities		
Number of staff[3]	FTE	15
Number of visitors[3]	Visitor	60
Meals[4]	Meals	75

1. Residential program information provided to SDE by Eden Housing on 1/3/2022
2. Proposed townhomes: three four-bedroom townhomes, 28 three-bedroom townhomes, and five two-bedroom townhomes.
3. "Coast Guard site project description revision and entitlement path" memo sent to SDE by CLAM on 1/11/22
4. Sum of staff and visitors

Wastewater flows are calculated based on the full-time residents, employees, daily visitors, and the corresponding unit flows provided by Marin County Regulations. Table 2 provides the basis for determining wastewater flows on based on a full occupancy day.

A wastewater unit flow rate of 65 gpd/bedroom for all residential units was used based on the historical flows identified above and based on discussions with staff from the County Environmental Health Department. This value is above the estimated historical wastewater flow for the site and above the mean and median of US EPA guidance on residential wastewater flows.[3] Unit wastewater flows for employees, visitors, and the kitchen were obtained from Section 601 of Marin County Regulations for Design, Construction, and Repair of Individual Sewage Disposal Systems.

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[2] Historical bedroom count provided to SDE by Eden Housing (townhomes had 106 bedrooms, dormitory had 24 beds)

[3] USEPA, February 2002 "Onsite Wastewater Treatment Systems Manual"

Table 2. Wastewater Flow Under Full Occupancy Conditions

Program Element	Value	Unit Flow	Wastewater Daily Flow (gpd)
Residential	121	65 gpd/bedroom	7,865
Staff	15	15 gpd/FTE[1]	225
Visitors	60	5 gpd/visitor[2]	300
Meals	75	5 gpd/meal[3]	375
Total			8,765

1. Sewage flow volume for “Day workers at schools and offices (per shift)”, Section 601 “Marin County Regulations for Design, Construction, and Repair of Individual Sewage Disposal Systems”
2. Sewage flow volume for “Picnic Parks (toilet wastes only), (gallons per picnicker)”, Section 601 “Marin County Regulations for Design, Construction, and Repair of Individual Sewage Disposal Systems”
3. Sewage flow volume for “Restaurant (kitchen wastes per meal served)”, Section 601 “Marin County Regulations for Design, Construction, and Repair of Individual Sewage Disposal Systems”

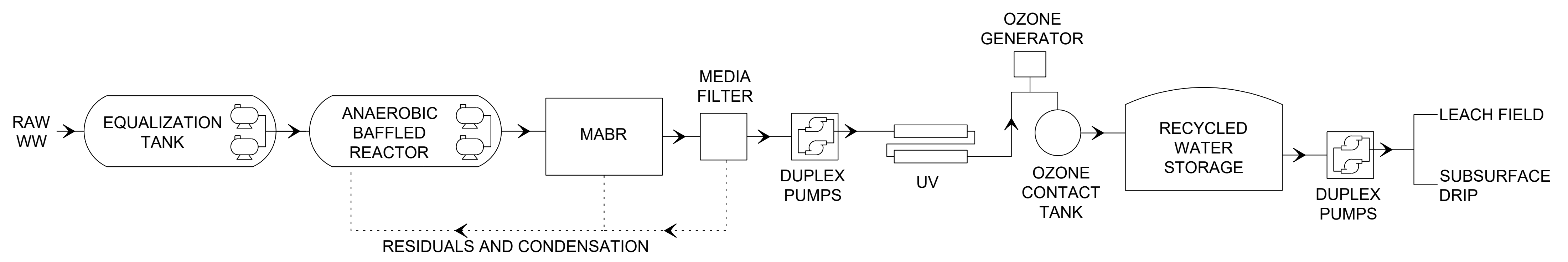
SDE estimates approximately 8,800 gallons per day (gpd) of wastewater will be generated at the project under full occupancy conditions. As an additional precautionary measure, SDE recommends a final design flow of 10,000 gpd, which equates to a factor of safety of 1.1.

The project will likely have lower then estimated wastewater flows once the project is constructed based on several factors, such as all the residential units will be retrofitted with low flow or water-efficient fixtures, the pool and hot tub will be removed, and the galley historically served more meals than what is being proposed.

Contingency for Large Events

It is anticipated that the number of visitors will not exceed sixty (60) people during most of the year. However, on a rare occasion the CLAM may host community events with more than 60 visitors. By increasing the design capacity of the wastewater system from 8,800 gpd to 10,000 gpd, the system would be able to support approximately 120 additional visitors, or approximately 180 visitors total. If more than 180 visitors are anticipated, then temporary portable toilets could be brought on site to accommodate this size of event.

During large special events with visitors exceeding 180 visitors, portable toilets could be used to manage sanitary waste and maintain average flows to the onsite wastewater system. The use of portable toilets to manage sanitary waste during infrequent special events has been accommodated at other facilities in Marin County, such as Sprit Rock Meditation Center, and is permitted by the California Regional Water Board.



1 WASTEWATER TREATMENT SCHEMATIC

DESIGN CRITERIA

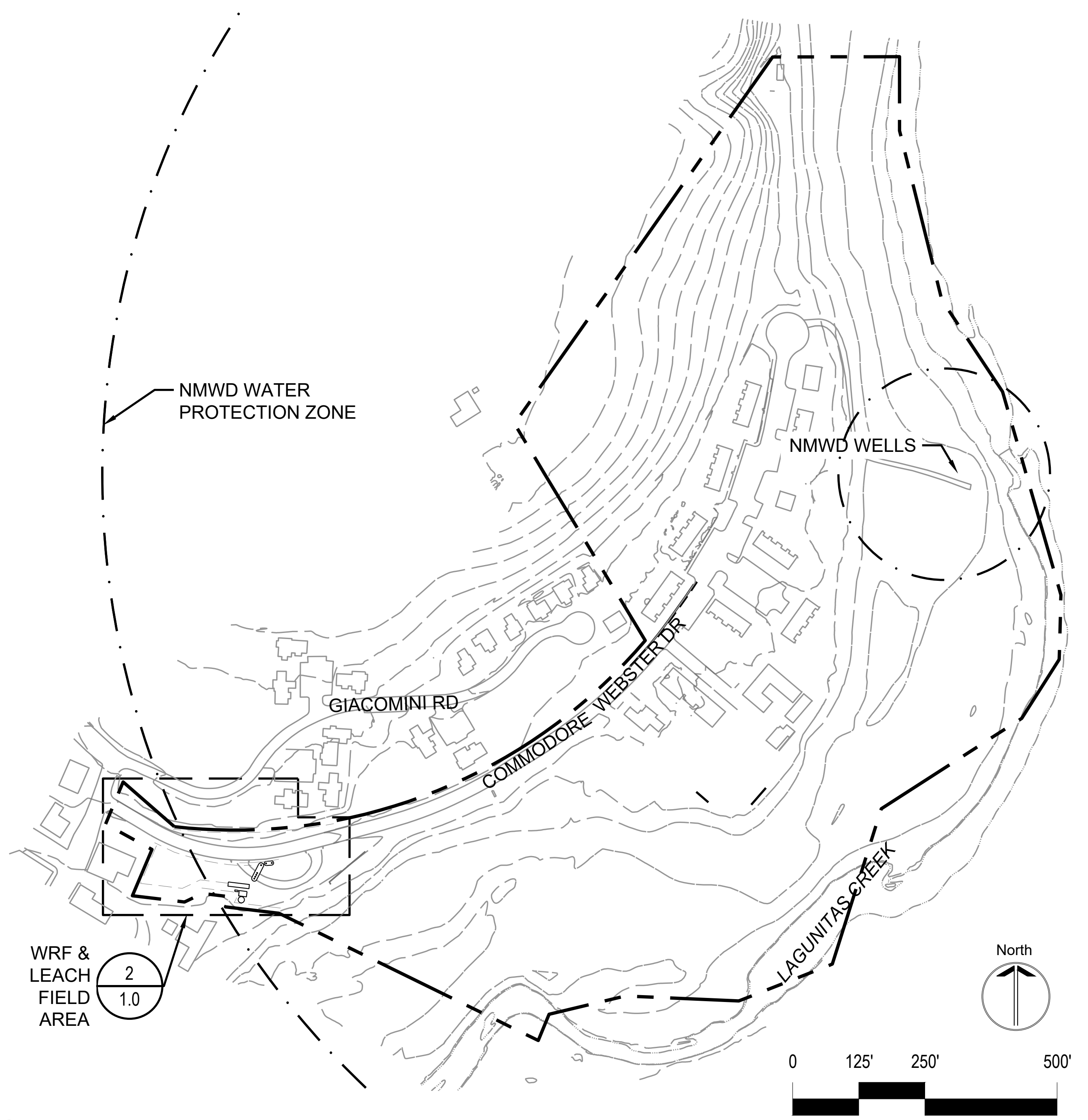
WASTEWATER PRODUCTION	
DESIGN FLOW	10,000 GPD

INFLUENT AND EFFLUENT QUALITY			
PARAMETER	UNIT	INFLUENT	EFFLUENT
BOD	MG/L	210	10
TSS	MG/L	210	10
TN	MG/L	35	10

DISPOSAL / REUSE ASSUMPTIONS	
SOIL APPLICATION RATE	1.2 GAL/SF-DAY
CLIMATE ZONE	1

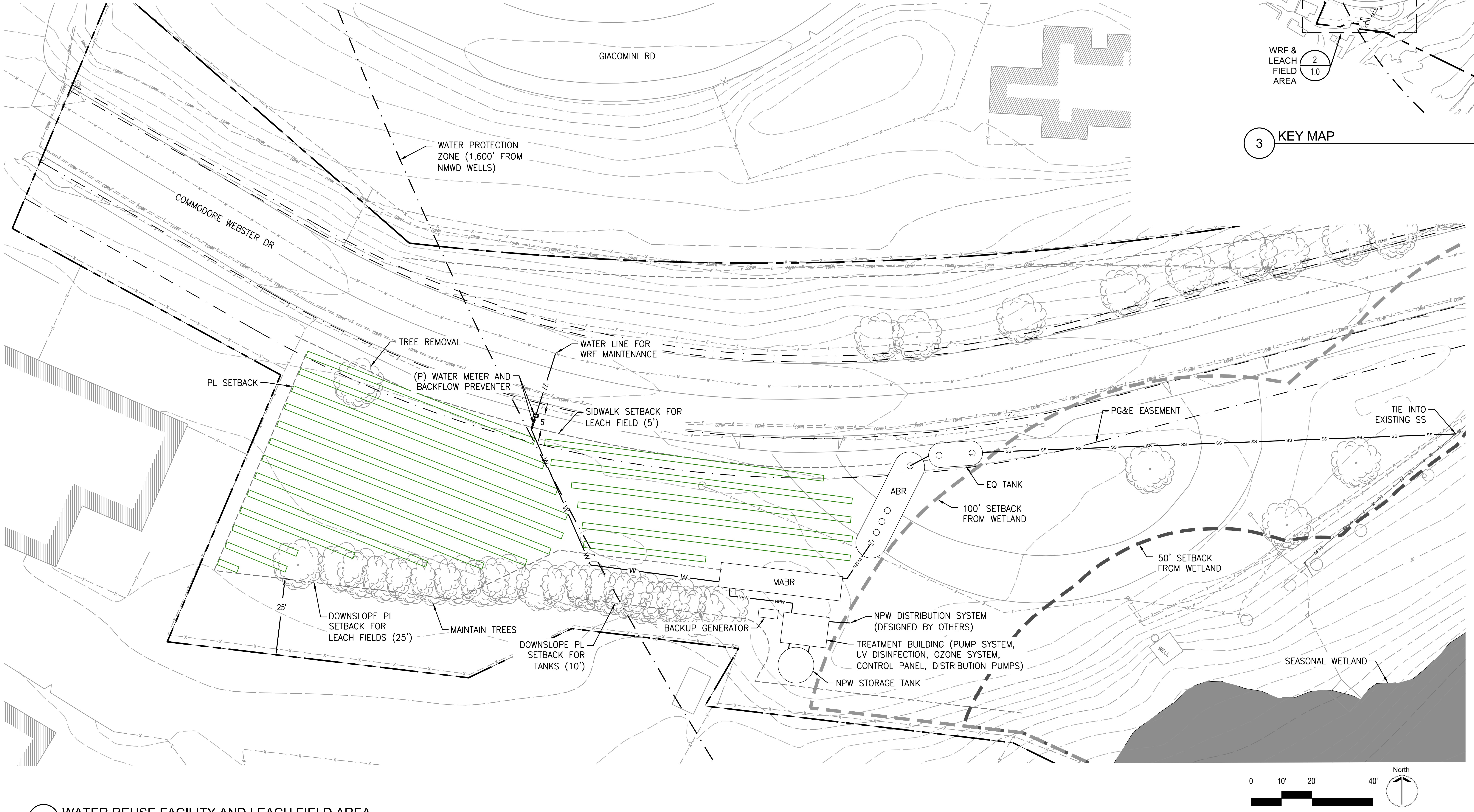
ACRONYMS

ABR	ANAEROBIC BAFFLED REACTOR
BOD	BIOCHEMICAL OXYGEN DEMAND
ESHA	ENVIRONMENTALLY SENSITIVE HABITAT AREA
EQ	EQUALIZATION
MABR	MEMBRANE AERATED BIOFILM REACTOR
NMWD	NORTH MARIN WATER DISTRICT
PL	PROPERTY LINE
SSD	SUBSURFACE DRIP
TN	TOTAL NITROGEN
TSS	TOTAL SUSPENDED SOLIDS
WRF	WATER REUSE FACILITY



3 KEY MAP

SCALE: 1" = 250'



2 WATER REUSE FACILITY AND LEACH FIELD AREA

SCALE: 1" = 20'

LEGEND

- PROPERTY LINE
- EASEMENT LINE
- (E) MAJOR CONTOUR
- (E) MINOR CONTOUR
- (E) CREEK
- (E) TREE CANOPY
- NMWD WATER PROTECTION ZONE
- EDGE OF PAVEMENT
- (E) BUILDING
- (E) AC PAVEMENT
- CCC SEASONAL WETLAND
- CORPS SEASONAL WETLAND
- PERENNIAL STREAM
- PURPLE NEEDLEGRASS GRASSLAND
- RIPARIAN WOODLAND
- LEACH LINES
- SETBACK
- EASEMENT

Project Title:

COMMUNITY LAND TRUST OF W. MARIN &
EDEN HOUSING, INC.
POINT REYES HOUSING RENEWAL
100 COMMODORE WEBSTER DR.
POINT REYES STATION, CA 04956

Design Firm:

Consultant:

SHERWOOD
DESIGN ENGINEERS
1525 Seabright Ave
Santa Cruz, CA 95062
www.sherwoodengineers.com

Stamp:

PETER H. HAASE
EXP. 12/31/22
PROGRESS PLOT

No.	Description	Date

Issue Note:

CONCEPT DESIGN

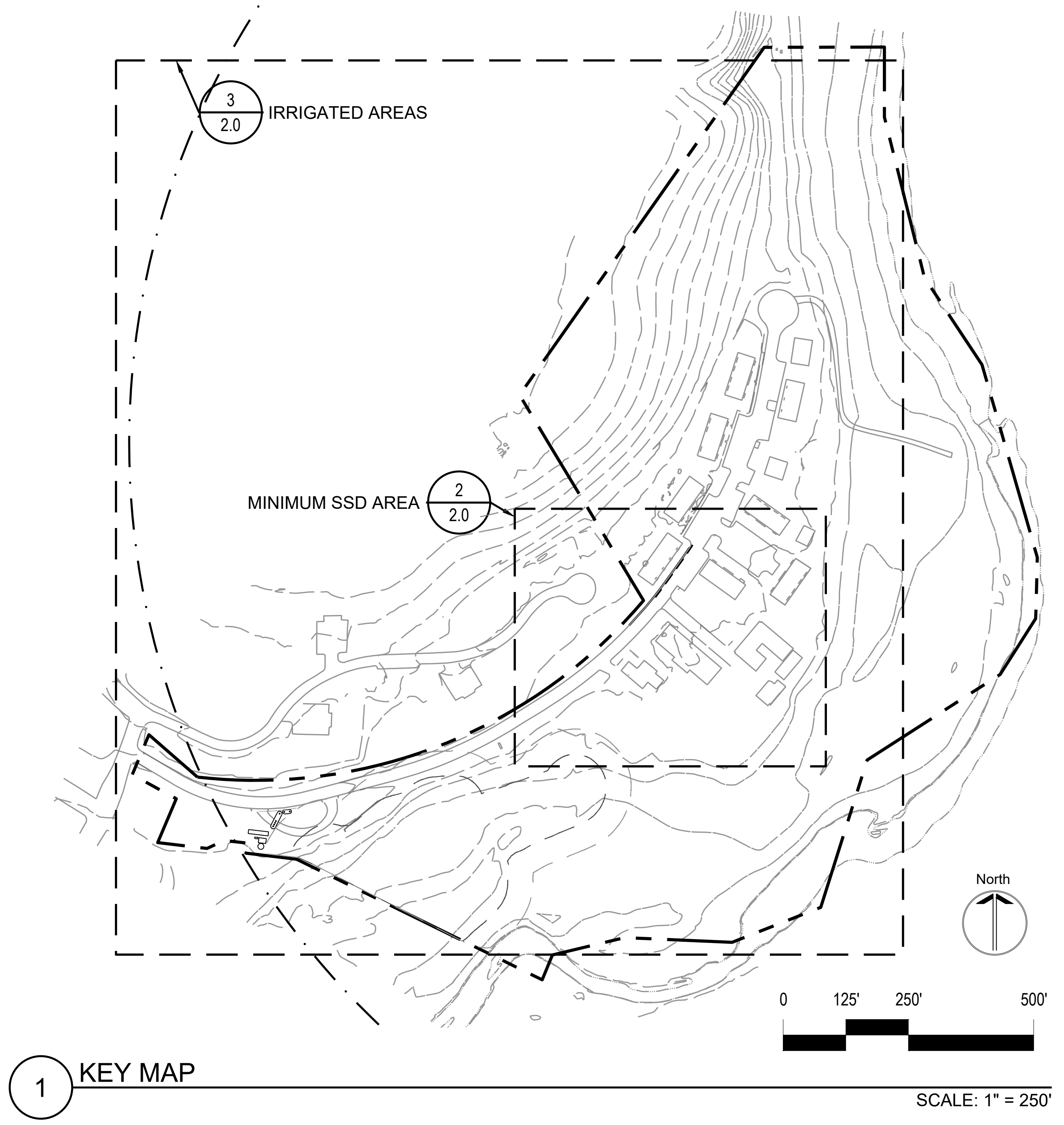
Project ID:	PRH
File Name:	
Drawn by:	KA
Checked by:	CC
Plot Date:	6/9/22
Scale:	AS SHOWN

Sheet Title:

WASTEWATER
TREATMENT PLAN

Sheet No.:

WW1.0



① KEY MAP

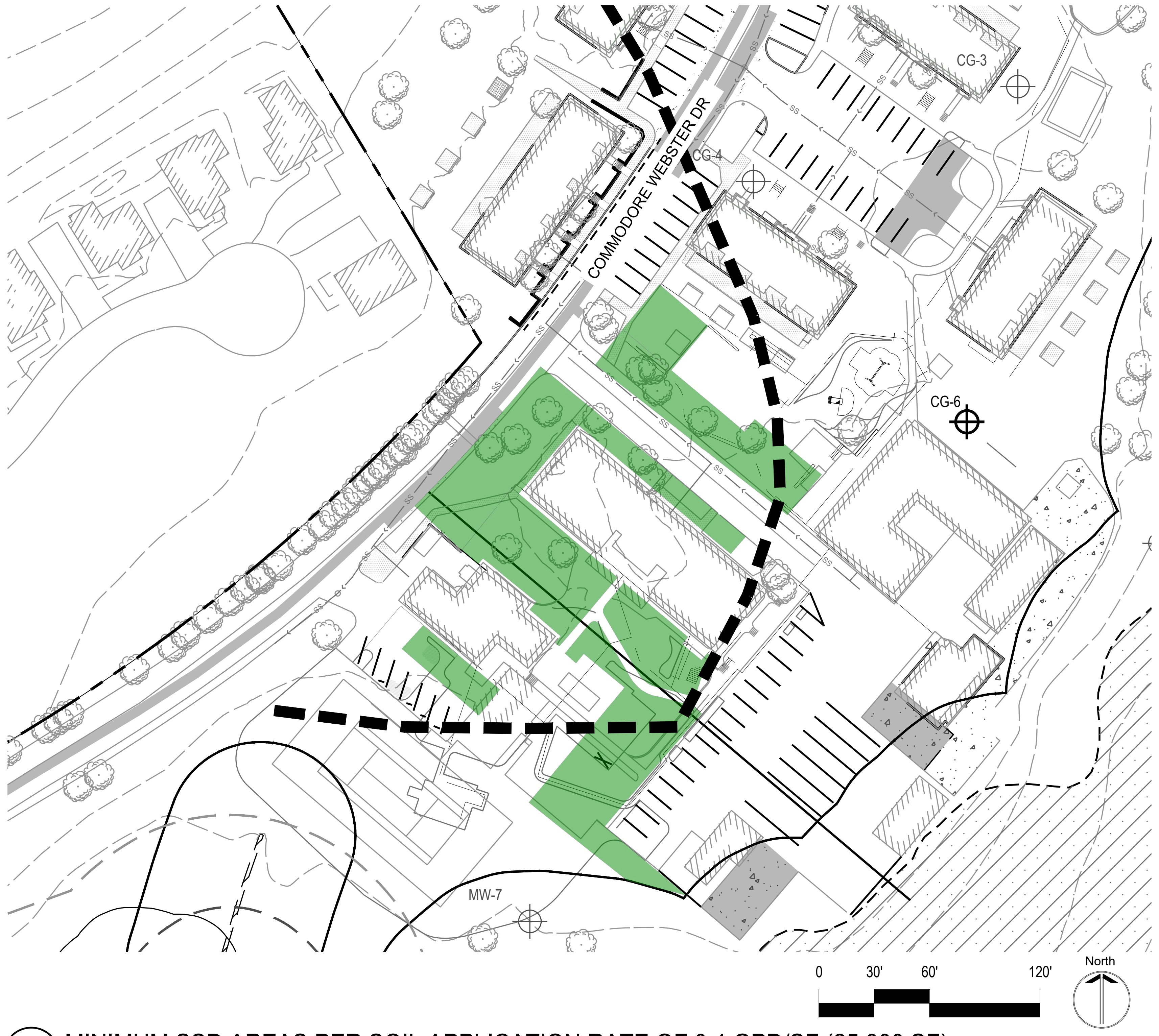
SCALE: 1" = 250'

LEGEND

- PROPERTY LINE
- EASEMENT LINE
- (E) MAJOR CONTOUR
- (E) MINOR CONTOUR
- (E) CREEK
- (E) TREE CANOPY
- NMWD WATER PROTECTION ZONE
- EDGE OF PAVEMENT
- (E) BUILDING
- (E) AC PAVEMENT
- CCC SEASONAL WETLAND
- CORPS SEASONAL WETLAND
- PERENNIAL STREAM
- PURPLE NEEDLEGRASS GRASSLAND
- RIPARIAN WOODLAND
- 🟩 SSD OR IRRIGATED AREA
- (E) MONITORING WELL (APPROX.)
- (P) MONITORING WELL
- ESTIMATED TWO-YR TIME OF TRAVEL GROUNDWATER BOUNDARY (QUESTA APPROX.)

NOTES

1. PROPOSED IRRIGATED AREAS PROVIDED BY BAY TREE DESIGN ON 3/29/22 AND SHOULD ONLY BE INTERPRETED AS CONCEPTUAL.



② MINIMUM SSD AREAS PER SOIL APPLICATION RATE OF 0.4 GPD/SF (25,000 SF)

SCALE: 1" = 60'

③ IRRIGATED AREAS (121,000 SF, CONCEPTUAL)

SCALE: 1" = 100'

Project Title:

COMMUNITY LAND TRUST OF W. MARIN &
EDEN HOUSING, INC.

POINT REYES HOUSING RENEWAL

100 COMMODORE WEBSTER DR.
POINT REYES STATION, CA 04956

Design Firm:

Consultant:

SHERWOOD
DESIGN ENGINEERS
1525 Seabright Ave
Santa Cruz, CA 95062
www.sherwoodengineers.com

Stamp:

PROGRESS PLOT
CIVIL

No.	Description	Date

Issue Note:

CONCEPT DESIGN

Project ID: PRH
File Name:
Drawn by: KA
Checked by: CC
Plot Date: 6/9/22
Scale: AS SHOWN

Sheet Title:
SUBSURFACE DRIP PLAN

Sheet No.:
WW2.0

SHERWOOD
DESIGN ENGINEERS

Appendix C

Planning Level Engineer's Estimate of Probable Construction Costs
Water Reclamation Facility
at
Pt. Reyes Coast Guard Housing
Design Flow: 10,000 gpd

Item	Description	Quantity	Units	Unit Price	Total Cost	Notes
1	**Materials and Installation**					
	Wastewater Treatment					
	Equalization Tank	1	EA	$52,500	$52,500	5,000 gal, below-ground double-walled fiberglass tank
	Anaerobic Baffled Reactor	1	EA	$105,000	$105,000	20,000 gal, below-ground double-walled fiberglass tank
	Treatment System Pumps	6	EA	$3,000	$18,000	
	Membrane Aerated Bioreactor	1	EA	$200,000	$200,000	
	Tertiary Filtration	2	EA	$15,000	$30,000	Multi-media filtration
	UV Disinfection	2	EA	$12,000	$24,000	
	Ozone System	1	EA	$25,000	$25,000	Includes generator and contact tank
	Control Panel	1	EA	$30,000	$30,000	
	Equipment Shed (10'x12')	120	SF	$100	$12,000	
	Site Work	40%			$199,000	
	Electrical	15%			$74,000	
	Instrumentation & Controls	20%			$99,000	
	Distribution and Disposal					
	Non-Potable Recycled Water Storage Tank	10,000	GAL	$3.5	$35,000	10,000 gal above-ground HDPE tanks
	Distribution Pumps	2	EA	$5,000	$10,000	
	Recycled Water Distribution Piping	2,000	LF	$100	$200,000	2" pressurized line
	Subsurface Drip Fields	121,000	LF	$3.5	$423,500	
	Leach Fields	1,390	LF	$75	$104,250	
	Total Direct Costs				$1,641,250	
2	**Markups**					
2.1	**General Conditions**					
	Contractor Overhead & Profit	15%			$246,188	
	Mobilization	2.5%			$41,031	
	Permitting Fees	2.0%			$32,825	
2.2	**Projects Contingencies**					
	Design Contingency	2.5%			$48,212	
	Construction Contingency	10%			$192,847	
	Owner's Contingency	2.5%			$48,212	
	Total Cost				**$2,260,000**	

APPENDIX G

STORMWATER CONTROL PLAN

FOR A REGULATED PROJECT

Stormwater Control Plan
For a Regulated Project
Point Reyes Station Housing Renewal

July 28, 2022

Revised March 10, 2023

Prepared by:

SHERWOOD
DESIGN ENGINEERS

625 2nd Street, Ste 202, Petaluma, CA 94952

415-677-7300

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Table of Contents

Figures

Attachments

This Stormwater Control Plan was prepared using the template dated October 2018.

I. Project Data

Project Name/Number	Point Reyes Station Housing Renewal
Application Submittal Date	07/29/2022
Project Location	100 Commodore Webster Dr, Point Reyes Station, CA 94956
Project Phase No.	N/A
Project Type and Description	Demolition of outbuildings; renovation of existing residential buildings; refinishing asphalt and concrete; construction of decks and outdoor classroom; new pathways for improved accessibility; modification to existing drainage system and landscaping
Total Project Site Area (acres)	7.47 acres
Total New and Replaced Impervious Surface Area	27,756 square feet
Total Pre-Project Impervious Surface Area	186,136 square feet
Total Post-Project Impervious Surface Area	188,010 square feet

II. Setting

II.A. Project Location and Description

The proposed project involves the rehabilitation of an existing residential development at Point Reyes Coast Guard Housing located at 100 Commodore Webster Drive near Point Reyes Station in unincorporated Marin County, California. The site was previously owned by the United States Coast Guard, and in 2014 was purchased by the Community Land rust of West Marin to be converted to affordable housing. The project site is at the terminus of Commodore Webster Drive, east of its intersection with Mesa Road, as shown on the Vicinity Map (Figure 1), approximately one-quarter mile east of downtown Point Reyes Station.

The programmed site is relatively level with adjacent hillsides to the North and downward-sloping embankments toward Lagunitas Creek. It is currently occupied by 10 at-grade, wood-framed, two- to three-story townhome buildings and two administrative buildings, as well as paved parking lots and landscaped areas. The existing townhomes on the site will be remodeled, and 15 additional one-bedroom apartments will be added in the former barracks building. The existing coast guard offices will be converted to a community room run by CLAM and office space for the residential property manager, Eden Housing Inc. The former galley will be converted to a community-focused education institute, and will include a maker space, outdoor classrooms, and a lending library. Other proposed improvements include improvements to wastewater treatment facilities, constructing additional community spaces, and upgrading outdoor common spaces, roadways, pedestrian paths, and sidewalks.

The site is bounded to the south and east by the appropriate setbacks from Lagunitas Creek. The northern boundary is the property line, and the western boundary is the termination of Commodore Webster Drive.

The proposed use of the project is consistent with current use zoning. This project is considered a regulated project according to the BASMAA Post-Construction Manual because it creates or replaces more than 5,000 square feet of impervious surface. Therefore, it must be designed to comply with Provision E.12 under the statewide Phase II municipal stormwater NPDES permit reissued by the California State Water Resources Control Board in 2013. The project will implement runoff reduction measures including limiting clearing, grading, and soil compaction, minimizing impervious surfaces, conserving natural areas, complying with ESHA buffer requirements, and using a combination of LID and BMPs to significantly improve the water quality of runoff from the site compared to existing conditions. Utilizing existing underground infrastructure where possible, storm drain outlet pipes in a number of locations will be intercepted and routed to new bioretention facilities in order to provide treatment of not only the new impervious surfaces, but existing as well. Furthermore, there will be a conversion of an existing mulched playground into a self-retaining area that will accept runoff from the uphill site by means of a cutoff swale to allow for infiltration into the ground rather than direct discharge into Lagunitas Creek.

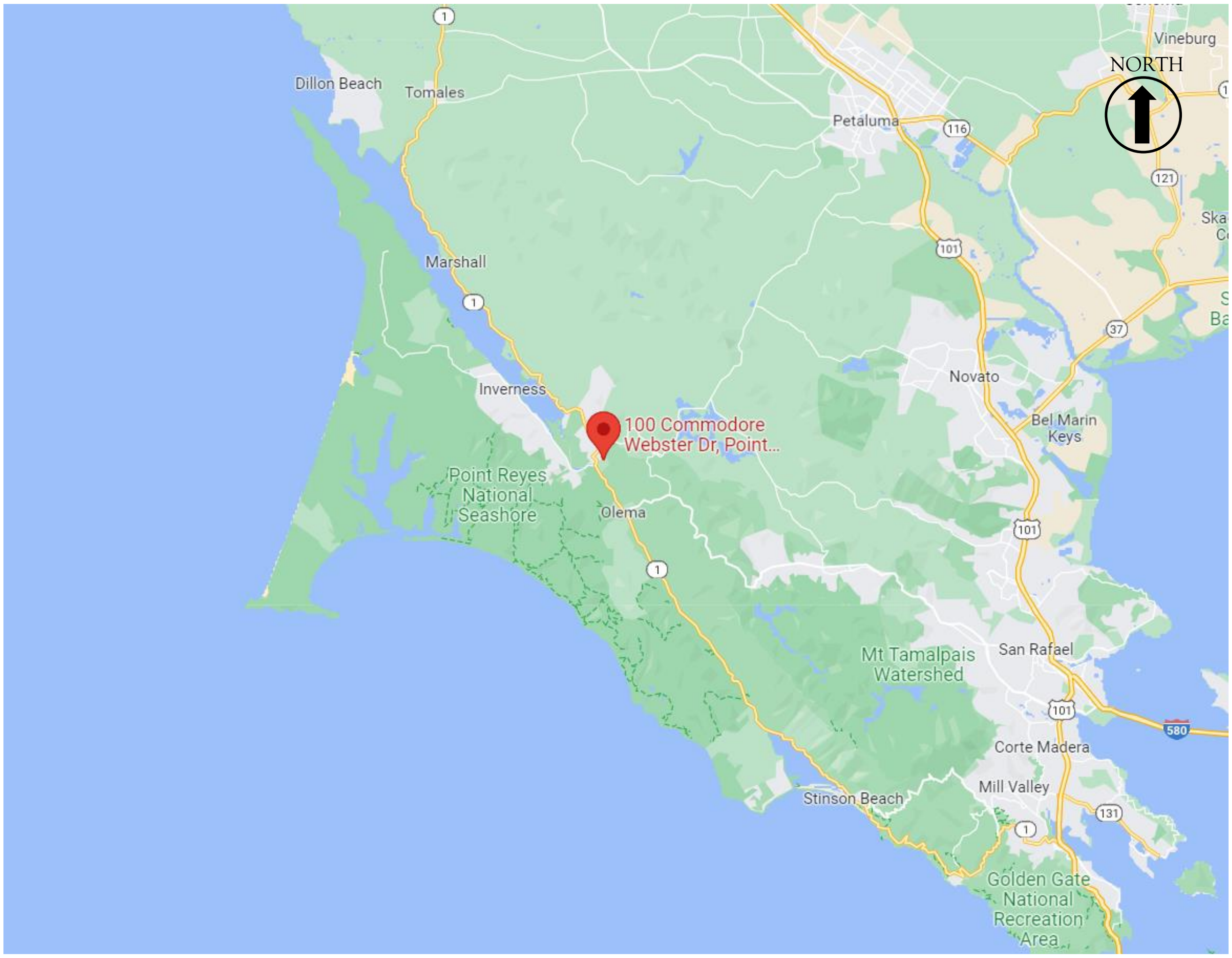


Figure 1: Vicinity Map

II.B. Existing Site Features and Conditions

The existing site (see Figure 2) is predominantly 12 low-rise residential and administrative buildings, with associated paving. Commodore Webster Drive is a narrow street with one lane in each direction, connecting every building to Mesa Road. North of Commodore Webster Drive are a small number of residential buildings and agricultural fields. Topographically, the site is characterized by its position on a hillside. To the northwest, the surrounding grade slopes up at approximately 7:1. To the southeast, the land slopes down at approximate 8:1 to Lagunitas Creek. The existing development itself also slopes towards Lagunitas Creek at a grade of about 2.5%.

Under existing conditions, site drainage is characterized by existing stormwater inlets conveying directly to outfalls into the riparian areas that eventually lead into Lagunitas Creek. There is currently no treatment of runoff prior to outfall.

The soil is approximately 60% xerorthents and 40% Cortina, which is a gravelly sandy loam. It has a hydrologic rating of A, meaning that it has a low runoff potential, and very good infiltration. The Cortina unit is primarily located north of Commodore Webster Drive, where only minor work is taking place. The majority of work will occur on xerorthents.

Figure 2: Existing Site Conditions

II.C. Opportunities and Constraints for Stormwater Control

The primary opportunity comes from the site's existing topography. Because the entire site slopes towards Lagunitas Creek, it will be straightforward to install swales, bioretention facilities, and self-retaining areas that can intercept water without significant grading or piping infrastructure. This provides opportunities to not only treat runoff from the new impervious areas, but to also mitigate for existing conditions, thus significantly improving water quality of runoff entering Lagunitas Creek The owner's intended use also means that many existing impervious areas will be either removed entirely or resurfaced with impervious materials that allow for better management.

The most constraining aspects of the site are the ESHA boundaries around Lagunitas Creek. Because the site is so close to the creek itself, runoff must be captured sooner along its path than later to minimize construction and disturbance within the creek's protection area.

III. Low Impact Development Design Strategies

III.A. Optimization of Site Layout

The site will remain largely unchanged from its existing state in its general layout. Buildings and walkways will be renovated to comply with code and accessibility requirements, but the majority of new impervious area is compensated for by the removal of existing impervious surface.

III.A.1. Limitation of development envelope

Improvements outside the existing site envelope have been minimized to limit unnecessary development. The primary boundaries are the property line to the north and west, and the flood and environmental boundaries of Lagunitas Creek to the south and east.

III.A.2. Preservation of natural drainage features

The immediate site currently has no natural drainage features, however there are a number of wetlands toward the southeast and south west edges of the site that currently receive waters from the existing upland development. Improved water quality via new treatment measures will improve the health of these features.

III.A.3. Setbacks from creeks, wetlands, and riparian habitats

The proposed development has been specifically designed to avoid construction within the setbacks associated with Lagunitas Creek, the only adjacent body of water. ESHA boundaries have been mapped by a Biologist and are incorporated into the base mapping of the project.

III.A.4. Minimization of imperviousness

To the extent possible, imperviousness of the site is minimized by removing portions of unused pavement, tennis court and outbuildings, and incorporating new drought-tolerant landscaping throughout the developed site. Some impervious surfaces have been added to improve accessibility for residents throughout the site, however most new pathways are surrounded by landscaping to allow for direct runoff into adjacent landscaping.

III.A.5. Use of drainage as a design element

Drainage is used as a design element on this site in the form of bioretention facilities, which are functional, enhanced plantings that contribute aesthetically to the landscaping of the site. There is a proposed “demonstration rain garden” next to the new community center which will be used for teaching the community about stormwater management and protection of our waters.

III.B. Use of Permeable Pavements

Impervious surfaces that are not intended for vehicular traffic or regular pedestrian traffic, such as the outdoor classroom to the southwest, will be surfaced with a compacted gravel surface. While not entirely permeable, this type of surface introduces less contaminants into runoff than asphaltic concrete. For the purposes of stormwater calculations, it will be considered impervious.

III.C. Dispersal of Runoff to Pervious Areas

Where possible, stormwater runoff will be directed along a pervious path to one of the two self-retaining areas or the five bioretention facilities. Both existing and proposed inlets will also capture runoff and deposit it in one of the bioretention facilities.

III.D. Stormwater Control Measures

Runoff from the majority of impervious surfaces, both existing and proposed, and some of the pervious, non-self-treating surfaces, will be routed to one of five on-site bioretention facilities or a self-retaining area (see Attachment A). The bioretention facilities (see Figure 3) will be constructed in accordance with the guidelines provided in the BASMAA Post-Construction Manual, including the following:

- Each layer of the bioretention facility will be built flat and level. The following layers will have consistent elevations throughout the facility:
    - Bottom of Gravel Layer
    - Top of Gravel Storage Layer
    - Top of Soil Layer
    - Rim of Facility Reservoir
- 12 inches of Class 2 permeable, Caltrans specification 68-2.02F(3) used for the gravel layer
- 18 inches of a sand/compost mix per the BASMAA specifications provided for the planting medium
- 6-inch-deep reservoir between top of soil elevation and overflow grate elevation
- Plantings selected for water conservation
- Irrigation system on a separate zone, with drip emitters and "smart" irrigation controllers
- Sign identifying the facility as a separate stormwater treatment facility

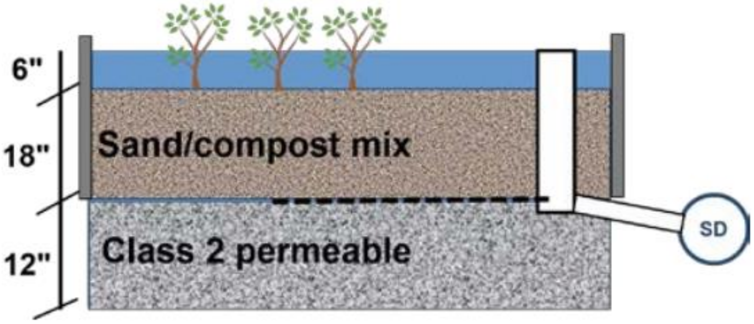


Figure 3: Bioretention Facility Schematic *(source: BASMAA Post-Construction Manual)*

IV. Documentation of Drainage Design

IV.A. Descriptions of Each Drainage Management Area

IV.A.1. Tables of Drainage Management Areas

DMA Name	Surface Type	Area (square feet)	Drains to:	Description
1.01	Paving	27	SR-1	Pedestrian hardscape
1.02	Landscaping	15,017	SR-1	Existing planting; proposed planting and rock mulch
1.03	Roofs and Paving	95	SR-1	Existing trash enclosure with associated paving
1.04	Roofs and Paving	1,313	SR-1	Residential building roof with associated paving; minor resurfacing
1.05	Roofs and Paving	2,361	SR-1	Residential building roof with associated paving; minor resurfacing
1.06	Paving	903	SR-1	Community garden: pedestrian hardscape
SR-1 / 1.07	Self-Retaining	5,992	Self	Self-retaining area; formerly a playground
1.08	Roofs and Paving	94	SR-1	Residential shed
1.09	Paving	1,535	SR-1	Pedestrian hardscape
1.10	Landscaping	5,086	SR-1	Existing planting; proposed planting and rock mulch
1.11	Roofs and Paving	1,385	SR-1	Residential building roof with associated paving; minor resurfacing
1.12	Roofs and Paving	2,725	SR-1	Residential building roof with associated paving; minor resurfacing
1.13	Roofs and Paving	864	SR-1	Residential building roof with associated paving; minor resurfacing
1.14	Landscaping	118	SR-1	Existing planting; proposed planting and rock mulch

DMA Name	Surface Type	Area (square feet)	Drains to:	Description
2.01	Roofs and Paving	31,114	Offsite	Residential building roof with associated paving; minor resurfacing
2.02	Self-Treating	33,807	Self-Treating	Existing planting, untouched
2.03	Landscaping	83	Offsite	Existing planting; proposed planting and rock mulch
2.04	Paving	633	Offsite	Pedestrian hardscape
2.05	Landscaping	293	Offsite	Existing planting; proposed planting and rock mulch
2.06	Landscaping	1,205	Offsite	Existing planting; proposed planting and rock mulch
2.07	Roofs and Paving	100	Offsite	Residential building roof with associated paving; minor resurfacing
2.08	Landscaping	1,164	Offsite	Existing planting; proposed planting and rock mulch
2.09	Landscaping	76	Offsite	Existing planting; proposed planting and rock mulch
2.10	Roofs and Paving	906	Offsite	Residential building roof with associated paving; minor resurfacing
2.11	Landscaping	886	Offsite	Existing planting; proposed planting and rock mulch
2.12	Paving	156	Offsite	Pedestrian hardscape
2.13	Roofs and Paving	4,131	Offsite	Residential building roof with associated paving; minor resurfacing
2.14	Landscaping	3,656	Offsite	Existing planting; proposed planting and rock mulch
2.15	Roofs and Paving	90	Offsite	Residential building roof with associated paving; minor resurfacing
2.16	Roofs and Paving	93	Offsite	Residential building roof with associated paving; minor resurfacing
2.17	Roofs and Paving	94	Offsite	Residential building roof with associated paving; minor resurfacing
2.18	Paving	539	Offsite	Pedestrian hardscape

2.19	Landscaping	478	Offsite	Existing planting; proposed planting and rock mulch
2.20	Roofs and Paving	1,713	Offsite	Residential building roof with associated paving; minor resurfacing
2.21	Landscaping	343	Offsite	Existing planting; proposed planting and rock mulch
2.22	Landscaping	350	Offsite	Existing planting; proposed planting and rock mulch
2.23	Roofs and Paving	4,453	Offsite	Residential building roof with associated paving; minor resurfacing
2.24	Landscaping	167	Offsite	Existing planting; proposed planting and rock mulch
2.25	Landscaping	229	Offsite	Existing planting; proposed planting and rock mulch
2.26	Landscaping	108	Offsite	Existing planting; proposed planting and rock mulch
2.27	Paving	158	Offsite	Pedestrian hardscape
2.28	Landscaping	285	Offsite	Existing planting; proposed planting and rock mulch
2.29	Paving	150	Offsite	Pedestrian hardscape
2.30	Landscaping	379	Offsite	Existing planting; proposed planting and rock mulch
2.31	Paving	2,174	Offsite	Pedestrian hardscape
2.32	Landscaping	55	Offsite	Existing planting; proposed planting and rock mulch
2.33	Landscaping	796	Offsite	Existing planting; proposed planting and rock mulch
2.34	Landscaping	134	Offsite	Existing planting; proposed planting and rock mulch
2.35	Landscaping	830	Offsite	Existing planting; proposed planting and rock mulch
2.36	Roofs and Paving	692	Offsite	Residential building roof with associated paving; minor resurfacing
2.37	Landscaping	1,529	Offsite	Existing planting; proposed planting and rock mulch
2.38	Landscaping	351	Offsite	Existing planting; proposed planting and rock mulch

2.39	Landscaping	1,166	Offsite	Existing planting; proposed planting and rock mulch
2.40	Landscaping	2,708	Offsite	Existing planting; proposed planting and rock mulch
2.41	Roofs and Paving	4,412	Offsite	Residential building roof with associated paving; minor resurfacing
2.42	Landscaping	115	Offsite	Existing planting; proposed planting and rock mulch
2.43	Landscaping	104	Offsite	Existing planting; proposed planting and rock mulch
2.44	Landscaping	96	Offsite	Existing planting; proposed planting and rock mulch
2.45	Paving	154	Offsite	Pedestrian hardscape
2.46	Landscaping	311	Offsite	Existing planting; proposed planting and rock mulch
2.47	Paving	172	Offsite	Pedestrian hardscape
2.48	Landscaping	2,187	Offsite	Existing planting; proposed planting and rock mulch
2.49	Landscaping	193	Offsite	Existing planting; proposed planting and rock mulch
2.50	Roofs and Paving	5,157	Offsite	Residential building roof with associated paving; minor resurfacing
2.51	Landscaping	502	Offsite	Existing planting; proposed planting and rock mulch
2.52	Landscaping	508	Offsite	Existing planting; proposed planting and rock mulch
2.53	Landscaping	502	Offsite	Existing planting; proposed planting and rock mulch
2.54	Landscaping	191	Offsite	Existing planting; proposed planting and rock mulch
2.55	Paving	67	Offsite	Pedestrian hardscape
2.56	Paving	68	Offsite	Pedestrian hardscape
2.57	Landscaping	195	Offsite	Existing planting; proposed planting and rock mulch
2.58	Paving	64	Offsite	Pedestrian hardscape
2.59	Landscaping	198	Offsite	Existing planting; proposed planting and rock mulch

2.60	Paving	65	Offsite	Pedestrian hardscape
2.61	Roofs and Paving	249	Offsite	Residential building roof with associated paving; minor resurfacing
2.62	Landscaping	200	Offsite	Existing planting; proposed planting and rock mulch
2.63	Paving	25	Offsite	Pedestrian hardscape
2.64	Roofs and Paving	238	Offsite	Residential building roof with associated paving; minor resurfacing

DMA Name	Surface Type	Area (square feet)	Drains to:	Description
3.01	Roofs and Paving	1,549	RG-5	Residential building roof with associated paving; minor resurfacing
3.02	Paving	4,162	RG-5	Pedestrian hardscape
3.03	Landscaping	115	RG-5	Existing planting; proposed planting and rock mulch
3.04	Landscaping	66	RG-5	Existing planting; proposed planting and rock mulch
3.05	Roofs and Paving	7,654	RG-5	Existing driveway and parking lot; minor resurfacing
3.06	Landscaping	266	RG-5	Existing planting; proposed planting and rock mulch
3.07	Landscaping	105	RG-5	Existing planting; proposed planting and rock mulch
3.08	Landscaping	555	RG-5	Existing planting; proposed planting and rock mulch
3.09	Landscaping	775	RG-5	Existing planting; proposed planting and rock mulch
3.10	Landscaping	649	RG-5	Existing planting; proposed planting and rock mulch
3.11	Landscaping	963	RG-5	Existing planting; proposed planting and rock mulch
3.12	Landscaping	662	RG-5	Existing planting; proposed planting and rock mulch
3.13	Roofs and Paving	1,578	RG-5	Residential building roof with associated paving; minor resurfacing
3.14	Landscaping	1,430	RG-5	Existing planting; proposed planting and rock mulch
RG-5 / 3.15	Bioretention	750	Self	Depressed rain garden
3.16	Landscaping	95	RG-5	Existing planting; proposed planting and rock mulch
3.17	Roofs and Paving	1,750	RG-5	Residential building roof with associated paving; minor resurfacing
3.18	Landscaping	447	RG-5	Existing planting; proposed planting and rock mulch
3.19	Landscaping	24	RG-5	Existing planting; proposed planting and rock mulch
3.20	Landscaping	57	RG-5	Existing planting; proposed planting and rock mulch

DMA Name	Surface Type	Area (square feet)	Drains to:	Description
4.01	Roofs and Paving	3,713	RG-4	Residential building roof with associated paving; minor resurfacing
4.02	Landscaping	10,847	RG-4	Existing planting; proposed planting and rock mulch
4.03	Roofs and Paving	96	RG-4	Accessory structure
4.04	Paving	263	RG-4	Pedestrian hardscape
4.05	Landscaping	38	RG-4	Existing planting; proposed planting and rock mulch
4.06	Roofs and Paving	1,340	RG-4	Residential building roof with associated paving; minor resurfacing
RG-4 / 4.07	Bioretention	620	Self	Depressed rain garden
4.08	Paving	239	RG-4	Pedestrian hardscape

DMA Name	Surface Type	Area (square feet)	Drains to:	Description
5.01	Roofs and Paving	1,942	RG-3	Residential building roof with associated paving; minor resurfacing
5.02	Landscaping	5,699	RG-3	Existing planting; proposed planting and rock mulch
5.03	Paving	3,471	RG-3	Pedestrian hardscape
5.04	Landscaping	3,276	RG-3	Playground
5.05	Landscaping	342	RG-3	Existing planting; proposed planting and rock mulch
5.06	Landscaping	247	RG-3	Existing planting; proposed planting and rock mulch
5.07	Landscaping	1,330	RG-3	Existing planting; proposed planting and rock mulch
5.08	Roofs and Paving	12,310	RG-3	Existing driveway and portion of parking lot; minor resurfacing
5.09	Landscaping	459	RG-3	Existing planting; proposed planting and rock mulch
5.10	Paving	90	RG-3	Pedestrian hardscape
5.11	Roofs and Paving	2,566	RG-3	Residential building roof with associated paving; minor resurfacing
5.12	Roofs and Paving	3,677	RG-3	Residential building roof with associated paving; minor resurfacing
5.13	Paving	1,754	RG-3	Pedestrian hardscape
5.14	Roofs and Paving	439	RG-3	Residential building roof with associated paving; minor resurfacing
5.15	Paving	226	RG-3	Proposed trash enclosure
5.16	Roofs and Paving	275	RG-3	Residential building roof with associated paving; minor resurfacing
5.17	Landscaping	150	RG-3	Existing planting; proposed planting and rock mulch
5.18	Landscaping	140	RG-3	Existing planting; proposed planting and rock mulch

5.19	Landscaping	4,448	RG-3	Existing planting; proposed planting and rock mulch
5.20	Roofs and Paving	1,365	RG-3	Maintenance building roof with associated paving; minor resurfacing
5.21	Roofs and Paving	105	RG-3	Residential building roof with associated paving; minor resurfacing
RG-3 / 5.22	Bioretention	1,310	Self	Depressed rain garden
5.23	Landscaping	500	RG-3	Existing planting; proposed planting and rock mulch
5.24	Landscaping	75	RG-3	Existing planting; proposed planting and rock mulch
5.25	Paving	12	RG-3	Pedestrian hardscape
5.26	Landscaping	534	RG-3	Existing planting; proposed planting and rock mulch

DMA Name	**Surface Type**	**Area (square feet)**	**Drains to:**	**Description**
6.01	Paving	4,916	Offsite	Existing asphalt road

DMA Name	**Surface Type**	**Area (square feet)**	**Drains to:**	**Description**
7.01	Roofs and Paving	1,933	RG-6	Residential building roof with associated paving; minor resurfacing
7.02	Paving	1,177	RG-6	Pedestrian hardscape
7.03	Roofs and Paving	3,011	RG-6	Residential building roof with associated paving; minor resurfacing
7.04	Roofs and Paving	2,010	RG-6	Residential building roof with associated paving; minor resurfacing
7.05	Landscaping	155	RG-6	Existing planting; proposed planting and rock mulch
7.06	Roofs and Paving	516	RG-6	Residential building roof with associated paving; minor resurfacing
RG-6 / 7.07	Bioretention	370	Self	Depressed rain garden
7.08	Landscaping	203	RG-6	Existing planting; proposed planting and rock mulch

DMA Name	Surface Type	Area (square feet)	Drains to:	Description
8.01	Roofs and Paving	1,530	RG-2	Residential building roof with associated paving; minor resurfacing
8.02	Landscaping	658	RG-2	Existing planting; proposed planting and rock mulch
8.03	Paving	2,952	RG-2	Pedestrian hardscape
8.04	Landscaping	231	RG-2	Existing planting; proposed planting and rock mulch
8.05	Roofs and Paving	526	RG-2	Residential building roof with associated paving; minor resurfacing
8.06	Landscaping	1,202	RG-2	Existing planting; proposed planting and rock mulch
8.07	Landscaping	14	RG-2	Existing planting; proposed planting and rock mulch
8.08	Landscaping	51	RG-2	Existing planting; proposed planting and rock mulch
8.09	Landscaping	344	RG-2	Existing planting; proposed planting and rock mulch
8.10	Landscaping	189	RG-2	Existing planting; proposed planting and rock mulch
8.11	Roofs and Paving	10,368	RG-2	Existing parking lot; minor resurfacing
8.12	Landscaping	101	RG-2	Existing planting; proposed planting and rock mulch
8.13	Landscaping	1,724	RG-2	Existing planting; proposed planting and rock mulch
8.14	Landscaping	153	RG-2	Existing planting; proposed planting and rock mulch
RG-2 / 8.15	Bioretention	700	Self	Depressed rain garden
8.16	Roofs and Paving	833	RG-2	Existing parking lot; minor resurfacing

DMA Name	Surface Type	Area (square feet)	Drains to:	Description
9.01	Landscaping	77	RG-1	Existing planting; proposed planting and rock mulch
9.02	Roofs and Paving	2,238	RG-1	Residential building roof with associated paving; minor resurfacing
9.03	Roofs and Paving	2,814	RG-1	Residential building roof with associated paving; minor resurfacing
9.04	Landscaping	16	RG-1	Existing planting; proposed planting and rock mulch
9.05	Landscaping	48	RG-1	Existing planting; proposed planting and rock mulch
9.06	Paving	3,683	RG-1	Pedestrian hardscape; outdoor education area
9.07	Landscaping	256	RG-1	Existing planting; proposed planting and rock mulch
9.08	Landscaping	443	RG-1	Existing planting; proposed planting and rock mulch
9.09	Landscaping	2,596	RG-1	Existing planting; proposed planting and rock mulch
9.10	Landscaping	1,131	RG-1	Existing planting; proposed planting and rock mulch
9.11	Landscaping	923	RG-1	Existing planting; proposed planting and rock mulch
RG-1 / 9.12	Bioretention	380	Self	Depressed rain garden; demonstration area
9.13	Paving	120	RG-1	Pedestrian hardscape

DMA Name	Surface Type	Area (square feet)	Drains to:	Description
10.01	Paving	213	Offsite	Pedestrian hardscape; outdoor education area
10.02	Self-Treating	13,545	Self-Treating	Existing planting, untouched

DMA Name	Surface Type	Area (square feet)	Drains to:	Description
11	Paving	21,885	Offsite	Existing asphalt road

IV.B. Tabulation and Sizing Calculations

IV.B.1. Information Summary for Bioretention Facility Design

Total Project Area (square feet)	**325,550**
DMA-1	37,515
DMA-2	114,246
DMA-3	23,651
DMA-4	17,156
DMA-5	46,743
DMA-6	4,916
DMA-7	9,375
DMA-8	21,577
DMA-9	14,727
DMA-10	13,759
DMA-11	21,885

IV.B.2. Self-Treating Areas

DMA Name	**Area (Square Feet)**
2.02	28,892
10.02	13,545

IV.B.3. Self-Retaining Areas

DMA Name	**Area (Square Feet)**
SR-1 / 1.07	5,992

IV.B.4. Areas Draining to Self-Retaining Areas

DMA Name	**Area (square feet)**	**Post-project surface type**	**Runoff factor**	**Product (Area x runoff factor) [A]**	**Receiving self-retaining DMA**	**Receiving self-retaining DMA Area (square feet) [B]**	**Ratio [A]/[B]**
1.01	27	Paving	1.0	27	SR-1	5,992	0.00
1.02	15,020	Landscaping	0.1	1,502	SR-1	5,992	0.25
1.03	95	Roofs and Paving	1.0	95	SR-1	5,992	0.02
1.04	1,338	Roofs and Paving	1.0	1,338	SR-1	5,992	0.22
1.05	2,361	Roofs and Paving	1.0	2,361	SR-1	5,992	0.39
1.06	903	Paving	1.0	903	SR-1	5,992	0.15
1.08	94	Roofs and Paving	1.0	94	SR-1	5,992	0.02
1.09	1,535	Paving	1.0	1,535	SR-1	5,992	0.26
1.10	5,086	Landscaping	0.1	509	SR-2	5,992	0.08
1.11	1,385	Roofs and Paving	1.0	1,385	SR-2	5,992	0.23
1.12	2,725	Roofs and Paving	1.0	2,725	SR-2	5,992	0.45
1.13	864	Roofs and Paving	1.0	864	SR-2	5,992	0.14
1.14	118	Landscaping	0.1	12	SR-2	5,992	0.00

IV.B.5. Areas Draining to Bioretention Facilities

RG-1

DMA Name	DMA Area (square feet)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	Sizing Factor	Minimum Facility Size	Proposed Facility Size
9.01	77	Landscaping	0.1	8			
9.02	2,238	Roofs and Paving	1.0	2,238			
9.03	2,814	Roofs and Paving	1.0	2,814			
9.04	16	Landscaping	0.1	2			
9.05	48	Landscaping	0.1	5			
9.06	3,683	Paving	1.0	3,683			
9.07	256	Landscaping	0.1	26			
9.08	443	Landscaping	0.1	44			
9.09	2,596	Landscaping	0.1	260			
9.10	1,131	Landscaping	0.1	113			
9.11	923	Landscaping	0.1	92			
9.13	120	Paving	1.0	120			
9.01	77	Landscaping	0.1	8			
Total				9,404	0.04	376	380

RG-2

DMA Name	DMA Area (square feet)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	Sizing Factor	Minimum Facility Size	Proposed Facility Size
8.01	1,530	Roofs and Paving	1.0	1,530			
8.02	658	Landscaping	0.1	66			
8.03	2,952	Paving	1.0	2,952			
8.04	231	Landscaping	0.1	23			
8.05	526	Roofs and Paving	1.0	526			
8.06	1,202	Landscaping	0.1	120			
8.07	14	Landscaping	0.1	1			
8.08	51	Landscaping	0.1	5			
8.09	344	Landscaping	0.1	34			
8.10	189	Landscaping	0.1	19			

8.11	10,368	Roofs and Paving	1.0	10,368			
8.12	101	Landscaping	0.1	10			
8.13	1,724	Landscaping	0.1	172			
8.14	153	Landscaping	0.1	15			
8.16	833	Roofs and Paving	1.0	833			
8.01	1,530	Roofs and Paving	1.0	1,530			
8.02	658	Landscaping	0.1	66			
Total				16,677	0.04	667	700

RG-3							
DMA Name	**DMA Area (square feet)**	**Post-Project Surface Type**	**DMA Runoff Factor**	**DMA Area x Runoff Factor**	**Sizing Factor**	**Minimum Facility Size**	**Proposed Facility Size**
5.01	1,942	Roofs and Paving	1.0	1,942			
5.02	5,699	Landscaping	0.1	570			
5.03	3,471	Paving	1.0	3,471			
5.04	3,276	Landscaping	0.1	328			
5.05	342	Landscaping	0.1	34			
5.06	247	Landscaping	0.1	25			
5.07	1,330	Landscaping	0.1	133			
5.08	12,310	Roofs and Paving	1.0	12,310			
5.09	459	Landscaping	0.1	46			
5.10	90	Paving	1.0	90			
5.11	2,566	Roofs and Paving	1.0	2,566			
5.12	3,677	Roofs and Paving	1.0	3,677			
5.13	1,754	Paving	1.0	1,754			
5.14	439	Roofs and Paving	1.0	439			
5.15	226	Paving	1.0	226			
5.16	275	Roofs and Paving	1.0	275			
5.17	150	Landscaping	0.1	15			
5.18	140	Landscaping	0.1	14			
5.19	4,448	Landscaping	0.1	445			

5.2	1,365	Roofs and Paving	1.0	1,365			
5.21	105	Roofs and Paving	1.0	105			
5.23	500	Landscaping	0.1	50			
5.24	75	Landscaping	0.1	8			
5.25	12	Paving	1.0	12			
5.26	534	Landscaping	0.1	53			
Total				29,953	0.04	1,198	1,310

RG-4							
DMA Name	**DMA Area (square feet)**	**Post-Project Surface Type**	**DMA Runoff Factor**	**DMA Area x Runoff Factor**	**Sizing Factor**	**Minimum Facility Size**	**Proposed Facility Size**
4.01	3,713	Roofs and Paving	1.0	3,713			
4.02	10,847	Landscaping	0.1	1,085			
4.03	96	Roofs and Paving	1.0	96			
4.04	263	Paving	1.0	263			
4.05	38	Landscaping	0.1	4			
4.06	1,340	Roofs and Paving	1.0	1,340			
4.08	239	Paving	1.0	239			
Total				6,740	0.04	270	620

RG-5							
DMA Name	**DMA Area (square feet)**	**Post-Project Surface Type**	**DMA Runoff Factor**	**DMA Area x Runoff Factor**	**Sizing Factor**	**Minimum Facility Size**	**Proposed Facility Size**
3.01	1,549	Roofs and Paving	1.0	1,549			
3.02	4,162	Paving	1.0	4,162			
3.03	115	Landscaping	0.1	12			
3.04	66	Landscaping	0.1	7			
3.05	7,654	Roofs and Paving	1.0	7,654			
3.06	266	Landscaping	0.1	27			
3.07	105	Landscaping	0.1	10			
3.08	555	Landscaping	0.1	56			
3.09	775	Landscaping	0.1	77			
3.10	649	Landscaping	0.1	65			
3.11	963	Landscaping	0.1	96			
3.12	662	Landscaping	0.1	66			
3.13	1,578	Roofs and Paving	1.0	1,578			
3.14	1,430	Landscaping	0.1	143			
3.16	95	Landscaping	0.1	9			
3.17	1,750	Roofs and Paving	1.0	1,750			
3.18	447	Landscaping	0.1	45			
3.19	24	Landscaping	0.1	2			
3.20	57	Landscaping	0.1	6			
Total				17,314	0.04	693	749

RG-6							
DMA Name	**DMA Area (square feet)**	**Post-Project Surface Type**	**DMA Runoff Factor**	**DMA Area x Runoff Factor**	**Sizing Factor**	**Minimum Facility Size**	**Proposed Facility Size**
7.01	1,933	Roofs and Paving	1.0	1,933			
7.02	1,177	Paving	1.0	1,177			
7.03	3,011	Roofs and Paving	1.0	3,011			

7.04	2,010	Roofs and Paving	1.0	2,010			
7.05	155	Landscaping	0.1	16			
7.06	516	Roofs and Paving	1.0	516			
7.08	203	Landscaping	0.1	20			
Total				8,683	0.04	347	370

V. Source Control Measures

V.A. Site activities and potential sources of pollutants

On-site activities that could potentially produce stormwater pollutants include:

- On-site storm drain inlets
- Paved driveways and walkways
- Landscape maintenance
- Solid waste management

V.B. Source Control Table

Potential source of runoff pollutants	**Permanent source control BMPs**	**Operational source control BMPs**
On-site storm drain inlets	All inlets will be marked with the words “No Dumping! Flows to Creek” or similar.	Inlet markings will be maintained and periodically repainted or replaced. Stormwater pollution prevention information will be provided to all site owners, representatives, and residents. Leases will include the following agreement: “Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains.”
Paved driveways and walkways		Plazas, sidewalks, and parking lots should be swept regularly to prevent accumulation of litter and debris. Debris from pressure washing will be collected to prevent entry into the storm drain system.
Landscape maintenance	Existing native trees, shrubs, and ground cover will be preserved to the maximum extent possible. Landscaping will be designed to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. Landscaped areas used to retain or detain stormwater will have plants that are tolerant of saturated soil conditions. Pest-resistant plants will be used where appropriate, especially when adjacent to hardscape. Plants appropriate to site soils, slope, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions will be selected.	Landscaping will be maintained using minimum or no pesticides. Integrated Pest Management (IPM) information will be provided to owners and operators.

Solid waste management areas	All drain inlets in covered trash enclosures will include a sand trap and are routed to sanitary sewer. Signs will be posted on all trash enclosures with the message "Do not dump hazardous materials here" or similar.	Multiple trash enclosures have been proposed, reducing the likelihood of spills or solid pollution. Enclosures will be inspected and maintained regularly. Spill control materials will be available on-site.

VI. Stormwater Facility Maintenance

VI.A. Ownership and Responsibility for Maintenance in Perpetuity

Maintenance of stormwater facilities will be the responsibility of the property owner and will be performed by the owner's employees as part of routine maintenance of buildings, grounds, and landscaping. The applicant commits to execute any necessary agreements prior to completion of construction. The applicant accepts responsibility for interim operation and maintenance of stormwater treatment and flow-control facilities until such time as this responsibility is formally transferred to a subsequent owner.

VI.B. Summary of Maintenance Requirements for Each Stormwater Facility

The five bioretention facilities will be maintained as follows. Details of maintenance responsibilities and procedures will be included in a Stormwater Facility Operation and Maintenance Plan to be submitted for approval prior to the completion of construction.

- Annual Landscape Maintenance: Remove any soil or debris blocking planter inlets or overflows; remove the trash that collects near inlets or gets caught in vegetation; prune or cut back plants for health and to ensure flow into inlets and across the surface of the facility; remove and replant as necessary while maintaining the design surface elevation and minimizing the introduction of soil; control weeds by manual methods and soil amendment and only use natural herbicides if necessary; add mulch to control weeds and maintain the mulch layer thickness
- Check signage: remove graffiti and replace if necessary
- Check irrigation: confirm to be adequate but not excessive
- Do not add fertilizer to bioretention facilities
- Do not use synthetic pesticides on bioretention facilities

VII. Construction Checklist

Stormwater Control Plan Page #	Source Control or Treatment Control Measure	See Plan Sheet #s
Page 19 and SCP Exhibit	All inlets will be marked with the words "No Dumping! Flows to Creek" or similar.	
Page 19 and SCP Exhibit	Existing native trees, shrubs, and ground cover will be preserved to the maximum extent possible.	
Page 19 and SCP Exhibit	Landscaping will be designed to minimize irrigation and runoff, to promote surface infiltration where	

	appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.	
Page 19 and SCP Exhibit	Landscaped areas used to retain or detain stormwater will have plants that are tolerant of saturated soil conditions.	
Page 19 and SCP Exhibit	Pest-resistant plants will be used where appropriate, especially when adjacent to hardscape.	
Page 19 and SCP Exhibit	Plants appropriate to site soils, slope, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions will be selected.	
Page 20 and SCP Exhibit	All drain inlets in covered trash enclosures will include a sand trap and routed to sanitary sewer.	
Page 20 and SCP Exhibit	Signs will be posted on all trash enclosures with the message "Do not dump hazardous materials here" or similar.	

VIII. Certifications

The preliminary design of stormwater treatment facilities and other stormwater pollution control measures in this plan are in accordance with the current edition of the BASMAA *Post-Construction Manual*.

TREATMENT AREAS SUMMARY

DMA #	Impervious Area		Pervious Area Treated	Total Area	Outfall / Treatment	Minimum Required Area**	Provided Treatment Area
	Existing to Remain*	Proposed					
	square feet					square feet	
1	8,479	2,823	26,213	37,515	SR-1	5,651	5,992
2	53,051	4,815	56,380	114,246	OFFSITE	-	-
3	12,715	3,978	6,958	23,651	RG-5	695	750
4	3,870	1,781	11,505	17,156	RG-4	272	620
5	22,745	5,488	18,510	46,743	RG-3	1,203	1,310
6	4,553	-	363	4,916	OFFSITE	-	-
7	6,618	2,029	728	9,375	RG-6	348	370
8	13,177	3,033	5,367	21,577	RG-2	669	700
9	5,260	3,595	5,872	14,727	RG-1	377	380
10	-	213	13,545	13,758	OFFSITE	-	-
11	21,885	-	-	21,885	OFFSITE	-	-
Site Total	152,353	27,755	145,459	325,550		9,215	10,122

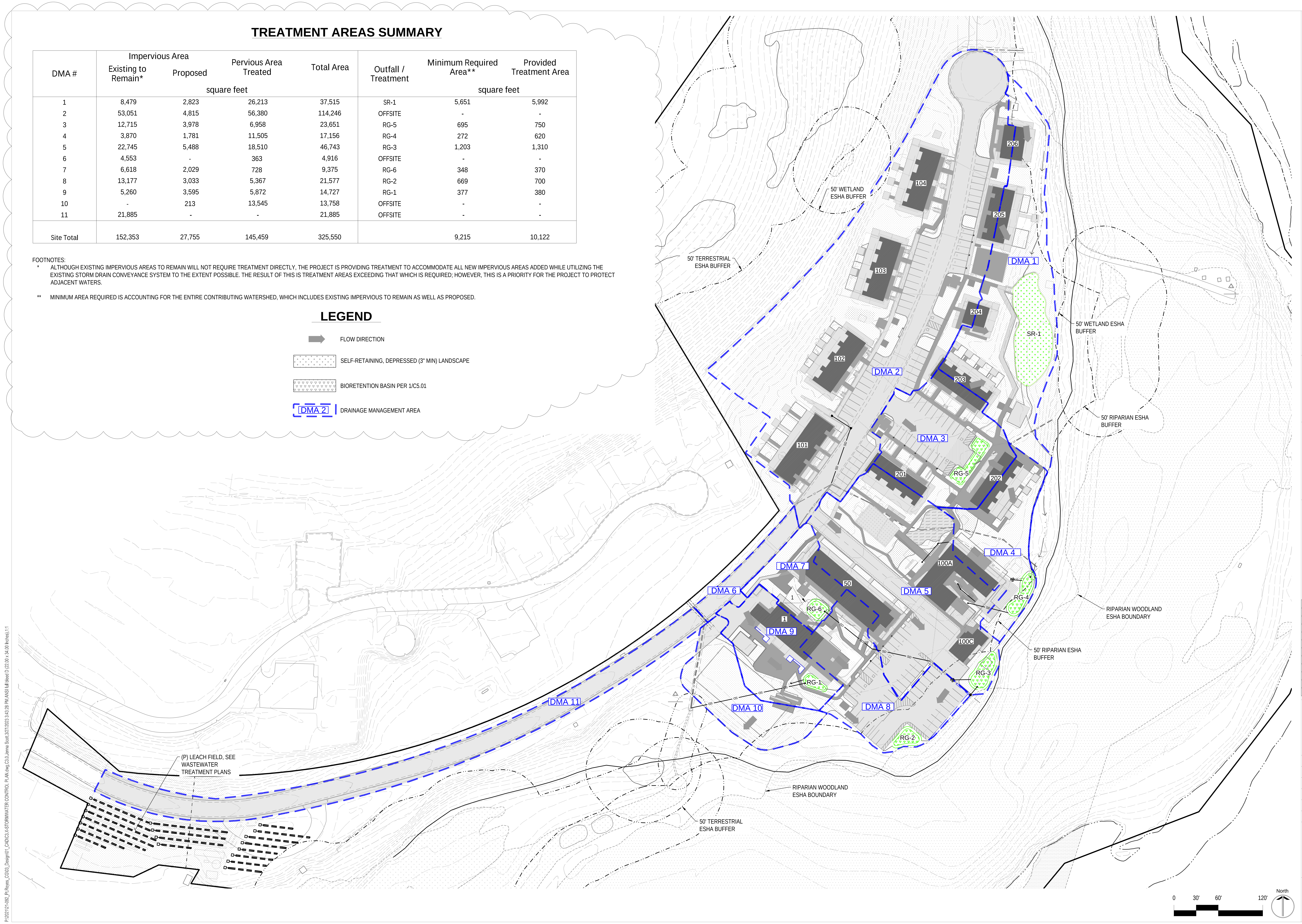
FOOTNOTES:

* ALTHOUGH EXISTING IMPERVIOUS AREAS TO REMAIN WILL NOT REQUIRE TREATMENT DIRECTLY, THE PROJECT IS PROVIDING TREATMENT TO ACCOMMODATE ALL NEW IMPERVIOUS AREAS ADDED WHILE UTILIZING THE EXISTING STORM DRAIN CONVEYANCE SYSTEM TO THE EXTENT POSSIBLE. THE RESULT OF THIS IS TREATMENT AREAS EXCEEDING THAT WHICH IS REQUIRED; HOWEVER, THIS IS A PRIORITY FOR THE PROJECT TO PROTECT ADJACENT WATERS.

** MINIMUM AREA REQUIRED IS ACCOUNTING FOR THE ENTIRE CONTRIBUTING WATERSHED, WHICH INCLUDES EXISTING IMPERVIOUS TO REMAIN AS WELL AS PROPOSED.

LEGEND

➡	FLOW DIRECTION
⁘	SELF-RETAINING, DEPRESSED (3" MIN) LANDSCAPE
▽	BIORETENTION BASIN PER 1/C5.01
DMA 2	DRAINAGE MANAGEMENT AREA



P:\2021\21-092_Pt.Reyes_CG\03_Design\01_CAD\C3.X-STORMWATER CONTROL PLAN.dwg,C3.0,Jenna Scott,3/27/2023 3:43:28 PM,ANSI full bleed D (22.00 x 34.00 Inches),1:1

Project Title:

COMMUNITY LAND TRUST OF W. MARIN &
EDEN HOUSING, INC.
POINT REYES HOUSING RENEWAL
100 COMMODORE WEBSTER DR.
POINT REYES STATION, CA 94956
APN#: 1 1 9 - 2 4 0 - 7 3

Design Firm:

SIEGEL & STRAIN Architects
6201 Doyle Street, Suite B
Emeryville, CA 94608
TEL 510 / 547-8092
info@siegelstrain.com

Consultant:

SHERWOOD
DESIGN ENGINEERS
625 2nd Street, Suite 202
Petaluma, CA 94952
www.sherwoodengineers.com

Stamp:

REGISTERED PROFESSIONAL ENGINEER
MICHAEL ROY HASTINGS
No. C 81176
EXP: 09/30/23
CIVIL
STATE OF CALIFORNIA

No.	Description	Date
1	Planning R1	03/15/23

Issue Note:

PLANNING SET
07/29/22

Project ID:	PRH
File Name:	
Drawn by:	KB
Checked by:	MH
Plot Date:	02/23/23
Scale:	1" = 60'

Sheet Title:

STORMWATER
CONTROL PLAN

Sheet No.:

ATTACHMENT A

APPENDIX I

MITIGATION MONITORING AND REPORTING PLAN

Mitigation Monitoring and Reporting Plan

MMRP Requirements and Use

The Marin County (County) Planning Division of the Community Development Agency has prepared an Initial Study/Mitigated Negative Declaration (ISMND) to provide the public, responsible agencies, and trustee agencies with information about the potential environmental effects of the proposed Coastal Permit and Conditional Use Permit to adaptively reuse and repurpose the former United States Coast Guard (USCG) site to provide affordable housing units in Point Reyes Station. Mitigation measures are defined in the IS/MND to reduce potentially significant impacts of project construction and operation. The mitigation measures included in the IS/MND reduce all potential project impacts to less than significant levels.

Implementation of the project will require execution and monitoring of all the mitigation measures identified in the IS. The California Environmental Quality Act (CEQA) Section 15097(a) requires that:

> "… In order to ensure that the mitigation measures and project revisions identified in the EIR or negative declaration are implemented, the public agency shall adopt a program for monitoring or reporting on the revisions which it has required in the project and the measures it has imposed to mitigate or avoid significant environmental effects. A public agency may delegate reporting or monitoring responsibilities to another public agency or to a private entity which accepts the delegation; however, until mitigation measures have been completed the lead agency remains responsible for ensuring that implementation of the mitigation measures occurs in accordance with the program."

CEQA Section 15097(c) defines monitoring and reporting responsibilities of the lead agency.

> "(c) The public agency may choose whether its program will monitor mitigation, report on mitigation, or both. "Reporting" generally consists of a written compliance review that is presented to the decision making body or authorized staff person. A report may be required at various stages during project implementation or upon completion of the mitigation measure. "Monitoring" is generally an ongoing or periodic process of project oversight. There is often no clear distinction between monitoring and reporting and the program best suited to ensuring compliance in any given instance will usually involve elements of both. The choice of program may be guided by the following:
>
>> (1) Reporting is suited to projects which have readily measurable or quantitative mitigation measures or which already involve regular review. For example, a report may be required upon issuance of final occupancy to a project whose mitigation measures were confirmed by building inspection.

> (2) Monitoring is suited to projects with complex mitigation measures, such as wetlands restoration or archeological protection, which may exceed the expertise of the local agency to oversee, are expected to be implemented over a period of time, or require careful implementation to assure compliance.
>
> (3) Reporting and monitoring are suited to all but the most simple projects. Monitoring ensures that project compliance is checked on a regular basis during and, if necessary after, implementation. Reporting ensures that the approving agency is informed of compliance with mitigation requirements."

This Mitigation Monitoring and Reporting Program (MMRP) is meant to facilitate implementation and monitoring of the mitigation measures to ensure that measures are executed. This process protects against the risk of non-compliance.

The purpose of the MMRP is to:

- Summarize the mitigation required for the project.
- Comply with requirements of CEQA and the CEQA Guidelines.
- Clearly define parties responsible for implementing and monitoring the mitigation measures.
- Provide a plan for how to organize the measures into a format that can be readily implemented and monitored.

MMRP Components

The MMRP provides a summary of all mitigation measures that will be implemented for the project. Each mitigation measure is accompanied with identification of:

- Timing – measures may be required to be implemented prior to construction, during construction, or post construction
- Application Locations – locations where the mitigation measures will be implemented.
- Monitoring/Reporting Action – the monitoring and/or reporting actions to be undertaken to ensure the measure is implemented.
- Responsible and Involved Parties – the party or parties that will undertake the measure and will monitor the measure to ensure it is implemented in accordance with this MMRP

The responsible and involved parties will utilize the MMRP to identify actions that must take place to implement each mitigation measures, the time of those actions and the parties responsible for implementing and monitoring the actions.

Mitigation Monitoring and Reporting Program

Impact	Mitigation Measures	Mitigation Monitoring and Reporting Measures	When Implemented	Verified By
Biological Resources				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service	**Mitigation Measure BIO-1: Tree Removal Outside of Monarch Butterfly Roosting Season** Any removal of 3ucalyptus trees shall occur outside of the winter roosting season for monarch butterfly in Marin County (October through February). If the roosting season for monarch butterfly cannot be fully avoided, a pre-construction survey for active monarch butterfly roosts shall be conducted by a qualified biologist within three days prior to removal of eucalyptus trees. If no active roosts are identified within the eucalyptus trees, the trees may be removed. If active roosts are identified within the eucalyptus trees, the trees cannot be removed until the roost has left the area as documented by a qualified biologist.	• Eucalyptus trees to be removed October through February when feasible. • A pre-construction survey for monarch butterfly must be completed if tree removal occurs during monarch roosting season. • Report identified active roosts if found.	• Pre-Construction • Construction	• Marin County Community Development Agency prior to eucalyptus removal.
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service	**Mitigation Measure BIO-2: Worker Environmental Awareness Training** Prior to construction, all contractor construction personnel shall attend an environmental training program provided by a qualified biologist. The training program provided by a qualified biologist. The training shall discuss sensitive species and nesting bird habitat that may occur within the project area as well as identification of California red-legged frog and their burrows. The training shall include the responsibilities of contractor's construction personnel, applicable mitigation measures, and notification requirements. The training shall also address other measures that protect biological resources.	• Attendance of an environmental training program. • Fact Sheets and educational brochure to be prepared prior to environmental training program.	• Pre-Construction • Construction	• Marin County Community Development Agency verifies contractor training. • USFWS has authority to verify training upon request.

Impact	Mitigation Measures	Mitigation Monitoring and Reporting Measures	When Implemented	Verified By
	The following information shall also be provided during the training: • Specific information regarding the special-status species potentially present and their habitat needs • Any reports of occurrences in the project area • An explanation of the status of each listed species and their protection under state and federal laws • A list of measures being taken to reduce effects to the species during construction and implementation Fact sheets conveying this information and an educational brochure containing color photographs of all special-status species potentially present shall be prepared for distribution to the above-mentioned people and anyone else who may enter the project area. Construction personnel shall be instructed to halt construction activities and contact the designated biologist if a wildlife species is observed in an area where it could be harmed by construction activities. A list of employees who attend the training sessions shall be maintained on the site during construction and made available to USFWS upon request.			
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service	**Mitigation Measure BIO-3: Install Exclusion Fencing** Temporary exclusion fencing shall be installed around the limits of work areas to ensure special status animals (i.e., CRLF and western pond turtle) cannot enter the work area. Installation of exclusion fencing shall occur under the supervision of the designated biologist and immediately following a clearance survey of the area. The exclusion fencing shall have a minimum aboveground height of 30 inches, and the bottom of the fence shall be keyed in at least 4 inches deep and backfilled with soil to prevent wildlife from passing	• Installation of temporary exclusion fencing. • Inspection of fencing for sensitive species, trapped wildlife, and damage before each workday.	• Pre-Construction • Construction	• Marin County Community Development Agency prior to work in undeveloped areas.

Impact	Mitigation Measures	Mitigation Monitoring and Reporting Measures	When Implemented	Verified By
	under the fencing. Exclusion fencing shall be installed to prevent species entry into active work areas and to mark the limits of construction disturbance. The exclusion fencing shall be installed in a manner that reduces the potential for trapping migrating wildlife and for wildlife climbing over the fence, such as having the top of the fencing curved over on the outside of the fence. Cover boards shall be installed along the perimeter of the fencing to provide protection from the sun and predators, where necessary and appropriate. Gates shall be installed in the exclusion fencing that allow project access and adequately exclude wildlife. Gates will be secured at the end of each workday using sandbags or other means to prevent wildlife from entering the exclusion zone. The exclusion fencing shall remain in place and be maintained for the duration of construction activities and shall be removed within 15 days of completion of construction activities. Prior to construction personnel entering and beginning work in fenced areas each day, the fenced areas shall be inspected by a biological monitor for special status species or any trapped wildlife and to identify damage to the exclusion fencing. The biological monitor must be trained by the designated biologist (BIO-4) on California red-legged frog identification, the laws protecting the species, and procedures to implement if the species is observed. If California red-legged frogs or trapped wildlife are observed, the designated biologist shall be notified immediately to determine the appropriate procedures to implement. Any damage to the fencing shall be immediately reported and repaired until the last day that construction equipment is at the project site.			

Impact	Mitigation Measures	Mitigation Monitoring and Reporting Measures	When Implemented	Verified By
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service	**Mitigation Measure BIO-4: Designated Biologist** The applicant shall obtain USFWS approval for a designated biologist(s) for the project. The designated biologist(s) shall be on site during all activities that may result in take of California red-legged frog. The qualifications of the designated biologist(s) shall be submitted to USFWS for review and written approval at least 30 calendar days prior to the date earthmoving is initiated at the project site. The designated biologist(s) shall keep a copy of any Biological Opinion issued for the project in their possession when on site.	• Obtain USFWS approval for a designated biologist. • Submit qualifications of designated biologist at least 30 calendar days prior to the initiation of earthmoving activities.	• Pre-Construction • Construction	• USFWS and Marin County Community Development Agency.
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service	**Mitigation Measure BIO-5: Designated Biologist Authority** The designated biologist(s) shall be given the authority to freely communicate verbally, by telephone, by electronic mail, or in writing at any time with construction personnel, any other person(s) at the project site or otherwise associated with the project, the USFWS, or their designated agents. The designated biologist shall have oversight over implementation of the avoidance and minimization measures and all permit conditions and shall have the authority and responsibility to stop project activities if they determine any of the associated permit requirements are not being fulfilled. If the designated biologist(s) exercises this authority, the USFWS shall be notified by telephone and electronic mail within 24 hours.	• Designated biologist shall notify USFWS within 24 hours if permit requirements are not being fulfilled.	• Construction	• USFWS in coordination with Marin County Community Development Agency.
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or	**Mitigation Measure BIO-6: On-site Construction Monitoring** The designated biologist shall be present at the project site until all initial habitat disturbances have been	• Biological monitor to contact designated biologist should any CRLF be observed on site.	• Pre-Construction • Construction	• Marin County Community Development Agency.

Impact	Mitigation Measures	Mitigation Monitoring and Reporting Measures	When Implemented	Verified By
special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service	completed. After habitat disturbance has been completed and all exclusion fencing has been installed, a biological monitor, who will be trained by the designated biologist, shall monitor daily on-site compliance with all avoidance and minimization measures (AMMs) in the U.S. Fish and Wildlife Service Biological Opinion. The biological monitor shall contact the designated biologist for instructions should any CRLF be observed on the site. The biological monitor and the designated biologist shall have the authority to halt any action that could adversely affect sensitive biological resources. The designated biologist shall continue to conduct compliance checks at least once per week until construction is completed to ensure that the fencing is intact and that all AMMs are being implemented.	• Biological monitor and designated biologist shall have the authority to halt any action that could adversely affect sensitive biological resources. • Designated biologist shall conduct compliance checks least once per week until construction is completed to ensure that the fencing is intact and that all AMMs are being implemented.		
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service	**Mitigation Measure BIO-7: California Red-legged Frog Pre-construction Survey** No more than 24 hours prior to the date of initial ground disturbance, a pre-construction survey for California red-legged frog shall be conducted by a designated biologist at the project site. The survey shall consist of walking the project limits and within the project site to ascertain the possible presence of California red-legged frog. The designated biologist shall investigate all potential areas that could be used by the species for feeding, breeding, sheltering, movement, and other essential behaviors. This includes an adequate examination of mammal burrows, such as for California ground squirrels or gophers. If any California red-legged frogs are found, the designated biologist shall follow the procedures specified in Mitigation Measure BIO-13.	• A pre-construction survey for California red-legged frog shall be conducted by a designated biologist at the project site no more than 24 hours prior to the date of the initial ground disturbance. • Follow the procedures specified in Mitigation Measure BIO-13 if any California red-legged frogs are found.	• Pre-Construction	• Marin County Community Development Agency and USFWS.

Impact	Mitigation Measures	Mitigation Monitoring and Reporting Measures	When Implemented	Verified By
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service	**Mitigation Measure BIO-8: Timing Construction Commencement to Avoid California Red-legged Frog** Initial ground-disturbing activities shall be avoided between November 1 and March 31 to avoid the time period when California red-legged frogs are most likely to be moving through the project area.	• Initial ground disturbing activities shall be avoided between November 1 through March 31.	• Construction	• Marin County Community Development Agency.
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service	**Mitigation Measure BIO-9: Avoid Construction During Rain Events** No ground-disturbing construction activities shall occur during rain events or within 24 hours following a rain event. Prior to ground-disturbing construction activities resuming, a designated biologist shall inspect the project area and all equipment/materials for the presence of California red-legged frogs.	• Cease ground-disturbing construction activities during rain event or within 24 hours following a rain event. • Designated biologist shall inspect the project area and all equipment/materials for the presence of California red-legged frogs prior to ground-disturbing construction activities resuming following a rain event.	• Construction	• Marin County Community Development Agency.
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local	**Mitigation Measure BIO-10: Cover Trenches** Trenches or pits 1 foot or deeper that are going to be left unfilled overnight shall be securely covered with boards or other material to prevent California red-legged frog or other special-status species from falling into them. If covering of trenches or pits is not feasible, wooden	• Trenches shall be securely covered or wooden ramps or other structures. • Biological monitor shall inspect the trenches, pits,	• Construction	• Marin County Community Development Agency.

Impact	Mitigation Measures	Mitigation Monitoring and Reporting Measures	When Implemented	Verified By
or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service	ramps or other structures of suitable surface that provide adequate footing for the California red-legged frog are to be placed in the trench or pit to allow for their unaided escape. Auger holes or fence post holes that are greater than 0.10 inch in diameter shall be immediately filled or securely covered so they do not become pitfall traps for the California red-legged frog or other special-status species. The biological monitor shall inspect the trenches, pits, or holes prior to their being filled to ensure there are no trapped wildlife in them. The trench, pit, or hole shall also be examined by the biological monitor each workday morning prior to initiation of work and in the late afternoon no more than 1 hour after work has ceased to ascertain whether any individuals have become trapped. If the escape ramps fail to allow the animal to escape, the biological monitor shall contact the designated biologist, who shall remove and transport the animal to a safe location or contact the USFWS for guidance	or holes prior to their being filled. • The trench, pit, or hole shall also be examined by the biological monitor each workday morning and afternoon. • If the escape ramps fail to allow the animal to escape, the biological monitor shall contact the designated biologist, who shall remove and transport the animal to a safe location or contact the USFWS for guidance.		
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service	**Mitigation Measure BIO-11: Erosion Control Material** Plastic monofilament netting (i.e., erosion control matting), loosely woven netting, or similar material in any form shall not be used at the project site because California red-legged frogs can become entangled and trapped in them. Any such material found on site shall be immediately removed by the designated biologist or construction personnel. Materials utilizing fixed weaves (i.e., strands cannot move), polypropylene, polymer, or other synthetic materials shall not be used.	• Verify no plastic monofilament netting, erosion control matting, woven netting or similar material are used.	• Construction	• Marin County Community Development Agency.

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a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service	**Mitigation Measure BIO-12: Waste Management** Uneaten human food and trash attracts crows, ravens, coyotes, and other predators of the California red-legged frog and other wildlife. A litter control program shall be instituted at the project site. All workers shall ensure their food scraps, paper wrappers, food containers, cans, bottles, and other trash are deposited in covered or closed trash containers. The trash containers shall be removed from the project site at the end of each working day.	• Implement a litter control program at the project site. • Trash containers shall be removed from the project site at the end of each working day.	• Construction	• Marin County Community Development Agency.
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service	**Mitigation Measure BIO-13: Procedures for Encounters with California Red-legged Frog** Each encounter with the California red-legged frog will be treated on a case-by-case basis in coordination with the USFWS, but the general procedure is as follows: (1) the animal will not be disturbed if it is not in danger; or (2) the animal will be moved to a secure location if it is in any danger. These procedures are further described below. When a California red-legged frog is encountered in the project area, all activities that have the potential to result in the harassment, injury, or death of the individual shall be immediately halted. The designated biologist will then assess the situation in order to select a course of action that shall avoid or minimize adverse effects to the animal. Contact with the animal shall be avoided and the applicant shall allow it to move out of the potentially hazardous situation to a secure location on its own volition. This procedure applies to situations where a California red-legged frog is encountered while it is moving to another location and is actively dispersing. It	• All activities that the potential to result in the harassment, injury, or death of the individual shall be immediately halted when a California red-legged frog is encountered in the project area. • California red-legged frogs that are in danger shall be relocated and related by the Designated Biologist within the same habitat outside of the construction area. • Designated Biologist shall obtain approval of the relocation protocol from the USFWS in the event that a California red-legged frog is	• Construction	• USFWS has authority for approval of relocation.

Impact	Mitigation Measures	Mitigation Monitoring and Reporting Measures	When Implemented	Verified By
	does not apply to animals that are uncovered or otherwise exposed or in areas where the individual is not expected to move on its own and may be in danger (e.g., within the fenced construction perimeter). California red-legged frogs that are in danger (e.g., animals that are uncovered or otherwise exposed or in areas within the fences construction perimeter where the individual is not expected to move on its own) shall be relocated and released by the designated biologist outside the construction area within the same habitat. Prior to the initial ground disturbance, the designated biologist shall obtain approval of the relocation protocol from the USFWS in the event that a California red-legged frog is encountered and needs to be moved away from the project site. California red-legged frog shall be released in appropriate habitat nearby on the watershed. The designated biologist shall limit the duration of the handling and captivity of the California red-legged frog to the minimum amount of time necessary to complete the task. The applicant shall immediately notify the USFWS once the California red-legged frog is relocated and the site is secure.	encountered and needs to be moved away from the project site. • The Designated Biologist shall limit the duration of the handling and captivity of the California red-legged frog. • Immediately notify USFWS once relocation of California red-legged frog is complete.		
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service	**Mitigation Measure BIO-14: Avoidance of Nesting Birds** All tree removal activities shall be avoided between February 1 and August 15 to avoid the time period when birds are most likely to be nesting, to the extent feasible. Prior to any construction activities during the bird nesting season (February 1 to August 15), a pre-activity nesting bird survey shall be conducted no more than 7 days prior to tree removal and start of construction activities. The survey shall include all areas within 500 feet of active construction. If active nests of special status or migratory bird species (listed in the MBTA) are	• Pre-construction survey by Qualified Biologist 7 days prior to tree removal and start of construction activities. • Monitoring of active nests if any work occurs within the buffer zones defined in the measure.	• February 1 to August 15	• Marin County Community Development Agency

Impact	Mitigation Measures	Mitigation Monitoring and Reporting Measures	When Implemented	Verified By
	found within the project site, or in areas subject to disturbance from construction activities, an avoidance buffer to avoid nest disturbance shall be constructed. The buffer size shall be determined by a qualified biologist and is based on the nest location, topography, cover, and species' tolerance to disturbance. A standard buffer of 500 feet shall be used for raptors and special-status birds and 200 feet for migratory birds. If the standard avoidance buffer is not achievable, a reduced buffer may be allowed under the direction of a qualified biologist and the qualified biologist will monitor the nest(s) to document that no take of the nest (nest failure) has occurred. Active nests shall not be taken or destroyed under the MBTA and, for raptors, under the CDFW Code. If it is determined that construction activity is resulting in any nest disturbance, work should cease immediately in the vicinity of the nest and will not be allowed to recommence in the area until the young have fledged the nest. If preconstruction surveys indicate that nests are inactive or potential habitat is unoccupied during the construction period, no further action is required. Trees and shrubs within the construction footprint that have been determined to be unoccupied by special status birds or that are located outside the avoidance buffer for active nests may be removed. Nests initiated during construction (while significant disturbance from construction activities persist) may be presumed to be unaffected, and only a minimal buffer, determined by the qualified biologist, would be necessary.			
a) Have a substantial adverse effect, either directly or through habitat modifications,	**Mitigation Measure BIO-15: American Badger Protection**	• Qualified biologist shall conduct pre-construction surveys to determine if	• Prior to Construction	• Marin County Community

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on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service	Prior to ground-disturbing activities, a qualified biologist shall conduct a pre-construction survey of the project area to determine if new badger burrows have been constructed and/or if older (remnant) burrows appear to be re-occupied. These surveys will be conducted no less than 14 days and no more than 30 days prior to the start of ground disturbing activities. If burrows are occupied, the biologist will establish a 100-foot avoidance buffer around occupied maternity dens throughout the pup-rearing season (February 15 through July 1) and a 50-foot avoidance buffer around occupied dens during other times of the year.	new badger burrows are present and/or if older remnant burrows appear to be re-occupied. • If burrows are found to be occupied, the biologist will establish an avoidance buffer around the occupied maternity dens		Development Agency.
Cultural Resources				
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5	**Mitigation Measure CUL-1: Archaeological Monitoring Plan (AMP) and Archaeological Monitoring:** A Secretary of Interior-qualified archaeologist shall prepare an Archaeological Monitoring Plan (AMP) that includes a provision for worker Cultural Resources Awareness Training (CRAT) as well as details regarding the archaeological sensitivity of the project area, the types of archaeological resources that could be encountered, the methodology and protocols to be employed during monitoring, and specific procedures to identify, evaluate, and treat new archaeological discoveries and for addressing specific contingencies, such as the discovery of human remains, project personnel qualifications, data collection protocols, site safety considerations, and post-field actions. The archaeologist preparing the AMP shall contact the Federated Indians of Graton Rancheria (FIGR) and provide them an opportunity to review and comment on the AMP prior to its finalization.	• Qualified archaeologist shall prepare an Archeological Monitoring Plan that includes a provision for worker Cultural Resources Awareness Training in consultation with the Federated Indians of Graton Rancheria. • A professional archeologist shall provide sensitivity training to supervisory staff prior to initiation of site preparation and/or construction to alert construction workers to the possibility of exposing	• Prior to Construction • Construction	• Marin County Community Development Agency.

Impact	Mitigation Measures	Mitigation Monitoring and Reporting Measures	When Implemented	Verified By
	A professional archeologist shall provide sensitivity training to supervisory staff prior to initiation of site preparation and/or construction to alert construction workers to the possibility of exposing significant historic and/or prehistoric archaeological resources within the project area. The training shall include a discussion of the types of precontact or historic-era objects that could be exposed and how to recognize them, the need to stop excavation at a discovery, and procedures for protection and notification. An "alert sheet" shall be posted in staging areas, such as in construction trailers, to alert personnel to the procedures and protocols to follow for the discovery of a potentially significant historic-era and/or precontact archaeological resources. A qualified archaeologist shall monitor all ground-disturbing activities that take place within native (i.e., non-fill) soils. If an archaeological deposit is encountered during ground-disturbing activities, all work within 50 feet of the discovery shall be halted until a Secretary of Interior qualified archaeologist and FIGR (in the case of precontact-period resources) inspects the material, assesses its historical significance, and provides recommendations for the treatment of the discovery in accordance with the Secretary of Interior's Standards for the Treatment of Historic Properties (36 CFR Part 86). Potentially significant historic-era resources may include all by-products of human land use greater than 50 years of age, including subsurface deposits of domestic type material (e.g., glass, ceramic, metal, wood, faunal remains, brick), buried alignments of stone, brick, or foundation elements, and possible features associated with the former railroad, open workspaces, or yard spaces. Potentially significant	significant historic and/or prehistoric archaeological resources within the project area. • An alert sheet shall be posted in staging areas to alert personnel to the procedures and protocols for the discovery of a potentially significant historic-era and/or precontact archaeological resources. • Qualified archaeologist shall monitor all ground-disturbing activities that take place within native soils. • If an archaeological deposit is encountered, all work within 50 feet of the discovery shall be halted until Secretary of Interior qualified archaeologist and FIGR (in the case of precontact-period resources) inspects the material, assesses its historical significance, and provides recommendations for the treatment of the discovery.		

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	precontact period resources include midden soils, artifacts such as faunal bone, groundstone, fire-affected rock, baked clay, modified bone and/or shell, flake stone debitage, flake stone tools, etc., and features such as house floors, cooking pits, deliberately interred burials. If work must commence in the sensitive area, it can only be performed using hand tools or powered hand tools, cannot include ground disturbance below the topsoil layer, and can only be accessed on foot. Alternatively, the cultural resource specialist/archaeologist shall evaluate the resource and determine whether it is: • Eligible for the CRHR (and a historical resource for purposes of CEQA); or • A unique archaeological resource as defined by CEQA. If the resource meets the criteria for eligibility on the CHRH or is a unique archaeological resource, work shall remain halted, and the cultural resources specialist/archaeologist shall consult with County staff regarding methods to ensure that no substantial adverse change would occur to the significance of the resource pursuant to CEQA Guidelines section 15064.5(b). Avoidance of the area, or avoidance of impacts to the resource, is the preferred method of mitigation for impacts to cultural resources and shall be required unless there are other equally effective methods. Other methods to be considered shall include evaluation, collection, recordation, and analysis of any significant cultural materials in accordance with the AMP. The methods and results of evaluation or data recovery work at an archaeological find shall be documented in a professional-level technical report to be filed with the California Historical Resources Information System.	• Qualified archaeologist shall analyze evaluation, collection, recordation and approve the start of work in the project area.		

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	Work may commence within the vicinity of the discovery upon completion of evaluation, collection, recordation, and analysis as approved by the qualified archeologist.			
Geology and Soils				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: ii) Strong seismic ground shaking	**Mitigation Measure GEO-1: Implement Geotechnical Recommendations in Final Design** The applicant shall incorporate the following recommendations of the geotechnical investigation into the final design: • Site preparation and grading: In areas that will receive fill or improvements (i.e., pavement, foundations, or concrete flatwork), the soil subgrade would be scarified to a depth of at least 8 inches, moisture-conditioned to above optimum moisture content, and compacted to at least 90 percent relative compaction. The upper eight inches of soil subgrade for vehicular pavements should be compacted to at least 95 percent relative compaction and be non-yielding. • Utility trench backfill: All trenches would conform to the current CAL-OSHA requirements. Pipes and/or conduits would be bedded on a minimum of 4 inches of clean sand or fine gravel. After the pipes and/or conduits are tested, inspected (if required) and approved, all trenches would be covered to a depth of 6 inches with clean sand or fine gravel, which should be mechanically tamped. Backfill for utility trenches and other excavations is also considered fill and should be placed and compacted according to the recommendations previously presented. • Exterior concrete flatwork: Exterior concrete flatwork that would not receive vehicular traffic (i.e. sidewalk) would be underlain by at least 4 inches of Class 2	Incorporate stated recommendations of geotechnical investigation into the final design of the Project.	• Prior to Construction	• Marin County Community Development Agency

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	aggregate base compacted to at least 90 percent relative compaction. Prior to placement of the aggregate base, the upper eight inches of the subgrade soil should be scarified, moisture-conditioned to near optimum moisture content, and compacted to at least 90 percent relative compaction. • Spread footing: The existing buildings are assumed to be supported on spread footings bottomed in the existing fill; however, some footings may extend into the native soil. If new loads are imposed on the existing footings, test pits would be excavated to determine the depth and width of the footings. • Proposed improvements may be supported on conventional spread footings bearing on the existing fill or on new fill if placement of new fill is required to raise grades. Continuous footings should be at least 16 inches wide, and isolated footings should be at least 18 inches wide. • Concrete slab-on-grade floors: The subgrade for new slab-on-grade floors would be prepared in accordance with recommendations in Section 8.1 of the geotechnical investigation (Rockridge Geotechnical 2022). Where water vapor transmission through the new floor slab is not desirable, the project would install a capillary moisture break and water vapor retarder beneath the floor slab. A capillary moisture break consists of at least 4 inches of clean, freed raining gravel or crushed rock. • Permanent retaining walls: Retaining walls would be designed to resist static lateral earth pressures, lateral pressures caused by earthquakes, and traffic loads (if vehicular traffic is expected within a horizontal distance equal to 1.5 times the wall height). All on-site			

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	walls, including low retaining walls in landscaped areas, would be designed in accordance with the recommendations presented in the geotechnical investigation; however, checking the walls for seismic loading is not required for walls less than 6 feet high.			
Hazards and Hazardous Materials				
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment	**Mitigation Measure HAZ-1: Asbestos and Lead-Based Paint** Demolition activities shall comply with the OSHA Standard 1926.6 related to lead abatement, and all other applicable State and federal requirements for the safe handling and disposal of lead-based paint, ACM, and universal wastes. The project contractor shall implement the following measures. ***Lead-based Paint*** As lead was identified in the paints and a detailed inventory of paints was not performed for the entire project, for the purpose of complying with the Cal/OSHA lead in construction regulation (8 CCR 1532.1), all coated surfaces shall be considered to contain some lead and require demolition dust control procedures and presumed respiratory protection usage for compliance with Cal/OSHA's Construction Lead Standard under 8 CCR 1532.1. The aforementioned regulation contains requirements for lead air monitoring, work practices, respiratory protection, etc., that are triggered by the presence of any detected levels of lead. None of the applicable regulations require removal of lead paint prior to demolition if the paints are securely adhered to the substrates (i.e., non-flaking or non-peeling). Disposal of the demolition debris in this case can be handled as non-hazardous and non-RCRA waste	Contractor shall comply with the OSHA Standard 1926.6 and applicable measures and conduct required testing and abatement prior to demolition activities of any potential lead or asbestos containing materials.	• Demolition	• Marin County Community Development Agency.

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	after the loose and flaking paint have been removed as long as demolition practices do not compromise worker safety and waste stream characterization testing has been performed by the Contractor on the entire waste stream for verification. Conventional demolition techniques shall be employed for all painted surfaces, with the Contractor complying with applicable OSHA and Cal/OSHA statutes regarding the following: • Worker awareness training • Exposure monitoring, as needed • Medical examinations, which may include blood lead level testing • Establishing a written respiratory protection program ***Asbestos-containing Materials (ACM)*** Any suspect material not sampled or not visually identified as negative by the Environmental Compliance Due Diligence Activities Report prepared by Tetra Tech in 2016 shall be assumed to contain asbestos and require destructive testing prior to demolition. Inspections in California are required to be conducted by a Certified Asbestos Consultant (CAC) or by a Certified Site Surveillance Technician (CSST) working under a CAC. In the absence of testing, the materials shall be assumed to contain asbestos and disposed of in accordance with OSHA Standard 1926.6.			
Hydrology and Water Quality				
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such	**Mitigation Measure HYDRO-1: Protection of NMWD Water Supply Wells** ***Modify Leach Field to Avoid Protection Zone***	• Applicant shall ensure leach field avoids Zone A Protection Zone of NMWD groundwater supply wells.	• Prior to Construction • Construction	• RWQCB in coordination with Marin County

Impact	Mitigation Measures	Mitigation Monitoring and Reporting Measures	When Implemented	Verified By
that the project may impede sustainable groundwater management of the basin	The Applicant shall modify the leach field design to avoid application of treated wastewater within the Zone A Protection Zone of NMWD groundwater supply wells. ***Design Review*** Design of the tertiary treated wastewater system is subject to review by the San Francisco Bay Regional Water Quality Control Board and Division of Drinking Water and permitting by the San Francisco Bay Regional Water Quality Control Board. The proposed wastewater system will require a Report of Waste Discharge Form 200 and a Title 22 Engineering Report as part of the application process to meet the Waste Discharge Requirements of the State. The Title 22 Engineering Report shall also be submitted to the NMWD and County for informational purposes. ***Use of Wastewater for Irrigation: Timing*** Tertiary treated wastewater shall not be applied to landscaping irrigation within 24 hours of forecasted precipitation with a greater than 50-percent probability of occurring, during precipitation events, or when the land application area surface soil is saturated. Application of treated wastewater for landscape irrigation shall further only occur when the depth to groundwater in the area of irrigation is a minimum of 4.5 feet or more below the ground surface, based on groundwater monitoring data allowing a minimum of 3 feet of separation between the drip dispersal and the groundwater table. Application of treated wastewater for irrigation shall not exceed the agronomic rate The agronomic rate will be monitored daily using an onsite irrigation controller to determine real time daily evapotranspiration rates and calculate run times for wastewater dispersal for irrigation.	• Applicant shall follow the timing guidelines of tertiary treated wastewater use in landscaping irrigation. • Monitoring of the effluent from the wastewater treatment system shall be completed per the Regional Water Quality Control Board issued Monitoring and Reporting Program included in the Notice of Applicability for enrollment in the 2014 WDR General Order. • The Notice of Applicability must be issued prior to recycled water production and use. • No application of effluent shall be allowed within the Zone A Protection Zone unless the water quality criteria is met. • A Groundwater Monitoring and Mitigation Plan (GMMP) shall be prepared for the project by a qualified hydrologist or hydrogeologist. • Any violation of the RWQCB permit conditions		Department of Environmental Health

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	Monitoring of Effluent Monitoring of the effluent from the wastewater treatment system shall be completed per the Regional Water Quality Control Board issued Monitoring and Reporting Program included in the Notice of Applicability for enrollment in the 2014 WDR General Order. The Notice of Applicability must be issued prior to recycled water production and use. Constituents that would be monitored and reported on are listed in the table below. Should the effluent exceed the UV transmittance threshold specified in the National Water Research Institute Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse, turbidity threshold of 10 NTU at any time, or other standard specified in the Notice of Applicability for enrollment in the 2014 WDR General Order, the treated wastewater shall not be applied within any area within the NMWD Zone A Protection Zone, including any portion of the leach field located in the Zone A Protection Zone. No application of effluent shall be allowed within the Zone A Protection Zone until the treatment system is repaired and the effluent quality is demonstrated to meet the water quality objectives. During periods when the effluent is not meeting water quality standards specified in the Notice of Applicability for enrollment in the 2014 WDR General Order, the effluent shall be stored in a tank and transferred to a wastewater treatment facility, if needed while maintenance is conducted on the wastewater treatment system. ***Groundwater Monitoring*** A Groundwater Monitoring and Mitigation Plan (GMMP) shall be prepared for the project by a qualified	shall require immediate notification to the RWQCB with a report filed within five (5) business days documenting the violation and corrective actions taken to address the violation. • Water quality monitoring reports shall be prepared quarterly and submitted to the RWQCB, NMWD, and County for review. • An annual report shall also be submitted to the RWQCB consistent with all regulatory requirements and permit conditions. – Reporting frequency may be reduced or may cease if NMWD ceases use and abandons the groundwater supply wells on the project site.		

Impact	Mitigation Measures	Mitigation Monitoring and Reporting Measures	When Implemented	Verified By
	hydrologist or hydrogeologist. The groundwater quality monitoring program must comply with monitoring and reporting requirements issued by the Regional Water Quality Control Board. The GMMP shall include specifics on the procedures and timing for groundwater monitoring and reporting as well as action criteria and responses to action criteria. At a minimum, the GMMP shall include: • Quarterly groundwater sampling and water quality monitoring between the irrigated areas and NMWD wells using the existing wells CG-2 and CG-3 and two additional monitoring wells • Quarterly reporting to RWQCB, NMWD, and the County with the results of the monitoring program • Performance criteria: – The water quality within the groundwater monitoring wells between the area of application and NMWD drinking water wells shall not exceed 10 mg/L of nitrate (NO3) . Nitrate is used as an indicator of the treated wastewater given that the background levels of nitrate are less than the treatment standard for the wastewater system. • Corrective actions: If the intervening groundwater well(s) indicate an exceedance of 10 mg/L nitrate, effluent application shall cease in the vicinity of the monitoring well where the exceedance is detected. Additional corrective actions including but not limited to, repairs or replacement of equipment, additional monitoring, or other actions, will be defined as appropriate depending on the exceedance detected and potential causes of the exceedance. ***Reporting***			

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	Any violation of the RWQCB permit conditions shall require immediate notification to the RWQCB with a report filed within five (5) business days documenting the violation and corrective actions taken to address the violation. Water quality monitoring reports shall be prepared quarterly and submitted to the RWQCB, NMWD, and County for review. The quarterly reports shall contain the daily and monthly groundwater and effluent monitoring results for the prior quarter, identify any exceedances of the water quality standards or performance criteria, and actions taken to address the exceedance. An annual report shall also be submitted to the RWQCB consistent with all regulatory requirements and permit conditions. Reporting frequency may be reduced or may cease if NMWD ceases use and abandons the groundwater supply wells on the project site. ***Alternative Uses of Treated Effluent*** Alternative uses of treated effluent may also include but not be limited to the following and would be based on Regional Water Board and Division of Drinking Water approval: • Use in off-site landscaping • Recycled water refill station			
	Mitigation Measure HYDRO-2: Avoid Equipment Staging and Storage in 100-Year Floodplain All equipment staging and storage areas shall be located outside of the 100-year floodplain. Any equipment-refueling activities shall be conducted within designated staging or storage areas with secondary containment for any potential spills of fuel.	• Locate storage and staging areas outside of the 100-year floodplain.	• Construction	• Marin County Community Development Agency

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Land Use and Planning				
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect	**Mitigation Measure BIO-1: Tree Removal Outside of Monarch Butterfly Roosting Season** Refer to Biological Resources.	Refer to Biological Resources.	Refer to Biological Resources.	Refer to Biological Resources.
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect	**Mitigation Measure BIO-2: Worker Environmental Awareness Training** Refer to Biological Resources.	Refer to Biological Resources.	Refer to Biological Resources.	Refer to Biological Resources.
Noise				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies	**Mitigation Measure NOI-1: Design of Wastewater Treatment System** The wastewater treatment system, including enclosures, shall be designed so that noise levels generated by the wastewater treatment system do not exceed 45 dB at the nearest residential property line adjacent the wastewater treatment system. A Noise Mitigation Plan, including the final wastewater treatment plan operational equipment noise levels, proposed enclosures, and any noise attenuation devices shall be submitted to the County at least 60 days prior to construction of the wastewater treatment system. The County may specify additional measures to reduce noise	• Wastewater treatment system shall be designed so that noise levels do not exceed 45 dB at the nearest residential property line. • Applicant shall prepare a Noise Mitigation Plan and submit to the County at least 60 days prior to construction of the wastewater treatment system.	• Prior to Construction	• Marin County Community Development Agency.

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	levels from the wastewater treatment system during the design review process.			
Transportation				
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)	**Mitigation Measure TRA-1: Traffic Management Plan** Prior to initiation of construction, the Project contractor(s) shall use a qualified traffic engineer to prepare a Traffic Management Plan (TMP) in compliance with the California Manual on Uniform Traffic Control Devices. The TMP shall be incorporated into the contract documents and specifications. The TMP shall include, but not necessarily be limited to, the elements listed below: • The construction contractor shall confirm with the West Marin Elementary School the typical start and dismissal times, school events, and irregular start and dismissal times prior to the start of construction. • The construction contractor shall avoid hauling/truck traffic on Highway 1 in front of West Marin Elementary School within 1 hour prior to the start of school and 1 hour following dismissal or special event times or equivalent method to avoid traffic hazards at the elementary school as defined in the TMP. • Installation of traffic-control devices where traffic conditions warrant, as specified in the applicable jurisdiction’s standards (e.g., the California Manual on Uniform Traffic Control Devices Part 6: Temporary Traffic Control); use of flaggers, when warranted, to control vehicle movements. • Implementation of a public information program to notify interested parties of the impending construction	• Traffic Management Plan prepared in compliance with the California Manual on Uniform Traffic Control Devices. • Submit Traffic Management Plan to the County for approval. • The Contractor or Traffic Engineer shall report to the County that applicable work was done in compliance with this measure.	• Prior to Construction	• Marin County Public Works

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	activities using means such as signs posted around the project site. • Compliance with roadside safety protocols to reduce the risk of accidents. • Maintaining of access for emergency vehicles at all times • Store all equipment and materials in designated contractor staging areas on or adjacent to the worksite in such a manner as to avoid obstruction to traffic including emergency vehicles.			
Tribal Cultural Resources				
a) Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is: i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	**Mitigation Measure CUL-1: Archaeological Monitoring Plan (AMP) and Archaeological Monitoring:** Refer to cultural resources	Refer to cultural resources.	Refer to cultural resources.	Refer to cultural resources.

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ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.				
Utilities and Service Systems				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	**Mitigation Measure HYDRO-1: Protection of NMWD Water Supply Wells** Refer to hydrology and water quality.	Refer to hydrology and water quality.	Refer to hydrology and water quality.	Refer to hydrology and water quality.