Due to the ongoing COVID-19 issues, the Governor of the State of California has issued Executive Order N-29-20 and Order N-25-20 establishing social distancing measures and suspending provisions of the Brown Act. For this reason we ask that you:

PLEASE SUBMIT ANY PUBLIC COMMENTS AHEAD OF TIME IF AT ALL POSSIBLE. Please visit http://www.co.del-norte.ca.us/ for a public comment form. Your comment will be limited to 3000 characters. Your comment will be read during the public comment period. Please submit only one comment per agenda item and only one general public comment.

VIEW THE MEETING AND COMMENT REMOTELY. A link to view the meeting will be posted on http://www.co.del-norte.ca.us/. Public comment on ALL agenda items as well as general public comment will be taken at the prescribed time for public comment via instructions provided on the website. Please submit only one comment per agenda item and only one general public comment.

IF YOU REQUIRE AN ACCOMMODATION DUE TO DISABILITY under the Americans with Disability Act that does not allow you to participate remotely or provide written comment ahead of the meeting YOU MUST notify the Planning Commission Secretary at least 24 HOURS in advance of the meeting and a reasonable accommodation will be made.

A G E N D A

DEL NORTE COUNTY PLANNING COMMISSION
VIA Zoom (media.co.del-norte.ca.us)
Crescent City, CA 95531

Regular Meeting
Wednesday,
June 2, 2021
6:00 p.m.

1. Roll Call

2. Consideration/Approval of Minutes

3. Communications and Petitions

   A. Information and Action Items:

      1. The after-the-fact grading permits for the State of California (GP2021-11C) and Bhanu and Angna Patel Trust 1999 (GP202-30 and CGP2021-16C) were held incomplete at the May 13, 2021 Environmental Review Committee Meeting. Full details regarding application materials required to hold the applications complete are included in the Minutes of the Environmental Review Committee located under Item 6.1 (Reports – Environmental Review Committee Minutes).

4. Order of the Day

   A. BOUNDARY ADJUSTMENTS

      NONE

   B. EXTENSION OF TIME REQUEST

JONES, WILLIAM – Extension of Time | Minor Subdivision – MS1901 – APNs 126-180-041 located at Big Flat Road, Big Flat.

C. USE PERMIT RENEWAL
NONE

6:00 PUBLIC HEARINGS

ALL PUBLIC HEARINGS SHALL COMMENCE NO SOONER THAN THIS TIME AND SHALL BE HEARD CHRONOLOGICALLY IN THE BELOW ORDER:
(Refer to each attached staff report)

NOTE: If you challenge the decision of the Planning Commission in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice, or in written correspondence delivered to the Planning Commission at, or prior to, the public hearing (Govt. Code 65009). There is a 90-day statute of limitations relating to decisions rendered after a public hearing of the Planning Commission.

D. CONSENT AGENDA – The following numbered projects meet local regulations and have been recommended for approval. Action will be taken without discussion unless a member of the Commission, the public, the applicant, or staff identifies a project to be removed for separate consideration. If you wish to discuss an item listed in the Consent Agenda, identify yourself when the Chairman calls the project name, and state why you wish it pulled for discussion. The Commission will take action on the other Consent Agenda items first, and then will discuss any pulled items before proceeding to the rest of the agenda. Please limit your comments to 3 minutes or less.

1) RAWSON, RON – Grading Permit – GP2021-14C – APN 103-020-030 located at 1881 S. Fred Haight Drive, Smith River.

E. PUBLIC HEARING

1) GREEN DIAMOND RESOURCE COMPANY – General Plan Amendment and TPZ Rezone to RR3 and RR3, MHF – GPA2001-R2001 – APN 106-021-074 and 076 located at the end of Wonder Stump Road, on the west side of Hwy 101, between Lake Earl Drive and Kings Valley Road, Crescent City.

5. PUBLIC COMMENT PERIOD - Public comment on items of interest to the public within the subject matter jurisdiction of the Planning Commission, and not otherwise appearing on the agenda. No action may be taken on any item not appearing on the agenda.

6. REPORTS

1) Environmental Review Committee Minutes

2) On their own initiative, Commission members may make brief announcements or brief reports on their own activities. They may ask questions for clarification, make a referral to staff or take action to have staff place a matter of business on a future agenda pursuant to Government Code Section 549.54.2(a).

3) Staff report on actions of the Board of Supervisors relating to Planning Commission matters.

7. ADJOURNMENT

NOTE: There is a 60-day statute of limitations relating to ministerial actions of the Planning Commission.

APP# GP2021-14C

Agent: Marisa Parish Hanson, Smith River Alliance

STAFF REPORT

APPLICANT: Ron Rawson

APPLYING FOR: Coastal Grading Permit to Replace Culverts for Fish Passage (Morrison Creek Tributary)

APN: 103-020-030 LOCATION: 1881 S. Fred Haight Drive, Smith River

PARCEL(S) SIZE:	EXISTING USE:	EXISTING STRUCTURES:
38.2 ac	Agricultural	None.

PLANNING AREA: 2 GENERAL PLAN: Agriculture Prime

ADJ. GEN. PLAN: Same, Agriculture General – 5 acre minimum

ZONING: AE ADJ. ZONING: Same and A-5

1. PROCESSING CATEGORY:
☐ NON-COASTAL ☒ APPEALABLE COASTAL
☐ NON-APPEALABLE COASTAL ☐ PROJECT REVIEW APPEAL

2. FIELD REVIEW NOTES: DATE: 5/6/2021

☒ ENVIRONMENTAL HEALTH ☒ BUILDING INSP
☒ PLANNING ☒ ENGINEERING/SURVEYING

ACCESS: Fred Haight Drive ADJ. USES: Agricultural, residential
TOPOGRAPHY: Flat DRAINAGE: Surface

DATE OF COMPLETE APPLICATION: May 13, 2021

3. ERC RECOMMENDATION: Application complete. Previously circulated environmental reviews apply – see SCH #2019109011 and SCH #2012098078. Post Public Hearing Notice. Approve with conditions.

4. STAFF RECOMMENDATION:

The Smith River Alliance, on behalf of property owner Ron Rawson, has submitted an application for a Coastal Grading Permit to implement the Morrison Creek Tributary Project which includes the replacement of two undersized culverts which impede fish passage and the removal of a third culvert along an unnamed tributary to Morrison Creek. In some reports included in the Staff Report, the unnamed tributary is referred to as Rawson Creek. The project is a culmination of several efforts of the Smith River Alliance to restore habitat in the Smith River watershed for salmonids. The project is intended to improve upstream fish passage for adult and juvenile Coho salmon and steelhead, and to reduce the potential for culvert failure and resulting sediment delivery to the stream. A State Coastal Conservancy Grant was awarded to the Smith River Alliance to identify stream crossings that restrict fish movement in tributaries to the lower Smith River. The Smith River Alliance partnered with hydrologist,

Michael Love of Michael Love and Associates (MLA) to prepare the crossing replacement designs and SHN Engineers and Geologists (SHN) to serve as the project engineering geologist. An assessment of biological resources was provided by the Smith River Alliance in the Morrison Creek Tributary Fish Passage Project Summary which is included as an attachment to this Staff Report.

Mr. Rawson's 38.2 acre parcel is designated as Prime Agriculture in the County's Land Use Plan of its' Local Coastal Program and has a zoning designation of Agriculture Exclusive (AE) in Title 21, the Implementation Plan of the County's Local Coastal Program. The project site is agricultural land managed for livestock grazing.

The proposed project is considered resource dependent as the purpose of the project is to remove barriers to fish and to prevent repeated flooding area. Completion of the project will provide 100% fish passage during migration flows and allow for natural conveyance of flow and debris.

Crossing One

In collaboration with the U.S. Fish and Wildlife Service, the Smith River Alliance has identified crossing one as a high priority project. Crossing one is roughly 2,600 feet upstream of the stream's confluence with Morrison Creek as shown on Figure 1. Underlying the private farming road that crosses the stream at this location is a 36-inch diameter corrugated metal pipe (CMP), 30 feet in length and set at a slope of 1.0% that is perched 2.0 feet above the downstream water surface of the culvert. The culvert is to be replaced with a 30 foot long by 16 foot bridge to be pre-fabricated by Kernan Construction, a building and engineering contractor located in McKinleyville. Several other design options were considered including a concrete box culvert and an open bottom culvert before selecting the bridge replacement. In the case of the former option, it was a viable but due to the size it would require a crane to install it and the removal of a number of riparian trees for the crane to operate removing it from consideration. As for the latter option, poor soils conditions identified by SHN during their evaluation of the site were not considered desirable due to the potential for scour and settlement. MLA has considered SHN's recommendations from the *Limited Geotechnical Evaluation, Smith River Alliance, Morrison Creek Tributary Culvert Replacement, Del Norte County* memo dated March 20, 2018, when preparing *Technical Memorandum – Summary of Final Bridge Design for Morrison Creek Tributary* dated August 1, 2018. Both documents are included in this Staff Report and provide more extensive technical details about the bridge replacement.

According to application materials, channel grading will occur upstream and downstream of the new bridge to match the design profile of 1.2%, matching the overall slope of the channel. Large wood pieces will be placed downstream of the bridge to raise the channel. The wood was selected to match natural conditions present in the stream. Upstream and downstream, large wood with rootwads will be placed at the abutment of the bridge on the outside of the north bank to create a natural bank revetment which will deflect high flows and protect the upper bank from scour. Imported streambed of a similar size to the natural substrate on the site will be used to grade the channel extending approximately 110 feet – 62 feet upstream and 47 feet downstream of the existing culvert. Rock Slope Protection (RSP) will also be imported to be placed under the bridge to protect the footings from scour and to protect the embankment. The dimension of the RSP will be ¼ tone pieces with a median diameter of 1.8 feet.

North of crossing one is an abandoned culvert that will be removed as part of the project.

Crossing Two

Crossing two is being undertaken through the California Department of Fish and Wildlife (CDFW) Fisheries Restoration Grant Program (FRGP) using the engineering plans prepared by MLA. Included in the Staff Report is *Technical Memorandum – Summary of Preliminary Design for Replacement of Rawson Creek Culvert Crossing No. 3 on a Tributary to Morrison Creek* dated January 11, 2021, which includes complete technical details and the preliminary plans for the second crossing replacement proposal.

Crossing two is located 500 feet south of crossing one and will replace a 36 inch diameter CMP, 20 feet in length and set at an inverse slope of 1.1% with a pre-cast concrete box culvert that is 12 feet wide by 6 feet tall by 16 feet long. The plan is to embed the culvert to a depth of 3 feet below the design channel to allow for channel continuity, without creating a significant constriction of channel width. Engineered streambed material (ESM) will be needed to supplement any native material removed on site during culvert removal. Similar to crossing one, crossing two will require channel grading upstream and downstream of the project area for no more than 100 feet of linear disturbance. Four pieces of large wood with rootwads will be installed for bank stabilization and to provide habitat enhancement features upstream and downstream of the new culvert. The wood will be sourced on site from a 7 mature Eucalyptus trees located at least 70 feet from the stream. Removal of the trees is not expected to result in a risk of sediment discharge to the stream. Four mature alder trees will be removed along the bank in order to carry out the project. The applicant has indicated that disturbance will be minimized the greatest extent possible and mulch and silt fencing will be used post construction to prevent soil erosion.

Impacts to Biological Resources

The table below, taken from the *Morrison Creek Tributary Fish Passage Project* summary prepared by the Smith River Alliance, indicates the state or federally listed, candidate, critical habitat, or essential fish habitat were listed as potentially being located within the project area.

SPECIES	STATUS	CRITICAL HABITAT IN THE ACTION AREA
Coho salmon	State and fed threatened	Yes
Pacific Salmon EFH*	Designated	NA
Willow Flycatcher	State endangered	No
Western Yellow-billed cuckoo	State endangered; fed threatened	No

*Pacific salmon essential fish habitat (EFH) is designated in Morrison Creek

Morrison Creek is designated critical habitat for Coho salmon and designated Pacific Salmon essential fish habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act. Additionally the Morrison Creek sub basin provides habitat to aquatic dependent species such as the red-legged frog (*Rana aurora*) and Foothill yellow-legged frogs (*Rana Boylii*). The project will be implemented when the stream is dry and as such effects on the aforementioned species is expected to be very limited in scope and duration. According to the summary, it is projected that any residual sediment activated by the project will be low and will dissipate prior to recolonization following the dry summer season. It is explained that the disturbance of the armor layer may temporarily reduce the quality of rearing habitat but that it is not expected to result in a reduction in reproduction or survival of fish, frogs, or other aquatic life as immediate resorting and improvement of substrate quality is expected prior to recolonization once stream flows resume. Overall, no adverse effect on Coho salmon, their critical habitat or Pacific Salmon EFH is projected for the project. Condition number 2 requires that all work be completed when the stream is dry.

Neither the Western Yellow-billed cuckoo nor the Willow Flycatcher were expected to be in the project area, the project will be scheduled after August 15th, when impacts are expected not occur. Condition numbers 2 and 3 address this requirement.

The project areas as defined in the application include a total of .04 acres of disturbed area including stream and riparian areas. Tree removal will be limited to the four mature Alder trees located adjacent to crossing two and the seven Eucalyptus trees located 70 feet from the stream. Condition 5 requires that any trees removed must be documented and replanted or replaced once the project is finished. Permanent effects to riparian habitat are expected to be minimal and mature vegetation will be avoided to maximum extent practical. Furthermore, the project was designed to minimize the need for tree removal. While the project may be considered wetland under the Coastal Act and Section 404 of the Clean Water Act., the project will result in no net loss of wetland habitat and will result in a net gain of wetland function and habitat connectivity in the long term.

Other Issues
As grading is a primary component of the project, several conditions have been placed on the project approval to specifically address this subject. In particular, conditions 12, 13, and 14 indicate that the applicant must submit improvements plans to the Engineering Division for review and approval, the project must be constructed per the approved plans and that no work shall occur outside between October 30 and April 30 any year without prior authorization from the County Engineer. Conditions applying best management practices to the construction site are also applied in conditions 5 and 6.

Several other conditions of note include the County's inadvertent find condition for archaeological resources (condition 8) and a requirement that any soil removed during grading activities be retained upon the parcel or spread upon parcels also designated as prime agriculture (condition 15). The purpose of the latter condition is to ensure the preservation of ongoing agricultural activities in the project area. Due to nature of the project being located in Waters of the State and United States, other permitting will be required by state and federal agencies to address water quality impacts and alterations to a streambed. Securement of any other permits is a requirement of the County's Coastal Grading permit per condition 16.

CEQA
Crossing one is covered under a Notice of Exemption filed by the State Water Resources Control Board which authorizes incidental discharges to the Waters of the State for projects associated with small habitat restoration. The title of the document on the State Clearinghouse website is, General Water Quality Certification for Small Habitat Restoration and may be found using State Clearinghouse # 2012098078. Crossing two, which is funded through a California Department of Fish and Wildlife Fisheries Restoration Grant Program (FRGP) grant, was included in a Mitigated Negative Declaration prepared by the California Department of Fish and Wildlife for all grant recipients of the 2019 FRGP. The project is identified as Project ID # 3064 and is titled, the Morrison Creek Tributary Barrier Removal. The review period started on 10/3/2019 and ended on 11/18/2019. The State Clearinghouse reference # is 2019109011.

Recommendation
Staff and ERC have found no issues with this project. The conditions recommended for approval mostly act to ensure the project is implemented according to application materials submitted to the County and other resource agency recommendations. Otherwise, it is recommended that the Planning Commission adopt the Negative Declaration and findings and approve the project with the 16 conditions.

5. FINDINGS:

A. This project is consistent with the policies and standards of the Local Coastal Program and Title 21 – Coastal Zoning;
B. The approval of the Coastal Grading Permit will not materially affect adversely the health and safety of persons residing or working in the neighborhood of the project site, and will not, be materially detrimental to the public welfare or injurious to property or improvements in the neighborhood;
C. Documentation provided by qualified biologist, professional engineers and professional geotechnical engineers for this project that has been incorporated onto the project and the action of the Planning Commission through conditions of approval;
D. Conditions have been incorporated into the project to ensure the project have no impact on biological resources;
E. The project will result in no-net loss of wetlands and will result in a net gain of wetland function and habitat connectivity;
F. Conditions have been incorporated into the project approval to ensure that water quality is maintained pre- and post- project activities; and
G. This project is subject to the California Environmental Quality Act and Negative Declarations (SCH# 2019109011 and SCH#2012098078) have been prepared and circulated pursuant this Act.

6. CONDITIONS:

1) The project shall be pursued in a diligent manner and completed in a reasonable period of time. If development has not commenced, the permit will expire within two years from the date of final approval. Application for extension of permit must be made prior to the date of expiration. All field activities must be completed in the same year and as one event;
2) All work shall be completed while the unnamed tributary to Morrison Creek is dry and after August 15 to avoid impacts to fish, amphibians, birds, or other stream/riparian dependent species;
3) Nesting bird surveys shall be conducted for any vegetation disturbance that is conducted prior to August 15;
4) All heavy equipment shall be inspected for leaks and washed prior to working within the project area. All fueling shall occur at 100 feet from any wetland and stream;
5) Permanent removal of vegetation, except non-native vegetation must be avoided. Any trees removed must be documented and replanted or replaced once the project is finished;
6) Access by equipment will occur on both sides of the stream to minimize disturbance and to reduce effects to soil;
7) Project activities must occur between 8:00 a.m. and 5:00 p.m.;
8) Should any archaeological resources be found during project activities, construction activities shall be halted until an evaluation of the find is made by either a qualified archaeologist or representatives of the local tribes. Any mitigation measures that may be deemed necessary must have the approval of the local tribes and the County of Del Norte, and shall be implemented by a qualified archeologist representing the County of Del Norte prior to resumption of construction activities. If human remains are exposed by a project related activity, the County of Del Norte shall comply with California State Health and Safety Code, Section 7050.5, which states that no further disturbance shall occur until the County Coroner has made the necessary findings as to the origin and disposition pursuant to California Public Resources Code, Section 5097.98;
9) This entitlement is specifically conditioned on the applicant agreeing to indemnify and hold harmless the County of Del Norte, the Planning Commission of the County of Del Norte, the Board of

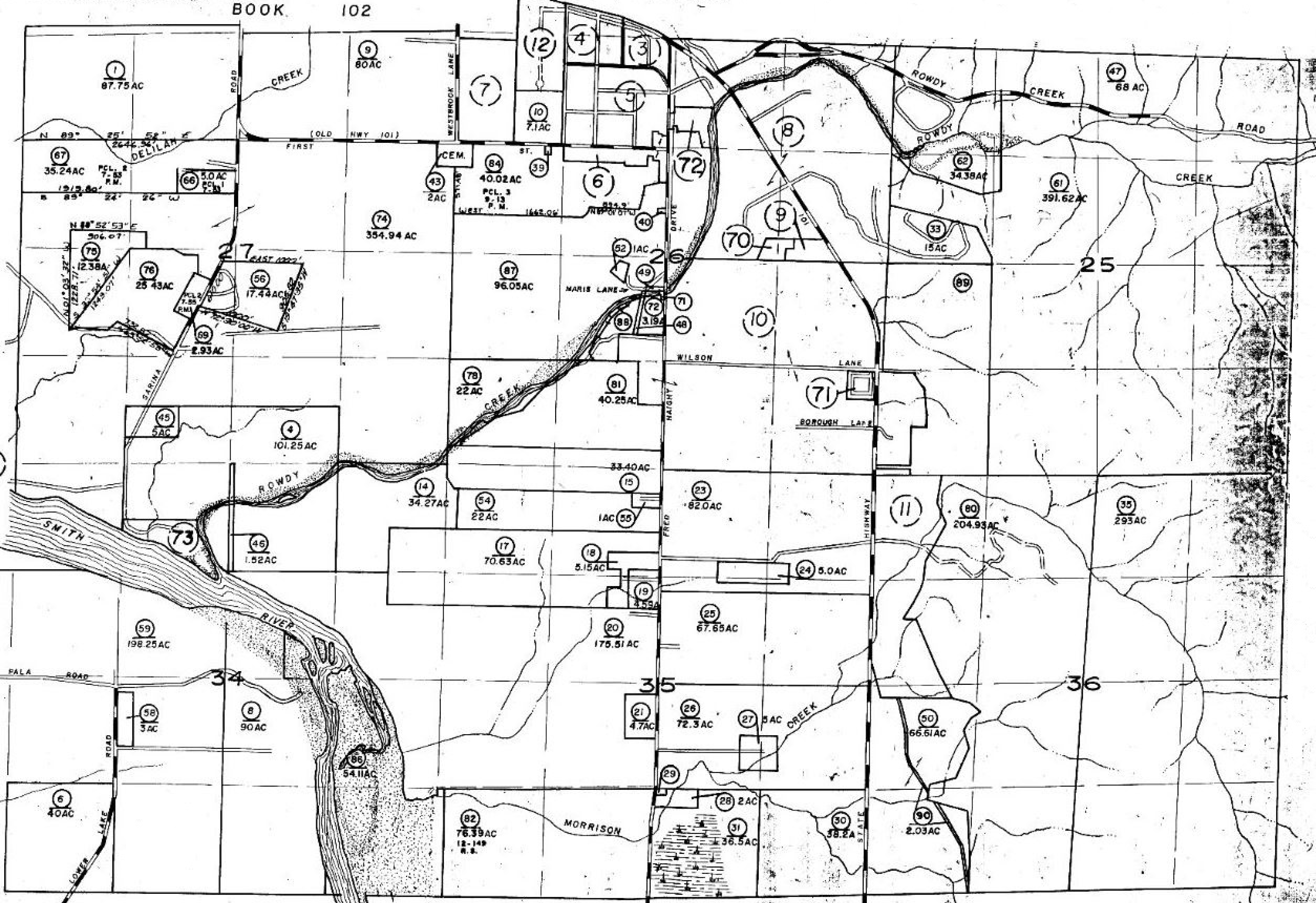
Supervisors of the County of Del Norte, their officers, employees and agents against any and all claims arising out of the issuance of the entitlement and specifically against any expense arising from defending any legal action challenging the issuance of the entitlement, including but not limited to the value of time devoted to such defense by County officers, employees and agents and the amount of any judgment, including costs of suit and attorney fees, recovered against the County or any of its officers, employees or agent in such legal action. The County of Del Norte reserves the option to either undertake the defense of any such legal action or to tender such defense to the applicant. Should the County tender such defense to the applicant and the applicant fail or neglect to diligently defend such legal action, the County may consider such failure or neglect to be a material breach of this conditions and forthwith revoke this entitlement;

10) The activities associated with this permit are not within the State Responsibility Area;
11) The applicant shall consult the Building Inspection Division to determine if a building permit is required for any portion of the project. Issuance of any building permit shall be subject to final review and approval by the Building Inspection Division ;
12) Prior to issuance of the Grading Permit, the applicant shall submit improvement plans for the project to the engineering and Surveying Division for review and acceptance. The plans shall be prepared by a California licensed design professional;
13) All improvements shall be constructed per the approved set of plans;
14) No grading shall occur between October 30 and April 30 of any year unless the applicant has obtained written authorization from the County Engineer;
15) All soils removed during grading activities shall be retained upon the parcel or, if removed from the parcel, shall be limited to surrounding, similarly designated parcels (e.g. Prime Agriculture Agricultural Exclusive), where the soils will serve to facilitate ongoing agricultural activities pursuant to policies identified in the County's Local Coastal Program (Land Resources, Section III: General Policies for Agricultural Lands) and shall be subject to separate permitting (i.e. Coastal Development/Grading Permit) and environmental review; and
16) It is the applicant's responsibility to determine if permits are required from other agencies and to obtain said permits. *The following are likely to be required: Section 404 Nationwide Permit from the United States Army Corps of Engineers, Section 401 Water Quality Certification from the California North Coast Regional Water Quality Control Board, and Section 1602 Streambed Alteration Agreement from the California Department of Fish and Wildlife.*

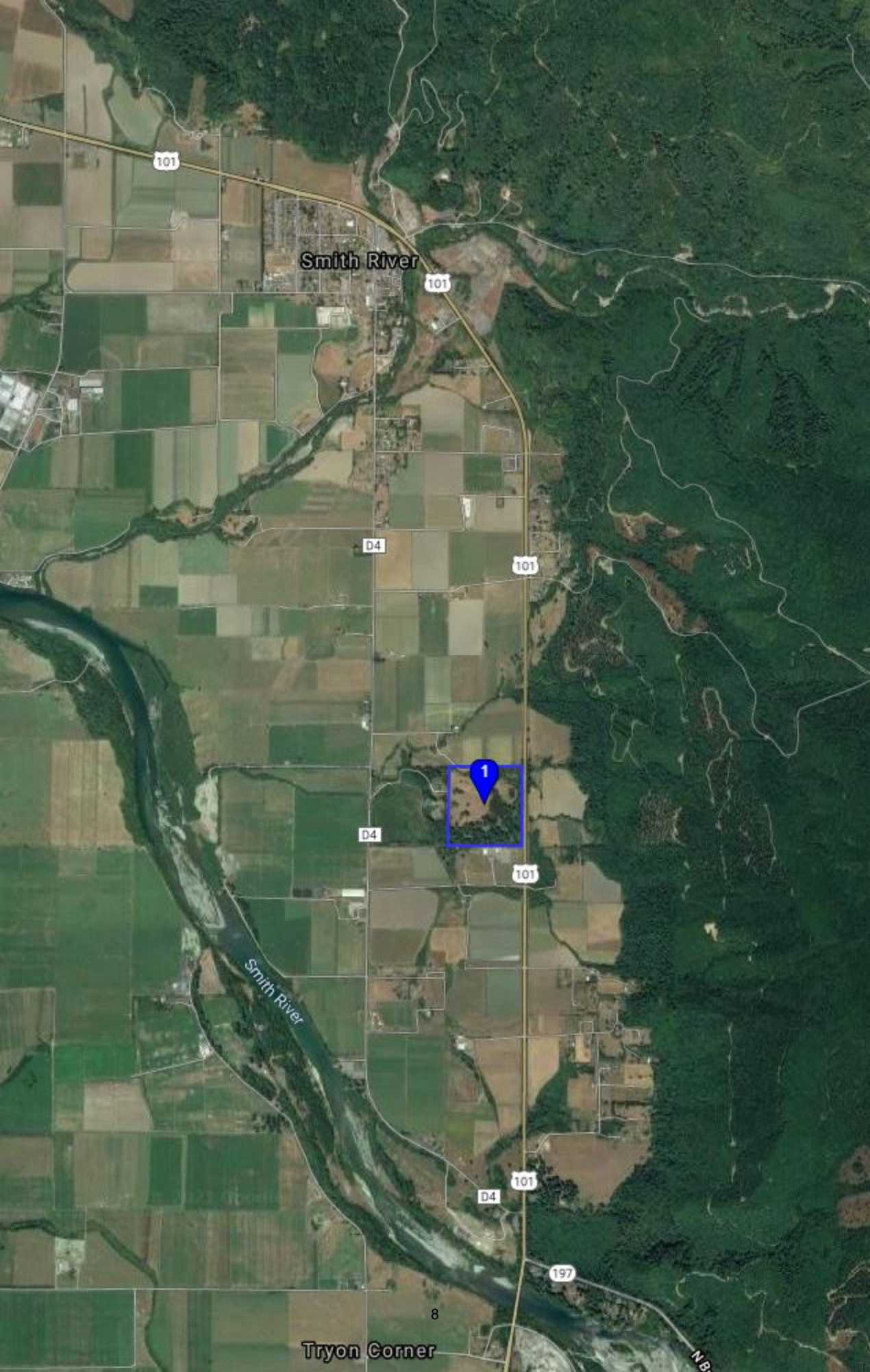
...IS NOT AN OFFICIAL MAP
...OR ASSESSMENT PURPOSES ONLY

T.18N., R.1W., H.B.&M.

BOOK 102



BOOK


Smith River
101
D4
1
Smith River
197
Tryon Corner

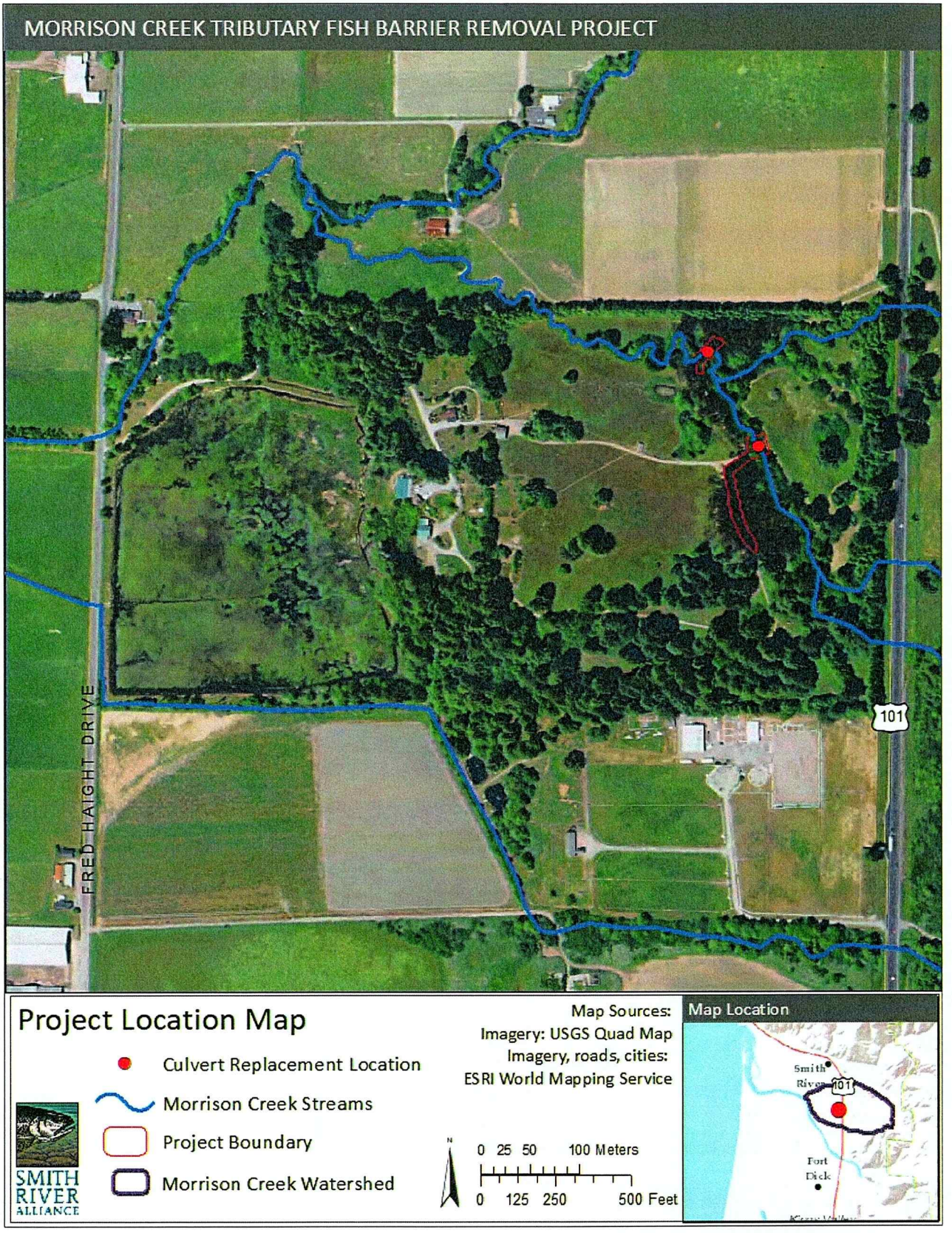
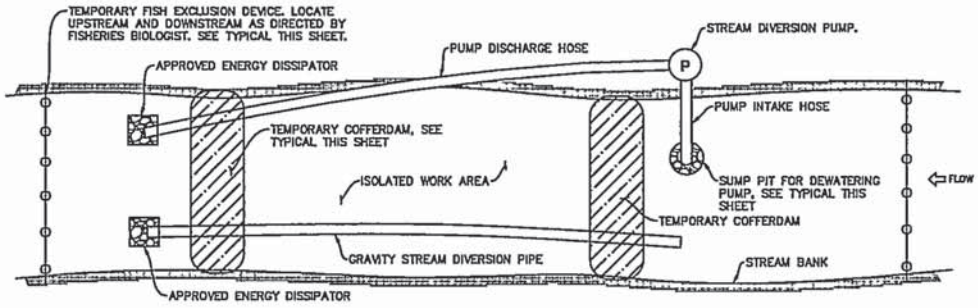
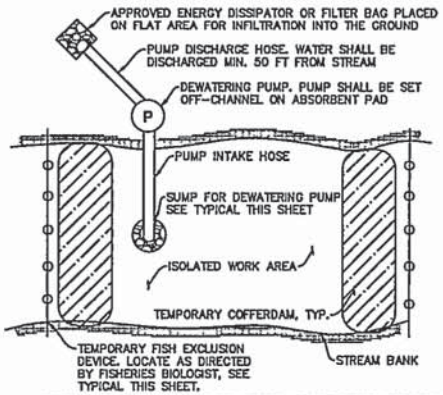


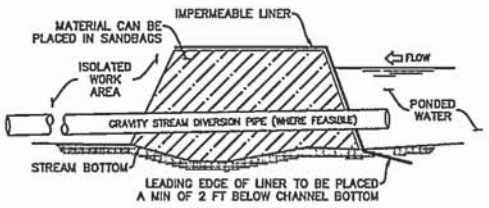
Figure 1. Project location in relation to the surrounding Morrison Creek basin including proximity to Highway 101, and Fred Haight Drive.



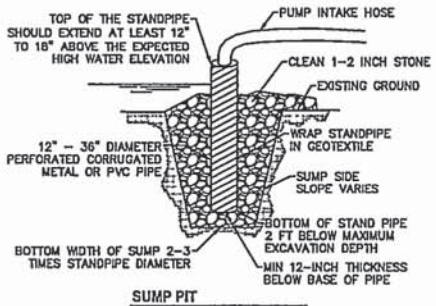
TEMPORARY CLEAR WATER DIVERSION
TYPICAL PLAN (NTS)



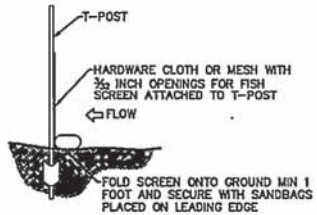
TEMPORARY NUISANCE AND POND DEWATERING MEASURES
TYPICAL PLAN (NTS)



TEMPORARY COFFERDAM
TYPICAL PROFILE (NTS)



SUMP PIT
TYPICAL SECTION (NTS)



TEMPORARY FISH EXCLUSION DEVICE
TYPICAL PROFILE (NTS)

1 TYP **WATER MANAGEMENT**
TYPICAL

WATER MANAGEMENT

GENERAL

1. THE WATER MANAGEMENT FEATURES (E.G. COFFERDAMS) SHOWN IN THE CONTRACT DRAWINGS ARE APPROXIMATE. THE CONTRACTOR IS TO DESIGN A WATER MANAGEMENT PLAN THAT MEETS THE CONTRACTORS APPROACH TO THE PROJECT WHILE MEETING PERMIT AND OTHER CONSTRAINTS.
2. THE OBJECTIVE OF WATER MANAGEMENT IS TO ISOLATE THE CHANNEL WORK SO THAT WORK IS COMPLETED IN DRY CONDITIONS. TO ACCOMPLISH THIS, THE CONTRACTOR MUST EMPLOY A CLEAR WATER DIVERSION SYSTEM AND A DEWATERING SYSTEM. THE CLEAR WATER DIVERSION SYSTEM BYPASSES CREEK WATER AROUND THE WORK AREA. THE DEWATERING SYSTEM REMOVES "NUISANCE" WATER (E.G. SEEPAGE) FROM WITHIN THE ISOLATED WORK AREA.
3. THE CONTRACTOR MUST SUBMIT A WATER MANAGEMENT PLAN FOR APPROVAL.
4. NO CONSTRUCTION ACTIVITIES ARE PERMITTED UNTIL THE WATER MANAGEMENT PLAN HAS BEEN APPROVED.

SUBMITTALS

THE WATER MANAGEMENT PLAN MUST INCLUDE THE FOLLOWING:

1. SUMMARY OF THE CONTRACTORS WATER MANAGEMENT APPROACH.
2. DESCRIBE THE APPROACH TO COORDINATE THE REMOVAL OF FISH AND OTHER SPECIES FROM THE ISOLATED WORK AREA.
3. DESCRIBE IN DETAIL, INCLUDING GRAPHICAL FIGURES, THE CLEAR WATER DIVERSION SYSTEM. THIS INCLUDES, BUT IS NOT LIMITED TO, LOCATION OF INFRASTRUCTURE, TYPE OF INFRASTRUCTURE, DESIGN FLOW, PIPE SIZE, PIPE MATERIAL, PIPE LENGTH, PIPE ROUTING, ETC., AND PUMP DETAILS, IF UTILIZED.
4. DESCRIBE IN DETAIL, INCLUDING GRAPHICAL FIGURES, THE DEWATERING SYSTEM. THIS INCLUDES, BUT IS NOT LIMITED TO, THE LOCATION OF INFRASTRUCTURE, TYPES OF EQUIPMENT, SIZE OF EQUIPMENT, DISCHARGE LOCATIONS, ETC.
5. DESCRIBE IN DETAIL THE PROCEDURES TO BE EXECUTED SHOULD THE CHANNEL FLOW INCREASE (I.E. BECAUSE OF STORM EVENT).

PRODUCTS

COFFERDAM

1. MAY BE CONSTRUCTED USING NATIVE OR IMPORTED MATERIAL PLACED IN BAGS (E.G. SAND BAGS, SUPERSACKS). NO COFFERDAM MATERIAL MAY BE RELEASED TO THE CHANNEL AT THE COMPLETION OF THE CONSTRUCTION WITHOUT APPROVAL. MATERIAL AND APPROACH TO BE DESCRIBED IN THE WATER MANAGEMENT PLAN.
2. THE IMPERMEABLE LINER MATERIAL TO BE USED SHALL BE IDENTIFIED IN THE WATER MANAGEMENT PLAN.

CLEAR WATER DIVERSION SYSTEM

1. GRAVITY SYSTEM IS PREFERRED. SYSTEM SHALL BE CAPABLE OF CONVEYING ALL OF THE STREAMS FLOW.
2. THE PIPE MATERIAL SHALL BE SELECTED FOR FLEXIBILITY AND DURABILITY TO ALLOW FOR THE OCCASIONAL RELOCATION DURING CONSTRUCTION.
3. THE CONTRACTOR SHALL USE RESTRAINED PIPE JOINTS OR USE FITTINGS AND COUPLINGS THAT PREVENT SEPARATION OF PIPES.
4. THE CONTRACTOR HAS THE OPTION TO USE PUMPING INSTEAD OF GRAVITY FOR THE CLEAR WATER DIVERSION, BUT GRAVITY IS PREFERRED. IF GRAVITY NOT UTILIZED, PRESENT REASONS WITHIN THE WATER MANAGEMENT PLAN.
5. THE PUMP AND PUMPING APPARATUS USED FOR THE CLEAR WATER DIVERSION SHALL BE OF THE SUBMERSIBLE TYPE WITH SUFFICIENT CAPACITY TO PUMP ALL THE STREAMS FLOW.
6. THE CONTRACTOR SHALL PROVIDE BACKUP POWER AND PUMPING EQUIPMENT TO ASSURE THAT THE CLEAR WATER DIVERSION REMAINS FUNCTIONAL THROUGHOUT THE TIME PERIOD THAT THE CHANNEL IS ISOLATED.

DEWATERING SYSTEM

1. THE CONTRACTOR SHALL FURNISH ALL MATERIALS, TOOLS, EQUIPMENT, FACILITIES AND SERVICES AS REQUIRED FOR PROVIDING THE NECESSARY DEWATERING WORK AND FACILITIES, AND PROVIDE BACKUP EQUIPMENT AS NECESSARY FOR REPLACEMENT AND FOR UNANTICIPATED EMERGENCIES.

EXECUTION

1. NO WORK MAY BEGIN UNTIL THE CONTRACTOR'S WATER MANAGEMENT PLAN HAS BEEN APPROVED.
2. PRIOR TO ANY INSTALLATION OF WATER MANAGEMENT FACILITIES, THE FISH REMOVAL WORK MUST BE COMPLETED.
3. INSTALL WATER MANAGEMENT SYSTEMS PER THE APPROVED WATER MANAGEMENT PLAN.
4. REFER TO CONTRACT DRAWING DETAILS FOR ADDITIONAL INFORMATION.
5. ONCE THE IN-CHANNEL WORK IS COMPLETED AND ACCEPTED, REMOVE WATER MANAGEMENT SYSTEMS PER THE APPROVED WATER MANAGEMENT PLAN AS AS DIRECTED.

AQUATIC SPECIES MANAGEMENT

GENERAL

- THE PROJECT AREA WILL LIKELY INCLUDE FISH AND OTHER SPECIES THAT NEED TO BE REMOVED PRIOR TO ANY IN-CHANNEL WORK, INCLUDING THE INSTALLATION OF WATER MANAGEMENT SYSTEMS. THE CONTRACTOR SHALL WORK WITH THE COR TO COORDINATE THE REMOVAL OF FISH AND OTHER SPECIES.
- NO WORK MAY BE COMPLETED UNTIL THE WATER MANAGEMENT PLAN HAS BEEN APPROVED.

PRODUCTS

- REFER TO DRAWING DETAILS FOR PRODUCT INFORMATION

EXECUTION

- THE CONTRACTOR MUST COORDINATE WITH THE CONTRACT OWNER AND THEIR BIOLOGIST. IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE CONTRACT OWNER AT LEAST ONE WEEK PRIOR TO NEEDING THE BIOLOGISTS SERVICES.

Michael Love & Associates, Inc.
PO Box 4477 • Arcata, CA 95518 • (707) 822-2411

SMITH RIVER ALLIANCE
P.O. Box 2129 • Crescent City, CA 95531

VERIFY SCALE
THIS BAR IS ONE INCH LONG AT FULL SCALE

SMITH RIVER ALLIANCE
RAWSON CREEK
CULVERT REPLACEMENT No. 3

4 - WATER MANAGEMENT

DATE
DEC 2020
SUBMITTAL
35% DESIGN
DESIGN
LLANOS / LOVE
DRAWN
LLANOS
SHEET
4 of 7

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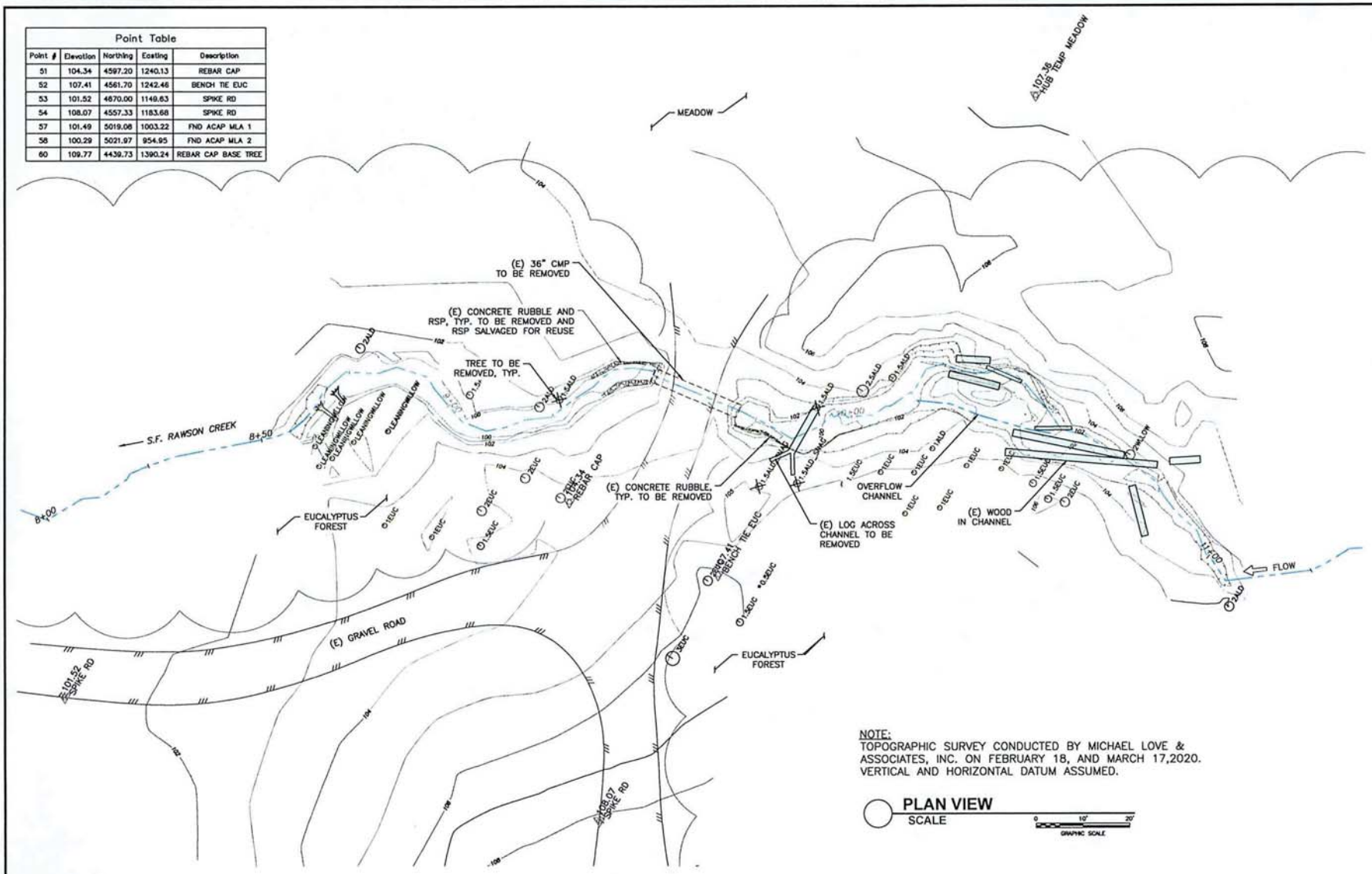
Point Table				
Point #	Elevation	Northing	Easting	Description
51	104.34	4597.20	1240.13	REBAR CAP
52	107.41	4561.70	1242.46	BENCH TIE EUC
53	101.52	4670.00	1149.63	SPIKE RD
54	108.07	4557.33	1183.68	SPIKE RD
57	101.49	5019.08	1003.22	FND ACAP MLA 1
58	100.29	5021.97	954.95	FND ACAP MLA 2
60	109.77	4439.73	1390.24	REBAR CAP BASE TREE



NOTE:
TOPOGRAPHIC SURVEY CONDUCTED BY MICHAEL LOVE & ASSOCIATES, INC. ON FEBRUARY 18, AND MARCH 17,2020. VERTICAL AND HORIZONTAL DATUM ASSUMED.

PLAN VIEW
SCALE 0 10' 20'
GRAPHIC SCALE

Michael Love & Associates, Inc.
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P.O. Box 2129 · Cameron City, CA 95531

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SMITH RIVER ALLIANCE
RAWSON CREEK
CULVERT REPLACEMENT No. 3

5 - EXISTING CONDITIONS

DATE
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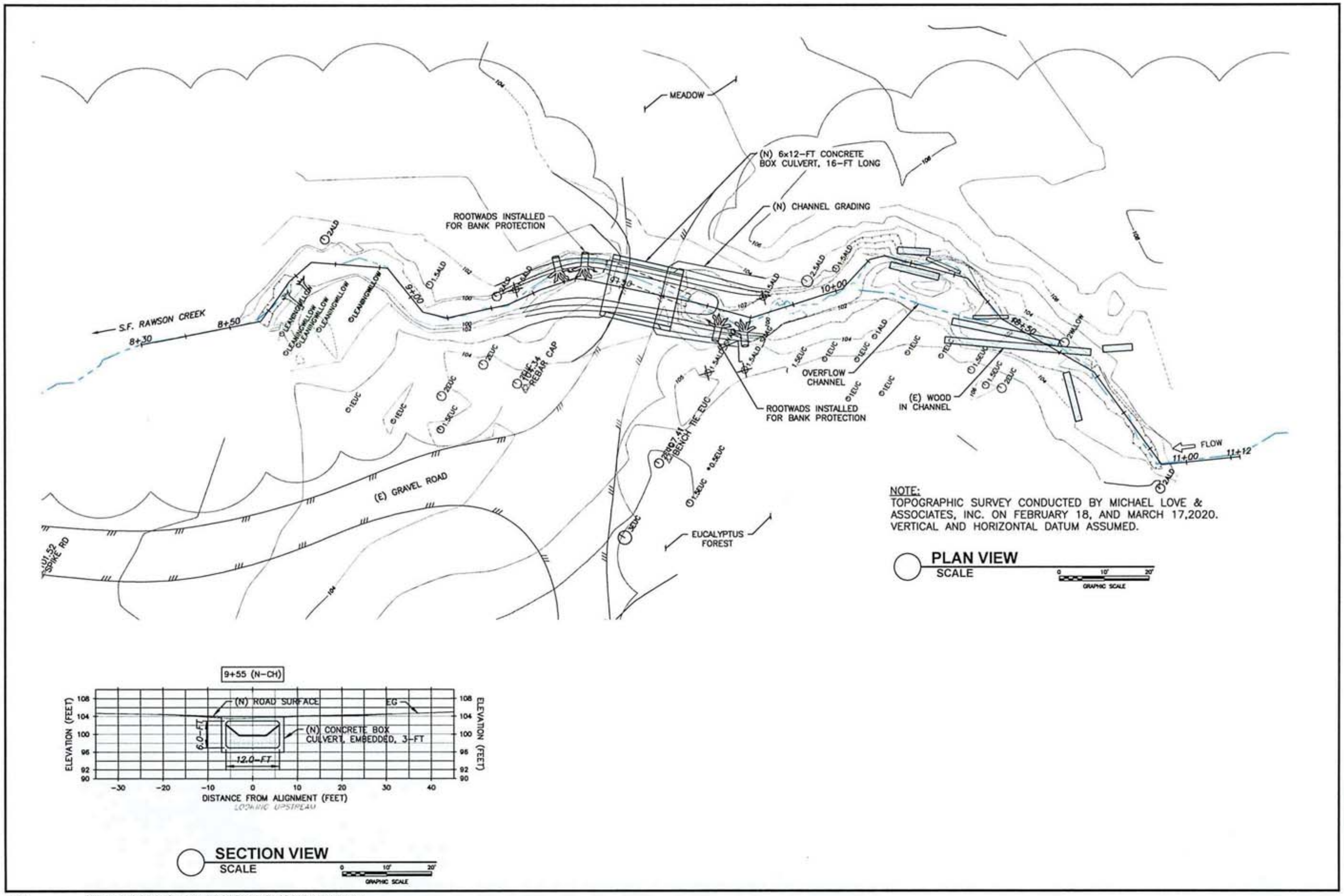

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CULVERT REPLACEMENT No. 3

6 - NEW CROSSING LAYOUT

DATE	DEC 2020
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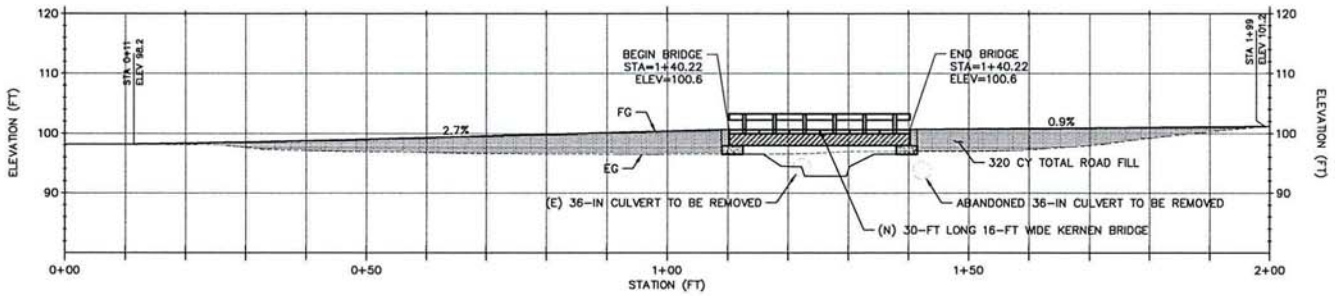
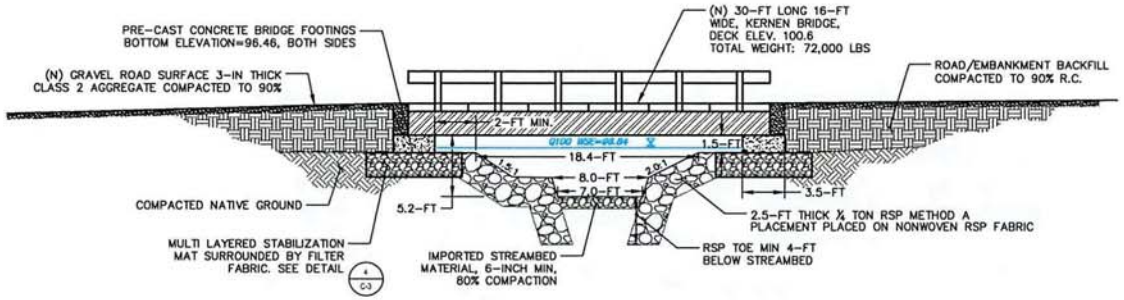
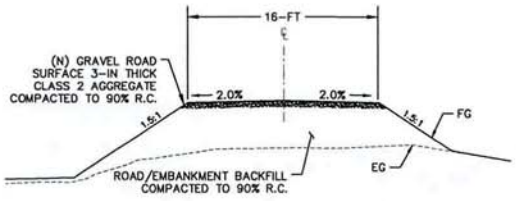


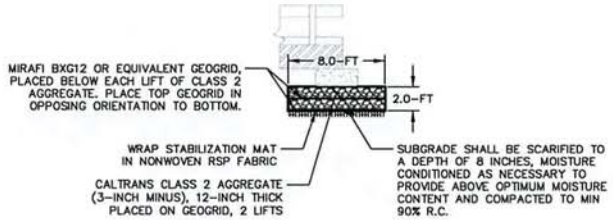
1 ROAD PROFILE
1H:1V



2 CHANNEL SECTION AT BRIDGE FACE
1H:1V



3 TYPICAL ROAD SECTION
TYPICAL



4 MULTILAYER STABILIZATION MAT
TYPICAL

ROAD SPECIFICATIONS

1. ROAD/EMBANKMENT BACKFILL SHALL CONSIST OF SUITABLE MATERIAL NO LARGER THAN 6-INCHES IN DIAMETER. MATERIAL SHALL BE PLACED IN 6-INCH LIFTS AND COMPACTED AS SPECIFIED.
2. NEW GRAVEL ROAD SHALL CONSIST OF 1-1/2 INCH MINUS CLASS II AGGREGATE COMPACTED AS SPECIFIED.

ROCK SLOPE PROTECTION (RSP)

RSP ROCK PROTECTS THE BRIDGE INSTALLATION.

MATERIAL SPECIFICATIONS

1. ROCK SHALL MEET MATERIAL PROPERTIES IN ACCORDANCE WITH CALTRANS, 2015 SECTION 72-2.
2. RSP SHALL BE ½ TON CLASS ROCK.
3. RSP FABRIC SHALL BE NONWOVEN CLASS 8 IN ACCORDANCE WITH CALTRANS, 2015 SECTION 72-2

INSTALLATION SPECIFICATIONS

1. ROCK SHALL BE PLACED IN ACCORDANCE WITH CALTRANS, 2015 SECTION 72 AND USING "METHOD A" PLACEMENT, INDIVIDUALLY PLACED ON NON-WOVEN RSP FABRIC.
2. ROCK SHALL HAVE A MINIMUM OF THREE CONTACT POINTS.
3. PLACE ROCK IN ROWS BEGINNING IN THE CHANNEL AND WORKING UP THE BANK.
4. BACKFILL ALL VOIDS WITH NATIVE MATERIAL AND COMPACT AFTER THE EACH ROW IS PLACED.

STABILIZATION MAT SPECIFICATIONS

1. STABILIZATION MAT SHALL BE MADE UP OF LATERALLY CONSTRAINED MULTI LAYERED BED OF WELL GRADED CRUSHED AGGREGATE AND TWO LAYERS OF MIRAFI BXG12 GEOGRID OR EQUIVALENT.
2. STABILIZATION MAT SHALL BE WRAPPED IN NONWOVEN RSP FABRIC.
3. THE BRIDGE FOOTING LOAD SHALL BE CENTERED ON THE STABILIZATION MAT.
4. THE THICKNESS OF THE STABILIZATION MAT SHALL BE A RATIO OF 1:4 WITH THE BASAL WIDTH ALONG THE ENTIRE LENGTH OF THE PRECAST BRIDGE ABUTMENT.
5. THE BASE OF THE STABILIZATION MAT CLOSEST TO THE CHANNEL SHOULD BE CONSTRUCTED ON OR BEHIND A SLOPING PLANE OF 2H:1V FROM THE FINISHED CHANNEL TOE.

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SMITH RIVER ALLIANCE
MORRISON CREEK TRIBUTARY
CULVERT REPLACEMENT
BRIDGE DETAIL & ROAD PROFILE

DATE	JULY 2018
SUBMITTAL	FINAL
DESIGN	ML
DRAWN	STP
SHEET	7 of 9
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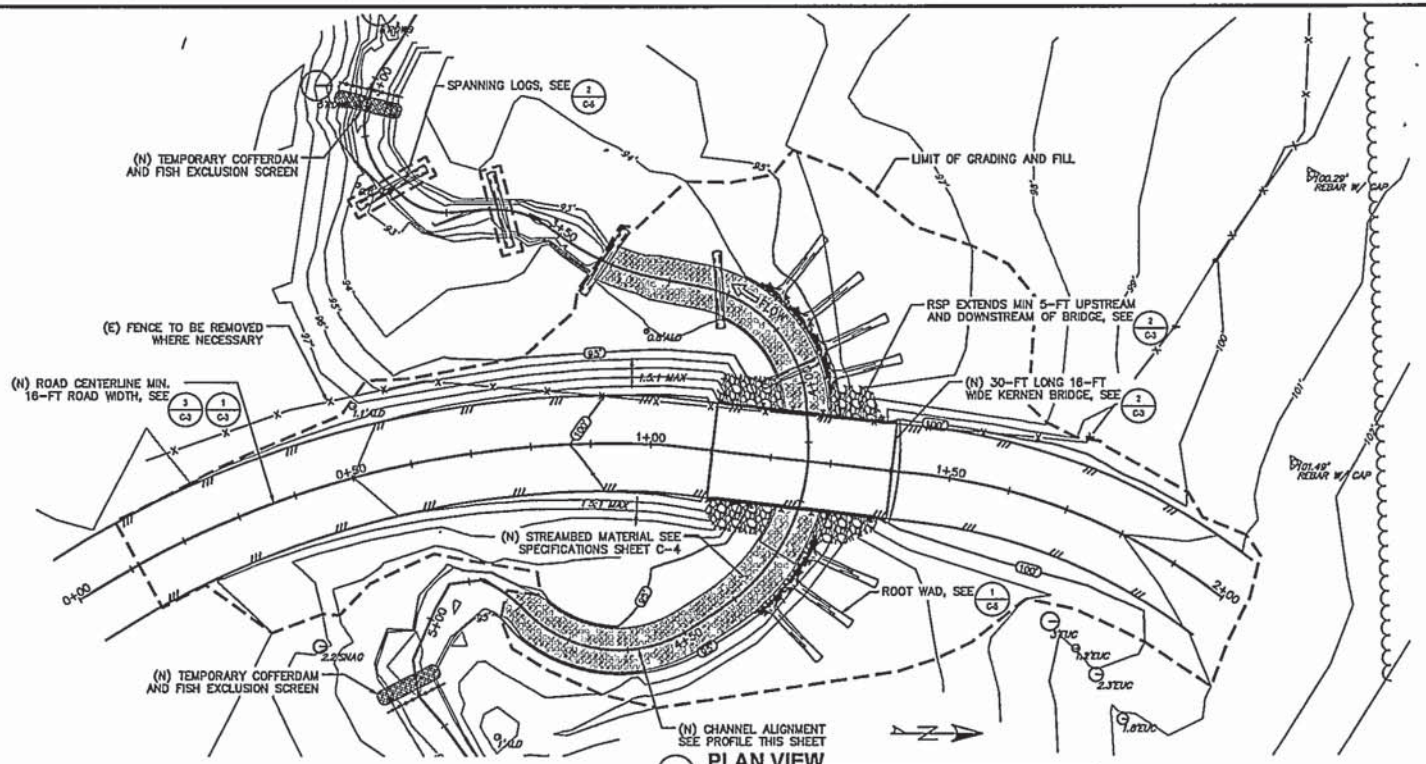

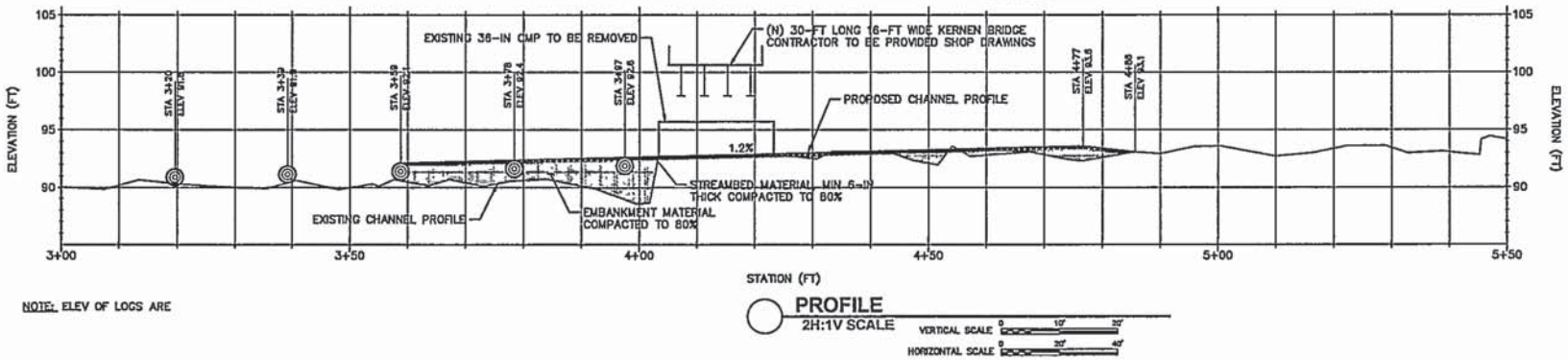

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SMITH RIVER ALLIANCE
MORRISON CREEK TRIBUTARY
CULVERT REPLACEMENT

NEW CONDITIONS PLAN & PROFILE

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Morrison Creek Tributary Fish Passage Project

Project Description

The project is resource dependent, involving actions necessary to remove two fish barriers on a small unnamed anadromous stream that flows into Morrison Creek, approximately 4,500 linear feet upstream of the Morrison Creek and Smith River confluence, in Del Norte County CA (Figure 1). The overall project goal is to remove two undersized culverts, one that is a total barrier and one that is a partial barrier to fish passage, and replace them with appropriately sized structures that allow passage at all migration flows. Crossings are located approximately 500 linear feet apart and will be constructed simultaneously. Work is anticipated to be completed in a single construction season.

Crossing #1

The downstream crossing will replace a 3 foot corrugated metal pipe (CMP), 30 feet in length and set at a slope of 1.0%, that is perched 2.0 feet above the downstream tailwater control. The crossing will be replaced with a 30 foot long, 16 foot wide Kernan bridge. An abandoned culvert, located to the north of the existing culvert, will also be removed. The crossing is located at the apex at a tight meander bend and the overall designed channel planform alignment was developed to restore the natural planform and eliminate abrupt turns, which results in the centerline of the stream shifting slightly north of the existing crossing, but south of the abandoned culvert.

Channel grading will occur upstream and downstream of the new bridge to match the design profile of 1.2%, matching the overall slope of the channel. Downstream of the crossing the channel bed will be raised using channel spanning large wood pieces; wood was selected to match natural conditions present in the stream. Large wood is functioning as grade control in the reference reaches upstream and downstream of the crossing. Large wood with rootwads will be placed upstream and downstream of the bridge abutment on outside of the meander bend (north bank). Wood is intended to create a natural bank revetment deflecting high flows and protecting the upper bank from scour.

Streambed material, similar in size to the natural substrate on site, will be imported and used to grade the channel extending approximately 110 feet, 62 feet upstream and 47 feet downstream of the existing CMP. Rock slope protection (RSP) will be imported and placed under the bridge to protect the embankment and bridge footings from scour. RSP will be composed of ¼ ton pieces with a median diameter of 1.8 feet and placed at a thickness of 2.5 feet. A multilayered stabilization mat made of well graded crushed aggregate will be used for the bridge abutments. All project construction will follow the finalized and stamped design plans included with the permit application packet.

Crossing #2

The project will replace a 3 foot CMP, 20 feet in length and set at an inverse slope of 1.1% with a pre-cast concrete box culvert that is 12' wide by 6' tall and 16' long. The culvert will be embedded 3' below the design channel bed to provide for channel continuity, without creating a significant constriction of channel width. Channel grading will occur upstream and downstream of the culvert replacement for a total of no more than 100 linear feet of disturbance. A channel spanning log will be removed near the upstream extent of the project to appropriately set the channel grade.

Vegetation disturbance will occur on both banks during construction and result in removal of four mature alders, shrubs and Eucalyptus. Disturbance will be minimized to the greatest extent possible and mulch and silt fencing will be used post construction to prevent soil erosion. In addition to installation of the culvert, four large wood

pieces with rootwads attached will be installed as bank stabilization and habitat enhancement features upstream and downstream of the new culvert. Concrete rubble located around the existing culvert will be removed from the channel. Engineered streambed material will be added to grade the culvert if the substrate on site is not of the appropriate size ratios to match the designs.

Large wood material will be sourced on site from a mature Eucalyptus grove in the project area. In addition to the four used on site, seven additional trees will be removed to be used on a different stream restoration project. Impacts from Eucalyptus removal, in addition to the in-stream activities, will be restricted to no more than 499 feet. The majority of the removed Eucalyptus are located on the outer edge of the grove, at least 70 feet from the stream, and will not present a risk of sediment discharge to the stream. As such, the Eucalyptus tree removal is accounted for in the acreage impact of the project but not in the linear foot impacts in section VII. Project Size table below. Sediment will be removed from the rootwads prior to transport and installation in the stream to prevent discharge to the stream. All project construction will follow the design plans included with the permit application packet.

Access to the construction site will occur on either side of the stream channel as needed. The site is anticipated to be dry but will be dewatered following the design guidelines if needed.

See the attached project map, designs, and design reports for more details.

Background and Setting

The project is located on a small unnamed tributary that flows into Morrison Creek approximately 4,500 linear feet upstream of the Morrison Creek and Smith River confluence. The stream is feed by multiple smaller tributaries that flow from the steep coastal foothills east of Highway 101. The Morrison Creek sub-basin meets the Smith River at 4.5 miles upstream from the river mouth. The land use around the unnamed tributary is primarily timber production in the foothills, for pasture and grazing and lily bulb production upstream of highway 101, and private timber and pasture around the project site.

The two private road crossings included in the Project are approximately 500 feet apart and approximately 2,600 feet upstream of the confluence with Morrison Creek. The downstream crossing (#1) is a total barrier to fish passage and the upstream crossing (#2) is a partial barrier to fish passage based on surveys performed by Smith River Alliance (Parish Hanson 2018) following protocols described in Park IX of the California Department of Fish and Wildlife's California Salmonid Stream Habitat Restoration Manual (CDFG 2003). However, both crossings are passable at high flows as both crossings are undersized and are overtopped based on field evidence and landowner reports. Juvenile salmonids, including Coho salmon, steelhead trout, and Coastal Cutthroat trout, have all been documented utilizing the unnamed stream upstream of the crossings (Parish and Garwood 2016).

Both crossings were designed using the stream simulation approach outlined in Part XII of the California Salmonid Stream Habitat Restoration Manual (CDFG 2009 and also described in NMFS (2001) and USFS (2008). The stream simulation approach utilizes a crossing structure that spans the bankfull channel, provides a seamless transition between the upstream and downstream channel profiles, and maintains a natural streambed within the crossing throughout the service life of the crossing. The approach relies on using the adjacent stream channel as a geomorphic reference for design of the crossing structure.

Completion of the project will provide 100% fish passage during migration flows and allow for natural conveyance of flow and debris. The purpose of the project is solely focuses on improving natural resources and stream processes.

Action Area

The project is located downstream (west) of Highway 101 and upstream (east) of S Fred Haight Drive. The two crossings are approximately 500 linear feet apart on the same stream. Crossing #1 will alter approximately 110 feet of the stream and crossing #2 will alter approximately 90 feet. The action area includes a total of approximately 0.04 acres of disturbed area, including the stream and riparian area; however, the graded area is less as tree removal will not occur throughout the entire action area. See project maps for more detail (Figure 1 & 2). The extension of area upstream and west of crossing #2 is the area where eucalyptus will be removed and then installed in the stream following the design specifications for each crossing.

Biological Resources

The Unnamed Morrison Creek tributary is an ephemeral stream, which typically goes dry during the summer months in the project reach. The stream has a diverse riparian corridor, which has been established through non-management, with typical riparian species (alder, willow) as well as mature redwoods and Eucalyptus. Other non-native species at the project site, in addition to Eucalyptus, includes Himalayan blackberry.

When water is present, the stream provides critically important habitat for non-natal salmonids, including winter-rearing juvenile Coho salmon (*Oncorhynchus kisutch*) (Parish and Garwood 2016), which are state and federally listed as threatened (Table 1). Morrison Creek is designated critical habitat for Coho salmon and designated Pacific Salmon essential fish habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act. These non-natal rearing areas provide important nurseries and high-flow refugia for Coho salmon where growth and survival may exceed natal areas (Koski 2009). Spawning by Coho salmon has also been documented in Morrison Creek though not in the unnamed tributary; however, the contribution to the overall Coho salmon population from adults spawning in Morrison Creek is low because its ephemeral nature limits egg to smolt juvenile production.

The Morrison Creek sub-basin also provides spawning habitat for red-legged frogs (*Rana aurora*) and Foothill yellow-legged frogs (*Rana boylii*). Various other aquatic dependent species (e.g., salamanders) likely rely on Morrison Creek when water is present; species observed in the project area include clouded salamander (*Aneides ferreus*) and rough skinned newt (*Taricha granulosa*). A number of bird species are also likely to utilize the riparian corridor for nesting or foraging. Yellow-billed cuckoo and willow flycatcher have not been documented in the action area (Table 1). The project intends to avoid the breeding, nesting, and fledging season for bird species including Yellow-billed cuckoo and willow flycatcher and other migratory species; however, if work is anticipated prior to the end of nesting bird season (<Aug 15), a nesting bird survey will be conducted prior to any vegetation disturbance to avoid any impacts to avian species.

Table 1. State or federally listed, candidate, critical habitat, or essential fish habitat in the action area.

Species	Status	Critical habitat in the action area
Coho salmon	State and fed threatened	Yes
Pacific Salmon EFH*	Designated	NA
Willow Flycatcher	State endangered	no
Western Yellow-billed cuckoo	State endangered; fed threatened	no

*Pacific salmon essential fish habitat (EFH) is designated in Morrison Creek

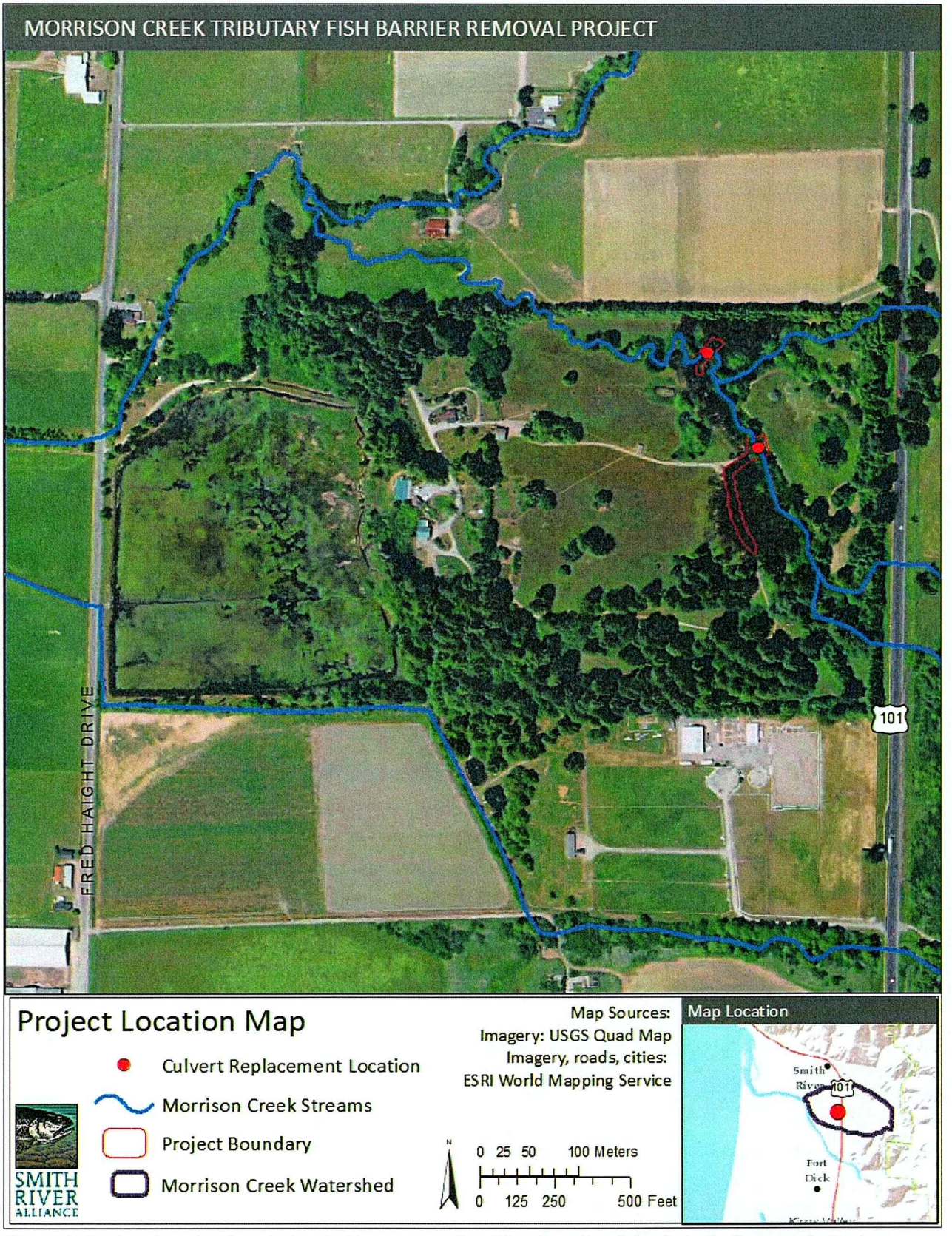

Figure 1. Project location in relation to the surrounding Morrison Creek basin including proximity to Highway 101, and Fred Haight Drive.

Figure 2. Proximity of crossing #1 (northern crossing) and crossing #2 (southern crossing) in relation to each other and highway 101.

5

PHOTOS

Crossing #1: Existing CMP at crossing #1 with a water surface drop at outlet during low winter flows and poor inlet alignment and aggradation upstream of culvert.

Crossing #2: Existing CMP stream crossing set at a reverse grade with RSP along both banks, outlet slightly embedded and poorly aligned, and poor inlet alignment and aggradation upstream of culvert.

Effects of the Project

No biological resources are expected to be adversely affected by the project because the timing of the project, which will avoid when candidate or state or federally listed species may be present in the action area. Since the Project will be implemented when the stream is dry, effects are expected to be very limited in scope and duration. An insignificant pulse of sediment may be mobilized from the disturbance of the stream-bed armor layer from excavation. However, fish, frogs, and other aquatic life are not expected to be adversely affected due to the limited duration and timing of the disturbance. Also, it is projected that any residual sediment activated by the project will be low and will dissipate prior to recolonization following the dry summer season. The disturbance of the armor layer may temporarily reduce the quality of rearing habitat. However, this temporary reduction in quality is not expected to result in a reduction in reproduction or survival of fish, frogs, or other aquatic life as immediate re-sorting and improvement of substrate quality is expected prior to recolonization once stream flows resume. Stranding and death of Coho salmon and other aquatic life may be reduced from the increased upstream and downstream passage following project implementation. Therefore, the project may affect, but is not likely to adversely affect Coho salmon or their critical habitat and will not adversely affect Pacific Salmon EFH.

Although Yellow-billed cuckoo and willow flycatcher are not expected to be present in the action area for the project, the project will be scheduled after August 15st, when effects to individuals from project implementation and disturbance would not be expected to occur. Permanent effects to riparian habitat is expected to be minimal and mature vegetation will be avoided to the maximum extent practicable. The project was designed to minimize the need for tree removal. Some permanent removal of blackberries and other non-native species will occur. The project will not affect Western yellow-billed cuckoo or willow flycatcher or other migratory bird species.

The stream and some of the adjacent riparian areas may be considered a wetland as defined under the Coastal Act and Section 404 of the Clean Water Act. However, the project was designed to restore natural stream flow conditions, improve connectivity between habitats and alleviate unnatural flooding of roads that can cause filling and erosion of the stream and wetland habitats. The project will result in no net loss of wetland habitat and the net gain of wetland function and habitat connectivity in the long term. Smith River Alliance (SRA) performed a delineation of all waters, including wetlands and other waters, regulated by the following agencies under the following statutes:

1. Section 404 of the Clean Water Act (CWA) as administered by the United States Army Corps of Engineers (USACE)
2. Section 401 of CWA as administered by the Regional Water Quality Control Board (RWQCB).
3. Sections 1600-1607 of the California Fish and Game Code, which is administered by the California Department of Fish and Wildlife (CDFW).

Summary of Best Management Practices (BMPs) to Reduce or Eliminate Potential Effects of the Project

1. All heavy equipment will be inspected for leaks and washed prior to working within the action area.
2. All fueling will occur at least 100 feet from any wetland or stream.
3. Activities will occur after August 15th to avoid impacts to amphibians, birds, or other stream/riparian dependent species.

4. Nesting bird surveys will be conducted for any vegetation disturbance that is conducted prior to August 15th.
5. Access by equipment will occur on both sides of the stream to minimize disturbance and reduce effects to soil.

Materials

Equipment includes but is not limited to excavator, backhoes, dump and/or flatbed truck, and crane.

Engineered streambed material (ESM) is needed to fill the culvert at crossing #2 that will be set 3 feet below the channel grade and to construct the design channel grade through the project reach at both crossings. To reduce importing new ESM, native material removed on site during culvert removal will be used to the greatest extent possible.

Large wood pieces, eleven in total, are needed to stabilize the stream bank upstream and downstream of both crossings and to control the stream grade at crossing #1. Use of LW with rootwads was selected over rock to also provide habitat enhancement for rearing juvenile salmonids.

A bridge and associated abutment construction for crossing #1 and a culvert for crossing #2 is needed to replace the undersized culverts currently on site while still allowing for access across the stream during winter flows.

Other Environmental Factor Impacts

Transportation/Traffic, Greenhouse Gas Emissions, Air Quality

Fred Haight Drive is a commonly used road by local residents and agricultural staff and equipment. All equipment and materials will access the Project area from Fred Haight Drive but will be limited in duration and frequency, reducing impacts to vehicle traffic during the Project. Project equipment will use private roads during implementation. Additionally, excavated materials will transported and remain at the Project site during implementation to reduce impacts to traffic, greenhouse gas emissions, and air quality.

Upon completion of the Project, transportation/traffic, greenhouse gas emissions, and air quality will return to the conditions prior construction.

Noise

Increased noise levels will be present in the area during the Project. Work will be conducted after 8:00 am and be completed by 5:00 pm each day to minimize impacts to the surrounding residential housing. Additionally, the project will be conducted expeditiously to reduce the timeframe of elevated noise levels in the project area. The Project will not result in any change in noise levels after construction is completed.

Population/Housing

The Project will not result in any loss of housing.

Aesthetics

During implementation of the Project the aesthetics of the area will be impacted, however no long term impacts will occur to the Project. Furthermore, the Project is located on private property not in the view

of general public as a mature vegetated buffer is present north and east of the Project, adjacent to highway 101. Lastly, the Project will be conducted expeditiously to reduce impacts to the aesthetics of the Project area.

Land Use/Planning, Public Services

The Project will result in no change to land use or planning and no public services will be impacted as a result of the Project.

Agriculture and Forestry Resources

The Project will result in no change to the surrounding agricultural practices or forestry resources.

Hazards & Hazardous materials, Hydrology/Water Quality

All heavy equipment will be inspected for leaks and washed prior to working within the action area. All fueling will occur at least 100 feet from any wetland or stream to prevent impacts to water quality and contamination of hazardous materials. All areas of bare soil outside the dry streambed, but within 100 feet of Morrison Creek will be mulched after project implementation.

Mineral Resources

No mineral resources are present in the Project area.

Tribal Cultural Resources

The Project area is in the Tolowa aboriginal lands. Currently the lands within the Project area are in private ownership and no cultural resources are known to be utilized within the Project area. Based on the USFWS Section 106 compliance report, the project is not anticipated to impact historic or cultural resources. However, following the 106 report, if buried cultural resources are discovered during implementation of the project, ground disturbing activities in the vicinity of the find will be halted and the Regional archaeologist will be notified immediately in order to determine next steps for protection of cultural resources.

Geology/Soils/Hydrology

The stream channel within the Project area is currently aggraded in sections and contains undersized culverts, reducing natural hydrologic processes and sediment transport within the stream. The Project may result in an insignificant pulse of sediment that is mobilized from the disturbance of the stream-bed armor layer from excavation. However, the elevated sediment levels will occur for a limited duration and the Project will result in improved natural hydrologic, geologic, and sediment transport processes.

Recreation

The majority of the Project footprint is located on private property and will not impact public recreation opportunities. The county road (Fred Haight Drive) will remain open to traffic and will not impact public access to local recreational opportunities.

Utilities/Service Systems

Utility service providers will be contacted prior to the Project to ensure excavation avoids all underground service lines. No power lines are present in the Project footprint.

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Hydrologic Solutions
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Technical Memorandum

Date: August 1, 2018

To: Marisa Parish, Project Manager
Smith River Alliance

From: Michael Love, P.E., Principal Engineer
mlove@h2odesigns.com / 707-822-2411 x 1

Steven Pearl, Staff Engineer
pearl@h2odesigns.com / 707-822-2411 x 6

Subject: **Summary of Final Bridge Design for Morrison Creek Tributary**

1 PURPOSE OF MEMORANDUM

The purpose of this technical memorandum (TM) is to summarize the final design for a culvert crossing replacement on a tributary to Morrison Creek, near Smith River, Del Norte County, California. The crossing replacement is intended to improve passage of fish and flood flows. The design plans are provided in **Attachment 1**.

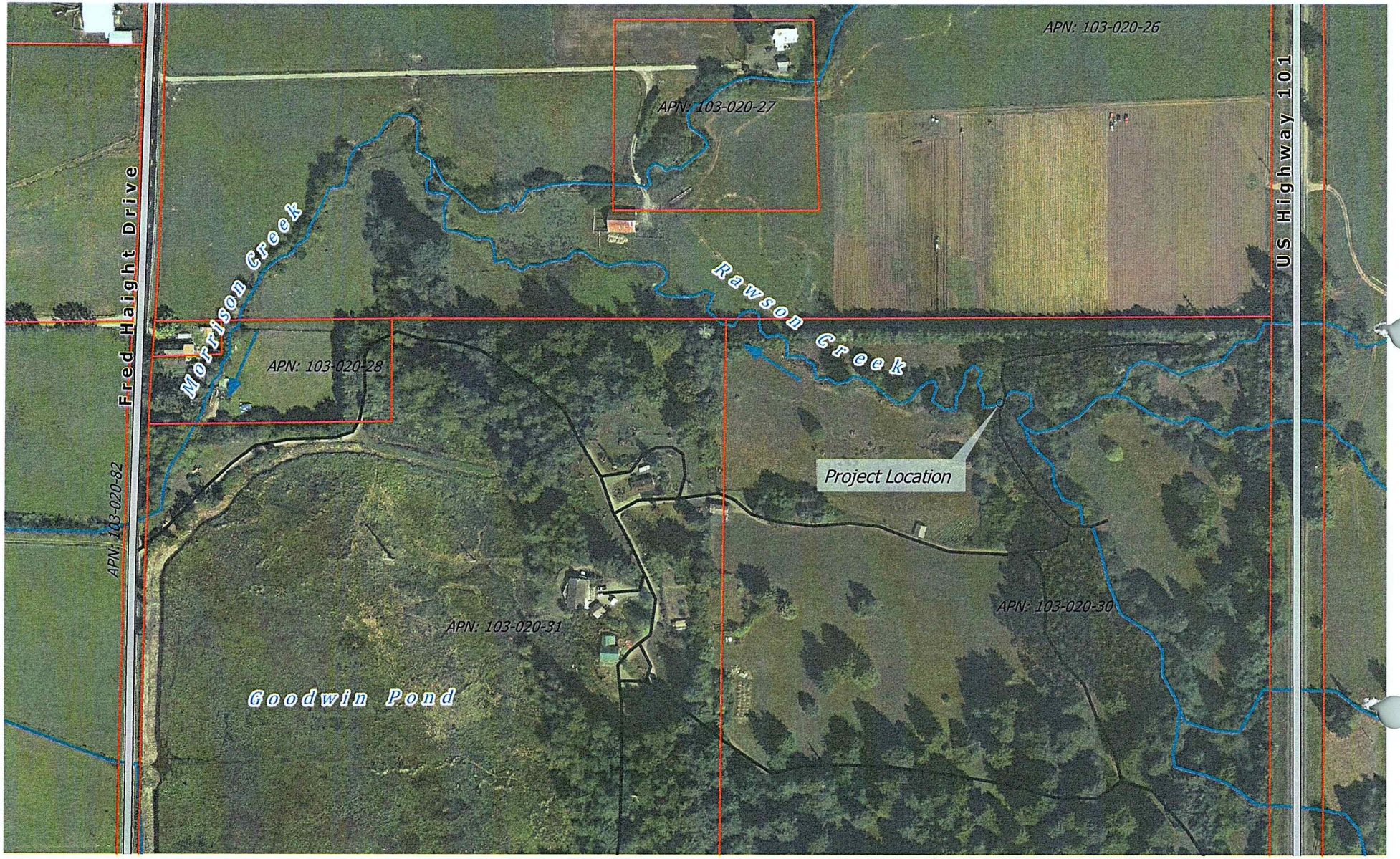
2 BACKGROUND

The tributary (Rawson Creek) flows into Morrison Creek approximately 4,500 linear feet upstream of the Morrison Creek and Smith River confluence. Several smaller tributaries flow into Rawson Creek from the steep coastal foothills east of Highway 101. The project is intended to improve upstream fish passage for adult and juvenile coho salmon and steelhead, and to reduce the potential for culvert failure and resulting sediment delivery to the stream.

The Smith River Alliance (SRA) is dedicated to restoring habitat for salmonids in the Smith River watershed. Through a grant from the California Coastal Conservancy, SRA identified stream crossings that restrict fish movement in tributaries to the lower Smith River. The crossing on Rawson Creek was identified as a high priority. SRA retained the services of Michael Love & Associates, Inc. (MLA) to develop a crossing replacement design. SHN Engineers and Geologist (SHN) served as the project engineering geologist.

3 EXISTING CONDITIONS

A private road crosses Rawson Creek approximately 2,600 feet upstream of the confluence with Morrison Creek, on property owned by the Rawson family (Figure 1). The crossing consists of a 36-inch diameter corrugated metal pipe (CMP), 30 feet in length and set at a slope of 1.0 percent. The outlet invert is perched 2.0 feet above the downstream tailwater control, creating a water surface drop into the receiving scour pool (Figure 2a).



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Horizontal Datum: NAD83/UTM Zone 10

Filepath: O:\Morrison Creek\7_CAD-GIS\GIS\Working

Figure 1

Morrison Creek Tributary - Plan Overview

Public Roads
Private Roads
Streams
Property Boundary

Michael Love & Associates
Hydrologic Solutions

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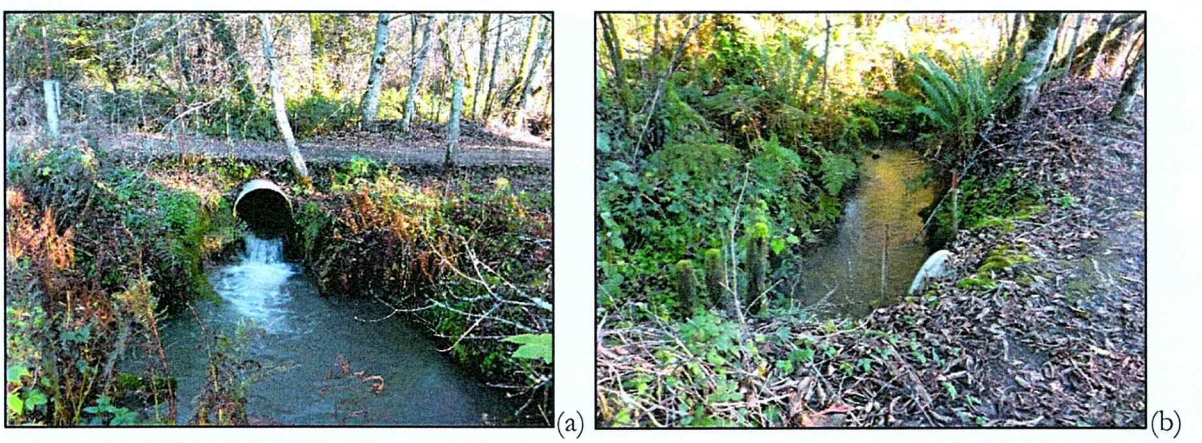
The culvert is located on a tight meander within the stream and is poorly aligned with the upstream channel (Figure 2b). Flow and debris approaching the culvert inlet must make an abrupt 45-degree turn to enter. Some gravel has aggraded upstream of the culvert, indicating that the culvert is undersized and creates a backwater during frequent high flow events. Also, field evidence indicated that the stream had overtopped the road crossing during winter of 2018. The landowner confirmed that the crossing overtops frequently. A previous generation culvert crossing is located adjacent to the existing crossing, which was abandoned after the road was washed out during a high flow event.

The existing crossing was evaluated for fish passage by SRA following protocols described in Part IX of the California Department of Fish and Wildlife's (CDFW's) California Salmonid Stream Habitat Restoration Manual (CDFG, 2003). Due to the 2-foot drop at the culvert outlet, the crossing was classified as "0% Passable" for juvenile and adult resident and anadromous salmonids. Although some individual fish may occasionally be able to pass through the crossing at certain streamflows, the crossing is considered inadequate by CDFW standards. The crossing was also identified as undersized and should be replaced with a properly sized crossing that meet fish passage criteria.



(a) (b)

Figure 2: Existing CMP stream crossing with (a) water surface drop at outlet during low winter flows and (b) poor inlet alignment and aggradation upstream of culvert.

4 STREAM CROSSING DESIGN APPROACH AND SITE CHARACTERIZATION

The proposed replacement stream crossing was designed using the stream simulation approach outlined in Part XII of the California Salmonid Stream Habitat Restoration Manual (CDFG, 2009) and also described in NMFS (2001) and USFS (2008). The stream simulation approach includes using a crossing structure that spans the bankfull channel, provides a seamless transition between the upstream and downstream channel profiles, maintains a natural streambed within the crossing throughout the service life of the crossing, and has adequate capacity to convey the 100-year discharge with freeboard (inlet water level below the culvert soffit or bridge lower cord). The approach relies on using the adjacent stream channel as a geomorphic reference for design of the crossing structure.

4.1 Site Hydrology

The contributing watershed area at the road crossing is approximately 0.59 square miles and is characterized by second growth forests in the steeper headwaters that drain onto an agricultural terrace of the Smith River coastal plain. The estimated mean annual precipitation for the watershed is 76.8 inches per year (USGS, 2017). The peak flows were estimated using both USGS regional regression equations (Gotvald et al. 2012) and using probabilistic analysis of annual peak flow records scaled to the project drainage area for three nearby streams with similar drainage areas and land cover. The three streams used in the probabilistic analysis were Little Lost Man Creek near Orick California, Lopez Creek in Smith River California, and Harris Creek in Brookings Oregon. A comparison of flow estimates for various return periods is provided in Table 1. A 100-year discharge of 343 cfs was selected for use in design of the new crossing structure. Calculations are provided in **Attachment 2**.

Table 1: Estimated peak flows for various return periods in Rawson Creek using probabilistic analysis of Elder Creek flows scaled to the Rawson Creek drainage area and the North Coast Regional Regression Equations.

Return Period of Peak Flow	Peak Flow at Rawson Creek Crossing	
	Probabilistic Analysis from 3 Regional Creeks	North Coast Regional Regression Equations
2-Year	83 cfs	81 cfs
5-Year	143 cfs	145 cfs
10-Year	190 cfs	191 cfs
25-Year	255 cfs	250 cfs
50-Year	307 cfs	296 cfs
100-Year	362 cfs	343 cfs

4.2 Field Surveys

On December 6, 2017 staff from MLA and Marisa Parish from SRA conducted topographic and geomorphic surveys of the crossing and adjacent stream channel. The topographic survey was conducted using a total station and assumed horizontal and vertical datums. The survey included the roadway and culverts, channel thalweg and toes and tops of banks, wetted edge of channel, and trees greater than 6" DBH within the project's anticipated limits of disturbance. The survey points were used to construct a basemap with 1-foot contours in AutoCAD Civil 3D. The existing conditions plan map is provided in the preliminary design drawings in **Attachment 1**.

The geomorphic field assessment included extending the thalweg and water surface profile survey further upstream and downstream using a tape and auto-level. The survey extended upstream to the confluence of the North and South forks of Rawson Creek, and then up the North Fork. While surveying the channel profile, the active channel, bankfull, and top of bank widths were measured at numerous locations. Discrete channel cross sections were also surveyed and geomorphic channel features noted.

4.3 Stream Planform

The crossing is located near the apex of a tight meander. The channel has several of these meander bends that appear to be naturally formed, and not anthropogenically induced. Based on the channel

form derived from the NOAA Coastal LiDAR digital terrain model, sinuosity is 2.2. The channel is moderately incised but field evidence and hydraulic analysis indicate streamflows inundates the floodplain on the inside of these meanders during annual peak flows.

4.4 Stream Profile Evaluation

The longitudinal profile of the channel extending approximately 415 feet downstream and 250 feet upstream of the culvert crossing, combined with geomorphic field observations, was used to estimate the overall stable channel profile through the project site (Figure 3). Downstream of the culvert outlet the pool bottom is scoured to clay. This clay exposure within the bed extends approximately 160 feet downstream of the culvert outlet. The slope of this reach is nearly flat (0.2%), likely due to scour from high velocities discharging from the culvert and from flows overtopping the roadway and cascading into this section of channel.

The 240 feet long reach downstream of this scoured channel reach had a slope of approximately1.2% and is largely controlled by large and small wood within the channel. The channel profile upstream of the crossing has a similar slope, at 1.2% and is also controlled by large wood as well as roots spanning the channel. Projecting the upstream and downstream profiles through the scoured reach and culvert crossing suggests they are the same, with no notable discontinuity (Figure 3). These findings suggest the drop at the culvert outlet is formed by local scour caused by the hydraulically undersized crossing and frequent road overtopping, and that channel incision is not the cause.

Developing stream crossing designs requires considering the degree that the channel bed may aggrade or degrade (rise or fall). The low and high vertical adjustment potential (VAP) profiles in Figure 3 represent the estimated range in elevations that the channel bed may occupy during the service life of the crossing structure. The VAP profiles were estimated based on field interpretation and evaluation of the channel profile. The low VAP profile was based on the pool bottom elevations within the downstream channel reach. The high VAP profile is based on the top of the wood steps and riffles in the profile upstream of the crossing. The crossing should be designed to maintain a natural streambed, structurally sound, and convey the 100-year flow with the channel bed occurring anywhere between the low and high VAP profiles.

4.5 Geomorphic Site Conditions

As part of the overall stream simulation channel design, channel dimensions were measured for 11 sections along the project reach. All sections measured were outside the influence of the crossing. Measurements made within the North Fork, upstream of the crossing, were not used due to the smaller drainage area. Averages of active channel width, bankfull width, and width between the top of banks were computed and are provide Table 2. These values were used to determine the appropriate dimensions for the channel within the new stream simulation crossing.

Four channel cross sections were surveyed as part of the geomorphic assessment and used to measure bankfull depth. In addition to these sections, the topographic survey captured distinct breaklines at the thalweg, channel toe, and tops of bank extending approximately 125 feet downstream of the crossing and 115 upstream of the crossing, which aided in verifying typical channel dimensions within the project reach. The typical bankfull depth ranged between 1.6 and 1.9 feet.

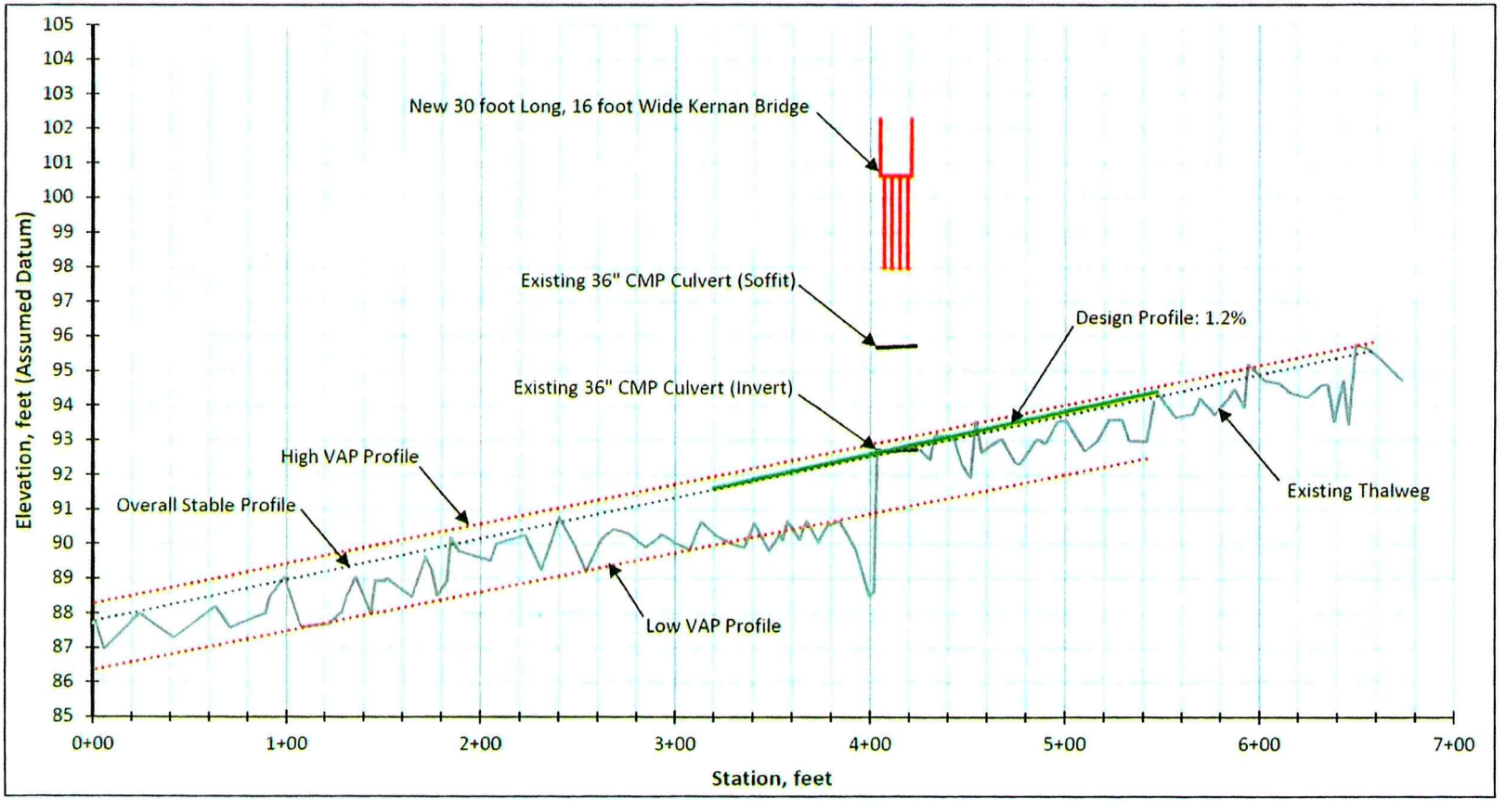


Figure 3: Channel thalweg profile upstream and downstream of the existing culvert crossing, surveyed on December 6, 2017.

Table 2: Measured channel widths upstream and downstream of the Rawson Creek culvert crossing.

Station (feet)	Active Channel Width (feet)	Bankfull Width (feet)	Top of Bank Width (feet)
1+46	4.6	6.5	7.2
1+62	6.0	7.2	7.8
2+01	6.7	7.1	7.6
2+20	5.1	6.3	7.1
2+36	6.1	7.0	10.7
2+67	4.8	5.1	7.7
2+68	4.3	4.3	4.8
2+89	6.7	6.3	8.4
4+64	6.0	7.2	7.8
4+83	5.9	6.8	7.2
5+21	5.2	5.8	6.2
Mean	**5.6**	**6.3**	**7.5**
Median	**5.9**	**6.5**	**7.6**
Min	**4.3**	**4.3**	**4.8**
Max	**6.7**	**7.2**	**10.7**

5 DESIGN DEVELOPMENT

The crossing design involved first developing the appropriate channel profile and dimensions and then determining the appropriate crossing structure. The final design drawings are provided in **Attachment 1**.

5.1 Channel Design

5.1.1 Crossing Location

The current crossing is located on the apex of a meander. Although this is typically not an ideal location for a stream crossing, the location seems suitable for the replacement crossing given the small size of the stream and relative stability of the channel (i.e. no notable lateral migration occurring). Alternative crossing locations in a straight reach approximately 350 feet downstream were considered. However, this would require building more than 700 feet of new road through two pastures. Due to the cost and impact to land use, this option was not selected.

5.1.2 Design Profile

The design profile for the stream channel was developed based on the current overall channel profile and the desire to minimize the amount of channel grading and disturbance. Figure 3 and Figure 4 show the proposed channel profile. The constructed channel slope is 1.2%, matching the overall slope. Upstream of the crossing the regraded channel will tie into an existing riffle crest. Downstream of the crossing the channel bed will be raised using large wood.

In the upstream and downstream reference channel reaches wood is a major feature controlling the channel profile and should be included in the design reach to restore the locally scoured downstream channel reach and maintain the overall channel slope. Downstream of the crossing channel-spanning logs will and be keyed into the streambanks and will be placed at a skew to the flow and

pitched towards the inside of the meander bends. These logs are designed to function similar to the logs and roots within the channel found upstream and downstream of the crossing that force the overall channel slope. The logs will be placed about 20 feet apart, and the drop from log to log is between 0.2 and 0.3 feet. This spacing and drop heights are similar to those found in the upstream and downstream reference reaches. Water may flow over the log or under the logs. In both situations, the logs create a flow obstruction that promotes scour pool formation and upstream sediment deposition that controls the overall channel profile.

5.1.3 Design Channel Planform

The crossing is at the apex of a tight meander bend and the channel alignment has been affected by the existing and abandoned culverts. The proposed channel planform alignment both upstream and downstream of the crossing was developed to restore the natural planform. It "smooths" the channel bend, eliminating the abrupt turns associated with the culvert and riprap downstream of the outlet. The smoothing of the meander bend shifts the centerline of the stream slightly to the north, placing the new crossing between the existing and abandoned culverts.

Root wads will be placed on the outside of the meander bend both upstream and downstream of the bridge. The intent of the placed root wads is to create a natural bank revetment deflecting high flows and protecting the upper bank from scour. It is expected that a pool may scour on the outside of the channel bend, and the root wads will serve to create overhangs and cover within the pool for use by juvenile salmonids.

5.1.4 Design Cross Sections

The channel cross section dimensions for the project were based on measured dimensions in Table 2. An active channel width of 6 to 7 feet and bankfull width of 7 to 8 feet were selected, with the wider width being at the crossing location to reduce flow velocities at the apex of the meander. A bankfull depth of 1.6 feet was applied to the design. A 2-foot wide floodplain bench at bankfull elevation was included on the inside of the meander bend to match upstream and downstream topography and increase flow conveyance area under the bridge.

5.1.5 Streambed Material

The existing channel bed upstream and downstream of the culvert's influence is composed of small gravel and fines. Streambed material of a similar size is specified to be imported and used in grading the channel bed. It is anticipated that substrate removed from Morrison Creek as part of channel maintenance can be used for this project.

Streambed material will be placed within the limit of grading for the 127 feet long realigned channel, extending approximately 62 feet upstream 47 feet downstream of the existing CMP. It will not be placed between the channel spanning logs downstream of the limit of grading. However, streambed materials transported from upstream are expected to fill the channel between the logs over a relatively short period of time.

5.2 Selection of Crossing Structure Type

5.2.1 Options Considered but Not Selected

The proposed crossing must span the bankfull channel width and convey the 100-year flow. The bankfull width is approximately 7 feet. The site is constrained by the low roadway, providing

minimal height above the stream channel. Initial evaluation of crossing options examined an embedded concrete box culvert and metal circular and pipe-arch culverts as potential structure types. Hydraulic sizing found metal culvert options require raising the road substantially to convey the 100-year flow and provide adequate cover over the top of the culvert. Evaluating numerous available culvert shapes found much of the culvert would be buried below the streambed. This proved impractical.

Evaluation of the concrete box culvert option found a 12-foot wide by 8-foot tall box culvert embedded 3 feet below the design channel bed was required to convey the 100-year flow with the headwater at the culvert soffit. Although this option is viable, the cost for cast-in-place culverts is high. Common practice is to use precast concrete box segments delivered to the site and installed. Due to the size of the culvert and weight of the segments, a crane would be required and substantial number of riparian trees would need to be removed for the crane to operate. The cost associated with this option was high relative to the preferred crossing type. Therefore, this option was not selected.

Open bottom culverts, such as arch culverts, set on footings were not considered desirable due to the poor soil conditions and potential for scour and settlement. Also, the required cover over metal arch culverts requires raising the road substantially.

5.2.2 Selected Crossing Structure Type

Given the low gradient of the channel, the tight meanders, channel dimensions, and flood water levels, a modular bridge is the selected structure type. This provides an economical solution for the site while meeting the stream simulation criteria and conveying the 100-year flow under the bridge. It also allows for the channel to continue the curve associated with the meander while flowing under the bridge. A locally produced 30-foot span Kernan bridge with a 16-foot wide deck set onto precast concrete strip footings was found to be most economical type of prefabricated bridge. It consists of H-beams as bridge girders that support a concrete deck. Railings are bolted to the concrete deck. The bridge can be assembled in a single day using one excavator.

5.2.3 Crossing Foundation Design

A geotechnical evaluation of the crossing site was conducted by SHN and their findings are provided in **Attachment 4**. They hand-augured two borings at the site and logged the soil profile. In general, they found pervasive, soft, saturated soil conditions. Due to the weak nature of the soils, they recommended that the bridge be designed to accommodate some settlement. Use of a deep foundation system to prevent settlement was considered unnecessary and cost prohibitive given the use of the crossing.

The geotechnical recommendations included guidance on design of a stabilization mat under the bridge footings. This is intended to distribute the load of the bridge through a flexible, low density, laterally constrained stabilization mat that can accommodate anticipated settlement. The design uses two layers of geogrid stabilization matting with 12-inch thickness of crushed aggregate placed on top of each geogrid, all wrapped in geotextile to form the stabilization mat for each bridge footing.

Based on this foundation design, the bottom of the footing should be set at or above the 100-year water surface elevation to reduce the risk of high flows scouring the stabilization mats under the footings. Shallow flow over the mat at the design flood is considered acceptable given that it will be wrapped in geotextile.

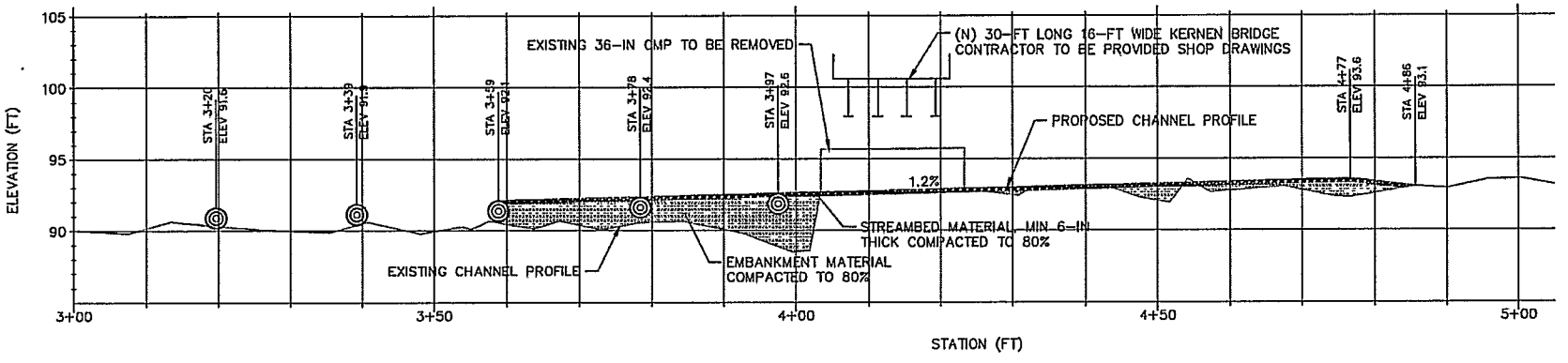


Figure 4: Channel profile at culvert replacement showing anticipated stable channel profile with five channel spanning logs and imported streambed material.

5.2.4 Road Profile Adjustments

The new bridge and footings are about 4-feet tall, due to the dimensions of the H-beam, concrete deck, and concrete strip footings. To minimize the amount that the concrete strip footings are inundated by the 100-year flow, the road will need to be raised about 4-feet at the crossing. The crossing is currently in a sag within the roadway. The reprofiled road will climb up to the bridge at a 2.7% slope from the south and climb an additional 0.9% slope heading north.

5.3 Hydraulic Analyses

A one-dimensional steady-state hydraulic model was developed for the proposed crossing using the HEC-RAS software (USACE, 2010). The model was used to evaluate hydraulic conveyance associated with the 100-year flow, perform a scour analysis, size rock slope protection under the bridge, and support log structure stability computations. HEC-RAS results are provided in **Attachment 3.**

5.3.1 Model Development

The model domain extends 506 feet through the project area. A total of 11 cross sections were used to model the project reach. Of the cross sections, three were entered into the model using the geomorphic channel sections surveyed using a rod and level, and the remaining cross sections were sampled from the proposed conditions surface. Based on observed conditions, the Manning's roughness coefficient for the channel was set at 0.04 for the main channel between the specified bank markers. For overbank areas, the Manning's roughness coefficient of 0.06 was assigned to simulate the hydraulic obstructions created by brush and dense vegetation along the channel. The proposed bridge dimensions and elevations were input using the bridge module. Ineffective flow areas were defined on the floodplains upstream and downstream of the bridge where the channel and stream valley geometry render the floodplain ineffective at conveying flow.

5.3.2 100-year Flow Conveyance

The HEC-RAS water surface profile for proposed conditions is provided in **Figure 5.** The 100-year water surface at the bridge face is at elevation 96.84, which is 1.13 feet below the bottom of the bridge deck, and 0.37 feet above the base of the concrete bridge footings. Average channel velocities are generally around 6 to 8 ft/s in the channel.

5.4 Scour Analysis

The proposed stream crossing will have a natural channel bottom. To facilitate design of the crossing foundation, a series of scour analyses were prepared. The potential for scour to occur under the new crossing was assessed using Federal Highway Administration's HEC-18 procedures (FHWA, 2012). The scour analyses included contraction scour, local abutment scour, and long-term scour (incision).

The scour analysis was performed using the HEC-RAS modeling results for design conditions using the 100-year flow. Detailed information on the scour analysis is presented in **Attachment 5.**

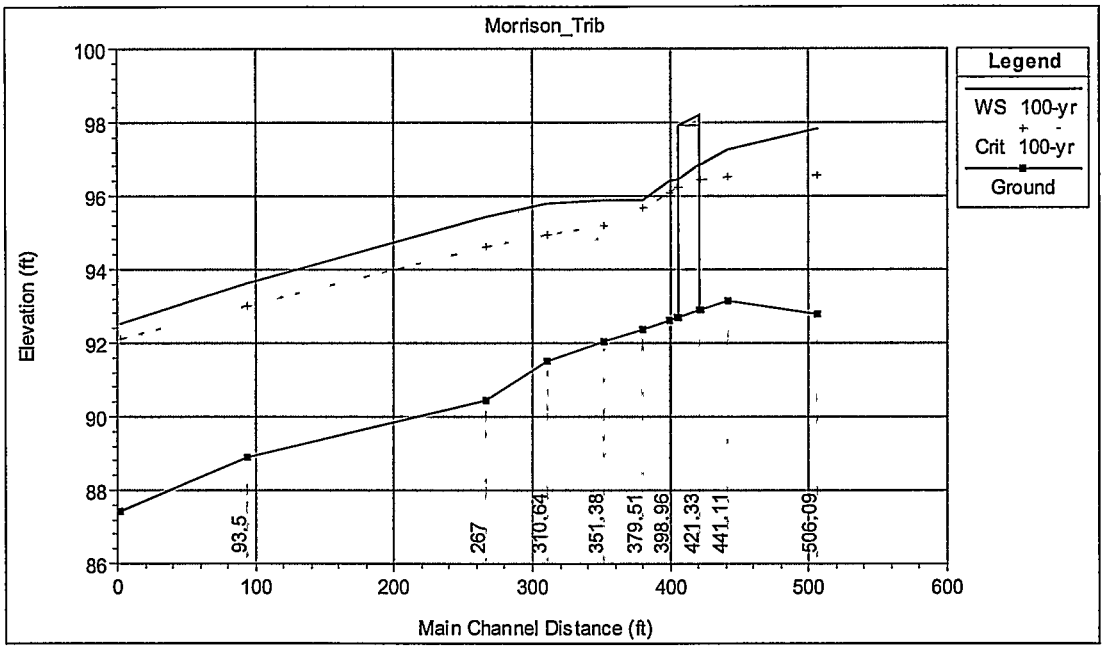


Figure 5. HEC-RAS profile of the 100-year flow through the new Morrison Creek Tributary Crossing.

5.4.1 Long-Term Scour (Channel Stability)

Long term scour consists of potential channel aggradation, degradation and lateral migration that could occur during the lifespan of the structure. Section 4.4 provides an analysis of long-term channel stability, including the estimated low vertical adjustment potential (VAP) of the channel, which reflects the lowest elevation that the channel is expected to degrade. Based on the predicted Low VAP profile, up to 2 feet of long-term channel degradation could occur below the constructed channel bottom at the crossing.

5.4.2 Contraction Scour Computation

Live-bed contraction scour at the new crossing was computed using the Modified Laursen equations and the top width of the flow (FHWA, 2012). This equation computes the average channel depth under the crossing during a scour event. The scour depth is computed based on the changes in average flow depth, top width, and flow conveyance between channel cross sections upstream and in the contracted reach within the crossing. The hydraulic variables used for the "uncontracted" cross section were average values derived from HEC-RAS results at cross sections 506.9 and 441.11. The maximum flow velocity, depth and top width from the two internal bridge cross sections were used for the "contracted" section. A k_1 value of 0.64 was used, assuming that there is a combination of bedload and suspended load in transport.

The computations indicated that up to 0.8 feet of contraction scour can be expected at the bridge. The scour will be caused by the change in channel cross section upstream and under the bridge.

5.4.3 Abutment Scour Computation (Local Scour)

Local abutment scour was computed using the Froelich equation (FHWA, 2012). This equation computes the average channel depth during scour in the cross section under a crossing based on floodplain flow depth, length that the abutments projection into the flow, and Froude number. A K_1 value of 0.55 was used to simulate a sloping bank under the bridge, and a K_2 value was derived assuming the face of the bridge will be 90-degrees to flow. A value of zero was used for the amount the bridge abutments project into the flow area because flow on most of floodplain upstream of the bridge is in an ineffective flow area. A small amount of flow depth on the floodplain (0.9 feet) was conservatively used in the computations to account for any flow transitioning from the floodplain into the main channel.

The computations indicated that a local scour depth of 2.1 feet can be expected due to abutment scour at the crossing.

5.4.4 Total Potential Scour Depth

Table 3 summarizes the scour depths predicted for various types of scour. HEC-18 recommends that the total potential scour depth be the sum of contraction, abutment and long-term scour. Therefore, the bridge foundations should be designed considering a scour depth up to 4.9 feet below the constructed channel bed.

Table 3. Summary of predicted scour depths at the proposed Morrison Creek Tributary stream crossing. The total potential scour depth is measured from the finished grade elevation of the stream.

Type of Scour	Scour Depth
Predicted Contraction Scour Depth	0.8 feet
Predicted Abutment Scour	2.1 feet
Long-Term Scour	2.0 feet
Total Potential Scour Depth	**4.9 feet**

5.4.5 RSP Sizing

Rock slope protection (RSP) will be placed under the bridge to protect the embankment and bridge footings from scour and to maintain the channel shape. RSP was sized using equation 3-3 in USACE (1994) using the 100-year flood hydraulics at the bridge internal cross sections from the HEC-RAS modeling. The analyses indicated that a median (D_{50}) rock diameter between 1.5 and 1.9 feet in diameter will remain stable during a 100-year flow event. Therefore, ¼ ton RSP, with a median diameter of 1.8 feet was specified for the RSP. The thickness of the placed RSP will be 2.5 feet, which is slightly larger than the D_{100} of the rock mix.

The scour analysis indicated that the toe of the RSP should be placed to a minimum depth of 4.9 feet below the channel invert. Due to the narrowness of the channel, the faces of the keyways comprised of the RSP will need to be nearly vertical to maintain the full width of active channel if the channel degrades. Stacking more than 3 rocks high to form the keyways and streambanks under

the bridge may not be feasible at the specified slope. Therefore, the plans specify that the RSP be placed a minimum of 4 feet below the channel bottom. If the channel degrades below the toe of the RSP, it is expected that the RSP will settle downwards, but will continue to protect the streambanks.

Computations for RSP sizing are presented in **Attachment 6**.

5.5 Log Structure Stability Computations

Root wads and Channel Spanning Logs are proposed for the project. Computation methods and a spreadsheet developed by Rafferty (2016) were used to evaluate the stability of the large wood structures. This spreadsheet computes vertical forces on a structure including buoyancy, lift, anchoring, and ballast, and horizontal forces including drag, passive soil pressure, and frictional resistance. Force-based factors of safety are computed for both vertical and horizontal forces and using a moment-based analysis for the resultant of the combined horizontal and vertical forces. Computations in this spreadsheet are based primarily on D'Aoust and Millar, (2000) and NRCS (2007).

Computations were prepared with a Factor of Safety of 1.5. Given the small size of the stream channel relative to the log lengths, it is expected that if a log becomes dislodged, it would likely end up jamming in the channel rather than being transported downstream.

The structures will be constructed of imported redwood or Douglas fir. The channel typically dries out during the summer months, and the wood can be expected to be dry at the onset of rainfall each fall. Therefore, it was assumed that the wood was dry for all computations. A dry density of 24.5 lbs/ft^3 or redwood, which is less dense than Doulas Fir, was used for all computations. Computations were prepared for log diameters of 2.5 and 3 feet, and the length of the log determined by the amount of embedment required to obtain the minimum Factor of Safety.

Because the project will generate only a small amount of excavated materials, it is anticipated that the backfill around and over the log structures will likely consist of imported sands and gravels. Therefore, it was assumed that the material in the streambanks are gravels and sands with a dry unit weight of 111.7 lbs/ft and an internal angle of friction of 39° (Rafferty, 2016). The streambed material was assumed to be very coarse sand.

Reach-averaged 100-year flow depth, velocity, and channel area were used in the computations. Flow hydraulics were obtained from the HEC-RAS hydraulic model from cross sections 310 to 411.11. A 35-foot meander radius was used for the computations, which results in an increased velocity on the outside of the meander bend, computed using FHWA (2009).

Root wad stability was assessed at channel cross section 3+99, the location of 4 root wads downstream of the bridge. The channel spanning log stability was assessed at cross section 3+43, which is typical of the cross sections were the channel spanning structure will have the least cover.

As specified on the plans, root wads with log diameters of up to 2.5 feet will need to be a minimum length of 15 feet to maintain a Factor of Safety of 1.5. Root wads with logs larger than 2.5 feet in diameter will need to be a least 18 feet long to maintain a Factor of Safety of 1.5.

The log stability computations indicated that the channel spanning logs that will be installed in the existing channel downstream of the limit of grading will have a Factor of Safety of a 1.33 for a 25-foot long, 2- foot diameter log. The Factor of Safety decreases for longer or larger diameter logs. The channel cross sections in this area are only about 3 feet deep, providing only about 1 to 2 feet of cover over the log in the streambanks, which is fairly minimal for logs of the size specified. The Factor of Safety for the channel spanning logs is lower than desirable, and there is a chance that the

logs can become dislodged. However, given the small size of the stream channel relative the log lengths, it is expected that a dislodged log would jam in the channel rather than being transported downstream.

The results of the log stability computations are presented in **Attachment 7.**

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Attachments

Attachment 1: Final Design Plans

Attachment 2: Hydrologic Calculations

Attachment 3: HEC-RAS Results

Attachment 4: Limited Geotechnical Evaluation

Attachment 5: Bridge Scour Analyses

Attachment 6: RSP Sizing

Attachment 7: Large Wood Stability Computations

SMITH RIVER ALLIANCE

PLANS FOR CONSTRUCTION OF

MORRISON CREEK TRIBUTARY CULVERT REPLACEMENT

JULY, 2018
FINAL DESIGN

Prepared For:

- SMITH RIVER ALLIANCE
- CALIFORNIA COASTAL CONSERVANCY

Prepared By:

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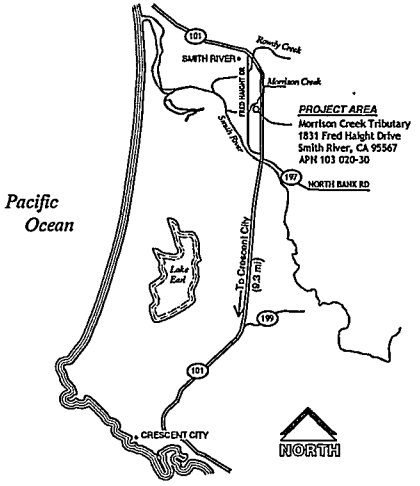

LOCATION MAP
NOT TO SCALE

SHEET INDEX		
Discipline	Sheet Number	Sheet Title
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REGISTERED PROFESSIONAL ENGINEER
MICHAEL A. LOVE
No. 71141
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STATE OF CALIFORNIA

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SMITH RIVER ALLIANCE
MORRISON CREEK TRIBUTARY
CULVERT REPLACEMENT
TITLE

DATE: JULY 2018
SUBMITTAL: FINAL
DESIGN: ML
DRAWN: STP
SHEET: 1 of 9
G-1

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LEGEND AND SYMBOLS

EXISTING

- FENCE LINE
- EDGE OF GRAVEL ROAD
- PROPERTY LINE
- 16 — CONTOUR AND ELEVATION
- CHANNEL THALWEG OR DRAINAGE
- 1+00 — ALIGNMENT STATIONING (FEET)
- CONTROL POINT/TEMPORARY BENCH MARK
- FLOW DIRECTION
- 4.5' RD — TREE OF DBH 6" AND GREATER, SIZE, AND TYPE
- STUMP
- HB-1 — EXPLORATORY BORING
- LARGE WOOD IN CHANNEL

NEW

- LIMIT OF DISTURBANCE (LOD)
- EDGE OF GRAVEL ROAD
- 16 — CONTOUR AND ELEVATION
- 1+00 — STATIONING (FEET)
- CHANNEL THALWEG
- TEMPORARY FISH EXCLUSION FENCING
- TEMPORARY EARTH DIKE
- TEMPORARY FILTER BAG
- FLOW DIRECTION
- ROOT WAD
- TREE TO BE REMOVED

ABBREVIATIONS

ABUT	ABUTMENT
AC	ASPHALT CONCRETE
AGG	AGGREGATE
ALD	ALDER
APPROX	APPROXIMATELY
BB	BEGIN BRIDGE
BRG	BRIDGE
BVC	BEGIN VERTICAL CURVE
CH	CHANNEL
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CONC	CONCRETE
CP	SURVEY CONTROL POINT
DBL	DOUBLE
DIAM	DIAMETER
EB	END BRIDGE
EG	EXISTING GROUND
EL, ELEV	ELEVATION
EUC	EUCALYPTUS
EVG	END VERTICAL CURVE
EXCAV	EXCAVATION
FG	FINISHED GROUND
FT	FOOT OR FEET
IN	INCHES
INV	INVERT
LBS	POUNDS
LOD	LIMIT OF DISTURBANCE
LOG	LIMIT OF GRADING
LOL	LAYOUT LINE
LT	LEFT
MAD	MADRONE
MAX	MAXIMUM
MBGR	METAL BEAM GUARD RAIL
MIN	MINIMUM
MP	MID POINT
MSE	MECHANICALLY STABILIZED EARTH
NTS	NOT TO SCALE
O.C.	ON CENTER
OG	ORIGINAL GROUND
OGRD	OLD GROWTH REDWOOD
PC, P/C	PRE-CAST
PG	PROPOSED GRADE
PSI	POUNDS PER SQUARE INCH
Q_{100}	PROJECT 100-YEAR RETURN PERIOD FLOW
R.C.	RELATIVE COMPACTION
R.D.	RELATIVE DENSITY
RD	ROAD
RDWD	REDWOOD
RSP	ROCK SLOPE PROTECTION
RT	RIGHT
RW	RETAINING WALL
RXR	RAILROAD
SPA	SPACING
SSP	STRUCTURAL STEEL PLATE
STA	STATION
T/R	TOP OF RAIL
TBD	TO BE DETERMINED
TBM	TEMPORARY BENCHMARK
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VC	VERTICAL CURVE
W/	WITH
WF	WIDE FLANGE
WSE	WATER SURFACE ELEVATION
#	NUMBER
%	PERCENT
(A)	EXISTING
(N)	NEW
ø	DIAMETER
1.5:1	HORIZONTAL: VERTICAL SLOPE

A / C-1 — SECTION, DETAIL OR TYPICAL NAME OR NUMBER

PAGE NO. OR DIVISION ON WHICH SECTION, DETAIL OR TYPICAL IS APPLIED, OR APPEARS

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SMITH RIVER ALLIANCE
MORRISON CREEK TRIBUTARY
CULVERT REPLACEMENT

LEGEND & SYMBOLS

DATE	JULY 2018 SUBMITTAL
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GENERAL

1. SMITH RIVER ALLIANCE (SRA) IS THE CONTRACT OWNER (CO). THE TERM CONTRACT OWNER REPRESENTATIVE (COR) IS DEFINED AS ANY AUTHORIZED PROFESSIONAL DESIGNATED BY SRA. ALL IMPROVEMENTS SHALL BE ACCOMPLISHED UNDER THE APPROVAL, INSPECTION AND TO THE SATISFACTION OF THE CO OR COR.
2. CONTRACTOR AGREES TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE WORK AREA DURING THE COURSE OF CONSTRUCTION, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND SHALL NOT BE LIMITED TO NORMAL WORKING HOURS. THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE LANDOWNER, CO, AND ITS REPRESENTATIVES HARMLESS FROM ANY LIABILITY, REAL AND OR ALLEGED, IN CONJUNCTION WITH THE PERFORMANCE OF THIS PROJECT.
3. A SET OF SIGNED WORKING DRAWINGS SHALL BE KEPT ON SITE AT ALL TIMES ON WHICH CONTRACTOR SHALL RECORD VARIATIONS IN THE WORK, INCLUDING ALL EXISTING UTILITIES. THESE DRAWINGS SHALL BE SUBMITTED TO THE COR UPON COMPLETION OF WORK.
4. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE COR UPON DISCOVERING SIGNIFICANT DISCREPANCIES, ERRORS OR OMISSIONS IN THE PLANS. PRIOR TO PROCEEDING, THE COR SHALL HAVE THE PLANS REVISED TO CLARIFY IDENTIFIED DISCREPANCIES, ERRORS OR OMISSIONS.
5. PLACED MATERIALS NOT CONFORMING TO SPECIFICATIONS SHALL BE REMOVED AND REPLACED AS DIRECTED BY THE COR AT NO ADDITIONAL COST TO THE CO.
6. IN THE EVENT CULTURAL RESOURCES (I.E., HISTORICAL, ARCHAEOLOGICAL, AND PALEONTOLOGICAL RESOURCES, OR HUMAN REMAINS) ARE DISCOVERED DURING EXCAVATION, GRADING OR OTHER CONSTRUCTION ACTIVITIES, WORK SHALL BE HALTED WITHIN A 100 FOOT RADIUS OF THE FIND. A QUALIFIED ARCHEOLOGIST RETAINED BY THE COR SHALL BE CONSULTED FOR AN ON-SITE EVALUATION. ADDITIONAL MITIGATION MAY BE REQUIRED, AT CO'S EXPENSE PER THE ARCHEOLOGIST'S RECOMMENDATIONS. IF HUMAN BURIALS OR HUMAN REMAINS ARE ENCOUNTERED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE COUNTY CORONER.
7. IF HAZARDOUS MATERIALS OR WHAT APPEAR TO BE HAZARDOUS MATERIALS ARE ENCOUNTERED, STOP WORK IN THE AFFECTED AREA IMMEDIATELY AND CONTACT 911 OR THE APPROPRIATE AGENCY FOR FURTHER INSTRUCTION.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THEIR OWN WATER AND POWER FOR OPERATIONS, IRRIGATION AND DUST CONTROL. WATER SHALL NOT BE PUMPED FROM THE CREEK FOR THESE USES.
9. NOTED DIMENSIONS TAKE PRECEDENCE OVER SCALE.
10. COR WILL PROVIDE CONSTRUCTION STAKING. RESPONSIBILITY OF CONTRACTOR TO MAINTAIN OR REPLACE CONSTRUCTION STAKES.

SEQUENCE OF CONSTRUCTION

WORK PHASING SHALL OCCUR AS FOLLOWS, UNLESS OTHERWISE APPROVED BY COR:

1. SUBMIT NECESSARY SUBMITTALS FOR APPROVAL. ONCE APPROVED, THE CONTRACTOR MAY COMMENCE THE WORK UNLESS OTHERWISE DIRECTED.
2. MOBILIZATION
3. INSTALLATION OF FISH EXCLUSION DEVICES AND REMOVAL OF FISH FROM WORK AREA.
4. INSTALLATION OF TEMPORARY COFFERDAMS, CLEAR WATER DIVERSIONS, DE-WATERING, AND SEDIMENT CONTROL WITHIN WORK AREA AS NEEDED.
5. CLEARING AND GRUBBING OF WORK AREA.
8. REMOVAL OF EXISTING CULVERTS, IN STREAM CONSTRUCTION, AND INSTALLATION OF NEW BRIDGE.
9. RECONSTRUCTION OF ROAD AND RE-OPENING FOR PRIVATE ACCESS.
10. REMOVAL OF WATER MANAGEMENT DEVICES.
11. REMOVAL OF FISH EXCLUSION DEVICES.
12. STABILIZATION OF THE WORK AREA.
13. DEMOBILIZATION.
14. REMEDIATION AND REPAIR OF PRIVATE ROADWAY.

CONTRACTOR SHALL SUBMIT A DETAILED SCHEDULE PRIOR TO COMMENCING CONSTRUCTION.

CLEARING AND GRUBBING

1. CLEARING AND GRUBBING SHALL BE IN ACCORDANCE WITH SECTION EC-2 OF CASQA AND THE EROSION AND SEDIMENT CONTROL NOTES IN THE CONTRACT DOCUMENTS.
2. THE LIMIT OF DISTURBANCE DOES NOT DENOTE THE LIMIT OF CLEARING AND GRUBBING. THE EXTENT OF CLEARING SHALL BE MINIMIZED TO THE EXTENT POSSIBLE WITHIN THE LIMIT OF DISTURBANCE TO ALLOW MANEUVERABILITY OF EQUIPMENT.
3. EUCALYPTUS TREES DESIGNATED FOR REMOVAL SHALL BE SALVAGED AND CUT TO 20-FT LENGTHS. ROOT WADS SHALL REMAIN INTACT WITH MIN 20-FT IN LENGTH. CUT LOGS AND ROOT WADS SHALL BE STOCKPILED AT A DESIGNATED LOCATION NEAR PROJECT SITE.
4. ALDER TREES, LIMBS AND SLASH SHALL BE CHIPPED AND USED FOR SITE STABILIZATION.
5. EXISTING TREE ROOTS OF TREES TO REMAIN WITHIN LIMITS OF EXCAVATION SHALL BE PRESERVED TO THE EXTENT POSSIBLE.
6. REMAINING ORGANIC MATERIAL FROM CLEARING AND GRUBBING SHALL BE CHIPPED AND USED FOR SITE STABILIZATION.
7. TREES NOT DESIGNATED FOR REMOVAL SHALL REMAIN AND BE PROTECTED.

EROSION & SEDIMENT CONTROL

GENERAL NOTES

1. AT MINIMUM THE CONTRACTOR SHALL EMPLOY THE FOLLOWING BEST MANAGEMENT PRACTICES (BMPS) AS APPLICABLE, AS DESCRIBED IN THE CURRENT CALIFORNIA STORMWATER BMP HANDBOOK FOR CONSTRUCTION (CASQA HANDBOOK) (WWW.CASQA.ORG):

EC-1 SCHEDULING
EC-2 PRESERVATION OF EXISTING VEGETATION
EC-8 WOOD MULCHING
SE-1 SILT FENCE
SE-5 FIBER ROLLS
WE-1 WIND EROSION CONTROL
NS-1 WATER CONSERVATION PRACTICES
NS-2 DEWATERING OPERATION
NS-5 CLEARWATER DIVERSION
NS-8 VEHICLE AND EQUIPMENT CLEANING
NS-9 VEHICLE AND EQUIPMENT FUELING
NS-10 VEHICLE AND EQUIPMENT MAINTENANCE
SS-9 EARTH DIKES AND DRAINAGE SWALES
SS-10 VELOCITY DISSIPATION DEVICES
WM-1 MATERIALS DELIVERY AND STORAGE
WM-2 MATERIAL USE
WM-3 STOCKPILE MANAGEMENT
WM-4 SPILL PREVENTION AND CONTROL
WM-5 SOLID WASTE MANAGEMENT
WM-8 CONCRETE WASTE MANAGEMENT
WM-9 SANITARY/SEPTIC WASTE MANAGEMENT

2. CONTRACTOR MUST ENSURE THAT THE CONSTRUCTION SITE IS STABILIZED PRIOR TO THE ONSET OF ANY RAIN EVENT TO PREVENT SEDIMENT DELIVERY TO WATERWAYS.
3. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO MINIMIZE EROSION AND PREVENT THE TRANSPORT OF SEDIMENT TO THE ADJACENT STREAM AND SENSITIVE AREAS. CONTRACTOR WILL BE RESPONSIBLE FOR ALL FINES AND CLEANUP OF ANY VIOLATIONS.
4. SUFFICIENT EROSION CONTROL SUPPLIES SHALL BE AVAILABLE ON-SITE AT ALL TIMES TO ADDRESS AREAS SUSCEPTIBLE TO EROSION DURING RAIN EVENTS.
5. MINIMIZE DISTURBANCE OF EXISTING VEGETATION TO THAT NECESSARY TO COMPLETE WORK.
6. ALL HEAVY EQUIPMENT SHALL BE STEAM CLEANED PRIOR TO ENTRY TO THE PROJECT SITE TO INHIBIT THE SPREAD OF EXOTIC SEED. ALL HEAVY EQUIPMENT SHALL BE LEAK FREE UPON ENTRY TO THE PROJECT SITE AND ANY LEAKS SHALL BE REPAIRED IMMEDIATELY.
7. ACTIVITIES SUCH AS VEHICLE WASHING ARE TO BE CARRIED OUT AT AN OFF-SITE FACILITY WHENEVER PRACTICAL.
8. THE CONTRACTOR, AS NECESSARY, SHALL IMPLEMENT OTHER BMPS SPECIFIED IN THE CASQA HANDBOOK DICTATED BY SITE CONDITIONS AND AS DIRECTED BY THE COR. THIS PLAN MAY NOT COVER ALL THE SITUATIONS THAT ARISE DURING CONSTRUCTION DUE TO UNANTICIPATED FIELD CONDITIONS. VARIATIONS MAY BE MADE TO THE PLAN IN THE FIELD SUBJECT TO THE APPROVAL OF OR AT THE DIRECTION OF THE COR.
9. THE CONTRACTOR SHALL MAKE ADEQUATE PREPARATIONS, INCLUDING TRAINING AND EQUIPMENT, TO CONTAIN SPILLS OF OIL AND OTHER HAZARDOUS MATERIALS. SPILL KITS SHALL BE PRESENT AT EACH WORK SITE TO INHIBIT THE SPREAD OF FLUID LEAKS ONTO THE GROUND OR SURROUNDING AREAS.
10. THE CONTRACTOR SHALL PROVIDE COVERED WASTE RECEPTACLE FOR COMMON SOLID WASTE AT CONVENIENT LOCATIONS ON THE JOB SITE AND PROVIDE REGULAR COLLECTION OF WASTES.
11. BOTH ACTIVE AND NON-ACTIVE SOIL AND MATERIAL STOCKPILES SHALL BE PROPERLY PROTECTED TO MINIMIZE SEDIMENT AND POLLUTANT TRANSPORT FROM THE CONSTRUCTION SITE (WM-3).
12. THE CONTRACTOR SHALL PROVIDE SANITARY FACILITIES OF SUFFICIENT NUMBER AND SIZE TO ACCOMMODATE CONSTRUCTION CREWS AND ENSURE ADEQUATE ANCHORAGE OF SUCH FACILITIES TO PREVENT TIPPING BY WEATHER OR VANDALISM.
13. THIS PLAN MAY NOT COVER ALL THE SITUATIONS THAT ARISE DURING CONSTRUCTION DUE TO UNANTICIPATED FIELD CONDITIONS. VARIATIONS MAY BE MADE TO THE PLAN IN THE FIELD SUBJECT TO THE APPROVAL OF OR AT THE DIRECTION OF THE COR.
14. PRIOR TO FINAL ACCEPTANCE, ALL DISTURBED AREAS SHALL BE PERMANENTLY STABILIZED WITH WOOD CHIPS BY CONTRACTOR AND TEMPORARY SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AS SPECIFIED.

EXCAVATION AND FILL

1. THE LIMITED GEOTECHNICAL DESIGN REPORT PREPARED BY SHN IS AVAILABLE UPON REQUEST.
2. EXCAVATION SHALL INCLUDE EXCAVATION AND HANDLING OF SATURATED SOILS. CONTRACTOR SHALL BE PREPARED TO DEWATER AND /OR TRANSPORT SATURATED SOIL IN A MANNER THAT PREVENTS EXCESS DISCHARGE OR SPILLAGE OF SOILS OR WATER WITHIN THE CONSTRUCTION ACCESS AREA OR ON ADJACENT PROPERTIES OR ROADWAYS. SHOULD ANY DISCHARGE OCCUR, THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMMEDIATE AND COMPLETE CLEAN UP. MULTIPLE HANDLING OF MATERIAL MAY BE NECESSARY.
3. EXCAVATED MATERIAL SHALL BE MOISTURE CONDITIONED TO ACHIEVE THE SPECIFIED COMPACTION FOR BACKFILL.
4. UNSUITABLE MATERIAL SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR FOR DISPOSAL IN AN APPROVED LOCATION. UNSUITABLE MATERIAL INCLUDES ORGANIC MATERIAL, CONCRETE, GROUTED RIPRAP, PIPES ALL AND OTHER MANMADE MATERIALS WITHIN THE LIMIT OF DISTURBANCE (LOD).
5. UNLESS OTHERWISE SPECIFIED, TOLERANCE FOR FINISHED GRADING SHALL BE ±0.2 FEET VERTICALLY AND ±0.5 FEET HORIZONTALLY.
6. SUITABLE EXCAVATED MATERIAL SHALL BE STOCKPILED IN THE DESIGNATED CONTRACTOR USE AREA.
7. GRADING MAY BE ADJUSTED AT DIRECTION OF COR TO AVOID TREES AND OTHER FEATURES.
8. THE GROUND SURFACE SHALL BE PREPARED TO RECEIVE FILL BY REMOVING VEGETATION, NON-COMPLYING FILL, TOPSOIL AND OTHER UNSUITABLE MATERIALS, SCARIFYING TO PROVIDE A BOND WITH THE NEW FILL.

UTILITY

1. ALL UTILITIES SHOWN (IF ANY) WERE LOCATED FROM ABOVE GROUND VISUAL STRUCTURES. NO UTILITY RESEARCH WAS CONDUCTED FOR THE SITE. NOTIFY UNDERGROUND SERVICE ALERT (DIGALERT) AT LEAST TWO DAYS PRIOR TO ANY GRADING OR EXCAVATION WITHIN THE SITE BY CALLING 811 OR 1-800-227-2600.
2. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO UTILITIES, FEATURES AND STRUCTURES LOCATED IN THE PROJECT AREA AND CONSTRUCTION ACCESS ROUTES. CONTRACTOR SHALL AVOID DISRUPTION OF ANY UTILITIES UNLESS PREVIOUSLY ARRANGED WITH COR.
3. CONSTRUCTION MAY TAKE PLACE IN THE VICINITY OF OVERHEAD UTILITY LINES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO BE AWARE OF AND OBSERVE THE MINIMUM CLEARANCES FOR WORKERS AND EQUIPMENT OPERATING NEAR HIGH VOLTAGE, AND COMPLY WITH THE SAFETY ORDERS OF THE CALIFORNIA DIVISION OF INDUSTRIAL SAFETY AS WELL AS OTHER APPLICABLE SAFETY REGULATIONS.
4. TELEPHONE, ELECTRIC, WATER AND OTHER UTILITY LINES SHALL BE PROTECTED DURING CONSTRUCTION TO PREVENT INTERRUPTION OF SERVICE.

CONSTRUCTION ACCESS:

1. CONTRACTOR WILL USE THE PRIMARY PRIVATE ROAD FOR CONSTRUCTION ACCESS.
2. CONTRACTOR USE AREAS ARE INDICATED IN THE DRAWINGS.
3. ANY ADDITIONAL AREAS TO BE USED MUST BE APPROVED BY THE COR.

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GENERAL NOTES

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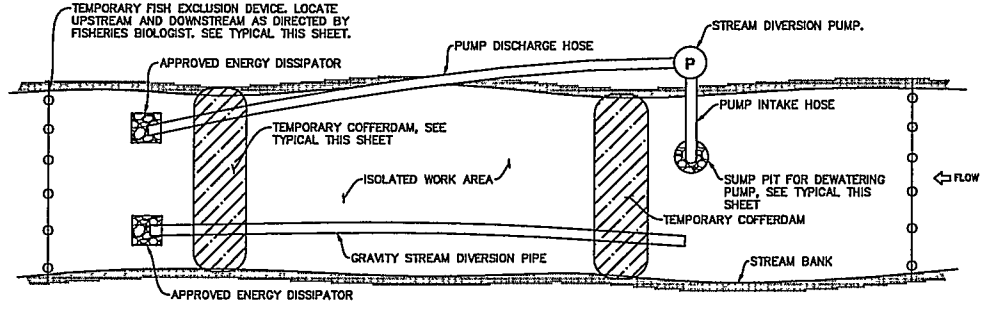
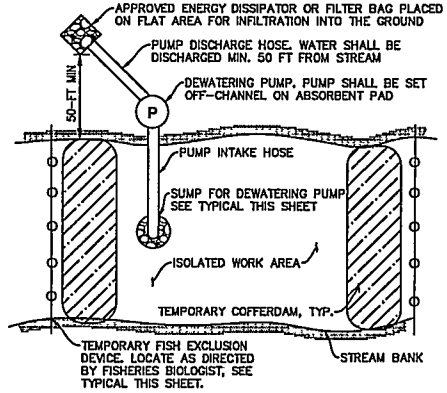
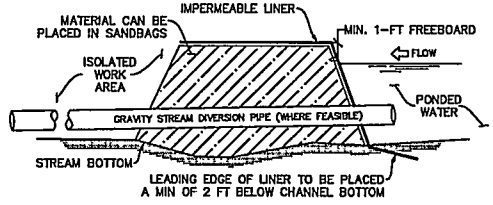


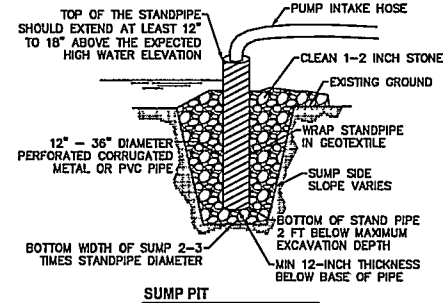
TEMPORARY CLEAR WATER DIVERSION
TYPICAL PLAN (NTS)



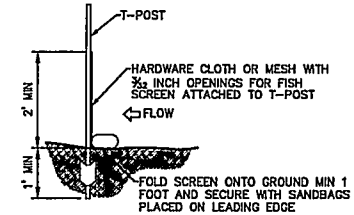
TEMPORARY NUISANCE AND POND DEWATERING MEASURES
TYPICAL PLAN (NTS)



TEMPORARY COFFERDAM
TYPICAL PROFILE (NTS)



SUMP PIT
TYPICAL SECTION (NTS)



TEMPORARY FISH EXCLUSION DEVICE
TYPICAL PROFILE (NTS)

1 TYP **WATER MANAGEMENT**
TYPICAL

WATER MANAGEMENT

GENERAL

1. THE WATER MANAGEMENT FEATURES (E.G. COFFERDAMS) SHOWN IN THE CONTRACT DRAWINGS ARE APPROXIMATE. THE CONTRACTOR IS TO DESIGN A WATER MANAGEMENT PLAN THAT MEETS THE CONTRACTORS APPROACH TO THE PROJECT WHILE MEETING PERMIT AND OTHER CONSTRAINTS.
2. THE OBJECTIVE OF WATER MANAGEMENT IS TO ISOLATE THE CHANNEL WORK SO THAT WORK IS COMPLETED IN DRY CONDITIONS. TO ACCOMPLISH THIS, THE CONTRACTOR MUST EMPLOY A CLEAR WATER DIVERSION SYSTEM AND A DEWATERING SYSTEM. THE CLEAR WATER DIVERSION SYSTEM BYPASSES CREEK WATER AROUND THE WORK AREA. THE DEWATERING SYSTEM REMOVES "NUISANCE" WATER (E.G. SEEPAGE) FROM WITHIN THE ISOLATED WORK AREA.
3. THE CONTRACTOR MUST SUBMIT A WATER MANAGEMENT PLAN FOR APPROVAL.
4. NO CONSTRUCTION ACTIVITIES ARE PERMITTED UNTIL THE WATER MANAGEMENT PLAN HAS BEEN APPROVED.

SUBMITTALS

THE WATER MANAGEMENT PLAN MUST INCLUDE THE FOLLOWING:

1. SUMMARY OF THE CONTRACTORS WATER MANAGEMENT APPROACH.
2. DESCRIBE THE APPROACH TO COORDINATE THE REMOVAL OF FISH AND OTHER SPECIES FROM THE ISOLATED WORK AREA.
3. DESCRIBE IN DETAIL, INCLUDING GRAPHICAL FIGURES, THE CLEAR WATER DIVERSION SYSTEM. THIS INCLUDES, BUT IS NOT LIMITED TO, LOCATION OF INFRASTRUCTURE, TYPE OF INFRASTRUCTURE, DESIGN FLOW, PIPE SIZE, PIPE MATERIAL, PIPE LENGTH, PIPE ROUTING, ETC , AND PUMP DETAILS, IF UTILIZED.
4. DESCRIBE IN DETAIL, INCLUDING GRAPHICAL FIGURES, THE DEWATERING SYSTEM. THIS INCLUDES, BUT IS NOT LIMITED TO, THE LOCATION OF INFRASTRUCTURE, TYPES OF EQUIPMENT, SIZE OF EQUIPMENT, DISCHARGE LOCATIONS, ETC.
5. DESCRIBE IN DETAIL THE PROCEDURES TO BE EXECUTED SHOULD THE CHANNEL FLOW INCREASE (I.E. BECAUSE OF STORM EVENT).

PRODUCTS

COFFERDAM

1. MAY BE CONSTRUCTED USING NATIVE OR IMPORTED MATERIAL PLACED IN BAGS (E.G. SAND BAGS, SUPERSACKS). NO COFFERDAM MATERIAL MAY BE RELEASED TO THE CHANNEL AT THE COMPLETION OF THE CONSTRUCTION WITHOUT APPROVAL. MATERIAL AND APPROACH TO BE DESCRIBED IN THE WATER MANAGEMENT PLAN.
2. THE IMPERMEABLE LINER MATERIAL TO BE USED SHALL BE IDENTIFIED IN THE WATER MANAGEMENT PLAN.

CLEAR WATER DIVERSION SYSTEM

1. GRAVITY SYSTEM IS PREFERRED. SYSTEM SHALL BE CAPABLE OF CONVEYING ALL OF THE STREAM'S FLOW.
2. THE PIPE MATERIAL SHALL BE SELECTED FOR FLEXIBILITY AND DURABILITY TO ALLOW FOR THE OCCASIONAL RELOCATION DURING CONSTRUCTION
3. THE CONTRACTOR SHALL USE RESTRAINED PIPE JOINTS OR USE FITTINGS AND COUPLINGS THAT PREVENT SEPARATION OF PIPES.
4. THE CONTRACTOR HAS THE OPTION TO USE PUMPING INSTEAD OF GRAVITY FOR THE CLEAR WATER DIVERSION, BUT GRAVITY IS PREFERRED. IF GRAVITY NOT UTILIZED, PRESENT REASONS WITHIN THE WATER MANAGEMENT PLAN.
5. THE PUMP AND PUMPING APPARATUS USED FOR THE CLEAR WATER DIVERSION SHALL BE OF THE SUBMERSIBLE TYPE WITH SUFFICIENT CAPACITY TO PUMP ALL THE STREAM'S FLOW.
6. THE CONTRACTOR SHALL PROVIDE BACKUP POWER AND PUMPING EQUIPMENT TO ASSURE THAT THE CLEAR WATER DIVERSION REMAINS FUNCTIONAL THROUGHOUT THE TIME PERIOD THAT THE CHANNEL IS ISOLATED.

DEWATERING SYSTEM

1. THE CONTRACTOR SHALL FURNISH ALL MATERIALS, TOOLS, EQUIPMENT, FACILITIES AND SERVICES AS REQUIRED FOR PROVIDING THE NECESSARY DEWATERING WORK AND FACILITIES, AND PROVIDE BACKUP EQUIPMENT AS NECESSARY FOR REPLACEMENT AND FOR UNANTICIPATED EMERGENCIES.

EXECUTION

1. NO WORK MAY BEGIN UNTIL THE CONTRACTOR'S WATER MANAGEMENT PLAN HAS BEEN APPROVED.
2. PRIOR TO ANY INSTALLATION OF WATER MANAGEMENT FACILITIES, THE FISH REMOVAL WORK MUST BE COMPLETED.
3. INSTALL WATER MANAGEMENT SYSTEMS PER THE APPROVED WATER MANAGEMENT PLAN.
4. REFER TO CONTRACT DRAWING DETAILS FOR ADDITIONAL INFORMATION
5. ONCE THE IN-CHANNEL WORK IS COMPLETED AND ACCEPTED, REMOVE WATER MANAGEMENT SYSTEMS PER THE APPROVED WATER MANAGEMENT PLAN AS AS DIRECTED.

AQUATIC SPECIES MANAGEMENT

GENERAL

- THE PROJECT AREA WILL LIKELY INCLUDE FISH AND OTHER SPECIES THAT NEED TO BE REMOVED PRIOR TO ANY IN-CHANNEL WORK, INCLUDING THE INSTALLATION OF WATER MANAGEMENT SYSTEMS. THE CONTRACTOR SHALL WORK WITH THE COR TO COORDINATE THE REMOVAL OF FISH AND OTHER SPECIES.
- NO WORK MAY BE COMPLETED UNTIL THE WATER MANAGEMENT PLAN HAS BEEN APPROVED.

PRODUCTS

- REFER TO DRAWING DETAILS FOR PRODUCT INFORMATION.

EXECUTION

- THE CONTRACTOR MUST COORDINATE WITH THE CONTRACT OWNER AND THEIR BIOLOGIST. IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE CONTRACT OWNER AT LEAST ONE WEEK PRIOR TO NEEDING THE BIOLOGISTS SERVICES.

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WATER MANAGEMENT

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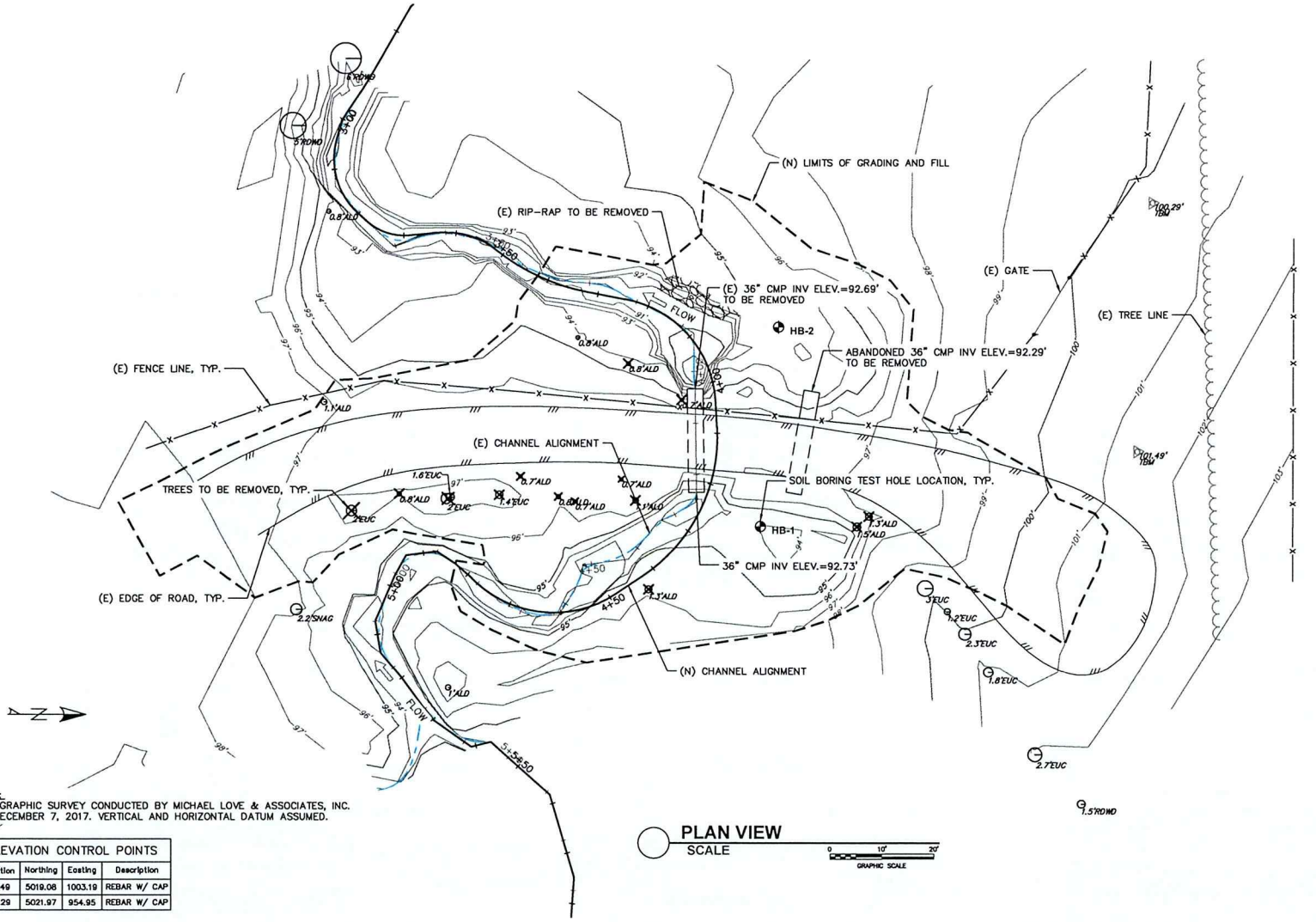

NOTE:
TOPOGRAPHIC SURVEY CONDUCTED BY MICHAEL LOVE & ASSOCIATES, INC. ON DECEMBER 7, 2017. VERTICAL AND HORIZONTAL DATUM ASSUMED.

ELEVATION CONTROL POINTS			
Elevation	Northing	Easting	Description
101.49	5019.08	1003.19	REBAR W/ CAP
100.29	5021.97	954.95	REBAR W/ CAP

PLAN VIEW
SCALE 0 10' 20'
GRAPHIC SCALE

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VERIFY SCALE
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SMITH RIVER ALLIANCE
MORRISON CREEK TRIBUTARY
CULVERT REPLACEMENT

EXISTING CONDITIONS & DEMOLITION PLAN

DATE	JULY 2018
SUBMITTAL	FINAL
DESIGN	ML
DRAWN	STP
SHEET	5 of 9

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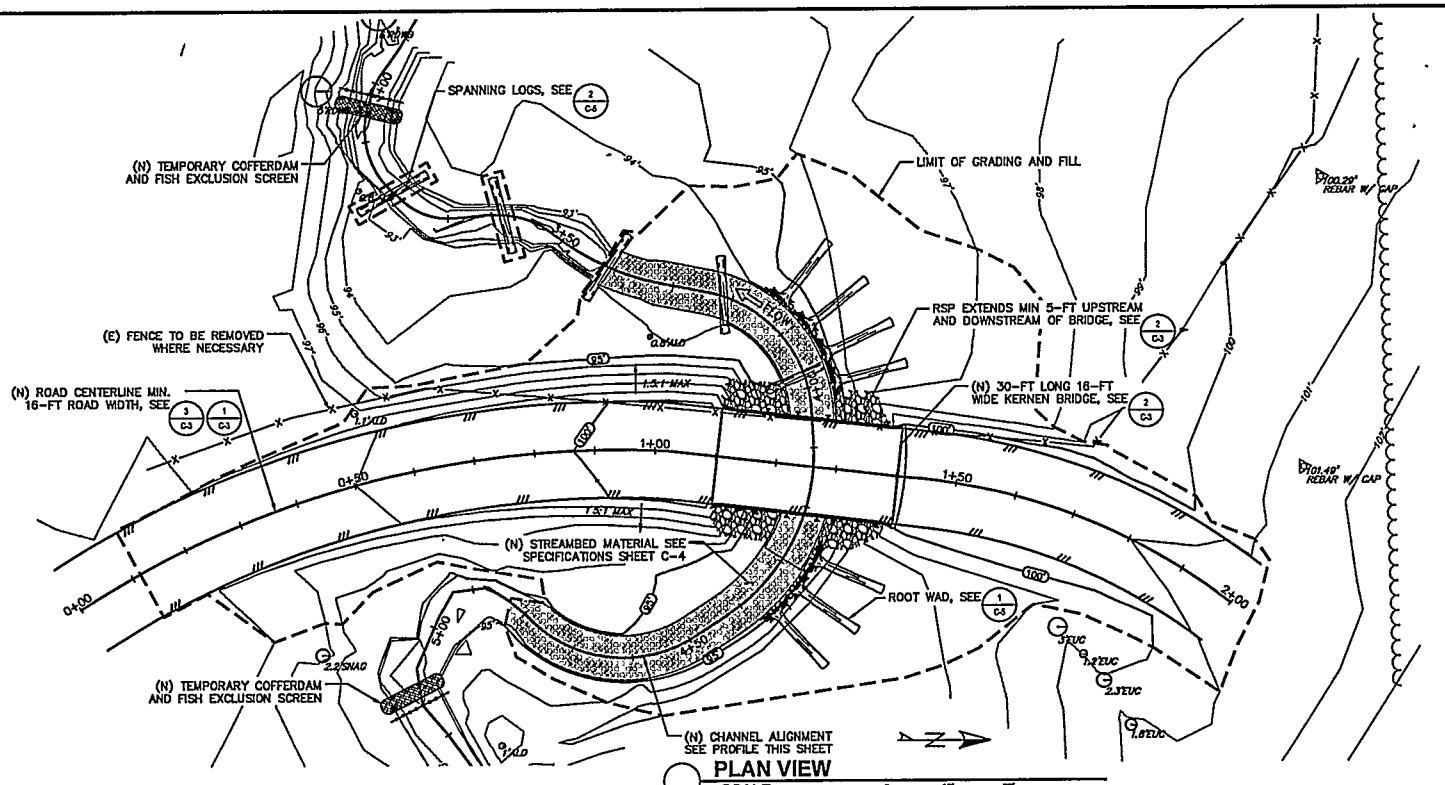

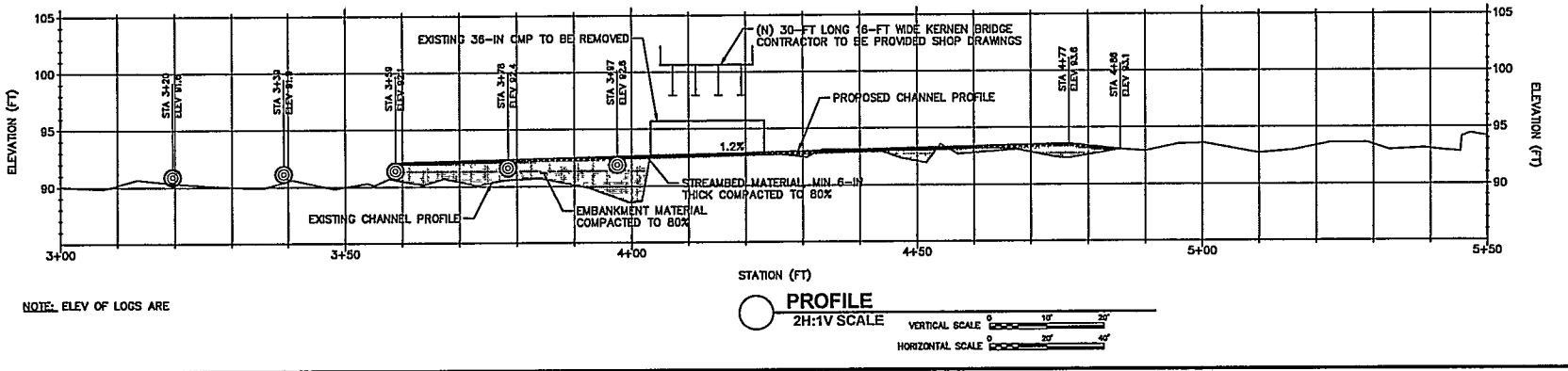

NOTE: ELEV OF LOGS ARE

PROFILE
2H:1V SCALE
VERTICAL SCALE
HORIZONTAL SCALE

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CULVERT REPLACEMENT

NEW CONDITIONS PLAN & PROFILE

DATE	JULY 2018
SUBMITTAL	FINAL
DESIGN	ML
DRAWN	STP
SHEET	6 of 9

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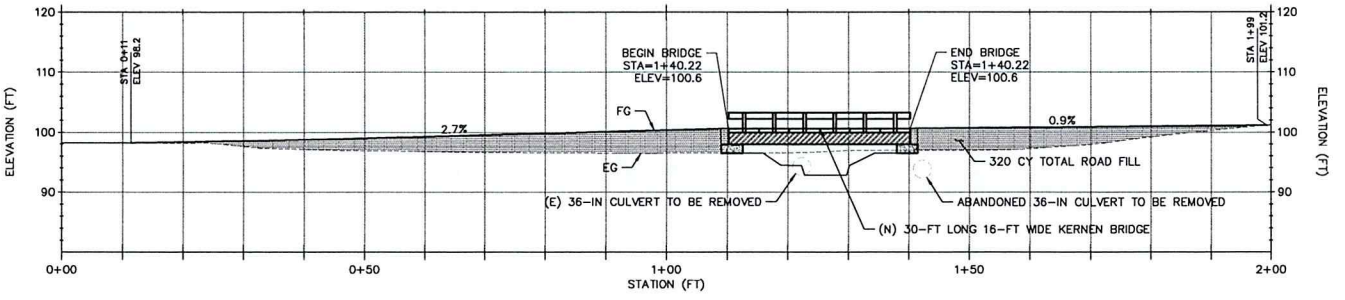
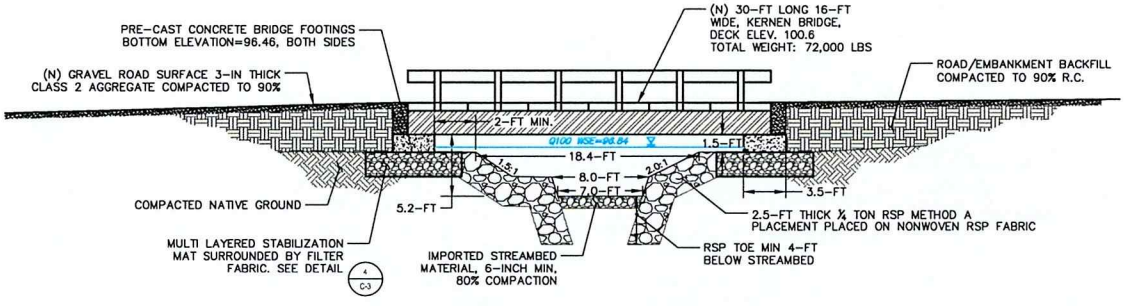


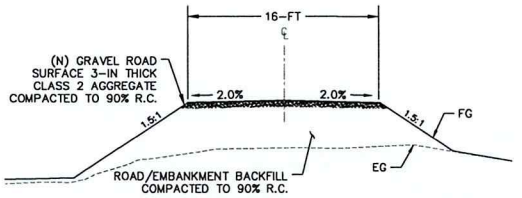
1 ROAD PROFILE
1H:1V

GRAPHIC SCALE 0 10' 20'



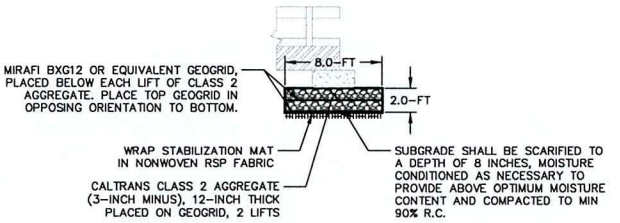
2 CHANNEL SECTION AT BRIDGE FACE
1H:1V

GRAPHIC SCALE 0 5' 10'



3 TYPICAL ROAD SECTION
TYPICAL

GRAPHIC SCALE 0 5' 10'



4 MULTILAYER STABILIZATION MAT
TYPICAL

GRAPHIC SCALE 0 5' 10'

ROAD SPECIFICATIONS

1. ROAD/EMBANKMENT BACKFILL SHALL CONSIST OF SUITABLE MATERIAL NO LARGER THAN 6-INCHES IN DIAMETER. MATERIAL SHALL BE PLACED IN 6-INCH LIFTS AND COMPACTED AS SPECIFIED.
2. NEW GRAVEL ROAD SHALL CONSIST OF 1-1/2 INCH MINUS CLASS II AGGREGATE COMPACTED AS SPECIFIED.

ROCK SLOPE PROTECTION (RSP)

RSP ROCK PROTECTS THE BRIDGE INSTALLATION.

MATERIAL SPECIFICATIONS

1. ROCK SHALL MEET MATERIAL PROPERTIES IN ACCORDANCE WITH CALTRANS, 2015 SECTION 72-2.
2. RSP SHALL BE ½ TON CLASS ROCK.
3. RSP FABRIC SHALL BE NONWOVEN CLASS 8 IN ACCORDANCE WITH CALTRANS, 2015 SECTION 72-2

INSTALLATION SPECIFICATIONS

1. ROCK SHALL BE PLACED IN ACCORDANCE WITH CALTRANS, 2015 SECTION 72 AND USING "METHOD A" PLACEMENT, INDIVIDUALLY PLACED ON NON-WOVEN RSP FABRIC.
2. ROCK SHALL HAVE A MINIMUM OF THREE CONTACT POINTS.
3. PLACE ROCK IN ROWS BEGINNING IN THE CHANNEL AND WORKING UP THE BANK.
4. BACKFILL ALL VOIDS WITH NATIVE MATERIAL AND COMPACT AFTER THE EACH ROW IS PLACED.

STABILIZATION MAT SPECIFICATIONS

1. STABILIZATION MAT SHALL BE MADE UP OF LATERALLY CONSTRAINED MULTI LAYERED BED OF WELL GRADED CRUSHED AGGREGATE AND TWO LAYERS OF MIRAFI BXG12 GEOGRID OR EQUIVALENT.
2. STABILIZATION MAT SHALL BE WRAPPED IN NONWOVEN RSP FABRIC.
3. THE BRIDGE FOOTING LOAD SHALL BE CENTERED ON THE STABILIZATION MAT.
4. THE THICKNESS OF THE STABILIZATION MAT SHALL BE A RATIO OF 1:4 WITH THE BASAL WIDTH ALONG THE ENTIRE LENGTH OF THE PRECAST BRIDGE ABUTMENT.
5. THE BASE OF THE STABILIZATION MAT CLOSEST TO THE CHANNEL SHOULD BE CONSTRUCTED ON OR BEHIND A SLOPING PLANE OF 2H:1V FROM THE FINISHED CHANNEL TOE.

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CULVERT REPLACEMENT

BRIDGE DETAIL & ROAD PROFILE

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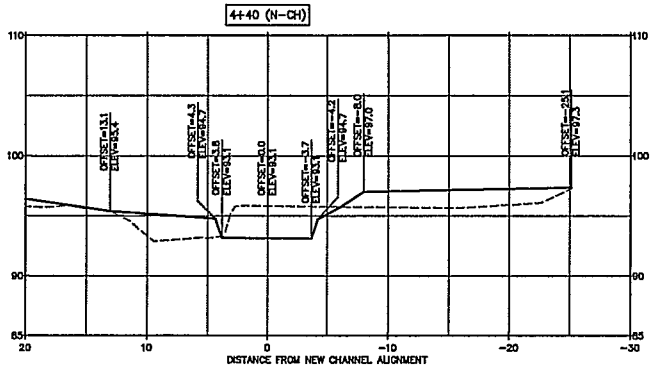
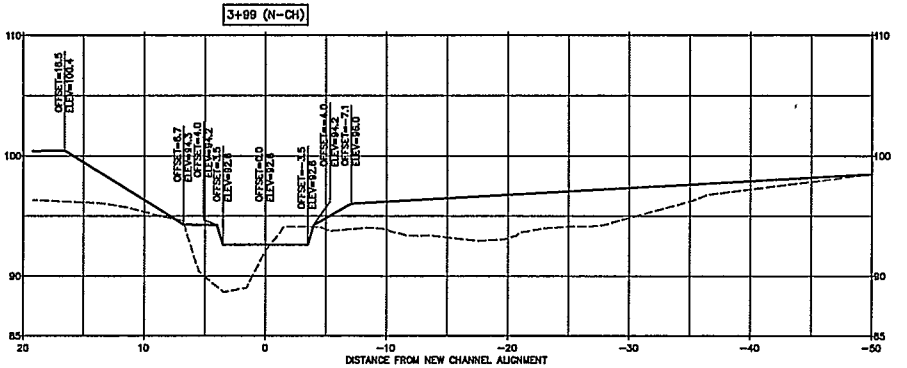
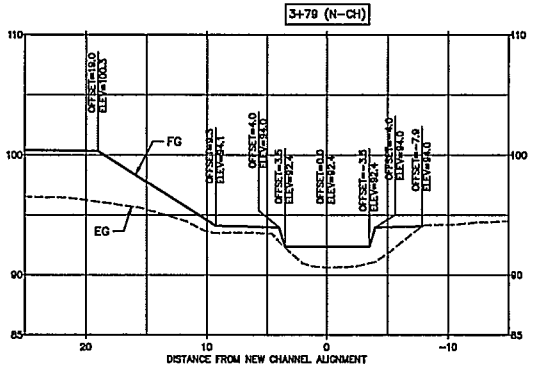
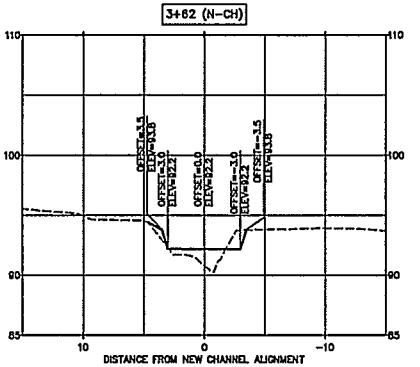
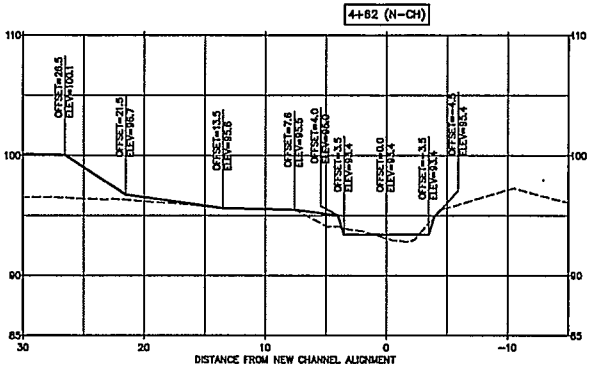


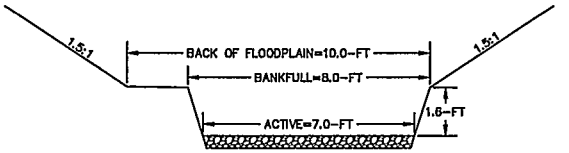




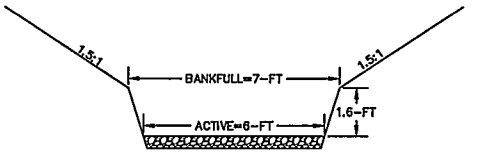




CHANNEL GRADING SECTIONS
NOT TO SCALE LOOKING DOWNSTREAM



CHANNEL SECTION STA 3+67-4+77
TYPICAL, N.T.S. LOOKING DOWNSTREAM



CHANNEL SECTION STA 2+90-3+67
TYPICAL, N.T.S. LOOKING DOWNSTREAM

STREAMBED MATERIAL

MATERIAL SPECIFICATIONS

1. EXCEPT AS DIRECTED BY COR, NO ROCK OR SIMILAR IRREDUCIBLE MATERIAL WITH A MAXIMUM DIMENSION GREATER THAN 12-INCHES SHALL BE BURIED OR PLACED IN STREAM BANK FILLS. DETRIMENTAL AMOUNTS OF ORGANIC MATERIAL SHALL NOT BE PERMITTED IN STREAM BANK FILLS.
2. STREAMBED MATERIAL SHALL CONSIST OF 2-INCH MINUS ROUNDED RIVER RUN MATERIAL.
3. EXCAVATION SHALL INCLUDE EXCAVATION AND HANDLING OF SATURATED SOILS. CONTRACTOR SHALL BE PREPARED TO DEWATER AND /OR TRANSPORT SATURATED SOIL IN A MANNER THAT PREVENTS EXCESS DISCHARGE OR SPILLAGE OF SOILS OR WATER WITHIN THE CONSTRUCTION ACCESS AREA OR ON ADJACENT PROPERTIES OR ROADWAYS. SHOULD ANY DISCHARGE OCCUR, THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMMEDIATE AND COMPLETE CLEAN UP. MULTIPLE HANDLING OF MATERIAL MAY BE NECESSARY.
4. NATIVE MATERIAL MAY BE REUSED, IF APPROVED BY THE ENGINEER.

INSTALLATION SPECIFICATIONS

1. STREAMBED MIX MUST BE THOROUGHLY MIXED PRIOR TO INSTALLATION. IF THE MATERIAL IS MIXED AND THEN TRANSPORTED TO THE INSTALLATION LOCATION, THE MATERIAL MUST BE REMIXED AS IT WILL NATURALLY SORT IN TRANSPORT.
2. INSTALLED MATERIAL SHALL BE COMPACTED AS SPECIFIED.

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MORRISON CREEK TRIBUTARY
CULVERT REPLACEMENT
CHANNEL GRADING SECTIONS

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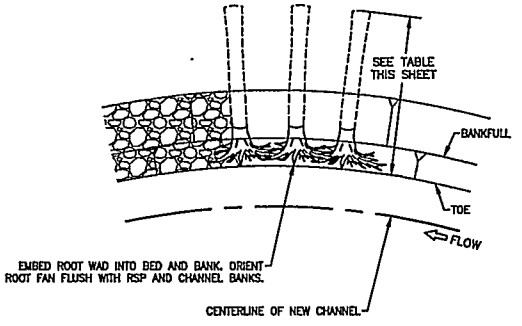
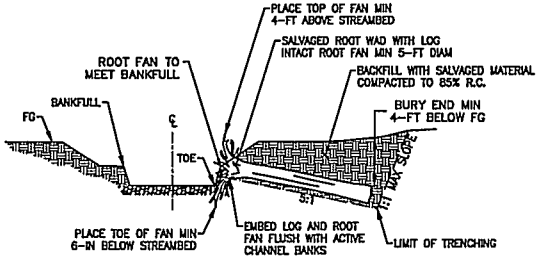


PLAN



SECTION

1 ROOT WAD DETAIL
NOT TO SCALE

SPECIFICATIONS FOR LOG STRUCTURES

MATERIAL SPECIFICATIONS

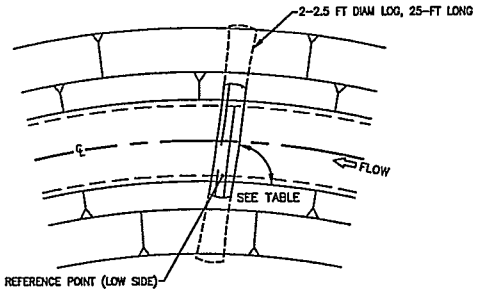
1. ALL LOGS SHALL BE SOUND, NON-ROTTED AND UNBROKEN DOUGLAS FIR OR REDWOOD.
2. LOGS SHALL MEET THE DIMENSIONS SPECIFIED. LOG LENGTH SHALL NOT BE ACCOMPLISHED WITH JOINING OF MULTIPLE LOGS. LOG DIAMETER SHALL BE MEASURED AT THE MIDPOINT OF THE LOG.

INSTALLATION SPECIFICATIONS

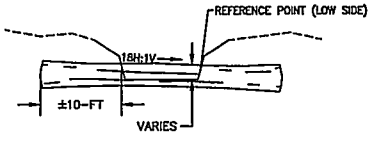
1. LOG STRUCTURES SHALL BE INSTALLED AS SPECIFIED AND DIRECTED BY THE COR. LOGS PLACED NOT MEETING CORS APPROVAL SHALL BE REMOVED AND RESET.
2. EXCAVATE TRENCH AS NECESSARY.
3. INSTALL LOGS IN LOCATIONS SPECIFIED WITH LOG CENTERED WITH CHANNEL CENTERLINE.
4. BACKFILL TRENCH WITH COMPACTED SALVAGE BACKFILL OR COMPACTED EMBANKMENT FILL TO SPECIFIED COMPACTION. MOUND BACKFILL UP TO 1-FT ABOVE EXISTING GROUND FOR DRAINAGE.

LOG SIZES FOR ROOT WADS	
LOG DIAMETER	MIN LOG LENGTH
< 2 FT	15 FT
2-3 FT	18 FT
1. LOG LENGTH INCLUDES ROOT WAD	
2. LOG DIAMETER SHALL BE MEASURED AT LOG MIDPOINT	
3. LOGS EXCEEDING THE MAXIMUM DIAMETER WILL NEED ADDITIONAL BURIAL AS DIRECTED BY THE COR	

CHANNEL SPANNING LOG TABLE			
STATION	REFERENCE POINT (LOOKING DOWNSTREAM)	REFERENCE ELEVATION	BANK ANGLE
3+97	LEFT	92.6	70-90°
3+78	LEFT	92.4	90-110°
3+59	RIGHT	92.1	75-95°
3+39	LEFT	91.9	95-115°
3+20	RIGHT	91.6	90-110°



PLAN



SECTION

2 CHANNEL SPANNING LOG DETAIL
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CHANNEL GRADING SECTIONS

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Peak Flow Calculation Summary
Rawson Creek

Method	Q-1yr (cfs)	Q-1.5yr (cfs)	Q-2yr (cfs)	Q-5yr (cfs)	Q-10yr (cfs)	Q-25yr (cfs)	Q-50yr (cfs)	Q-100yr (cfs)
LPIII Analysis of Stream Gages (Average of 3)		62	83	143	190	255	307	362
North Coast Regional Regression Equations	36	63	81	145	191	250	296	343

[1]Peak Flow Calculation Summary - Rawson Creek
Rawson Creek Near Smith River, CA (41.904220°N, -124.139361°W)

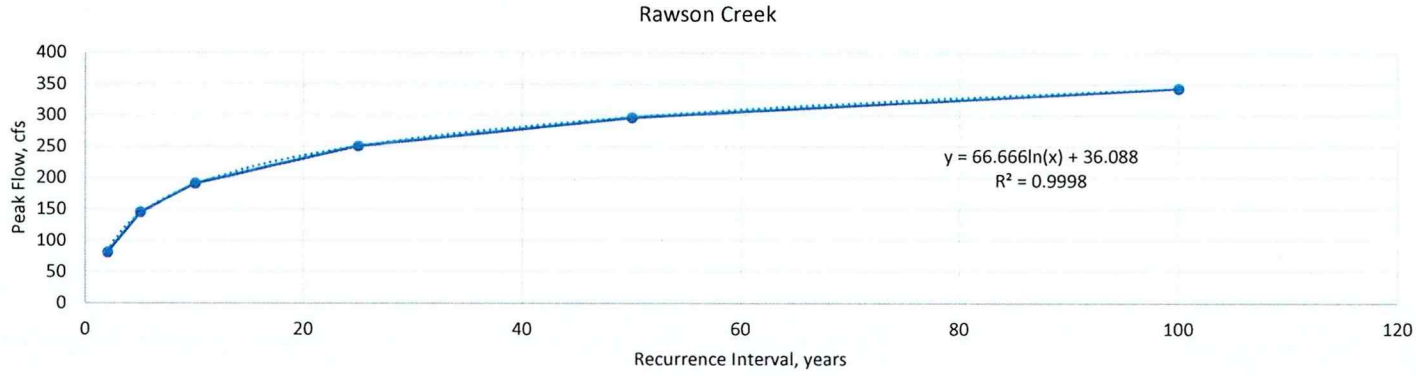
Reach	Q-1yr (cfs)	Q-1.5yr (cfs)	Q-2yr (cfs)	Q-5yr (cfs)	Q-10yr (cfs)	Q-25yr (cfs)	Q-50yr (cfs)	Q-100yr (cfs)	A Drainage Area (mi^2)	P Mean Annual Precipitation (in)
Rawson Creek	36	63	81	145	191	250	296	343	0.59	76.8

[1] Estimates using regional regression equations developed for the North Coast Region of California by the USGS (Gotvald, Barth, Veilleux, and Parrett, 2012).

$Q2\text{-yr} = 1.82\ A^{0.904}\ P^{0.983}$ $Q5\text{-yr} = 8.11\ A^{0.887}\ P^{0.772}$

$Q10\text{-yr} = 14.8\ A^{0.88}\ P^{0.696}$ $Q25\text{-yr} = 26.0\ A^{0.874}\ P^{0.628}$

$Q50\text{-yr} = 36.3\ A^{0.87}\ P^{0.589}$ $Q100\text{-yr} = 48.5\ A^{0.866}\ P^{0.556}$



Log Pearson Type III Probabilistic Analysis
Rawson Creek

Peak flows were estimated using a Log-Pearson type III distribution as described in Bulletin 17B (Guidelines for Determining Flood Flow Frequency, 1982).

Stream Name	Location	Drainage Area (mi^2)	Recurrence Interval of Peak Flows						
			1.5-yr (cfs/mi^2)	2-yr (cfs/mi^2)	5-yr (cfs/mi^2)	10-yr (cfs/mi^2)	25-yr (cfs/mi^2)	50-yr (cfs/mi^2)	100-yr (cfs) (cfs/mi^2)
Little Lost Man Creek	Orick, CA	3.46	58.89	81.47	147.47	197.56	266.30	320.67	377.04
Lopez Creek	Smith River, CA	0.92	117.50	165.35	311.36	427.04	591.51	725.71	868.71
Harris Creek	Brookings, OR	1.05	137.37	172.92	270.36	341.61	438.52	515.36	595.97
		Average	104.59	139.91	243.06	322.07	432.11	520.58	613.91

Rawson Creek							
Drainage Area (mi^2)	Q 1.5-yr (cfs)	Q 2-yr (cfs)	Q 5-yr (cfs)	Q 10-yr (cfs)	Q 25-yr (cfs)	Q 50-yr (cfs)	Q 100-yr (cfs)
0.59	61.71	82.55	143.41	190.02	254.95	307.14	362.21

Flood Frequency based on Annual Maximum Series

USGS 11482468 Little Lost Man C A Site No 2 Nr Orick Ca

Station #: 11482468

Drainage Area (sq. miles) 3.46

Maximum Daily Average Discharge

Water Year	Date of Peak	Discharge (cfs)
1975	03/18/75	808.0
1976	02/16/76	165.0
1977	09/28/77	88.0
1978	12/14/77	391.0
1979	01/11/79	177.0
1980	03/14/80	230.0
1981	12/02/80	240.0
1982	12/19/81	486.0
1985	11/12/84	252.0
1986	02/17/86	787.0
1987	01/03/87	76.0
1988	12/10/87	301.0
1989	11/22/88	471.0

RANK	Recurrence Interval (years)	Annual Exceedance Probability	Discharge (cfs)	Discharge (cms)	Log-Discharge (cfs)
1	14.00	0.07	808.0	22.88	2.91
2	7.00	0.14	787.0	22.29	2.90
3	4.67	0.21	486.0	13.76	2.69
4	3.50	0.29	471.0	13.34	2.67
5	2.80	0.36	391.0	11.07	2.59
6	2.33	0.43	301.0	8.52	2.48
7	2.00	0.50	252.0	7.14	2.40
8	1.75	0.57	240.0	6.80	2.38
9	1.56	0.64	230.0	6.51	2.36
10	1.40	0.71	177.0	5.01	2.25
11	1.27	0.79	165.0	4.67	2.22
12	1.17	0.86	88.0	2.49	1.94
13	1.08	0.93	76.0	2.15	1.88

Sample Size, n =	13		
Skewness =	1.03	1.03	-0.22
Mean=	344.00	9.74	2.44
Median=	252.00	7.14	2.40
Std Dev=	238.30	6.75	0.32
Outliers			
	Kn=	2.335	
	Q_{LOW}	49.08 cfs	
	Q_{HIGH}	1517.21 cfs	

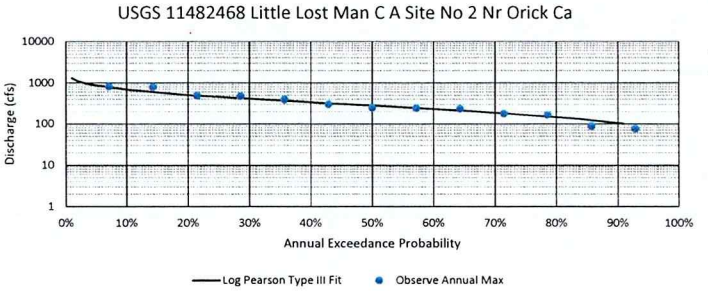
Generalized Skew=	-0.3	A=	-0.312413121
Station Skewness (log Q)=	-0.22	B=	0.882842643
Station Mean (log Q)=	2.44	MSE	
Station Median (log Q)=	2.40	(station skew) =	0.38636
Station Std Dev (log Q)=	0.32		
Weighted Skewness (G_W)=	-0.26		

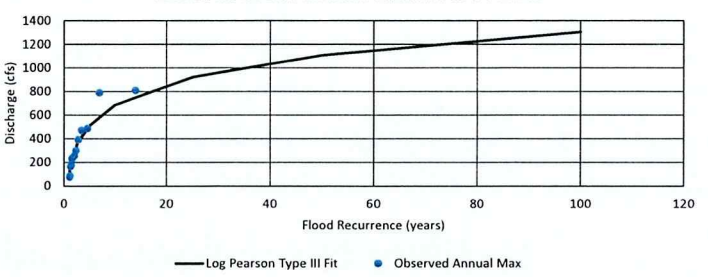
Log Pearson Type III Distribution

Return Period (years)	Exceedence Probability	Log-Pearson K	Est. Discharge [mean] (cfs)	Est. Discharge [median] (cfs)
1.1	0.909	-1.35010	101.2040	93.4561
1.2	0.833	-0.98622	132.2224	122.0998
1.5	0.667	-0.39751	203.7754	188.1749
2.0	0.500	0.04406	281.8712	260.2918
2.33	0.429	0.21941	320.6270	296.0805
2.4	0.417	0.25395	328.8678	303.6905
2.6	0.385	0.34239	350.9463	324.0787
2.8	0.357	0.41819	371.0468	342.6403
5.0	0.200	0.85180	510.2510	471.1874
10	0.100	1.24976	683.5435	631.2130
25	0.040	1.65620	921.4096	850.8687
50	0.020	1.90907	1109.5351	1024.5917
100	0.010	2.12948	1304.5725	1204.6976

Values From K-Table for Linear interpolation

Weighted Skewness =	-0.30	-0.20	-0.26
P	K	K	K
0.9	-1.30936	-1.30105	-1.30644
0.8	-0.82377	-0.83044	-0.82612
0.7	-0.48600	-0.49927	-0.49067
0.6	-0.20552	-0.22168	-0.21120
0.500	0.04993	0.03325	0.04406
0.429	0.22492	0.20925	0.21941
0.200	0.85285	0.84986	0.85180
0.100	1.24516	1.25824	1.24976
0.040	1.64329	1.67999	1.65620
0.020	1.88959	1.94499	1.90907
0.010	2.10294	2.17840	2.12948





Flood Frequency based on Annual Maximum Series

USGS 14378800 Harris Creek near Brookings, OR

Station #: 14378800

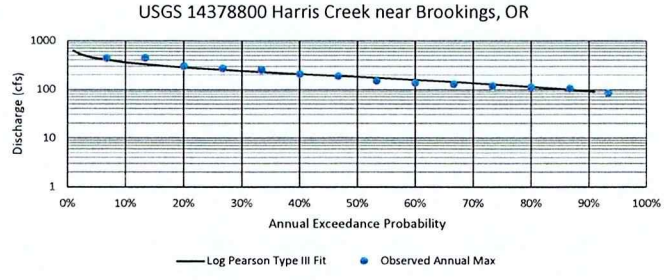
Drainage Area (sq. miles) 1.05

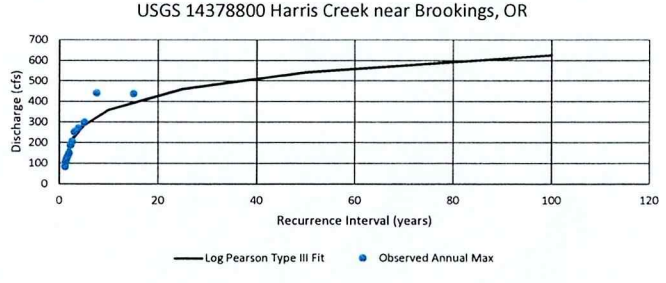
Maximum Daily Average Discharge

Water Year	Date of Peak	Discharge (cfs)
1953	1/17/1953	436.0
1954	11/22/1953	297.0
1955	12/30/1954	439.0
1957	12/11/1956	251.0
1959	1/12/1959	109.0
1960	5/26/1960	136.0
1961	2/10/1961	118.0
1962	11/22/1961	205.0
1963	5/6/1963	186.0
1964	11/8/1963	84.0
1965	4/19/1965	104.0
1966	12/28/1965	128.0
1967	11/19/1966	149.0
1968	2/20/1968	269.0

RANK	Recurrence Interval (years)	Annual Exceedance Probability	Discharge (cfs)	Discharge (cms)	Log-Discharge (cfs)
1	15.00	0.07	436.0	12.35	2.64
2	7.50	0.13	439	12.43	2.64
3	5.00	0.20	297	8.41	2.47
4	3.75	0.27	269	7.62	2.43
5	3.00	0.33	251	7.11	2.40
6	2.50	0.40	205	5.80	2.31
7	2.14	0.47	186	5.27	2.27
8	1.88	0.53	149	4.22	2.17
9	1.67	0.60	136	3.85	2.13
10	1.50	0.67	128	3.62	2.11
11	1.36	0.73	118	3.34	2.07
12	1.25	0.80	109	3.09	2.04
13	1.15	0.87	104	2.94	2.02
14	1.07	0.93	84	2.38	1.92

Sample Size, n =	14		
Skewness =	1.08	1.08	0.39
Mean=	207.93	5.89	2.26
Median=	167.50	4.74	2.22
Std Dev=	117.17	3.32	0.23
Outliers			
	Kn=	2.335	
	Q_{LOW}	52.63 cfs	
	Q_{HIGH}	627.05 cfs	





Generalized Skew=	-0.3	A=	-0.298683262
Station Skewness (log Q)=	0.39	B=	0.838220601
Station Mean (log Q)=	2.26	MSE	
Station Median (log Q)=	2.22	(station skew) =	0.37917
Station Std Dev (log Q)=	0.23		
Weighted Skewness (G_W)=	0.01		

Log Pearson Type III Distribution

Return Period (years)	Exceedence Probability	Log-Pearson K	Est. Discharge [mean] (cfs)	Est. Discharge [median] (cfs)
1.1	0.909	-1.32072	90.1509	82.6108
1.2	0.833	-0.98822	107.5432	98.5485
1.5	0.667	-0.43491	144.2360	132.1724
2.0	0.500	-0.00109	181.5646	166.3789
2.33	0.429	0.17627	199.4788	182.7948
2.4	0.417	0.21259	203.3602	186.3515
2.6	0.385	0.30559	213.6461	195.7771
2.8	0.357	0.38530	222.8756	204.2347
5.0	0.200	0.84128	283.8738	260.1311
10	0.100	1.28222	358.6951	328.6945
25	0.040	1.75292	460.4482	421.9371
50	0.020	2.05724	541.1305	495.8713
100	0.010	2.33116	625.7721	573.4337

Values From K-Table for Linear interpolation

Weighted Skewness =	0.00	0.10	0.01
P	K	K	K
0.9	-1.28155	-1.27037	-1.28082
0.8	-0.84162	-0.84611	-0.84191
0.7	-0.52440	-0.53624	-0.52518
0.6	-0.25335	-0.26882	-0.25437
0.500	0.00000	-0.01662	-0.00109
0.429	0.17733	0.16111	0.17627
0.200	0.84162	0.83639	0.84128
0.100	1.28155	1.29178	1.28222
0.040	1.75069	1.78462	1.75292
0.020	2.05375	2.10697	2.05724
0.010	2.32635	2.39961	2.33116

Flood Frequency based on Annual Maximum Series

USGS 11533000 Lopez Creek Near Smith River, CA

Station #: 11533000

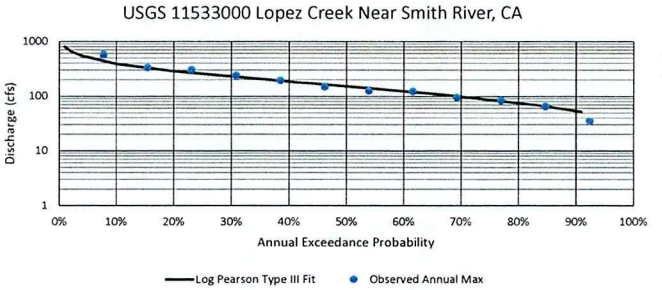
Drainage Area (sq. miles) 0.92

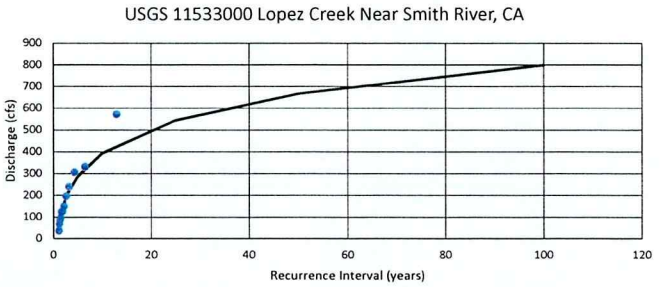
Maximum Daily Average Discharge

Water Year	Date of Peak	Discharge (cfs)
1962	11/23/61	305.0
1963	05/06/63	330.0
1964	01/19/64	65.0
1965	12/22/64	84.0
1966	01/06/66	149.0
1967	11/15/66	95.0
1968	02/23/68	239.0
1969	01/12/69	123.0
1970	01/22/70	195.0
1971	01/16/71	125.0
1972	03/02/72	570.0
1973	01/16/73	35.0

RANK	Recurrence Interval (years)	Annual Exceedance Probability	Discharge (cfs)	Discharge (cms)	Log-Discharge (cfs)
1	13.00	0.08	570.0	16.14	2.76
2	6.50	0.15	330.0	9.34	2.52
3	4.33	0.23	305.0	8.64	2.48
4	3.25	0.31	239.0	6.77	2.38
5	2.60	0.38	195.0	5.52	2.29
6	2.17	0.46	149.0	4.22	2.17
7	1.86	0.54	125.0	3.54	2.10
8	1.63	0.62	123.0	3.48	2.09
9	1.44	0.69	95.0	2.69	1.98
10	1.30	0.77	84.0	2.38	1.92
11	1.18	0.85	65.0	1.84	1.81
12	1.08	0.92	35.0	0.99	1.54

Sample Size, n =	12		
Skewness =	1.55	1.55	-0.09
Mean=	192.92	5.46	2.17
Median=	137.00	3.88	2.14
Std Dev=	150.71	4.27	0.34
Outliers			
	Kn=	2.335	
	Q_{LOW}	24.18 cfs	
	Q_{HIGH}	906.90 cfs	





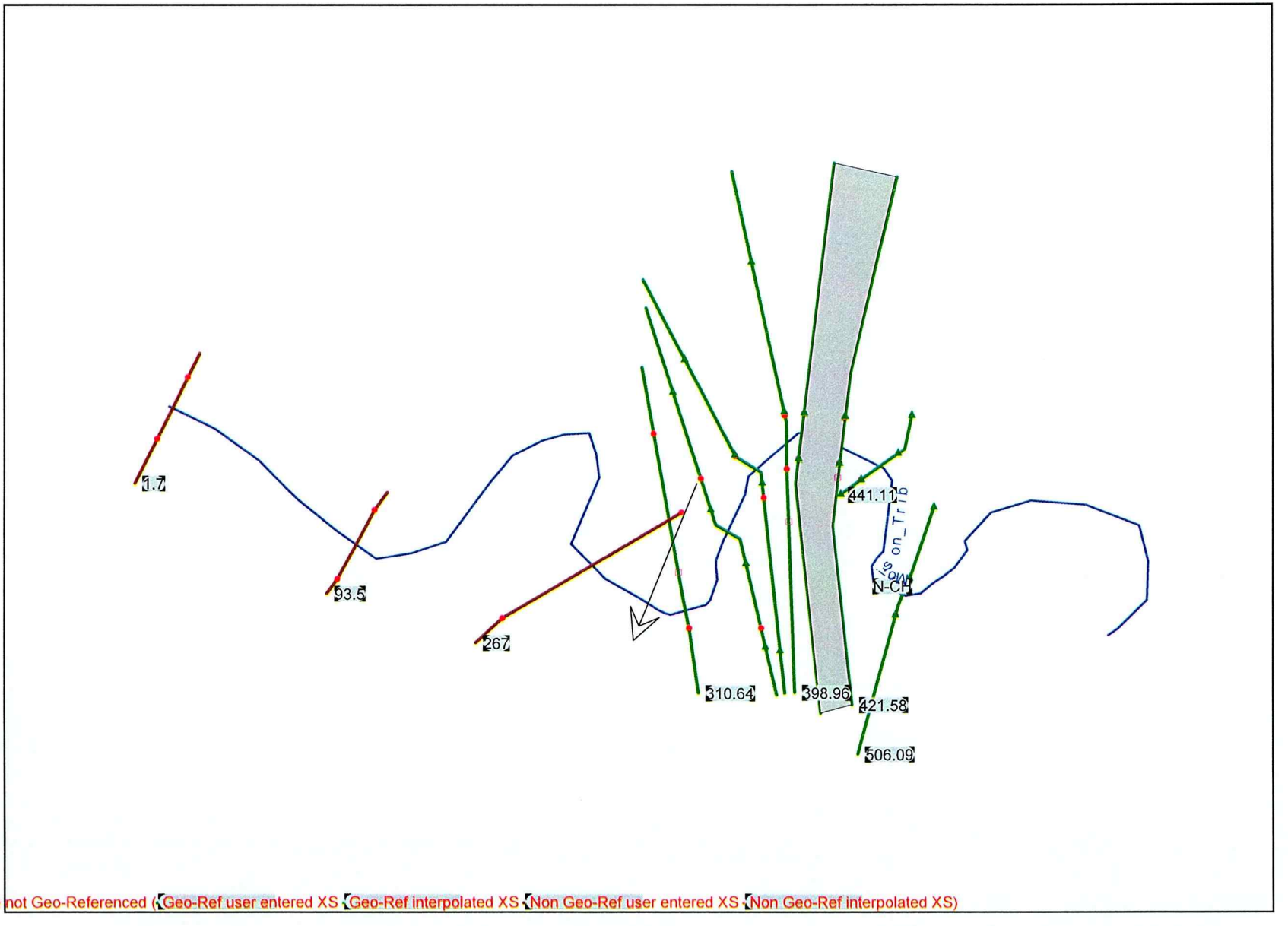
Generalized Skew=	-0.3	A=	-0.323103133
Station Skewness (log Q)=	-0.09	B=	0.917585181
Station Mean (log Q)=	2.17	MSE	
Station Median (log Q)=	2.14	(station skew) =	0.40201
Station Std Dev (log Q)=	0.34		
Weighted Skewness (G_W)=	-0.21		

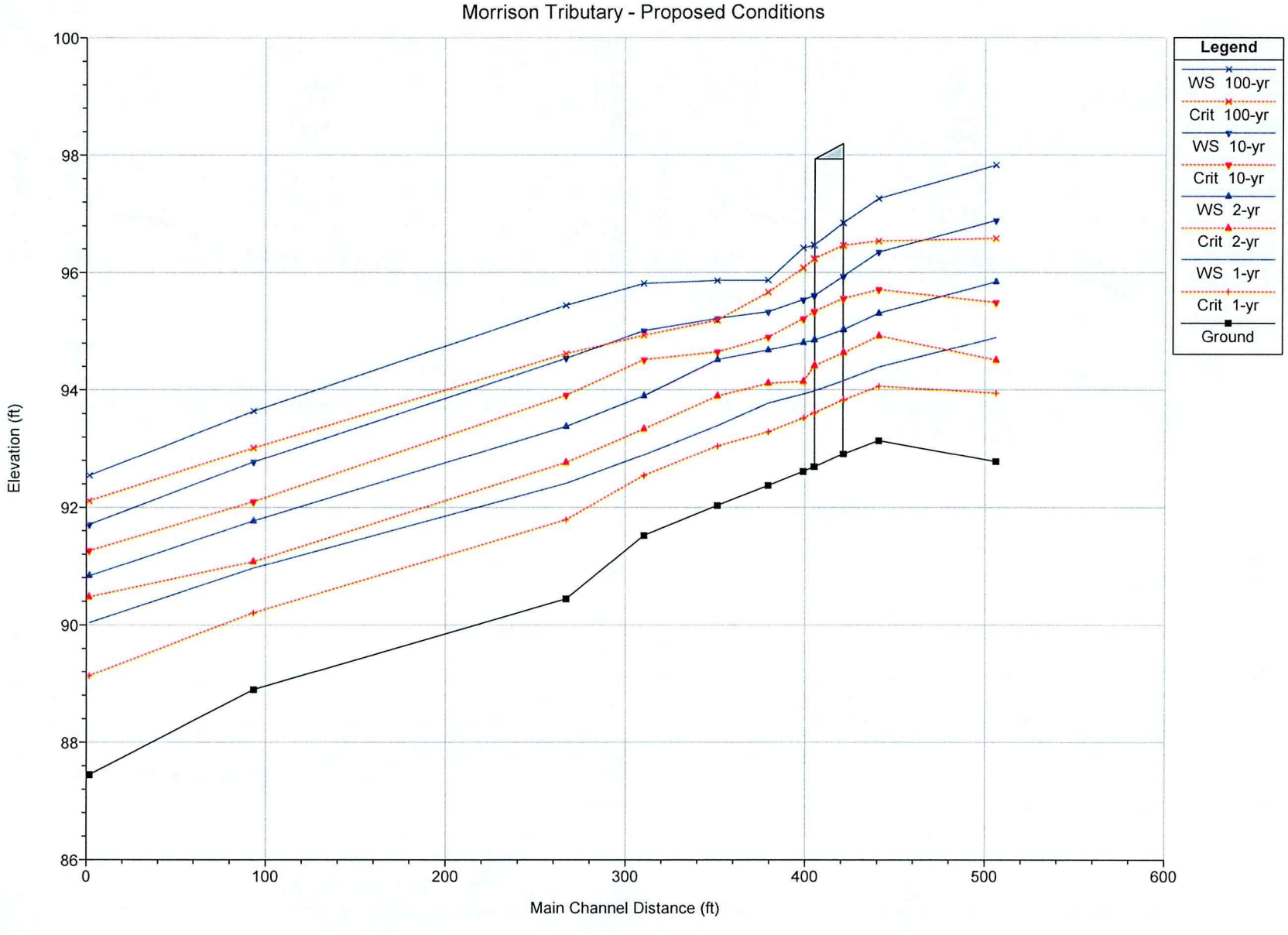
Log Pearson Type III Distribution

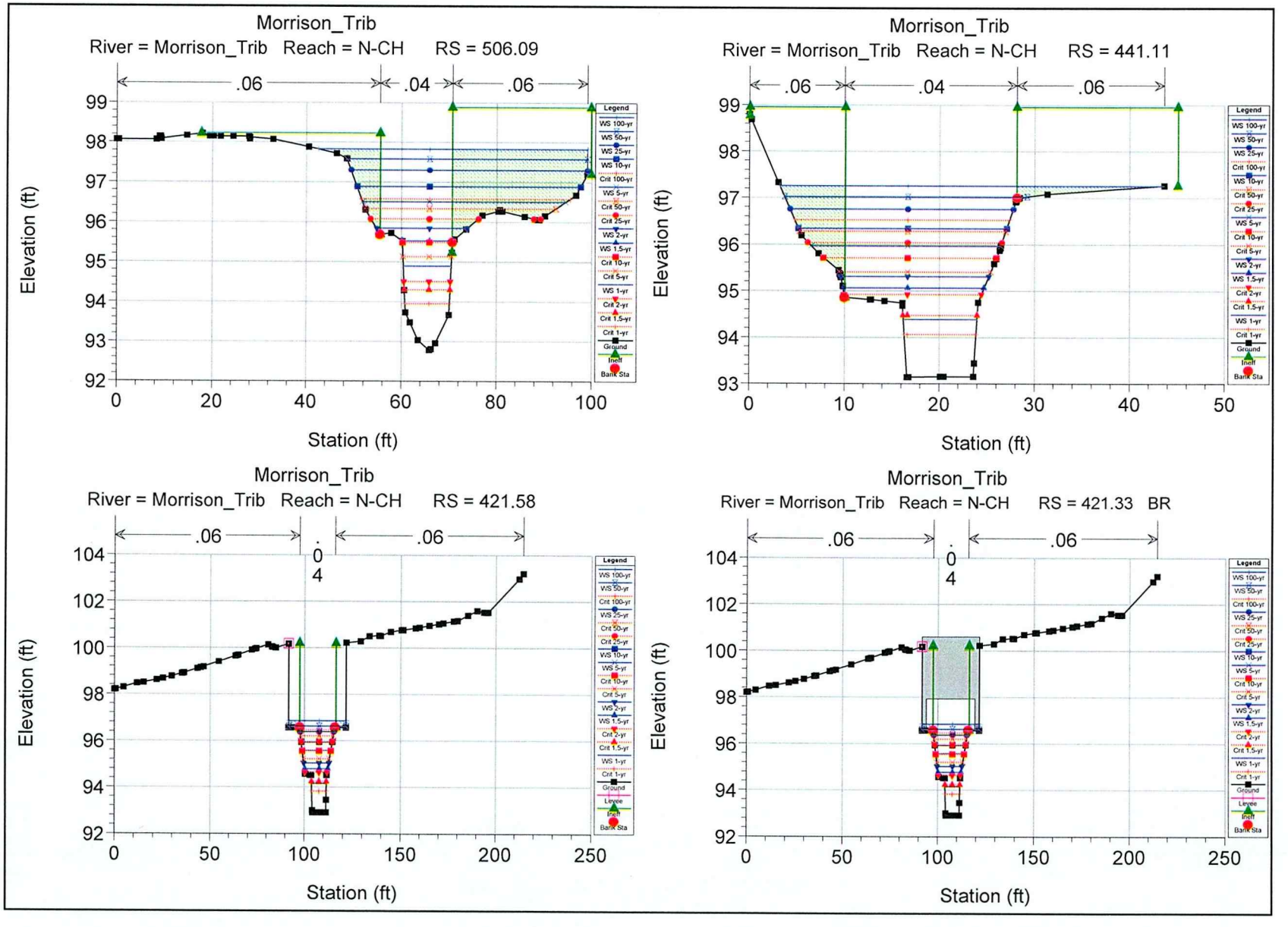
Return Period (years)	Exceedence Probability	Log-Pearson K	Est. Discharge [mean] (cfs)	Est. Discharge [median] (cfs)
1.1	0.909	-1.34463	52.1529	48.0637
1.2	0.833	-0.98717	68.8283	63.4317
1.5	0.667	-0.40556	108.0957	99.6203
2.0	0.500	0.03463	152.1187	140.1915
2.33	0.429	0.21055	174.3725	160.7005
2.4	0.417	0.24548	179.1647	165.1169
2.6	0.385	0.33492	192.0437	176.9862
2.8	0.357	0.41159	203.8173	187.8367
5.0	0.200	0.85011	286.4517	263.9919
10	0.100	1.25716	392.8740	362.0700
25	0.040	1.67695	544.1903	501.5221
50	0.020	1.94040	667.6529	615.3043
100	0.010	2.17214	799.2170	736.5529

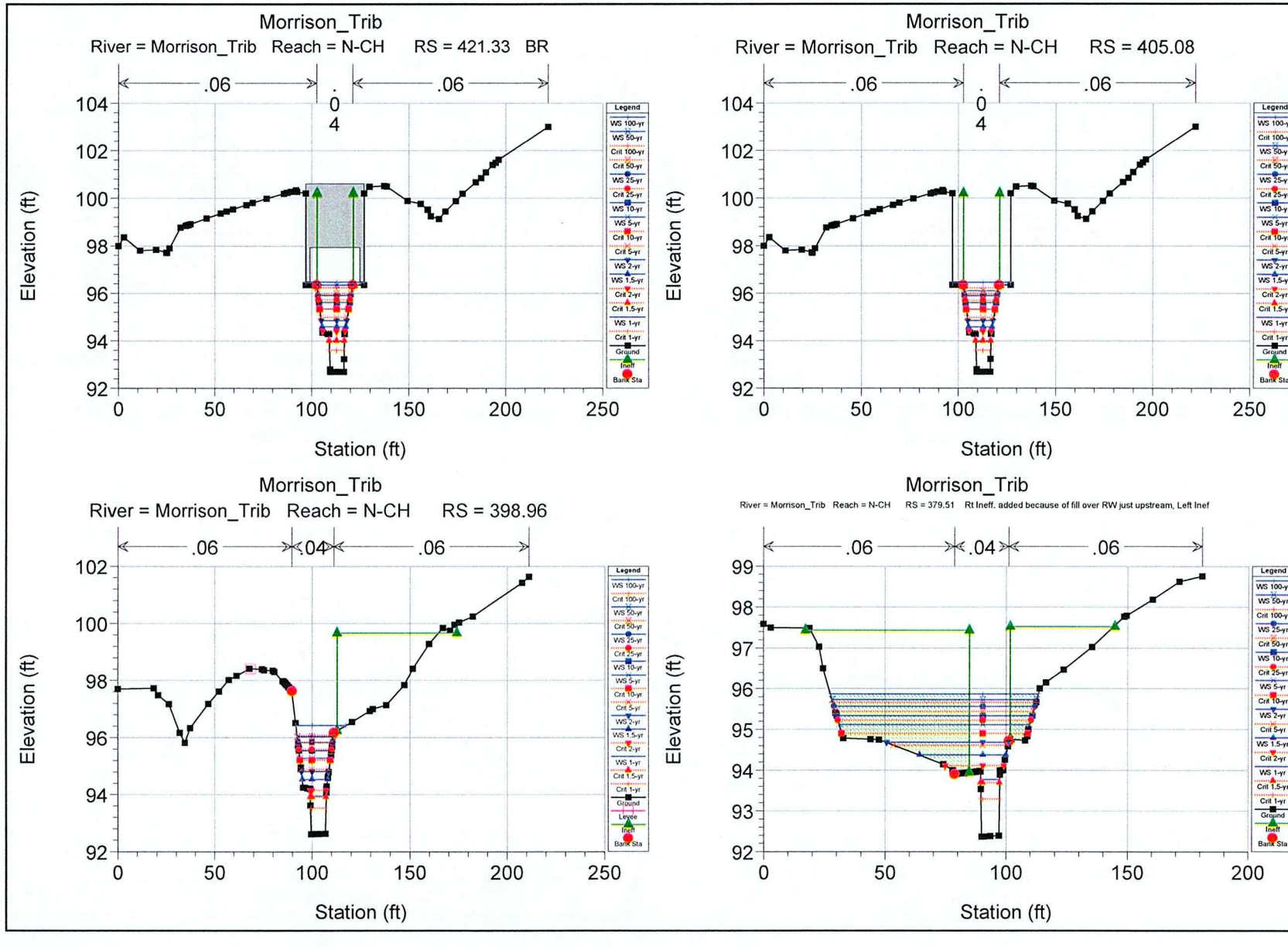
Values From K-Table for Linear interpolation

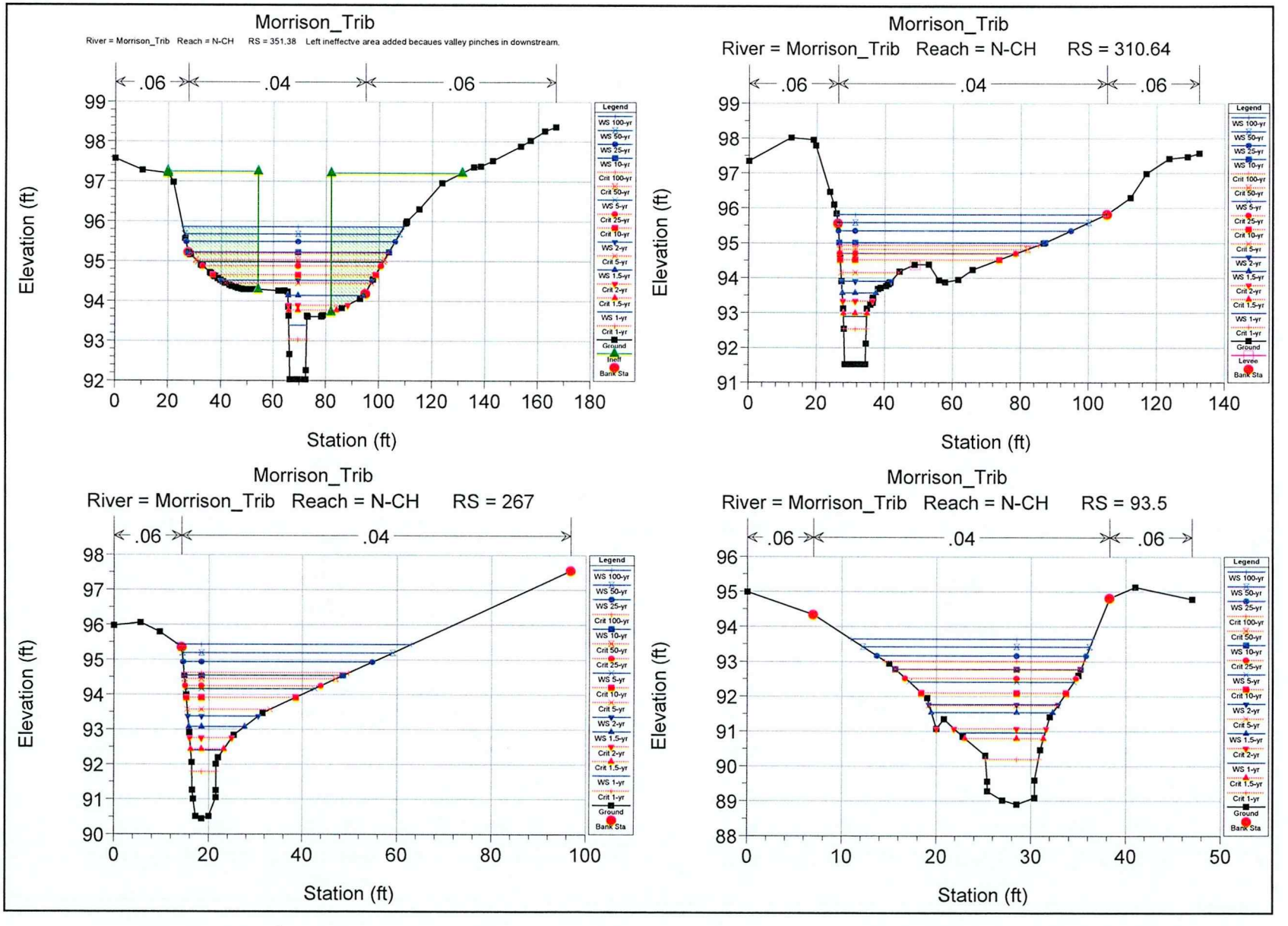
Weighted Skewness =	-0.30	-0.20	-0.21
P	K	K	K
0.9	-1.30936	-1.30105	-1.30174
0.8	-0.82377	-0.83044	-0.82989
0.7	-0.48600	-0.49927	-0.49817
0.6	-0.20552	-0.22168	-0.22034
0.500	0.04993	0.03325	0.03463
0.429	0.22492	0.20925	0.21055
0.200	0.85285	0.84986	0.85011
0.100	1.24516	1.25824	1.25716
0.040	1.64329	1.67999	1.67695
0.020	1.88959	1.94499	1.94040
0.010	2.10294	2.17840	2.17214

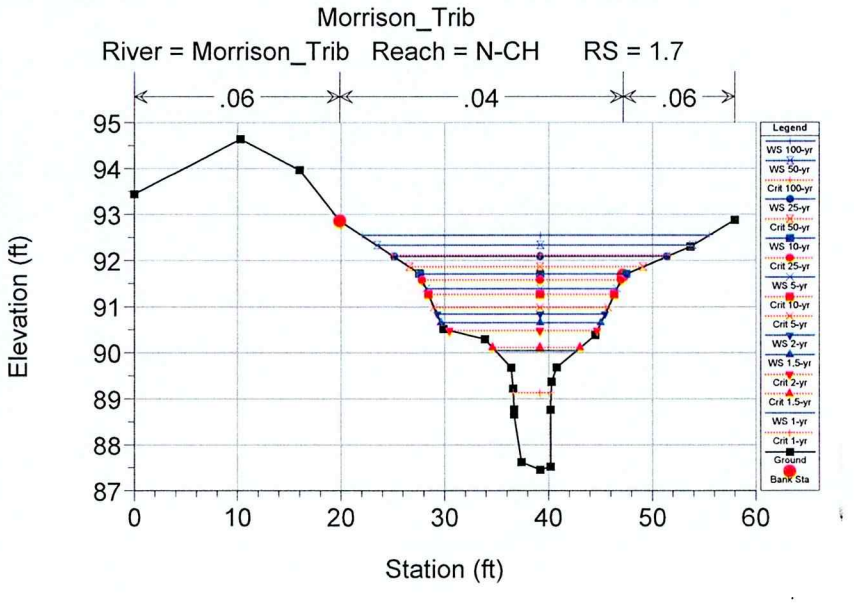

1.7
93.5
267
310.64
398.96
421.58
441.11
506.09
N-CH
3 of the 11 XS's are not Geo-Referenced (Geo-Ref user entered XS Geo-Ref interpolated XS Non Geo-Ref user entered XS Non Geo-Ref interpolated XS)


Morrison Tributary - Proposed Conditions
Legend
WS 100-yr
Crit 100-yr
WS 10-yr
Crit 10-yr
WS 2-yr
Crit 2-yr
WS 1-yr
Crit 1-yr
Ground
Elevation (ft)
Main Channel Distance (ft)
100
98
96
94
92
90
88
86
0
100
200
300
400
500
600


Morrison_Trib
River = Morrison_Trib Reach = N-CH RS = 506.09
.06
.04
.06
Elevation (ft)
Station (ft)
Morrison_Trib
River = Morrison_Trib Reach = N-CH RS = 441.11
.06
.04
.06
Elevation (ft)
Station (ft)
Morrison_Trib
River = Morrison_Trib Reach = N-CH RS = 421.58
.06
.04
.06
Elevation (ft)
Station (ft)
Morrison_Trib
River = Morrison_Trib Reach = N-CH RS = 421.33 BR
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100-yr
WS 50-yr
WS 25-yr
WS 10-yr
Crit 100-yr
WS 5-yr
Crit 50-yr
Crit 25-yr
WS 2-yr
WS 1.5-yr
Crit 10-yr
Crit 5-yr
WS 1-yr
Crit 2-yr
Crit 1.5-yr
Crit 1-yr
Ground
Levee
Ineff
Bank Sta


Morrison_Trib
River = Morrison_Trib Reach = N-CH RS = 421.33 BR
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100-yr
WS 50-yr
Crit 100-yr
Crit 50-yr
WS 25-yr
Crit 25-yr
WS 10-yr
WS 5-yr
Crit 10-yr
Crit 5-yr
WS 2-yr
WS 1.5-yr
Crit 2-yr
Crit 1.5-yr
WS 1-yr
Crit 1-yr
Ground
Ineff
Bank Sta
Morrison_Trib
River = Morrison_Trib Reach = N-CH RS = 405.08
Morrison_Trib
River = Morrison_Trib Reach = N-CH RS = 398.96
Levee
Morrison_Trib
River = Morrison_Trib Reach = N-CH RS = 379.51 Rt Ineff. added because of fill over RW just upstream, Left Inef


Morrison_Trib
River = Morrison_Trib Reach = N-CH RS = 351.38 Left ineffectve area added becaues valley pinches in downstream.
.06
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100-yr
WS 50-yr
WS 25-yr
WS 10-yr
Crit 100-yr
Crit 50-yr
WS 5-yr
Crit 25-yr
Crit 10-yr
WS 2-yr
Crit 5-yr
WS 1.5-yr
Crit 2-yr
Crit 1.5-yr
WS 1-yr
Crit 1-yr
Ground
Ineff
Bank Sta
Morrison_Trib
River = Morrison_Trib Reach = N-CH RS = 310.64
Levee
Morrison_Trib
River = Morrison_Trib Reach = N-CH RS = 267
Morrison_Trib
River = Morrison_Trib Reach = N-CH RS = 93.5


Morrison_Trib
River = Morrison_Trib Reach = N-CH RS = 1.7
.06
.04
.06
Elevation (ft)
Station (ft)
95
94
93
92
91
90
89
88
87
0
10
20
30
40
50
60
Legend
WS 100-yr
WS 50-yr
Crit 100-yr
WS 25-yr
Crit 50-yr
WS 10-yr
Crit 25-yr
WS 5-yr
Crit 10-yr
Crit 5-yr
WS 2-yr
WS 1.5-yr
Crit 2-yr
Crit 1.5-yr
WS 1-yr
Crit 1-yr
Ground
Bank Sta

HEC-RAS Plan: Morrison PCM River: Morrison_Trib Reach: N-CH Profile: 1-yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
N-CH	506.09	1-yr	36.00	92.78	94.89	93.95	94.97	0.002317	2.21	16.31	10.04	0.31	0.20
N-CH	441.11	1-yr	36.00	93.14	94.39	94.07	94.63	0.011978	3.94	9.15	7.77	0.64	0.71
N-CH	421.58	1-yr	36.00	92.91	94.15	93.83	94.39	0.011762	3.91	9.20	7.78	0.63	0.70
N-CH	421.33		Bridge										
N-CH	405.08	1-yr	36.00	92.69	93.98	93.61	94.20	0.010564	3.78	9.54	7.81	0.60	0.65
N-CH	398.96	1-yr	36.00	92.61	93.93	93.52	94.13	0.009132	3.56	10.10	8.14	0.56	0.57
N-CH	379.51	1-yr	36.00	92.37	93.77	93.29	93.95	0.008001	3.43	10.50	7.99	0.53	0.52
N-CH	351.38	1-yr	36.00	92.03	93.39	93.05	93.65	0.012416	4.11	8.77	6.87	0.64	0.77
N-CH	310.64	1-yr	36.00	91.52	92.89	92.54	93.15	0.012191	4.08	8.82	6.86	0.63	0.76
N-CH	267	1-yr	36.00	90.44	92.40	91.79	92.64	0.010739	3.87	9.30	6.87	0.59	0.68
N-CH	93.5	1-yr	36.00	88.90	90.96	90.21	91.12	0.006945	3.13	11.50	9.19	0.49	0.44
N-CH	1.7	1-yr	36.00	87.45	90.03	89.13	90.25	0.012408	3.77	9.56	7.76	0.60	0.67

HEC-RAS Plan: Morrison PCM River: Morrison_Trib Reach: N-CH Profile: 2-yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
N-CH	506.09	2-yr	81.00	92.78	95.84	94.51	95.98	0.003755	3.01	26.88	19.09	0.40	0.36
N-CH	441.11	2-yr	81.00	93.14	95.31	94.92	95.57	0.010335	4.08	19.84	15.63	0.63	0.73
N-CH	421.58	2-yr	81.00	92.91	95.03	94.63	95.34	0.011756	4.45	18.19	13.03	0.66	0.85
N-CH	421.33		Bridge										
N-CH	405.08	2-yr	81.00	92.69	94.85	94.41	95.14	0.010803	4.32	18.74	13.18	0.64	0.80
N-CH	398.96	2-yr	81.00	92.61	94.81	94.15	95.06	0.009231	4.05	20.02	13.98	0.60	0.70
N-CH	379.51	2-yr	81.00	92.37	94.68	94.12	94.88	0.007035	3.56	22.77	50.42	0.53	0.54
N-CH	351.38	2-yr	81.00	92.03	94.51	93.90	94.64	0.007163	2.94	27.56	57.56	0.52	0.40
N-CH	310.64	2-yr	81.00	91.52	93.90	93.34	94.20	0.013435	4.44	18.26	14.60	0.70	0.88
N-CH	267	2-yr	81.00	90.44	93.37	92.76	93.65	0.011519	4.19	19.32	14.97	0.65	0.78
N-CH	93.5	2-yr	81.00	88.90	91.77	91.08	92.00	0.007777	3.86	21.00	13.70	0.55	0.62
N-CH	1.7	2-yr	81.00	87.45	90.83	90.48	91.10	0.012402	4.13	19.61	16.16	0.66	0.77

HEC-RAS Plan: Morrison PCM River: Morrison_Trib Reach: N-CH Profile: 10-yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
N-CH	506.09	10-yr	191.00	92.78	96.88	95.49	97.20	0.004489	4.48	42.63	46.99	0.47	0.68
N-CH	441.11	10-yr	191.00	93.14	96.34	95.71	96.77	0.008733	5.22	36.56	21.93	0.63	1.01
N-CH	421.58	10-yr	191.00	92.91	95.94	95.56	96.51	0.013934	6.07	31.46	16.21	0.77	1.42
N-CH	421.33		Bridge										
N-CH	405.08	10-yr	191.00	92.69	95.60	95.33	96.25	0.016511	6.45	29.61	15.80	0.83	1.62
N-CH	398.96	10-yr	191.00	92.61	95.53	95.22	96.12	0.014692	6.12	31.20	16.71	0.79	1.45
N-CH	379.51	10-yr	191.00	92.37	95.33	94.90	95.83	0.010993	5.71	33.66	80.77	0.70	1.22
N-CH	351.38	10-yr	191.00	92.03	95.22	94.65	95.47	0.006640	4.05	47.18	76.08	0.55	0.64
N-CH	310.64	10-yr	191.00	91.52	95.01	94.52	95.15	0.006399	2.97	64.24	60.64	0.51	0.40
N-CH	267	10-yr	191.00	90.44	94.54	93.91	94.79	0.008593	4.03	47.38	33.78	0.60	0.68
N-CH	93.5	10-yr	191.00	88.90	92.77	92.10	93.17	0.009572	5.09	37.56	19.58	0.65	0.99
N-CH	1.7	10-yr	191.00	87.45	91.71	91.26	92.16	0.012380	5.42	35.26	19.86	0.71	1.16

HEC-RAS Plan: Morrison PCM River: Morrison_Trib Reach: N-CH Profile: 100-yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
N-CH	506.09	100-yr	343.00	92.78	97.83	96.58	98.39	0.005542	6.03	56.86	56.63	0.55	1.11
N-CH	441.11	100-yr	343.00	93.14	97.26	96.53	97.91	0.008990	6.50	52.75	40.16	0.67	1.41
N-CH	421.58	100-yr	343.00	92.91	96.84	96.46	97.65	0.013430	7.22	47.65	29.99	0.79	1.82
N-CH	421.33		Bridge										
N-CH	405.08	100-yr	343.00	92.69	96.46	96.23	97.38	0.016816	7.72	44.43	29.99	0.88	2.13
N-CH	398.96	100-yr	343.00	92.61	96.42	96.08	97.23	0.014463	7.25	47.56	25.48	0.82	1.87
N-CH	379.51	100-yr	343.00	92.37	95.87	95.67	96.88	0.016138	8.09	42.74	85.87	0.89	2.26
N-CH	351.38	100-yr	343.00	92.03	95.86	95.19	96.29	0.007313	5.27	65.12	83.84	0.61	0.97
N-CH	310.64	100-yr	343.00	91.52	95.81	94.93	95.94	0.003587	2.85	120.32	79.47	0.41	0.32
N-CH	267	100-yr	343.00	90.44	95.44	94.62	95.69	0.006358	4.05	84.64	49.60	0.54	0.64
N-CH	93.5	100-yr	343.00	88.90	93.64	93.02	94.20	0.010629	6.01	57.06	25.56	0.71	1.30
N-CH	1.7	100-yr	343.00	87.45	92.54	92.11	93.14	0.012421	6.24	57.77	33.48	0.75	1.44

HEC-RAS Plan: Morrison PCM River: Morrison_Trib Reach: N-CH Profile: 100-yr

Reach	River Sta	Profile	Q Total	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Vel Chnl	Area Channel	Top W Chnl	Froude # Chl	Top W Left	Top W Right	Area Left	Area Right
			(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)	(sq ft)	(sq ft)
N-CH	506.09	100-yr	343.00		343.00		92.78	97.83	6.03	57.16	15.21	0.55	13.00	28.42	9.61	45.55
N-CH	441.11	100-yr	343.00		343.00		93.14	97.26	6.50	52.88	18.16	0.67	6.80	15.20	8.21	1.75
N-CH	421.58	100-yr	343.00	0.02	342.81	0.17	92.91	96.84	7.22	47.49	18.43	0.79	5.69	5.88	1.56	1.61
N-CH	421.33		Bridge													
N-CH	405.08	100-yr	343.00	0.00	342.99	0.01	92.69	96.46	7.72	44.41	18.43	0.88	5.69	5.88	0.60	0.62
N-CH	398.96	100-yr	343.00		342.66	0.34	92.61	96.42	7.25	47.24	19.46	0.82		6.02		0.74
N-CH	379.51	100-yr	343.00		341.13	1.87	92.37	95.87	8.09	53.90	22.40	0.89	51.28	12.19	65.28	10.73
N-CH	351.38	100-yr	343.00		343.00		92.03	95.86	5.27	124.47	67.28	0.61	2.05	14.51	0.66	12.05
N-CH	310.64	100-yr	343.00	0.02	342.98		91.52	95.81	2.85	120.27	79.01	0.41	0.46		0.06	
N-CH	267	100-yr	343.00	0.01	342.99		90.44	95.44	4.05	84.61	48.76	0.54	0.84		0.03	
N-CH	93.5	100-yr	343.00		343.00		88.90	93.64	6.01	57.06	25.56	0.71				
N-CH	1.7	100-yr	343.00		336.73	6.27	87.45	92.54	6.24	53.95	25.17	0.75		8.31		3.82

HEC-RAS Plan: Morrison PCM River: Morrison_Trib Reach: N-CH Profile: 100-yr

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)
N-CH	441.11	100-yr	97.91	97.26	96.53	0.21	0.05	40.16		343.00		6.50
N-CH	421.58	100-yr	97.65	96.84	96.46	0.00	0.00	29.99	0.02	342.81	0.17	7.22
N-CH	421.33 BR U	100-yr	97.65	96.84	96.46	0.24	0.03	25.50	0.02	342.82	0.16	7.24
N-CH	421.33 BR D	100-yr	97.38	96.46	96.24	0.00	0.00	25.51	0.00	342.99	0.01	7.70
N-CH	405.08	100-yr	97.38	96.46	96.23	0.10	0.06	29.99	0.00	342.99	0.01	7.72
N-CH	398.96	100-yr	97.23	96.42	96.08	0.30	0.06	25.48		342.66	0.34	7.25

CONSULTING ENGINEERS & GEOLOGISTS, INC.
812 W. Wabash • Eureka, CA 95501-2138 • 707-441-8855 • FAX: 707-441-8877 •shninfo@shn-engr.com

Reference: 017264

March 20, 2018

Mr. Michael Love, PE, Principal Engineer
Michael Love & Associates, Inc.
P.O. Box 4477
Arcata, CA 95518

Subject: **Limited Geotechnical Evaluation, Smith River alliance, Morrison Creek Tributary Culvert Replacement, Del Norte County, California**

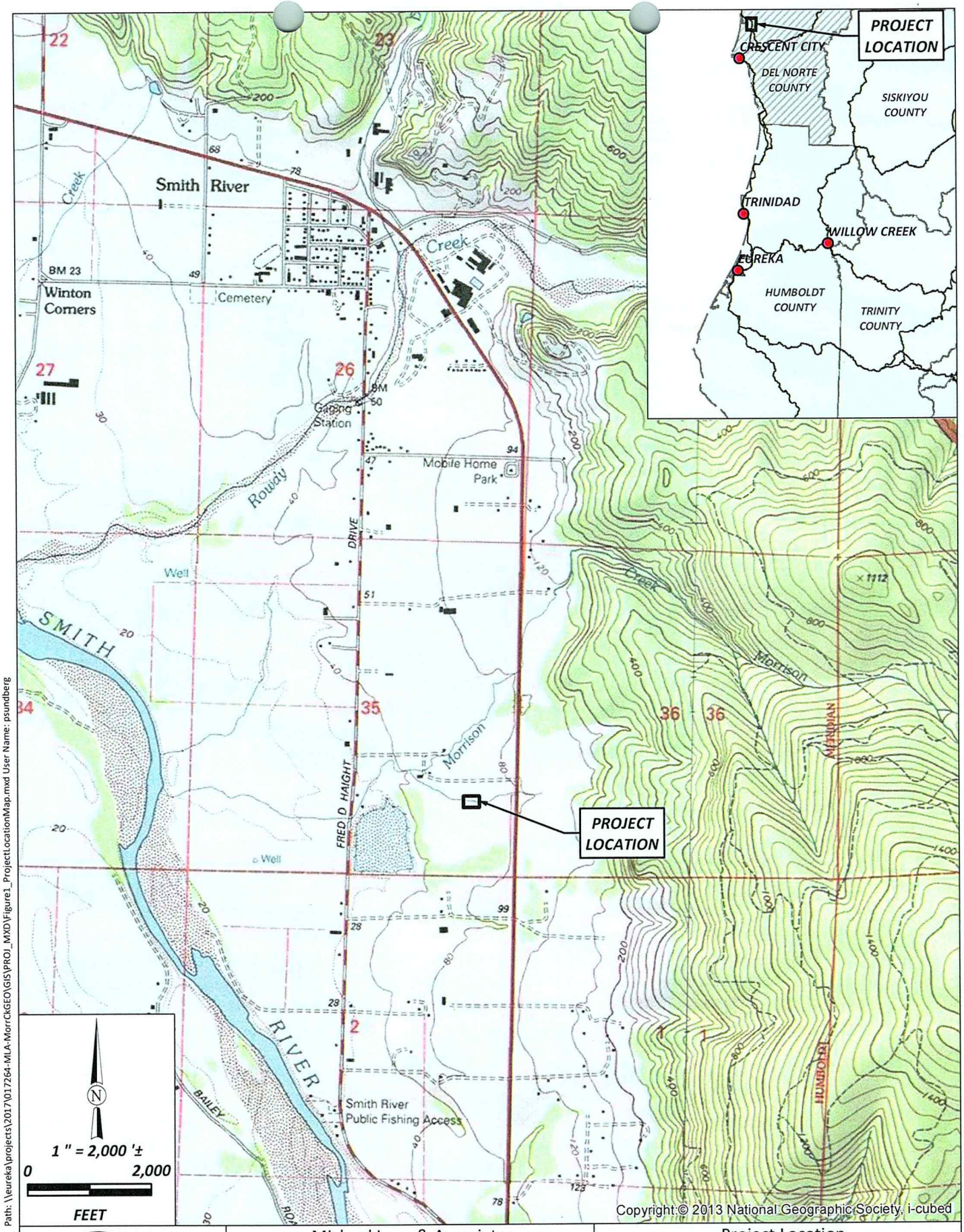
Mr. Love:

The proposed project consists of the replacement of an existing corrugated metal pipe culvert at a ranch road stream crossing on Morrison Creek (a salmon-bearing stream), south of the community of Smith River in Del Norte County, California (Figure 1). The anticipated replacement culvert initially consisted of a prefabricated closed-bottom concrete box culvert embedded below the streambed. However, following the completion of the field investigation, the project was modified, and now consists of removal of the existing 36-inch culvert, widening the channel at that location, and placing a 30-foot long by 16-foot wide Kernen Bridge across the channel. We understand that the approaches on both sides of the proposed bridge structure will be raised by about 4 feet. Our understanding of the project is based on conceptual design from Michael Love & Associates on plans (Sheets 2 and 3) dated March 2018.

Field Exploration Program

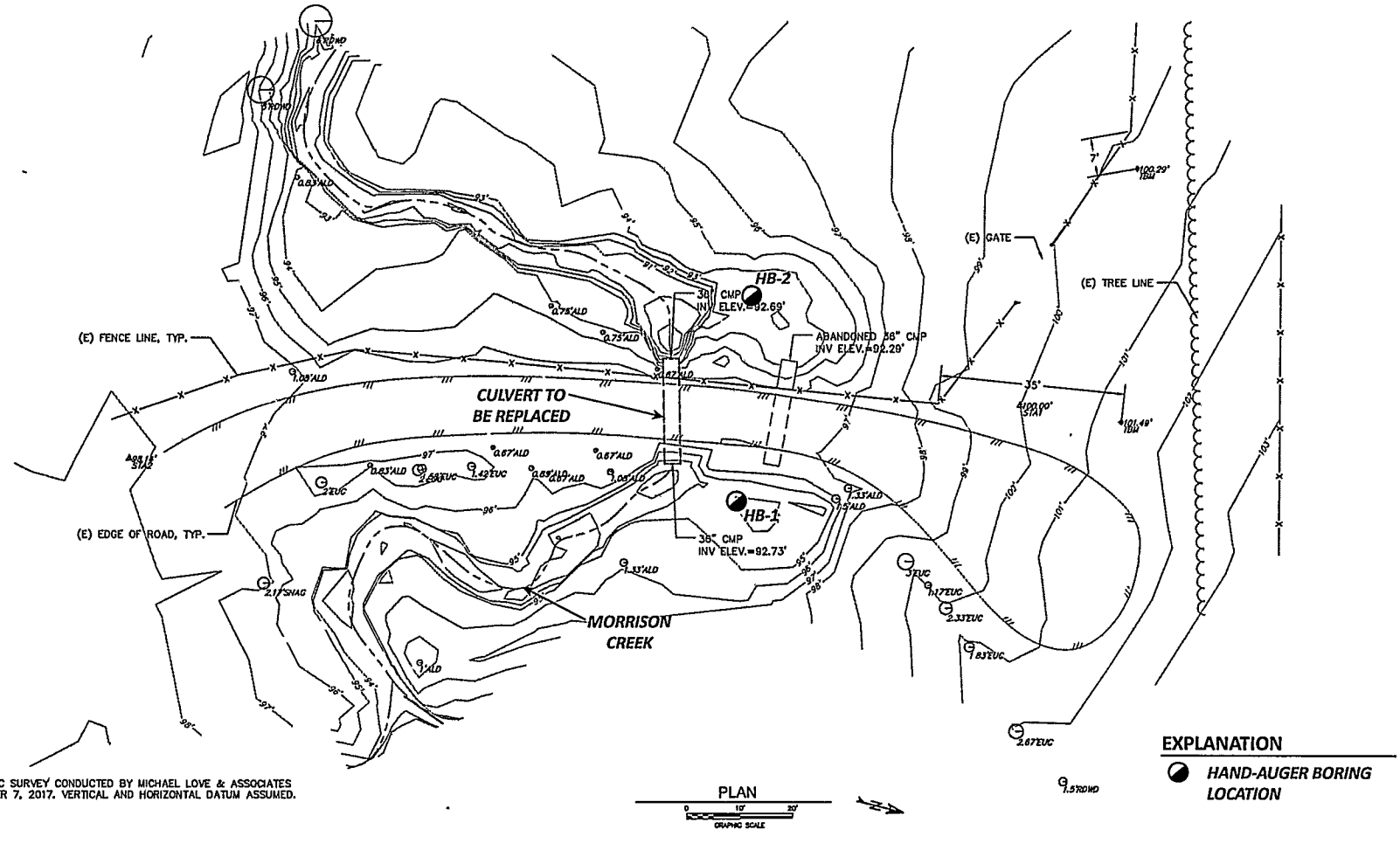
On December 21, 2017, a project geologist from SHN logged and sampled two hand-auger borings at the project site, in the general vicinity of the culvert that is to be replaced. The borings, denoted as HB-1 and HB-2 on Figure 2, were drilled in the Morrison Creek floodplain at roughly the elevation of the bottom of the existing culvert. HB-1 was located upstream of the existing culvert, while HB-2 was located on the downstream side of the existing culvert. The borings were advanced to the maximum depth explored of 7.5 feet. The borings were located relative to the initial plan to replace the culvert with a closed-bottom box culvert, and as such were advanced in relatively close proximity to the channel. Based on the change in project strategy, we have had to extrapolate the results of the near-channel borings to the areas that will support the bridge approaches and abutments.

The soils encountered in the hand-auger borings were logged and field classified in general accordance with the Manual-Visual Classification Method (ASTM-International [ASTM] D 2488). During auger drilling, the project geologist evaluated the in situ soil consistency based on equipment performance and level of effort required to advance the hand auger. Final hand-boring logs, presented in Appendix 1, were prepared based on the field logs, examination of samples in the laboratory, and laboratory test results.



Path: \\eureka\projects\2017\017264-MLA-MorrCk\GEO\GIS\PROJ_MXD\Figure1_ProjectLocationMap.mxd User Name: psundberg

SHN Consulting Engineers & Geologists, Inc.	Michael Love & Associates Morrison Creek Culvert Replacement Project Smith River, California	Project Location Map SHN 017264
	January 2018 | Figure1_ProjectLocationMap	Figure 1



NOTE:
TOPOGRAPHIC SURVEY CONDUCTED BY MICHAEL LOVE & ASSOCIATES ON DECEMBER 7, 2017. VERTICAL AND HORIZONTAL DATUM ASSUMED.

BASEMAP FROM MICHAEL LOVE & ASSOCIATES, "EXISTING CONDITIONS PLAN OVERVIEW, SMITH RIVER ALLIANCE MORRISON CREEK TRIBUTARY, CULVERT REPLACEMENT", SHEET 1 OF 1, DATED DECEMBER 2017

SHN Consulting Engineers & Geologists, Inc.

Michael Love & Associates Morrison Creek Culvert Replacement Project Smith River, California		Site Map Showing Boring Locations SHN 017264
January 2018	Figure2_SiteMap	Figure 2

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Laboratory Testing

Selected soil samples were tested in SHN's certified soils-testing laboratory in Eureka, California to determine selected index properties of the subsurface materials. Samples were tested for in-place moisture content, dry density, and percent fines (percent passing the #200 sieve). Results of the tests are provided at the corresponding sample locations on the boring logs (Appendix 1) and included as Appendix 2.

Site Conditions

The project site is located within Morrison Creek, a tributary to the Smith River, roughly 1.7 miles south of the community of Smith River in Del Norte County, California (Figure 1). The site is situated at an elevation of approximately 95 feet, based on "Existing Conditions Plan Overview" map produced by Michael Love & Associates, Inc. (see Figure 2). At the project site, Morrison Creek flows from east to west through a corrugated metal pipe that supports flow of the creek under an existing ranch road. The elevation of the channel bottom at the culvert inlet is 93 feet, and is 89 feet at the culvert outlet, resulting in 4 feet of elevation difference from the upstream side of the culvert to the downstream side. The elevation of the ranch road is approximately 97 feet, roughly 4 to 8 feet above the active channel. The project site is within the riparian zone, and as such, is heavily vegetated.

Subsurface Soil and Groundwater Conditions

The results of our subsurface investigation indicate that soils encountered beginning at the elevation of the bottom of the existing culvert are very soft to soft silt (ML) and silt with sand (ML). Underlying the silt and silt with sand is soft to medium stiff sandy silt (ML), loose to medium dense silty sand (SM), and at a depth of 5 feet in HB-2, medium stiff to stiff sandy clay (CL). Laboratory tests indicate that the silt with sand at a depth of 1.5 feet in HB-1 has a dry density of 47 pounds per cubic foot (pcf) and a moisture content of 101 percent; which is due to the presence of organics in the soil. The sandy silt encountered at 1.5 feet in HB-2 has a dry density of 66 pcf and a moisture content of 61 percent.

Groundwater was encountered at a depth of 0.75 feet in HB-1 and at a depth of 1 foot in HB-2. At the time of our investigation, the water level in Morrison Creek was roughly 1 to 2 feet below HB-1, and 2 to 3 feet below HB-2. Mottled soils, indicative of historical high groundwater conditions, were observed beginning at a depth of 6 inches in both borings. Groundwater levels are expected to fluctuate seasonally, on the order of several feet in elevation. We anticipate groundwater will be encountered during any site grading activities and during excavation operations for the new culvert installation. It is recommended that earth work be done during the dry season.

Soil conditions beneath the existing access road in the area of the existing culvert are anticipated to be similar to the soils encountered in the channel.

Conclusions and Recommendations

Based on the results of our field and laboratory investigations, it is our opinion that the project site can be developed as proposed, if our recommendations are followed, and noted conditions and risks are acknowledged.

Soils will be easy to excavate using almost any equipment. Excavated soils will have over-optimum moisture content and will be difficult to dry out. Groundwater should be anticipated within all but the very shallowest excavations.

The primary geotechnical site consideration is the pervasive, soft, saturated soil conditions. Due to the weak, compressible soils, and the volume of materials planned for excavation and off-hauling, the construction operations will present the greatest geotechnical challenge to the project.

Permanent structures (such as, the bridge) that are supported on shallow soils are anticipated to be susceptible to settlement. The risks associated with settlement and the cost/ benefit of mitigation measures should be considered in the design of these structures. Implementing deep support for the bridge, however, is likely not necessary to meet project objectives and would not be cost effective. We recommend designing the bridge and its abutments to accommodate some settlement. We provide foundation design criteria recommendations for these structures below.

For bridge spans 30 feet and longer, we recommend the use of a two-part system, which includes a stabilization mat and the bridge footing itself. The purpose of the stabilization mat is to distribute the load of the bridge footing through a flexible, low density, laterally constrained structure that will maintain its integrity while undergoing anticipated significant differential settlement. Figure 3 presents a schematic drawing of this concept.

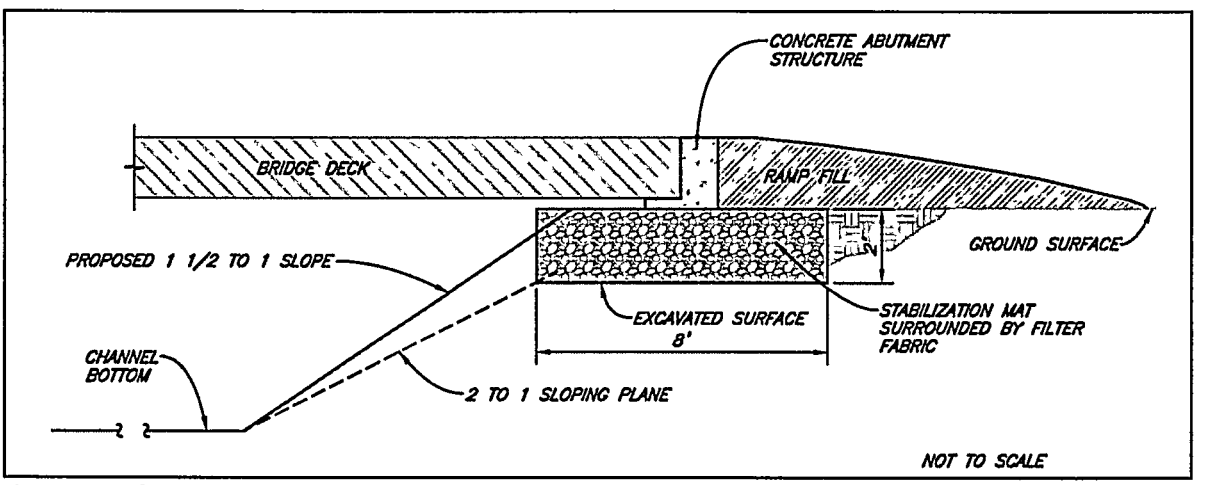


Figure 3. Schematic Drawing of Foundation System for Bridges with Spans Greater Than 30 feet
(actual dimensions will vary)

- We suggest the use of welded wire gabions wrapped with filter fabric, because it will result in minimal excavations, and a relatively easy installation process. Another option would be a laterally constrained multi-layered bed of well-graded crushed aggregate and two layers of geogrid (that is, Mirafi BXG12 or equivalent), one at the base of the crushed rock stabilization mat, and one at mid-height.
- The stabilization mats should be designed for equivalent basal footing loads of 750 pounds per square foot (psf) or less.
- The bridge footing load should be centered on the stabilization mat structure and should not exceed a footing load of 2,500 psf.
- The thickness of the stabilization mat should be at a ratio of 1:4 with the basal width. For example, an 8-foot basal-width stabilization mat would be at least 2 feet thick.
- The base of the stabilization mat closest to the channel should be constructed on or behind a sloping plane of 2H:1V (horizontal to vertical) starting at the edge of the channel bottom.

All backfill overlying the bridge abutment footing systems should be low density and provisions should be made to prevent saturation.

Closure and Limitations

The conclusions and recommendations presented in this report are based on site conditions that we observed at the time of our investigation, data from our subsurface explorations and laboratory tests, and our current understanding of proposed project elements. We have assumed that the information obtained from our limited subsurface explorations is representative of subsurface conditions throughout the site.

We recommend that a representative of our firm confirm site conditions during the construction phase. If subsurface conditions differ significantly from those disclosed by our investigation, we should be given the opportunity to re-evaluate the applicability of our conclusions and recommendations. Some alteration of recommendations may be appropriate.

If the scope of the proposed construction (including the proposed loads, grades, or structural locations) changes from that described in this report, our recommendations should also be reviewed.

If there is a substantial lapse of time between the submission of our report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, we should review our report to determine the applicability of the conclusions and recommendations considering the changed conditions and time lapse. This report is applicable only to the project and site studied.

The conclusions and recommendations presented in this report are professional opinions derived in accordance with current standards of professional practice. Our recommendations are tendered on the assumption that design of the improvements will conform to their intent. No warranty is expressed or implied.

The field and laboratory work was conducted to investigate the site characteristics specifically addressed by this report. Assumptions about other site characteristics, such as, hazardous materials contamination, or environmentally sensitive or culturally significant areas, should not be made from this report.

Respectfully,

SHN Engineers & Geologists

John H. Dailey
Senior Geotechnical Engineer

JHD:lms

Appendices:
1. Boring Logs
2. Laboratory Data

References

Michael Love & Associates. (March 2018). Plan Sheets 2 and 3. Arcata, CA:Michael Love & Associates.

---. (NR). "Existing Conditions Plan Overview." Arcata, CA:Michael Love & Associates.

Boring Logs 1

METHOD OF SOIL CLASSIFICATION

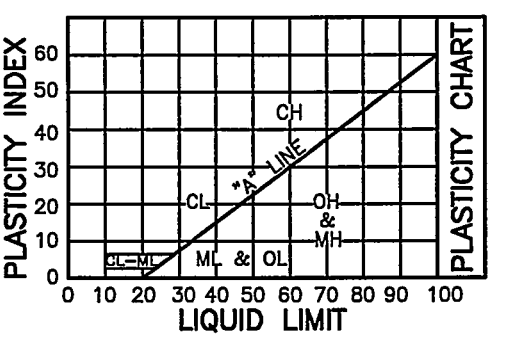
CLASSIFICATION CHART

MAJOR DIVISIONS		SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (MORE THAN 1/2 OF SOIL >NO. 200 SIEVE SIZE)	GRAVELS (MORE THAN 1/2 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 1/2 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 1/2 OF SOIL <NO. 200 SIEVE SIZE)	SILTS & CLAYS LIQUID LIMIT LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS & CLAYS LIQUID LIMIT GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTY CLAYS, ORGANIC SILTS
HIGHLY ORGANIC SOILS		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

GRAIN SIZE CHART

CLASSIFICATION	U.S. STANDARD SIEVE SIZE
BOULDERS	ABOVE 12"
COBBLES	12" TO 3"
GRAVEL	3" TO NO. 4
COARSE	3" TO 3/4"
FINE	3/4" TO NO. 4
SAND	NO. 4 TO NO. 200
COARSE	NO. 4 TO NO. 10
MEDIUM	NO. 10 TO NO. 40
FINE	NO. 40 TO NO. 200
SILT & CLAY	BELOW NO. 200

PLASTICITY CHART



CONSISTENCY OF FINE GRAINED SOILS		DENSITY OF COARSE GRAINED SOILS	
CLASSIFICATION	COHESION (PSF)	CLASSIFICATION	STANDARD PENETRATION (BLOW COUNT)
VERY SOFT	0–250	VERY LOOSE	0–4
SOFT	250–500	LOOSE	4–10
MEDIUM STIFF	500–1000	MEDIUM	10–30
STIFF	1000–2000	DENSE	30–50
VERY STIFF	2000–4000	VERY DENSE	50+
HARD	4000+		

MOISTURE CLASSIFICATIONS
DRY
DAMP
MOIST
WET

BASED ON UNIFIED SOILS CLASSIFICATION SYSTEM

BORING LOG KEY

SAMPLE TYPES

DISTURBED SAMPLE (BULK)

HAND DRIVEN TUBE SAMPLE

1.4" I.D. STANDARD PENETRATION TEST SAMPLE (SPT)

2.5" I.D. MODIFIED CALIFORNIA SAMPLE (SOLID WHERE RETAINED)

CORE BARREL SAMPLE (NOT RETAINED)

CORE BARREL SAMPLE (RETAINED)

SYMBOLS

INITIAL WATER LEVEL

STABILIZED WATER LEVEL

GRADATIONAL CONTACT

WELL DEFINED CONTACT

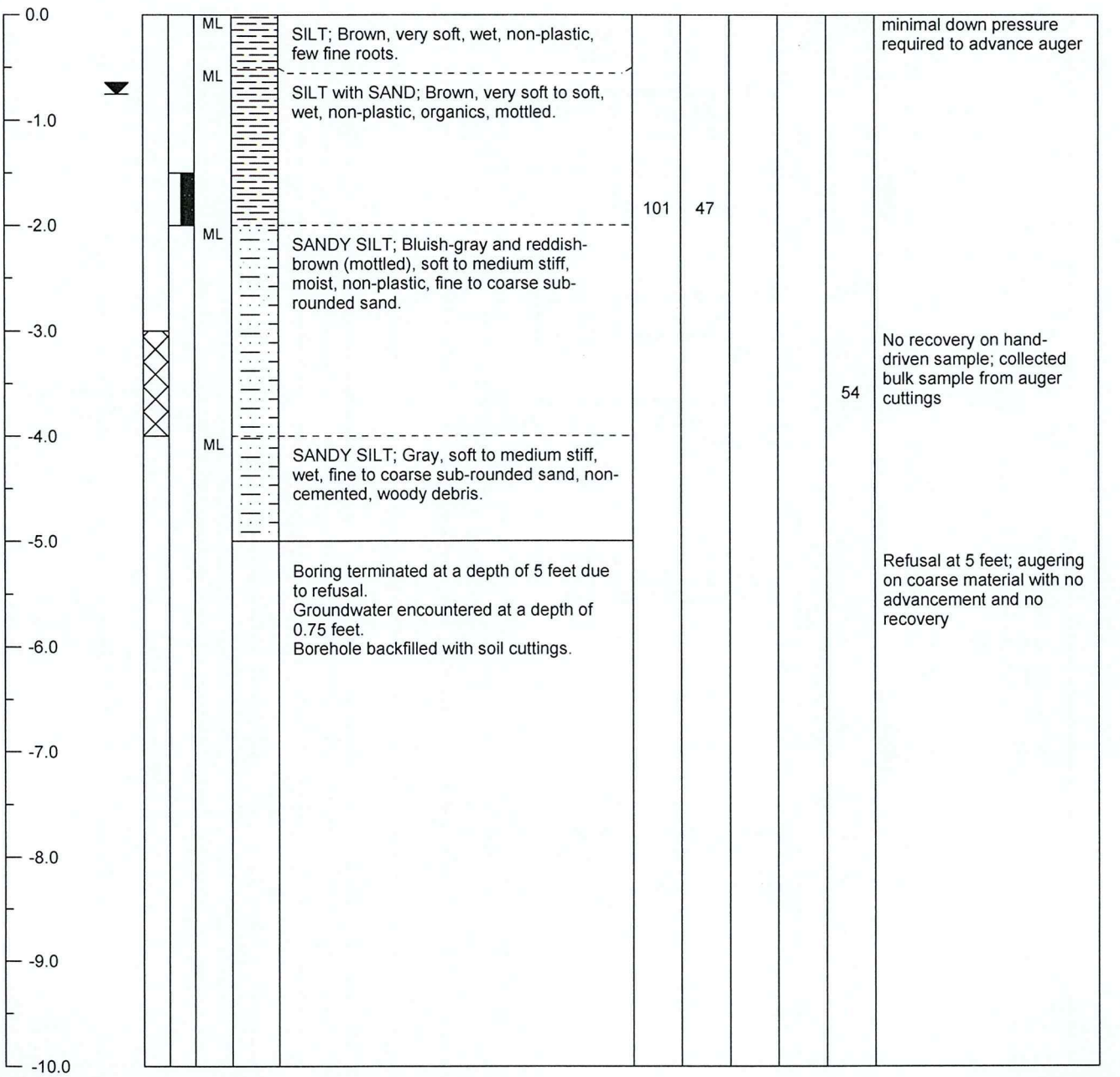
SS SPLIT SPOON

Consulting Engineers & Geologists, Inc.
812 West Wabash, Eureka, CA 95501 ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: MLA Morrison Creek GEO
LOCATION: Morrision Creek Culvert-Upstream Boring
GROUND SURFACE ELEVATION: 94 Feet
EXCAVATION METHOD: Hand Auger
LOGGED BY: PRS

JOB NUMBER: 017264
DATE DRILLED: 12/21/2017
TOTAL DEPTH OF BORING: 5 Feet
SAMPLER TYPE: Hand-driven brass tube

BORING NUMBER **HB-1**



The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

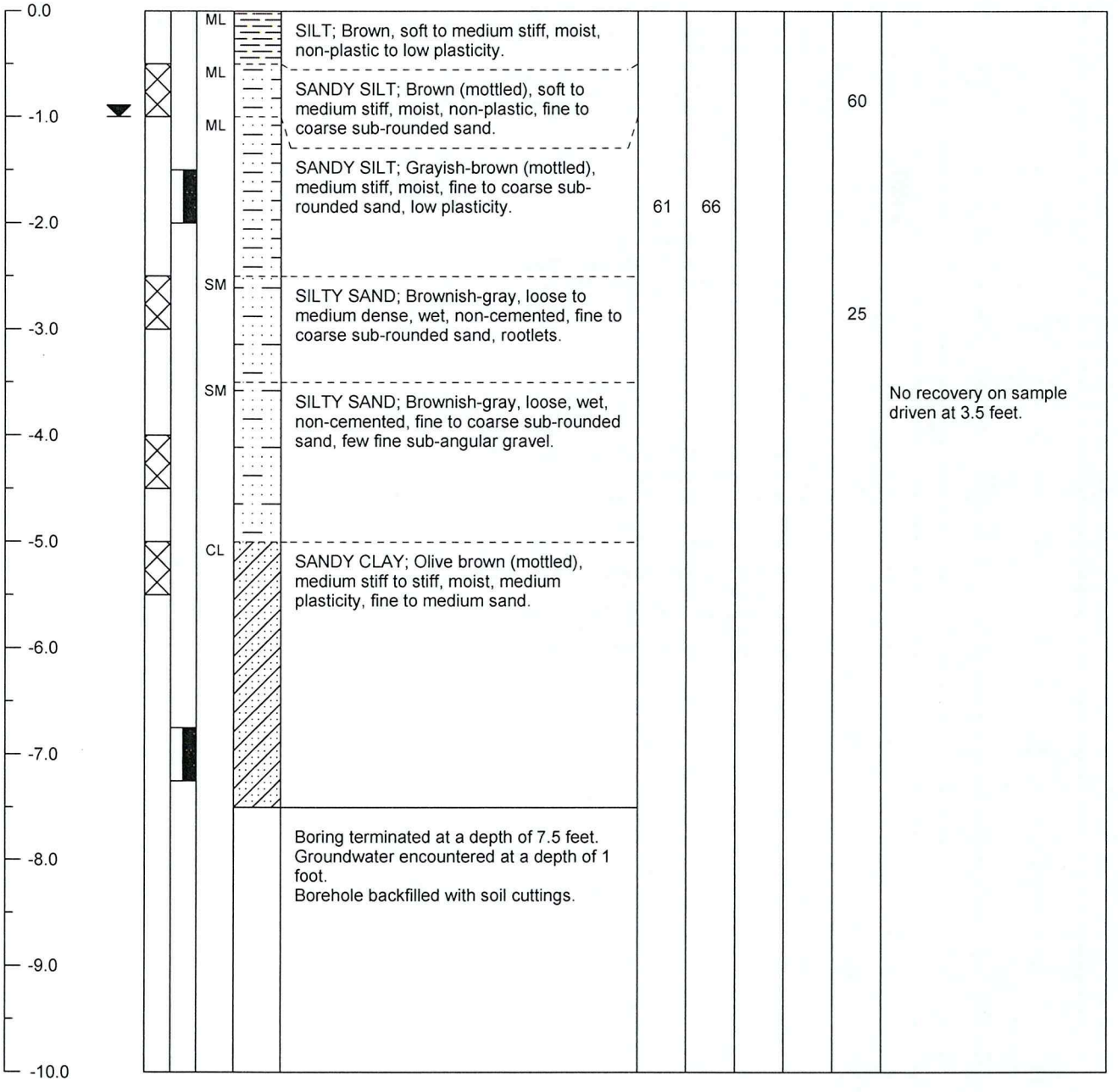
LOG OF BORING

Consulting Engineers & Geologists, Inc.
812 West Wabash, Eureka, CA 95501 ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: MLA Morrison Creek GEO
LOCATION: Morrision Creek Culvert-Downstream Boring
GROUND SURFACE ELEVATION: 94 Feet
EXCAVATION METHOD: Hand Auger
LOGGED BY: PRS

JOB NUMBER: 017264
DATE DRILLED: 12/21/2017
TOTAL DEPTH OF BORING: 7.5 Feet
SAMPLER TYPE: Hand-driven brass tube

BORING NUMBER HB-2



The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF BORING

Laboratory Data 2

CONSULTING ENGINEERS & GEOLOGISTS, INC.
812 W. Wabash Eureka, CA 95501-2138 Tel: 707/441-8855 FAX: 707/441-8877 E-mail: shninfo@shn-engr.com

DENSITY BY DRIVE- CYLINDER METHOD (ASTM D2937)

Project Name:	**Smith River Culvert**	**Project Number:**	**017264**
Performed By:	**ESP**	**Date:**	**1/5/2018**
Checked By:	**NAN**	**Date:**	**1/9/2018**
Project Manager:	**GDS**		

Lab Sample Number	18-007		18-009		
Boring Label	HB-1		HB-2		
Sample Depth (ft)	1.5-2'		1.5-2'		
Diameter of Cylinder, in	2.36		2.34		
Total Length of Cylinder, in.	7.85		8.00		
Length of Empty Cylinder A, in.	0.56		0.00		
Length of Empty Cylinder B, in.	2.45		2.69		
Length of Cylinder Filled, in	4.84		5.31		
Volume of Sample, in^3	21.17		22.84		
Volume of Sample, cc.	346.94		374.21		

Pan #	A-8		A-9		
Weight of Wet Soil and Pan	607.8		720.6		
Weight of Dry Soil and Pan	346.2		481.1		
Weight of Water	261.6		239.5		
Weight of Pan	87.5		88.1		
Weight of Dry Soil	258.7		393.0		
Percent Moisture	101.1		60.9		
Dry Density, g/cc	0.75		1.05		
Dry Density, lb/ft^3	46.5		65.6		

Revised 6/06

CONSULTING ENGINEERS & GEOLOGISTS, INC.
812 W. Wabash Eureka, CA 95501-2138 Tel: 707/441-8855 FAX: 707/441-8877 E-mail: shninfo@shn-engr.com

PERCENT PASSING # 200 SIEVE (ASTM - D1140)

Project Name:	**Smith River Culvert**	**Project Number:**	**017264**
Performed By:	**ESP**	**Date:**	**1/5/2018**
Checked By:	**NAN**	**Date:**	**1/9/2018**
Project Manager:	**GDS**		

Lab Sample Number	18-008		18-010		18-011
Boring Label	HB-1		HB-2		HB-2
Sample Depth	3-4'		0.5-1'		2.5-3'
Pan Number	SS-3		SS-10		SS-15
Dry Weight of Soil & Pan	298.6		318.4		317.6
Pan Weight	197.1		195.5		194.4
Weight of Dry Soil	101.5		122.9		123.2
Soil Weight Retained on #200&Pan	243.9		244.6		287.1
Soil Weight Passing #200	54.7		73.8		30.5
Percent Passing #200	**53.9**		**60.0**		**24.8**

Lab Sample Number					
Boring Label					
Sample Depth					
Pan Number					
Dry Weight of Soil & Pan					
Pan Weight					
Weight of Dry Soil					
Soil Weight Retained on #200&Pan					
Soil Weight Passing #200					
Percent Passing #200					

Morrison Creek Tributary Culvert Replacement			6/29/2018
Bridge Scour Input Variables			**RS**
	Flow Scenario	**100 Yr**	
Upstream Cross Section (Uncontracted) (Average of RAS sections 506.09 and 441.11).			
Total Flow Depth U/S bridge, feet		4.6	
Flow Upstream Transporting Sediment, cfs (Q1)		343.0	Total Flow
Flow area Channel, sq ft		55.0	
Top Width U/S, feet		18.8	
Avg Depth Upstream Channel (Hydraulic Depth, ft)		3.3	
Bottom Width, feet (W1)		7.0	
Average flow depth on Floodplain, feet (ya)		0.92	
Froude number		0.61	
Average velocity		6.27	> Critical Velocity, bed mobliized
D50 grain size (mm)		5.0	Visual Estimate
D50 grain size (ft)		0.016	
Critical Velocity of bed (fps)*		3.5	
Bridge Cross Section (Contracted)	**Flow Scenario**	**100 Yr**	
Flow through Bridge (cfs) (Q2)		343.0	Total Flow
Top width through contracted section, fee (W2)		18.8	
Bottom Width Contracted section, feet (W2)		7.0	
Dist. Low Chord to avg Ch Bottom (Hb)		4.6	
Avg Vel, through bridge opening (Va)		7.8	
Length of Abutment Projection into Flow Field (feet)		0.0	Floodplain in ineffective flow area
Orentation of Embankmnet angle, degrees		90.0	
Avg Depth Contracted Channel, feet (yo, Hydraulic Depth, ft)		2.5	

Morrison Creek Tributary Culvert Replacement
Contraction Scour Analysis

6/29/2018

Prepared by: RS

Checked by: ML

From: FHWA. 2012. Evaluating Scour at Bridges, Fifth Edition. Hydraulic Engineering Circular No. 18. U.S. Department of Transportation, Federal Highway Administration. Publication FHWA-HIF-12-003.

Live Bed Scour (Laursen, 1960 modified by HEC-18)

$$\frac{y_2}{y_1} = \left(\frac{Q_2}{Q_1}\right)^{6/7} \left(\frac{W_1}{W_2}\right)^{k_1} \quad (6.2)$$

$$y_s = y_2 - y_o = \text{(average contraction scour depth)} \quad (6.3)$$

where:

y_1 = Average depth in the upstream main channel, ft (m)
y_2 = Average depth in the contracted section, ft (m)
y_o = Existing depth in the contracted section before scour, ft (m) (see Note 7)
Q_1 = Flow in the upstream channel transporting sediment, ft^3/s (m^3/s)
Q_2 = Flow in the contracted channel, ft^3/s (m^3/s)
W_1 = Bottom width of the upstream main channel that is transporting bed material, ft (m)
W_2 = Bottom width of main channel in contracted section less pier width(s), ft (m)
k_1 = Exponent determined below

V_*/T	k_1	Mode of Bed Material Transport
<0.50	0.59	Mostly contact bed material discharge
0.50 to 2.0	0.64	Some suspended bed material discharge
>2.0	0.69	Mostly suspended bed material discharge

V_* = $(\vartheta_o/\Delta)^{1/2} = (g y_1 S_1)^{1/2}$, shear velocity in the upstream section, ft/s (m/s)
T = Fall velocity of bed material based on the D_{50}, m/s (Figure 6.8)
For fall velocity in English units (ft/s) multiply T in m/s by 3.28
g = Acceleration of gravity (32.2 ft/s^2) (9.81 m/s^2)
S_1 = Slope of energy grade line of main channel, ft/ft (m/m)
ϑ_o = Shear stress on the bed, (lb/ft^2) (Pa (N/m^2))
Δ = Density of water (1.94 $slugs/ft^3$) (1000 kg/m^3)

	100-Year Event
	343
Flow in Upstream Channel transporting sediment (Q_1) cfs	343.0
Flow in the Contracted Channel (Q_2) cfs	343.0
Top width of the upstream channel transporting sediment (W_1) cfs	**18.8**
Top width of the contracted channel (W_2) cfs	18.8
K_1 Value	**0.64**
Average Depth in the Upstream Channel (y_1)(ft)	**3.3**
Average Depth in the Contracted Channel before Scour (y_o) (ft)	2.5
Average Depth in Contraction Section (y_2) ft	3.33
Drop in Contracted Channel Elev, feet (Ys)	**0.8**

Morrison Creek Tributary Culvert Replacement **6/29/2018**

Contraction Scour Analysis

Prepared by: RS

Checked by: ML

From: FHWA. 2012. Evaluating Scour at Bridges, Fifth Edition. Hydraulic Engineering Circular No. 18. U.S. Department of Transportation, Federal Highway Administration. Publication FHWA-HIF-12-003.

Froehlich Equation

	100 Yr
Average flow depth on floodplain, feet (ya)	0.92
Length abutment projection into	0.00
K1	0.55
K2	1.00
Approach Froude number	0.61

Abutment Scour depth (y2) ft* **2.1**

K1 values	
1	vertical wall
0.82	vert wall with wingwalls
0.55	spill through

8.6.1 Froehlich's Abutment Scour Equation

Froehlich (TRB 1989) analyzed 170 live-bed scour measurements in laboratory flumes by regression analysis to obtain the following equation:

$$\frac{y_s}{y_a} = 2.27\, K_1\, K_2 \left(\frac{L'}{y_a}\right)^{0.43} Fr^{0.61} + 1 \qquad (8.1)$$

where:

- K_1 = Coefficient for abutment shape (Table 8.1)
- K_2 = Coefficient for angle of embankment to flow
- K_2 = $(\theta/90)^{0.13}$ (see Figure 8.5 for definition of θ)
  - $\theta<90°$ if embankment points downstream
  - $\theta>90°$ if embankment points upstream
- L' = Length of active flow obstructed by the embankment, ft (m)
- A_e = Flow area of the approach cross section obstructed by the embankment, ft^2 (m^2)
- Fr = Froude Number of approach flow upstream of the abutment = $V_e/(gy_a)^{1/2}$
- V_e = Q_e/A_e, ft/s (m/s)
- Q_e = Flow obstructed by the abutment and approach embankment, ft^3/s (m^3/s)
- y_a = Average depth of flow on the floodplain (A_e/L), ft (m)
- L = Length of embankment projected normal to the flow, ft (m)
- y_s = Scour depth, ft (m)

It should be noted that Equation 8.1 is not consistent with the fact that as L′ tends to 0, y_s also tends to 0. The 1 was added to the equation so as to envelope 98 percent of the data. See Section 8.2.2 and Figure 8.4 for guidance on estimating L′.

Morrison Creek Tributary RSP Sizing — RS — 6/28/2018

Stone Stability Calculation

USACE 1110-2-1601 , 1994. Hydraulic Design of Flood Control Channels, Equation 3-3

Equation for sizing riprap for channel bottom and side slopes

$$D_{30} = S_f C_s C_v C_t d \left[\left(\frac{\gamma_w}{\gamma_s - \gamma_w} \right)^{1/2} \frac{V}{\sqrt{K_1 g d}} \right]^{2.5} \qquad (3\text{-}3)$$

$$K_1 = \sqrt{1 - \frac{\sin^2 \theta}{\sin^2 \phi}}$$

and

$D_{50} = D_{30}(D_{85}/D_{15})^{(1/3)}$

CONSTANTS		
Stability Coef. for Incipient Failure (D85/D15 = 1.7 to 5.2) *0.30 = Angular Rock; 0.375 = Rounded Rock*	Cs	0.3
Vertical Velocity Distribution Coefficient for a Channel Bend *1.283-.2log(R/W) = Outside of Bends*	Cv	1.26
1.0 for thickness of 1D100 or 1.5 for thickness of 1.5D50 (whichever greater)	Ct	1.00
Gravitational Constant (ft/s^2)	g	32.2
Unit Weight of Water (lb/cf)	γw	62.4
Unit Weight of Sediment or Rock (lb/cf)	γs	165.0

HEC-RAS RIVER STATION:			
ROCK PLACEMENT LOCATION:		Upstream Face of Bridge	Downstream Face of Bridge
INPUT VARIABLES			
Side Slope Correction Factor			
Angle of Repose of Riprap (deg) *Normally 40 deg*	ϕ	40	40
Angle of Side Slope with Horizontal (deg)	Θ	33.7	33.7
Side Slope Correction Factor	K1	0.50	0.50
Design Variables			
Depth-Averaged Local Velocity (ft/s)	V	7.18	7.79
Local Depth of Flow* (ft)	d	3.94	3.52
Radius of Curvature - Outside Bend (ft)	R	35.00	35.00
Channel Width at Water Surface (ft)	W	25.50	25.51
Radius Curvature/Width	R/W	1.37	1.37
Safety Factor	Sf	2.00	2.00
Rock Gradation			
Gradation Ratio (for Calculating D50)	D84/D15	2.0	2.0
RESULTS			
D30 Rock			
Rock Diameter (ft)	**D30**	**1.2**	**1.5**
Weight (lb) [dia. rounded to tenths]	**W30**	**149**	**292**
D50 Rock			
Rock Diameter (ft)	**D50**	**1.5**	**1.9**
Weight (lb) [dia. rounded to tenths]	**W50**	**292**	**593**

Morrison Creek Tributry Culvert Replacement

Large Wood Structure Stability Analysis
95%
June 29, 2018

Date of Last Revision: January 7, 2016

Designer:
Rachel Shea, P.E.

Reviewed by:
Michael Love, P.E.

Large Wood Structure Stability Analysis Spreadsheet was developed by Michael Rafferty, P.E.
Version 1.1

Reference for Companion Paper:

Adapted By Rachel Shea, P.E., Michael Love & Associates

Morrison Creek Tributry Culvert Replacement
Factors of Safety and Design Constants

Spreadsheet developed by
Michael Rafferty, P.E.

	Description	Value
43280.0	Factor of Safety for Vertical Force Balance	1.50
FS_H	Factor of Safety for Horizontal Force Balance	1.50
FS_M	Factor of Safety for Moment Force Balance	1.50

Symbol	Description	Units	Value
C_{Lrock}	Coefficient of lift for submerged boulder (D'Aoust, 2000)	-	0.17
C_{Drock}	Coefficient of drag for submerged boulder (Schultz, 1954)	-	0.85
g	Gravitational acceleration constant	ft/s^2	32.174
DF_{RW}	Diameter factor for rootwad ($DF_{RW} = D_{RW}/D_{TS}$)	-	**2.50**
LF_{RW}	Length factor for rootwad ($LF_{RW} = L_{RW}/D_{TS}$)	-	**1.00**
SG_{rock}	Specific gravity of quartz particles	-	2.65
γ_{rock}	Dry unit weight of boulders	lb/ft^3	165.0
γ_w	Specific weight of water at 50°F	lb/ft^3	62.40
η	Rootwad porosity from WDFW (2012)	-	**0.60**
ν	Kinematic viscosity of water at 50°F	ft/s^2	1.41E-05

Morrison Creek Tributry Culvert Replacement
Hydrologic and Hydraulic Inputs

Spreadsheet developed by
Michael Rafferty, P.E.

100 yr

6/29/2018

Site ID	Proposed Station	Design Discharge, Q_{des} (cfs)	Maximum Depth, d_w (ft)	Average Velocity, u_{avg} (ft/s)	Bankfull Width, W_{BF} (ft)	Wetted Area, A_W (ft^2)	Radius of Curvature, R_c (ft)	R_c/W_{BF}	Velocity at Outer Meander Bend[1], u_m (ft/s)
Morrison Trib	3+99	343	4.03	6.13	8.0	72	35	4.38	8.62

87

Morrison Creek Tributry Culvert Replacement
Morrison Creek Tribu Stream Bed Substrate Properties

Spreadsheet developed by Michael Rafferty, P.E.

Morrison Creek Tributry Culvert Replacement
Bank Soil Properties

Spreadsheet developed by Michael Rafferty, P.E.

Stream	Proposed Station	Stream bed D_{50} (mm)	Stream Bed Substrate Grain Size Class	Bed Soil Class	Dry Unit Weight[1], γ_{bed} (lb/ft^3)	Buoyant Unit Weight, γ'_{bed} (lb/ft^3)	Friction Angle, ϕ_{bed} (deg)	Bank Soils (from field observations)	Bank Soil Class	Dry Unit Weight, γ_{bank} (lb/ft^3)	Buoyant Unit Weight, γ'_{bank} (lb/ft^3)	Friction Angle, ϕ_{bank} (deg)
Morrison Trib	3+99	1.50	Very coarse sand	6	103.2	64.2	32	Gravel/sand	5	111.7	69.5	39

Source: Compiled from Julien (2010) and Shen and Julien (1993); soil classes from NRCS Table TS14E–2 Soil classification

[1] γ_{bed} (kg/m^3) = 1,600 + 300 log D_{50} (mm) (from Julien 2010)

1 kg/m^3 = 0.062 1 lb/ft^3

Morrison Creek Tributry Culvert Replacement
Large Wood Properties

Spreadsheet developed by
Michael Rafferty, P.E.

West Coast

6/29/2018

Timber Unit Weights			Air-dried[1]	Green[2] γ_{Tgr}
Selected Species	Common Name	1.5	γ_{Td} (lb/ft^3)	(lb/ft^3)
Tree Type #1:	**Redwood, Coast (young)**	Sequoia sempervirens	24.5	50.0
Tree Type #2:				
Tree Type #3:				
Tree Type #4:				
Tree Type #5:				
Tree Type #6:				
Tree Type #7:				
Tree Type #8:				
Tree Type #9:				
Tree Type #10:				

[1] **Air-dried unit weight,** γ_{Td} = Average unit weight of wood after exposure to air on a 12% moisture content volume basis. Air-dried unit weight is used in the force balance calculations for the portion of wood that is above the proposed thalweg elevation (assuming unsaturated conditions).

[2] **Green unit weight,** γ_{Tgr} = Average unit weight of freshly sawn wood when the cell walls are completely saturated with water. Green unit weight is used in the force balance calculations as a conservative estimate of the unit weight for the portion of wood that is below the proposed thalweg elevation (assuming saturated conditions). For comparison, Thevenet, Citterio, & Piegay (1998) determined wood unit weight typically increases by more than 100% after less than 24 hours exposure to water.

Source for timber unit weights:

U.S. Department of Agriculture, U.S. Forest Service. (2009) Specific Gravity and Other Properties of Wood and Bark for 156 Tree Species Found in North America. Research Note NRS-38. Table 1A.

Morrison Creek Tributry Culvert Replacement

Spreadsheet developed by Michael Rafferty, P.E.

2.5-Foot Diamter Root Wad

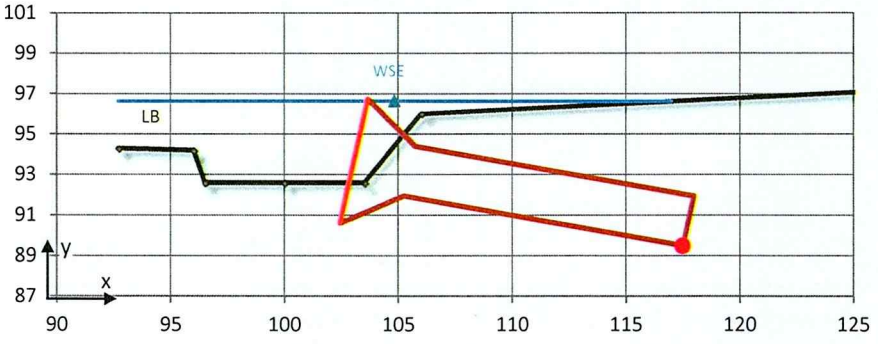
Single Log Stability Analysis Model Inputs

6/29/2018	Structure Type	Structure Position	Meander	Station	d_w (ft)	R_c/W_{BF}	u_{des} (ft/s)
Morrison Trib	Rootwad	Right bank	Straight	3+99	4.03	4.38	6.13

Multi-Log Structures	Layer	Log ID
	Key Log	1

Channel Geometry Coordinates		
Proposed	x (ft)	y (ft)
Fldpln LB	92.70	94.30
Top LB	96.00	94.20
Toe LB	96.50	92.60
Thalweg	100.00	92.60
Toe RB	103.50	92.60
Top RB	106.00	96.00
Fldpln RB	150.00	98.50

Proposed Cross-Section and Structure Geometry (Looking D/S)

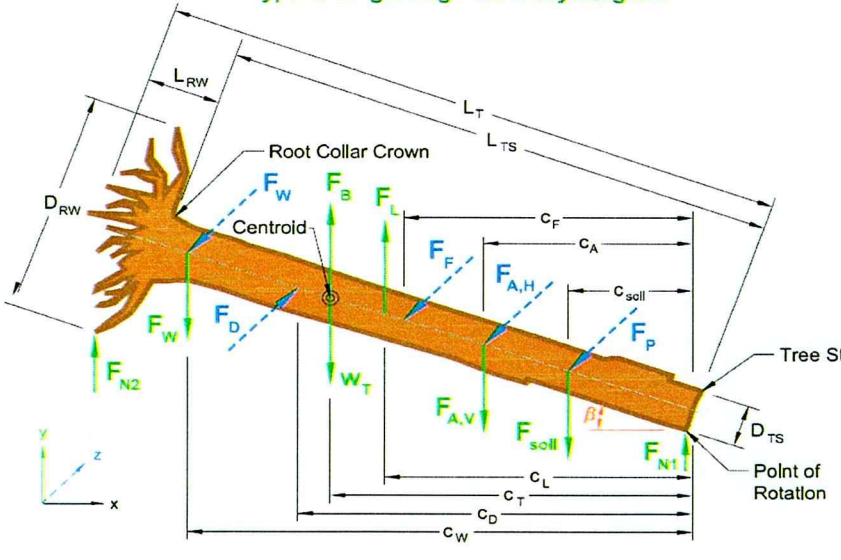


Wood Species	Rootwad	L_T (ft)	D_{TS} (ft)	L_{RW} (ft)	D_{RW} (ft)	γ_{Td} (lb/ft^3)	γ_{Tgr} (lb/ft^3)
Redwood, Coast (young)	Yes	15.0	2.50	2.50	6.25	24.5	24.5

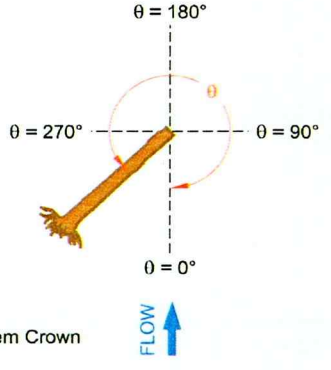
Structure Geometry	θ (deg)	β (deg)	Define Fixed Point	x_T (ft)	y_T (ft)	$y_{T,min}$ (ft)	$y_{T,max}$ (ft)	A_{Tp} (ft^2)
	-90.1	-11.30	Stem tip: Bottom	117.50	89.50	89.50	96.73	2.83

Soils	Material	γ_s (lb/ft^3)	γ'_s (lb/ft^3)	ϕ (deg)	Soil Class	$L_{T,em}$ (ft)	$d_{b,max}$ (ft)	$d_{b,avg}$ (ft)
Stream Bed	Very coarse sand	103.2	64.2	32.0	6	0.00	0.00	0.00
Bank	Gravel/sand	111.7	69.5	39.0	5	13.31	4.73	3.00

Typical Single Log Free Body Diagram



Log Orientation (Plan View)



Vertical Force Analysis

Net Buoyancy Force

Wood	V_{TS} (ft^3)	V_{RW} (ft^3)	V_T (ft^3)	W_T (lbf)	F_B (lbf)
↑WSE	0.0	0.0	0.0	0	0
↓WS↑Thw	16.4	11.9	28.3	692	1,765
↓Thalweg	45.0	4.0	49.0	1,199	3,059
Total	61.4	16.0	77.3	1,891	4,824

Soil Ballast Force

Soil	V_{dry} (ft^3)	V_{sat} (ft^3)	V_{soil} (ft^3)	F_{soil} (lbf)
Bed	0.0	0.0	0.0	0
Bank	0.1	99.7	99.8	6,939
Total	0.1	99.7	99.8	6,939

Lift Force

C_{LT}	0.00
F_L (lbf)	0

Vertical Force Balance

F_B (lbf)	4,824 ↑
F_L (lbf)	0
W_T (lbf)	1,891 ↓
F_{soil} (lbf)	6,939 ↓
$F_{W,V}$ (lbf)	0
$F_{A,V}$ (lbf)	0
ΣF_V (lbf)	4,006 ↓
FS_V	1.83 ✓

Horizontal Force Analysis

Drag Force

A_{Tp} / A_W	Fr_L	C_{Di}	C_w	C_D*	F_D (lbf)
0.04	0.68	1.00	0.43	1.00	103

Passive Soil Pressure / Friction Force

Soil	K_P	F_P (lbf)	L_{Tf} (ft)	μ	F_F (lbf)
Bed	3.25	0	2.19	0.62	322
Bank	4.40	15,251	14.81	0.81	2,827
Total	-	15,251	17.00	-	3,149

Horizontal Force Balance

F_D (lbf)	103 →
F_P (lbf)	15,251 ←
F_F (lbf)	3,149 ←
$F_{W,H}$ (lbf)	0
$F_{A,H}$ (lbf)	0
ΣF_H (lbf)	18,297 ←
FS_H	178.63 ✓

Moment Force Balance

Driving Moment Centroids / Resisting Moment Centroids

$c_{T,B}$ (ft)	c_L (ft)	c_D (ft)	$c_{T,W}$ (ft)	c_{soil} (ft)	$c_{F\&N}$ (ft)	c_P (ft)
7.9	0.0	14.2	7.9	6.6	7.5	8.9

*Distances are from the stem tip

Point of Rotation: stem tip

Moment Force Balance

M_d (lbf)	38,648
M_r (lbf)	244,740
FS_M	6.33 ✓

Morrison Creek Tributry Culvert Replacement

Spreadsheet developed by Michael Rafferty, P.E.

3-Foot Diamter Root Wad

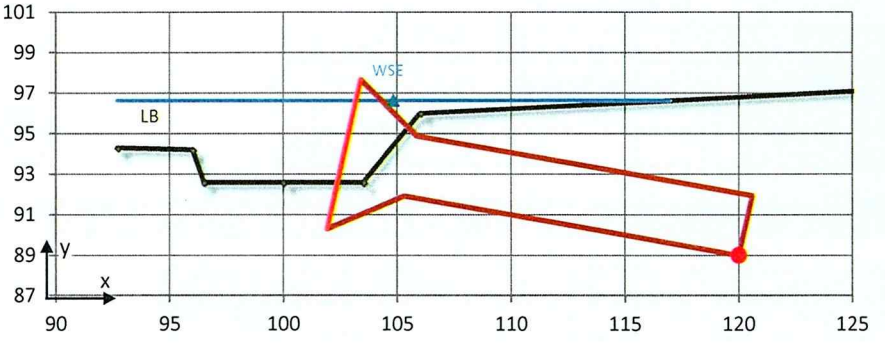
Single Log Stability Analysis Model Inputs

6/29/2018	Structure Type	Structure Position	Meander	Station	d_w (ft)	R_c/W_{BF}	u_{des} (ft/s)
Morrison Trib	Rootwad	Right bank	Straight	3+99	4.03	4.38	6.13

Multi-Log Structures	Layer	Log ID
	Key Log	1

Channel Geometry Coordinates		
Proposed	x (ft)	y (ft)
Fldpln LB	92.70	94.30
Top LB	96.00	94.20
Toe LB	96.50	92.60
Thalweg	100.00	92.60
Toe RB	103.50	92.60
Top RB	106.00	96.00
Fldpln RB	150.00	98.50

Proposed Cross-Section and Structure Geometry (Looking D/S)

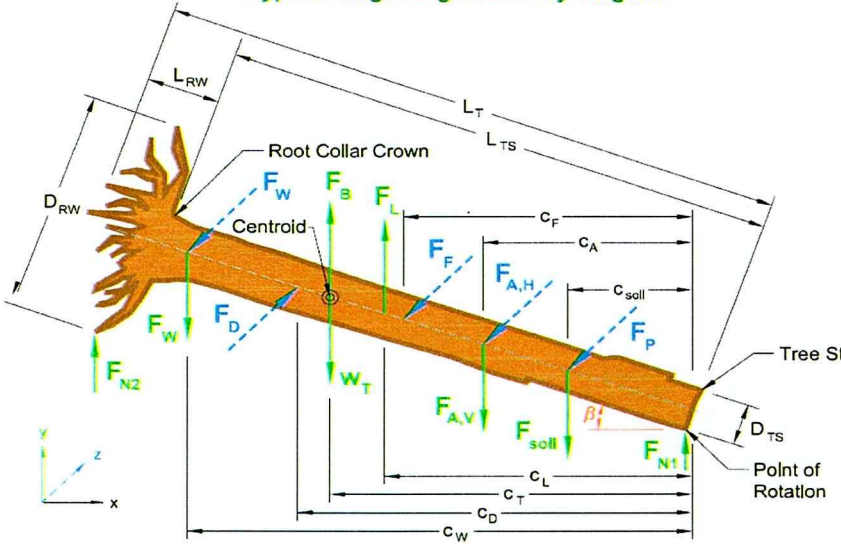


Wood Species	Rootwad	L_T (ft)	D_{TS} (ft)	L_{RW} (ft)	D_{RW} (ft)	γ_{Td} (lb/ft^3)	γ_{Tgr} (lb/ft^3)
Redwood, Coast (young)	Yes	18.0	3.00	3.00	7.50	24.5	24.5

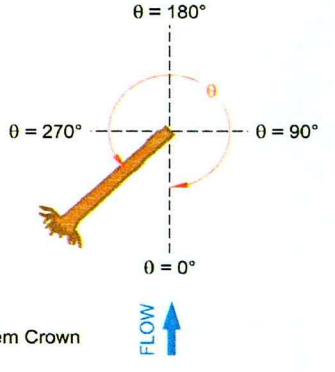
Structure Geometry	θ (deg)	β (deg)	Define Fixed Point	x_T (ft)	y_T (ft)	$y_{T,min}$ (ft)	$y_{T,max}$ (ft)	A_{Tp} (ft^2)
	-90.1	-11.30	Stem tip: Bottom	120.00	89.00	89.00	97.68	5.06

Soils	Material	γ_s (lb/ft^3)	γ'_s (lb/ft^3)	ϕ (deg)	Soil Class	$L_{T,em}$ (ft)	$d_{b,max}$ (ft)	$d_{b,avg}$ (ft)
Stream Bed	Very coarse sand	103.2	64.2	32.0	6	0.00	0.00	0.00
Bank	Gravel/sand	111.7	69.5	39.0	5	15.62	4.89	2.91

Typical Single Log Free Body Diagram



Log Orientation (Plan View)



Vertical Force Analysis

Net Buoyancy Force

Wood	V_{TS} (ft³)	V_{RW} (ft³)	V_T (ft³)	W_T (lbf)	F_B (lbf)
↑WSE	0.0	0.6	0.6	16	0
↓WS↑Thw	31.8	20.6	52.4	1,283	3,273
↓Thalweg	74.2	6.3	80.5	1,969	5,024
Total	106.0	27.6	133.6	3,268	8,296

Soil Ballast Force

Soil	V_{dry} (ft³)	V_{sat} (ft³)	V_{soil} (ft³)	F_{soil} (lbf)
Bed	0.0	0.0	0.0	0
Bank	1.1	134.7	135.8	9,491
Total	1.1	134.7	135.8	9,491

Lift Force

C_{LT}	0.00
F_L (lbf)	0

Vertical Force Balance

F_B (lbf)	8,296 ↑
F_L (lbf)	0
W_T (lbf)	3,268 ↓
F_{soil} (lbf)	9,491 ↓
$F_{W,V}$ (lbf)	0
$F_{A,V}$ (lbf)	0
ΣF_V (lbf)	4,462 ↓
FS_V	1.54 ✓

Horizontal Force Analysis

Drag Force

A_{Tp} / A_W	Fr_L	C_{Di}	C_w	C_D*	F_D (lbf)
0.07	0.62	1.00	0.43	1.00	184

Passive Soil Pressure / Friction Force

Soil	K_P	F_P (lbf)	L_{Tf} (ft)	μ	F_F (lbf)
Bed	3.25	0	2.59	0.62	360
Bank	4.40	20,858	17.42	0.81	3,146
Total	-	20,858	20.00	-	3,507

Horizontal Force Balance

F_D (lbf)	184 →
F_P (lbf)	20,858 ←
F_F (lbf)	3,507 ←
$F_{W,H}$ (lbf)	0
$F_{A,H}$ (lbf)	0
ΣF_H (lbf)	24,181 ←
FS_H	132.09 ✓

Moment Force Balance

Driving Moment Centroids / Resisting Moment Centroids

$c_{T,B}$ (ft)	c_L (ft)	c_D (ft)	$c_{T,W}$ (ft)	c_{soil} (ft)	$c_{F\&N}$ (ft)	c_P (ft)
9.4	0.0	16.8	9.4	7.8	9.0	10.4

*Distances are from the stem tip

Point of Rotation:	stem tip

Moment Force Balance

M_d (lbf)	79,846
M_r (lbf)	385,348
FS_M	4.83 ✓

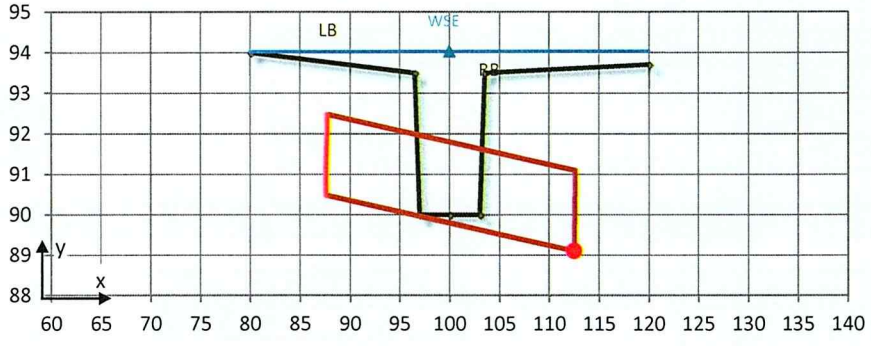
Single Log Stability Analysis Model Inputs

6/29/2018	Structure Type	Structure Position	Meander	Station	d_w (ft)	R_c/W_{BF}	u_{des} (ft/s)
Morrison Trib	Log Weir	Right bank	Straight	3+99	4.03	4.38	6.13

Multi-Log Structures	Layer	Log ID
	Key Log	1

Channel Geometry Coordinates		
Proposed	x (ft)	y (ft)
Fldpln LB	80.00	94.00
Top LB	96.50	93.50
Toe LB	97.00	90.00
Thalweg	100.00	90.00
Toe RB	103.00	90.00
Top RB	103.50	93.50
Fldpln RB	120.00	93.70

Proposed Cross-Section and Structure Geometry (Looking D/S)

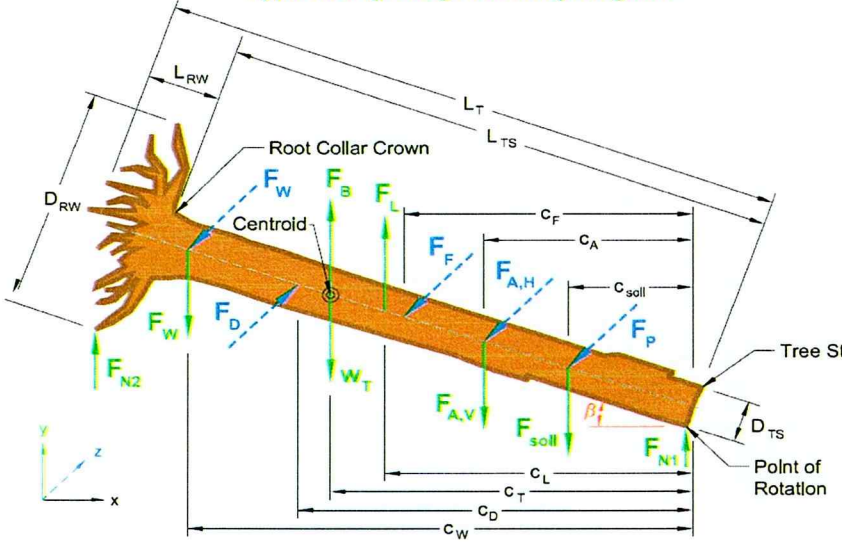


Wood Species	Rootwad	L_T (ft)	D_{TS} (ft)	L_{RW} (ft)	D_{RW} (ft)	γ_{Td} (lb/ft^3)	γ_{Tgr} (lb/ft^3)
Redwood, Coast (young)	No	25.0	2.00	-	-	24.5	24.5

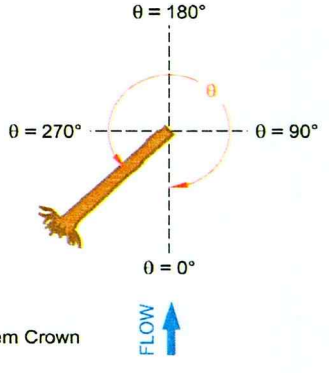
Structure Geometry	θ (deg)	β (deg)	Define Fixed Point	x_T (ft)	y_T (ft)	$y_{T,min}$ (ft)	$y_{T,max}$ (ft)	A_{Tp} (ft^2)
	-90.1	-3.18	Stem tip: Bottom	112.50	89.10	89.10	92.48	11.11

Soils	Material	γ_s (lb/ft^3)	γ'_s (lb/ft^3)	ϕ (deg)	Soil Class	$L_{T,em}$ (ft)	$d_{b,max}$ (ft)	$d_{b,avg}$ (ft)
Stream Bed	Very coarse sand	103.2	64.2	32.0	6	0.00	0.00	0.00
Bank	Gravel/sand	111.7	69.5	39.0	5	18.48	2.51	1.78

Typical Single Log Free Body Diagram



Log Orientation (Plan View)



Vertical Force Analysis

Net Buoyancy Force

Wood	V_{TS} (ft³)	V_{RW} (ft³)	V_T (ft³)	W_T (lbf)	F_B (lbf)
↑WSE	0.0	0.0	0.0	0	0
↓WS↑Thw	69.2	0.0	69.2	1,692	4,315
↓Thalweg	9.4	0.0	9.4	230	586
Total	78.5	0.0	78.5	1,921	4,901

Soil Ballast Force

Soil	V_{dry} (ft³)	V_{sat} (ft³)	V_{soil} (ft³)	F_{soil} (lbf)
Bed	0.0	0.0	0.0	0
Bank	0.0	65.9	65.9	4,579
Total	0.0	65.9	65.9	4,579

Lift Force

C_{LT}	0.00
F_L (lbf)	0

Vertical Force Balance

F_B (lbf)	4,901
F_L (lbf)	0
W_T (lbf)	1,921
F_{soil} (lbf)	4,579
$F_{W,V}$ (lbf)	0
$F_{A,V}$ (lbf)	0
ΣF_V (lbf)	1,599
FS_V	1.33

Horizontal Force Analysis

Drag Force

A_{Tp} / A_W	Fr_L	C_{Di}	C_w	C_D*	F_D (lbf)
0.15	0.76	0.90	0.39	0.90	365

Passive Soil Pressure / Friction Force

Soil	K_P	F_P (lbf)	L_{Tf} (ft)	μ	F_F (lbf)
Bed	3.25	0	8.00	0.62	296
Bank	4.40	10,063	19.00	0.81	911
Total	-	10,063	27.00	-	1,207

Horizontal Force Balance

F_D (lbf)	365
F_P (lbf)	10,063
F_F (lbf)	1,207
$F_{W,H}$ (lbf)	0
$F_{A,H}$ (lbf)	0
ΣF_H (lbf)	10,906
FS_H	30.91

Moment Force Balance

Driving Moment Centroids

$c_{T,B}$ (ft)	c_L (ft)	c_D (ft)
12.5	0.0	12.7

*Distances are from the stem tip

Resisting Moment Centroids

$c_{T,W}$ (ft)	c_{soil} (ft)	$c_{F\&N}$ (ft)	c_P (ft)
12.5	12.4	12.5	12.5

Point of Rotation:	stem tip

Moment Force Balance

M_d (lbf)	65,786
M_r (lbf)	241,457
FS_M	3.67

Morrison Creek Tributry Culvert Replacement
Notation, Units, and List of Symbols

	Description	1.5
A_W	Wetted area of channel at design discharge	1.5
A_{Tp}	Projected area of wood in plane perpendicular to flow	1.5
c_D	Centroid of the drag force along log axis	ft
c_{Am}	Centroid of a mechanical anchor along log axis	ft
c_{Ar}	Centroid of a ballast boulder along log axis	ft
c_{Asoil}	Centroid of the added ballast soil along log axis	ft
$c_{F\&N}$	Centroid of friction and normal forces along log axis	ft
c_L	Centroid of the lift force along log axis	ft
c_P	Centroid of the passive soil force along log axis	ft
c_{soil}	Centroid of the vertical soil forces along log axis	ft
$c_{T,B}$	Centroid of the buoyancy force along log axis	ft
$c_{T,W}$	Centroid of the log volume along log axis	ft
c_{WI}	Centroid of a wood interaction force along log axis	ft
C_{Lrock}	Coefficient of lift for submerged boulder	-
C_{LT}	Effective coefficient of lift for submerged tree	-
C_{Di}	Base coefficient of drag for tree, before adjustments	-
C_D*	Effective coefficient of drag for submerged tree	-
C_{Di}	Base coefficient of drag for tree, before adjustments	-
C_W	Wave drag coefficient of submerged tree	-
$d_{b,avg}$	Average buried depth of log	ft
$d_{b,max}$	Maximum buried depth of log	ft
d_w	Maximum flow depth at design discharge in reach	ft
D_{50}	Median grain size in millimeters (SI units)	mm
D_r	Equivalent diameter of boulder	ft
D_{RW}	Assumed diameter of rootwad	ft
D_{TS}	Nominal diameter of tree stem (DBH)	ft
DF_{RW}	Diameter factor for rootwad ($DF_{RW} = D_{RW}/D_{TS}$)	-
e	Void ratio of soils	-
$F_{A,H}$	Total horizontal load capacity of anchor techniques	lbf
$F_{A,HP}$	Passive soil pressure applied to log from soil ballast	lbf
$F_{A,Hr}$	Horizontal resisting force on log from boulder	lbf
F_{Am}	Load capacity of mechanical anchor	lbf
$F_{A,V}$	Total vertical load capacity of anchor techniques	lbf
$F_{A,Vr}$	Vertical resisting force on log from boulder	lbf
$F_{A,Vsoil}$	Vertical soil loading on log from added ballast soil	lbf
F_B	Buoyant force applied to log	lbf
F_D	Drag forces applied to log	lbf
$F_{D,r}$	Drag forces applied to boulder	lbf
F_F	Friction force applied to log	lbf
F_H	Resultant horizontal force applied to log	lbf
F_L	Lift force applied to log	lbf
$F_{L,r}$	Lift force applied to boulder	lbf
F_P	Passive soil pressure force applied to log	lbf
F_{soil}	Vertical soil loading on log	lbf
$F_{W,H}$	Horizontal forces from interactions with other logs	lbf
$F_{W,V}$	Vertical forces from interactions with other logs	lbf

Notation (continued)

Symbol	Description	Unit
F_V	Resultant vertical force applied to log	lbf
Fr_L	Log Froude number	-
FS_V	Factor of Safety for Vertical Force Balance	-
FS_H	Factor of Safety for Horizontal Force Balance	-
FS_M	Factor of Safety for Moment Force Balance	-
g	Gravitational acceleration constant	ft/s^2
K_P	Coefficient of Passive Earth Pressure	-
$L_{T,em}$	Total embedded length of log	ft
L_{RW}	Assumed length of rootwad	ft
L_T	Total length of tree (including rootwad)	ft
L_{Tf}	Length of log in contact with bed or banks	ft
L_{TS}	Length of tree stem (not including rootwad)	ft
$L_{TS,ex}$	Exposed length of tree stem	ft
LF_{RW}	Length factor for rootwad ($LF_{RW} = L_{RW}/D_{TS}$)	-
M_d	Driving moment about embedded tip	lbf
M_r	Driving moment about embedded tip	lbf
N	Blow count of standard penetration test	-
p_o	Porosity of soil volume	-
Q_{des}	Design discharge	cfs
R	Radius	ft
R_c	Radius of curvature at channel centerline	ft
SG_r	Specific gravity of quartz particles	-
SG_T	Specific gravity of tree	-
u_{avg}	Average velocity of cross section in reach	ft/s
u_{des}	Design velocity	ft/s
u_m	Adjusted velocity at outer meander bend	ft/s
V_{dry}	Volume of soils above stage level of design flow	ft^3
V_{sat}	Volume of soils below stage level of design flow	ft^3
V_{soil}	Total volume of soils over log	ft^3
V_{RW}	Volume of rootwad	ft^3
V_S	Volume of solids in soil (void ratio calculation)	ft^3
V_T	Total volume of log	ft^3
V_{TS}	Total volume of tree	ft^3
V_V	Volume of voids in soil	ft^3
V_{Adry}	Volume of ballast above stage of design flow	ft^3
V_{Awet}	Volume of ballast below stage of design flow	ft^3
$V_{r,dry}$	Volume of boulder above stage of design flow	ft^3
$V_{r,wet}$	Volume of boulder below stage of design flow	ft^3
W_{BF}	Bankfull width at structure site	ft
W_r	Effective weight of boulder	lbf
W_T	Total log weight	lbf
x	Horizontal coordinate (distance)	ft
y	Vertical coordinate (elevation)	ft
$y_{T,max}$	Minimum elevation of log	ft
$y_{T,min}$	Maximum elevation of log	ft

Greek Symbols

Symbol	Description	Unit
β	Tilt angle from stem tip to vertical	deg
γ_{bank}	Dry specific weight of bank soils	lb/ft^3
$\gamma_{bank,sat}$	Saturated unit weight of bank soils	lb/ft^3
γ'_{bank}	Effective buoyant unit weight of bank soils	lb/ft^3
γ_{bed}	Dry specific weight of stream bed substrate	lb/ft^3
γ'_{bed}	Effective buoyant unit weight of stream bed substrate	lb/ft^3
γ_{rock}	Dry unit weight of boulders	lb/ft^3
γ_s	Dry specific weight of soil	lb/ft^3
γ'_s	Effective buoyant unit weight of soil	lb/ft^3
γ_{Td}	Air-dried unit weight of tree (12% MC basis)	lb/ft^3
γ_{Tgr}	Green unit weight of tree	lb/ft^3
γ_w	Specific weight of water at 50°F	lb/ft^3
η	Rootwad porosity	-
θ	Rootwad (or large end of log) orientation to flow	deg
μ	Coefficient of friction	-
ν	Kinematic viscosity of water at 50°F	ft/s^2
Σ	Sum of forces	-
ϕ_{bank}	Internal friction angle of bank soils	deg
ϕ_{bed}	Internal friction angle of stream bed substrate	deg

Units

Notation	Description
cfs	Cubic feet per second
ft	Feet
lb	Pound
lbf	Pounds force
kg	Kilograms
m	Meters
mm	Millimeters
s	Seconds
yr	Year

Abbreviations

Notation	Description
ARI	Average return interval
Avg	Average
DBH	Diameter at breast height
deg	Degrees
Dia	Diameter
Dist	Distance
D/S	Downstream
ELJ	Engineered log jam
Ex	Example
FldpIn	Floodplain
H&H	Hydrologic and hydraulic
ID	Identification
i.e.	That is
LB	Left bank
LW	Large wood
Max	Maximum
MC	Moisture content
Min	Minimum
ML	Multi-log
SL	Single log
N/A	Not applicable
no	Number
Pt	Point
rad	Radians
RB	Right bank
RW	Rootwad
SL	Single log
Thw	Thalweg (lowest elevation in channel bed)
Typ	Typical
U.S.	United States
WS	Water surface
WSE	Water surface elevation
↑	Above
↓	Below

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Technical Memorandum

Date: January 11, 2021

To: Marisa Parish, Project Manager
Smith River Alliance

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Michael Love, P.E., Principal Engineer
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Subject: **Summary of Preliminary Design for Replacement of Rawson Creek Culvert Crossing No. 3 on a Tributary to Morrison Creek**

1 PURPOSE OF MEMORANDUM

The purpose of this technical memorandum (TM) is to summarize the proposed design for a culvert crossing replacement on the South Fork of Rawson Creek, a tributary to Morrison Creek, near Smith River, Del Norte County, California. The crossing replacement is intended to improve passage of fish and flood flows.

2 BACKGROUND

The tributary (Rawson Creek) flows into Morrison Creek approximately 4,500 linear feet upstream of the Morrison Creek and Smith River confluence. Several smaller tributaries flow into Rawson Creek from the steep coastal foothills east of Highway 101. This project is on the South Fork of Rawson Creek, and is intended to improve upstream fish passage for adult and juvenile Coho Salmon, Steelhead Trout, Coastal Cutthroat Trout, and potentially Chinook salmon.

The Smith River Alliance (SRA) is dedicated to restoring habitat for salmonids in the Smith River watershed. Through a grant from the California Coastal Conservancy, SRA identified stream crossings that restrict fish movement in tributaries to the lower Smith River. This crossing was identified by SRA as Crossing No. 3 on the Unnamed Tributary (South Fork Rawson Creek) to Morrison Creek as part of the lower Smith River fish passage assessments and prioritization effort. The effort identified it as a medium priority in the lower Smith River for replacement due to the existing 3.5-foot diameter culvert being undersized, a partial barrier to salmonids, and negatively affecting the channel's natural morphology.

There are two road-stream crossings downstream of this project. Crossing No. 1 on Rawson Creek is on adjacent property and found to be passable to adult and juvenile salmonids. Crossing No. 2 is

a partial barrier. SRA received a grant from the California Department of Fish and Wildlife (CDFW) Fisheries Restoration Grants Program (FRGP) for replacement of the downstream partial barrier, referred to as Crossing No. 2. This crossing replacement was designed by Michael Love & Associates, Inc. (ML) and is slated for replacement with a bridge in 2021.

The SRA has received a grant from US Fish and Wildlife Service (USFWS) Fish Passage Program for design and replacement of Crossing No. 3, thus opening up unrestricted access for salmonids to the entire Rawson Creek watershed. SRA retained the services of MLA to develop a crossing replacement design, with the intent of constructing the project during the summer of 2021 in conjunction with implementation of Crossing No. 2.

3 EXISTING CONDITIONS

A private road crosses Rawson Creek approximately 3,000 feet upstream of the confluence with Morrison Creek, on property owned by the Rawson family (Figure 3-1). It is located on the USGS quadrangle map; Township 17N, Range 1W, Section 35. The crossing is the third crossing upstream of the confluence with Morrison Creek. It has light use by ATVs and private land owner vehicles. The crossing, referred to herein as Crossing No. 3, consists of a 36-inch diameter corrugated metal pipe (CMP), 20 feet in length and set at an inverse slope of 1.1 percent (Figure 3-2). The culvert bottom has a thin veneer of sand and gravel approximately 0.4-ft thick along its length. It does not show wear and is in good condition. Channel banks are armored with concrete rubble and RSP at both the inlet and outlet.

The culvert is located on a slight meander within the stream and is poorly aligned with the downstream channel (Figure 3-2a), and concrete rubble has been placed along the toe to protect the bank from scour. Some gravel has aggraded upstream of the culvert, indicating that the culvert is undersized and creates a backwater during frequent high-flow events. Field and anecdotal evidence indicated that the stream overtops the road crossing during moderate flow events. The landowner confirmed that the crossing overtops frequently.

The left bank of the channel along the entire project reach is heavily forested with eucalyptus trees that provide a wind block and are regularly harvested for firewood. The right bank from the upstream reach to the confluence is vegetated with dense stands of invasive Himalayan blackberries and occasional alders. Beyond the top of bank is a large meadow with occasional redwoods in small clusters. The landowner reports that the meadow is a popular foraging area for Roosevelt elk.

The existing crossing was evaluated for fish passage by SRA following protocols described in Part IX of the California Department of Fish and Wildlife's (CDFW's) California Salmonid Stream Habitat Restoration Manual (CDFG, 2003). The crossing was classified as "Grey" and further evaluated with the FishXing program. With respect to passage for juvenile and adult resident and anadromous salmonids it was classified as a "partial barrier." The crossing was also identified as undersized and should be replaced with a properly sized crossing that meets fish passage criteria.

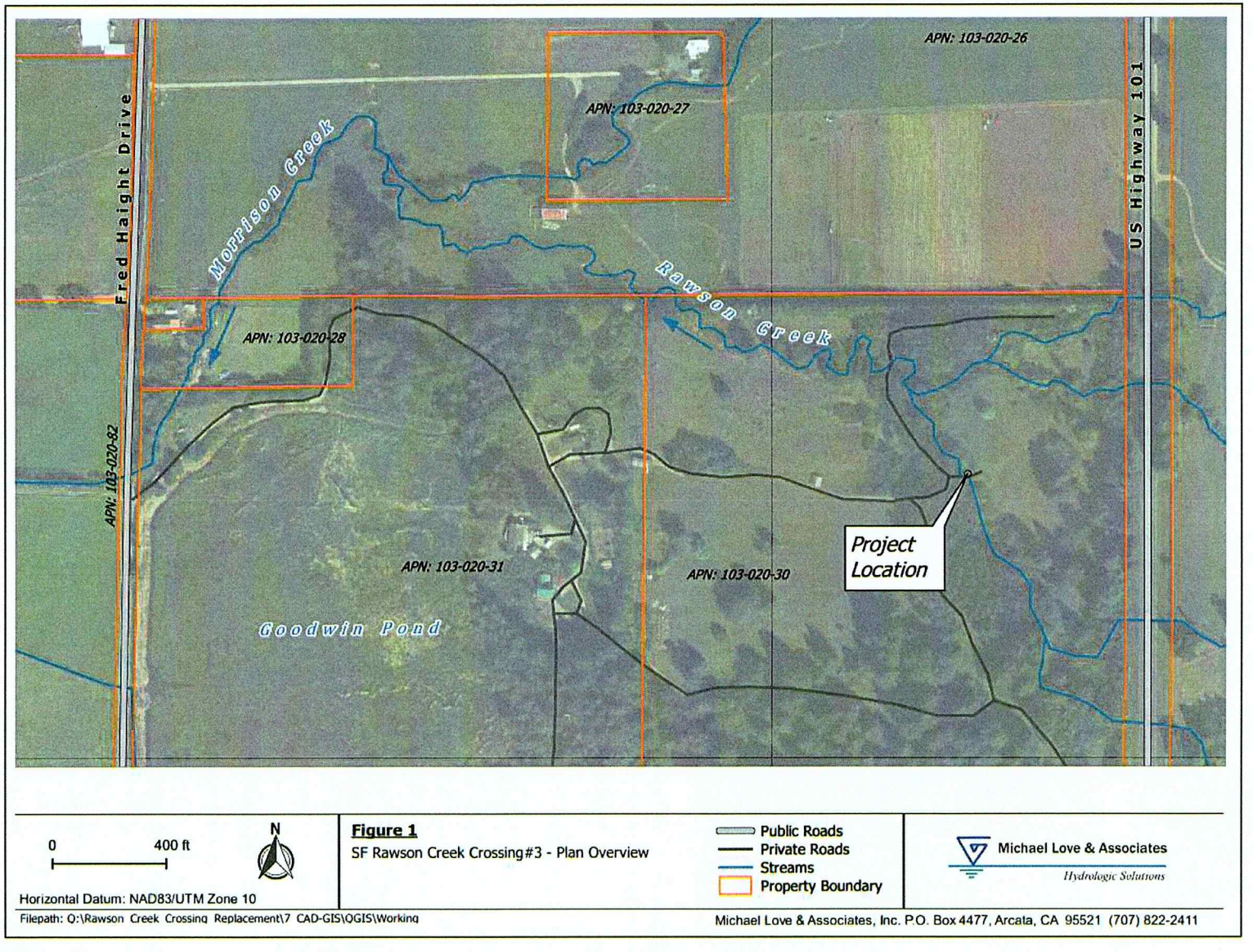

Figure 3-1: Project location and land ownership for Crossing No. 3 on South Fork Rawson Creek, a tributary to Morrison Ck.

100

(a) (b)

Figure 3-2: Existing CMP stream crossing set at a reverse grade with RSP along both banks, (a) outlet slightly embedded and poorly aligned, and (b) poor inlet alignment and aggradation upstream of culvert. Photo courtesy of SRA.

4 STREAM CROSSING DESIGN APPROACH AND SITE CHARACTERIZATION

The proposed replacement stream crossing was designed using the stream simulation approach outlined in Part XII of the California Salmonid Stream Habitat Restoration Manual (CDFG, 2009) and in NMFS (2001) and USFS (2008). The stream simulation approach utilizes a crossing structure that spans the bankfull channel, provides a seamless transition between the upstream and downstream channel profiles, and maintains a natural streambed within the crossing throughout the service life of the crossing. The approach relies on using the adjacent stream channel as a geomorphic reference for design of the crossing structure.

4.1 Site Hydrology

The contributing watershed area at the road crossing is approximately 0.31 square miles and is characterized by second growth forests in the steeper headwaters that drain onto an agricultural terrace of the Smith River coastal plain. The estimated mean annual precipitation for the watershed is 76.8 inches per year (USGS, 2017). The peak flows were estimated using both USGS regional regression equations (Gotvald et al. 2012) and using probabilistic analysis of annual peak flow records from three nearby streams with similar drainage areas and land cover scaled to the project drainage area. The three streams used in the probabilistic analysis were Little Lost Man Creek near Orick California, Lopez Creek in Smith River California, and Harris Creek in Brookings Oregon. A

comparison of flow estimates for various return periods is provided in Table 1. A Probabilistic Analysis of three regional streams was used in design of the new crossing structure. Hydrologic calculations are provided in Attachment 2.

Table 1: Estimated peak flows for various return periods in SF Rawson Creek using probabilistic analysis of gage records from three nearby streams scaled to the Rawson Creek drainage area and using the North Coast Regional Regression Equations.

Return Period of Peak Flow	Peak Flow at Rawson Creek Crossing	
	Average from Probabilistic Analysis of 3 Regional Streams	North Coast Regional Regression Equations
2-Year	43 cfs	45 cfs
5-Year	75 cfs	82 cfs
10-Year	100 cfs	108 cfs
25-Year	134 cfs	143 cfs
50-Year	161 cfs	169 cfs
100-Year	190 cfs	197 cfs

4.2 Field Surveys

On February 17, 2020 Antonio Llanos of MLA conducted topographic and geomorphic surveys of the crossing and adjacent stream channel, on March 17, 2020 Antonio Llanos and Jolyon Walkley from SRA completed the survey and data collection. The topographic survey was conducted using a total station and referenced control points established during the survey of the downstream crossing (Crossing No. 2), which are in assumed horizontal and vertical datums. The survey included the roadway and culvert, channel thalweg and toes and tops of banks, wetted edge of channel, and trees greater than 6" DBH within the project's anticipated limits of disturbance. The survey points were used to construct a basemap with 1-foot contours in AutoCAD Civil 3D. The existing conditions plan map is provided in the preliminary design drawings in Attachment 1.

The geomorphic field assessment included extending the thalweg profile survey further upstream and downstream. The profile survey extended 400 feet downstream to the confluence of North Fork Rawson Creek, and was appended to the previously surveyed profile associated with design of Crossing No. 2 (Figure 4-1). The survey extended 400 feet upstream of the crossing, through a reference reach beyond the influence of the current crossing. While surveying the channel profile, the active channel, bankfull, and top of bank widths were measured at numerous locations. A discrete channel cross section was surveyed in the upstream reach and geomorphic channel controlling features were noted. Two pebble counts were conducted to characterize the gradation of the streambed material. Pebble count locations, upstream and downstream of the crossing, are shown on the profile.

4.3 Stream Planform

In the project reach South Fork Rawson Creek generally flows to the northwest, where it meets the mainstem Rawson Creek. The crossing is located within a series of small meanders. The meander

bends in this reach of Rawson Creek have very low sinuosity when compared to the rest of the channel. This reach has an access road on one side and a large meadow on the other. The channel condition, low sinuosity and historic land use practices suggest that the channel may have been straightened in this reach. The channel is moderately incised downstream of the crossing and significantly incised upstream, and appears to flow onto the floodplain upstream of the crossing along the right bank through the meadow during high flow events.

4.4 Stream Profile Evaluation

The longitudinal profile of the channel was used to estimate the overall stable channel profile as well as the potential variability in the channel bed elevation through the project site (Figure 4-1). Downstream of the culvert there is a small outlet pool and the channel bed is comprised of sands and gravel. The 300-foot reach downstream of the crossing, before the confluence with the North Fork, has a much lower slope than the rest of the channel and appears to be an aggraded reach with an increase in finer bed material. The slope of this reach is approximately 0.6%, likely due to the influence of woody vegetation in the eucalyptus grove. Scour from high velocities discharging from the culvert and from flows overtopping the existing crossing do not appear to be causing significant scour in this reach.

Immediately upstream of the culvert for approximately 100 feet there is some evidence of deposition and lateral channel adjustment where the banks have widened through erosion and an overflow channel short circuits the upstream meander. This is likely caused by the undersized culvert constricting higher flows and creating an upstream backwater.

The upstream channel is notably different than downstream as it is characterized as incised with abundant wood in the channel. The channel profile upstream of the crossing has a slope, at 2.05% and is controlled by large and small wood as well as roots spanning the channel. The channel bed in the upstream reach is frequently scoured to a clay bottom. Much of the wood appears to be cut and is aligned with the flow indicating that it may have been pushed into the channel during previous land use practices. This creates a complex channel profile with larger drops and profile controls. The banks are a sandy-clay with embedded gravel

An overall stable profile was projected through the up and downstream channel and referenced to the stable profile developed for Crossing No. 2. This profile has a slope of 2.05% upstream and 1.23% downstream of the crossing (Figure 4-1).

Developing stream crossing designs requires considering the degree that the channel bed may aggrade or degrade (rise or fall). The low and high vertical adjustment potential (VAP) profiles in Figure 4-1 represent the estimated range in elevations that the channel bed may occupy during the service life of the crossing structure. The VAP profiles were estimated based on field interpretation and evaluation of the channel profile. In the reach upstream of the crossing, the low VAP profile was based on the pool bottom elevations, which are within the sandy clay soils. For the downstream reach, consideration was given when setting the low VAP to the potential that the aggraded channel section may degrade, resulting in channel adjustments that could propagate through Crossing No. 3.

The high VAP profile is based on the top of the wood controls and riffles in the profile upstream of the crossing, and the riffle crests in the depositional reach downstream. The crossing should be designed to maintain a natural streambed, be structurally sound, and maintain adequate hydraulic capacity with the channel bed occurring anywhere between the low and high VAP profiles.

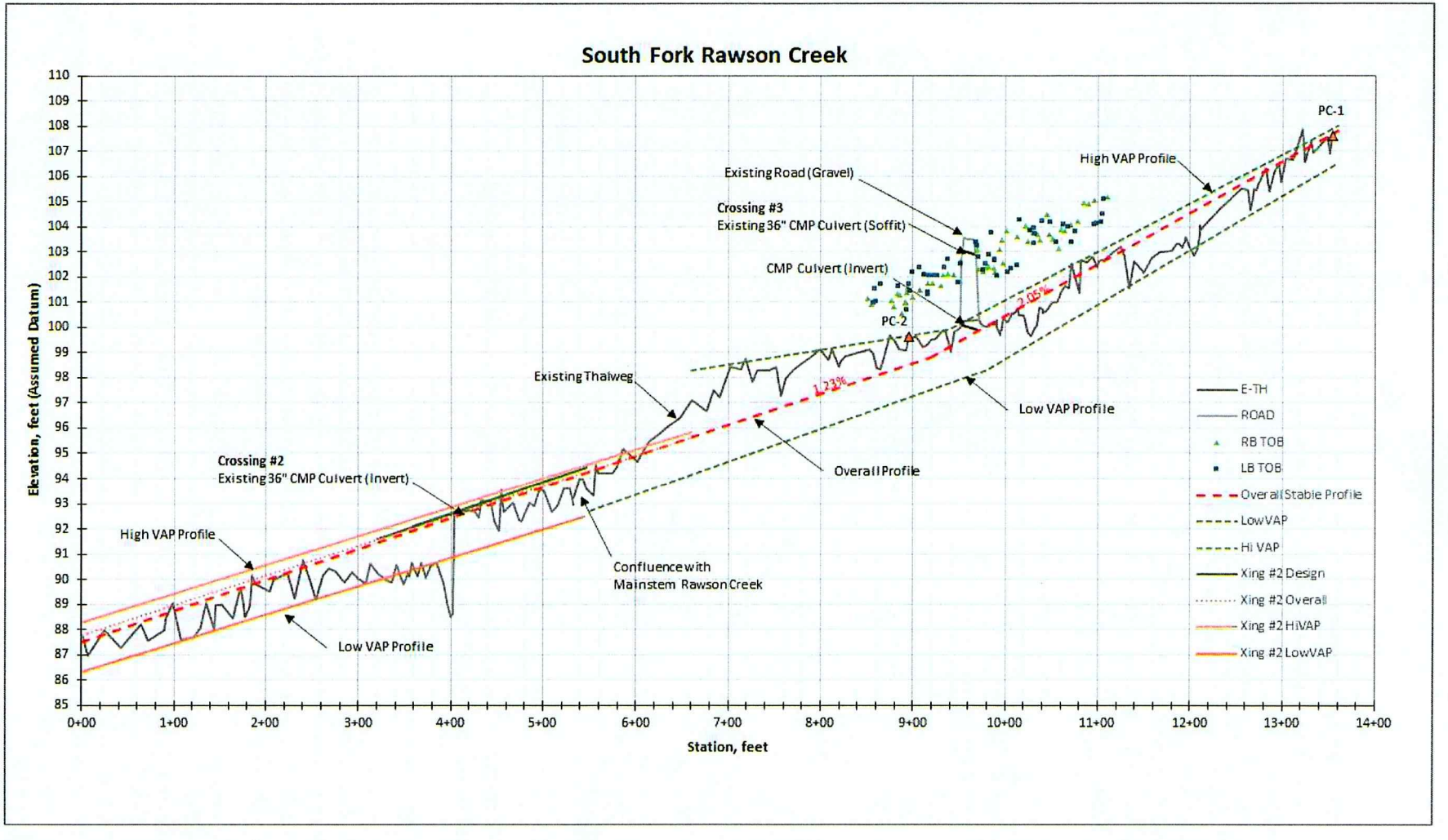

Figure 4-1: Channel thalweg profile upstream and downstream of the existing culvert Crossing No. 3, surveyed on March 17, 2020 appended with profile and analysis conducted for Crossing No. 2 replacement. Vertical adjustment potential profiles, existing culvert and pebble count locations are also shown. Right and left top of bank (RB TOB and LB TOB) shown for reference.

4.5 Streambed Material Gradation

Two pebble counts were conducted, with their locations shown on the thalweg profile in Figure 4-1. The downstream pebble count (PC-2) occurred within the aggraded reach while the upstream pebble count (PC-1) occurred in a much steeper reach. The resulting gradations provided in Figure 4-2 reflect the differences in channel slope, with the steeper upstream reach having a coarser bed. The streambed material downstream of the crossing has more fines representative of the depositional nature, whereas upstream is characterized as coarser gravel apparently originating from lag deposits embedded in the sandy-clay parent material seen in the bed and banks of the channel. PC-1 had a D84 of approximately 20 mm, or coarse gravel. PC-2 had a D84 of approximately 8 mm, or fine gravel.

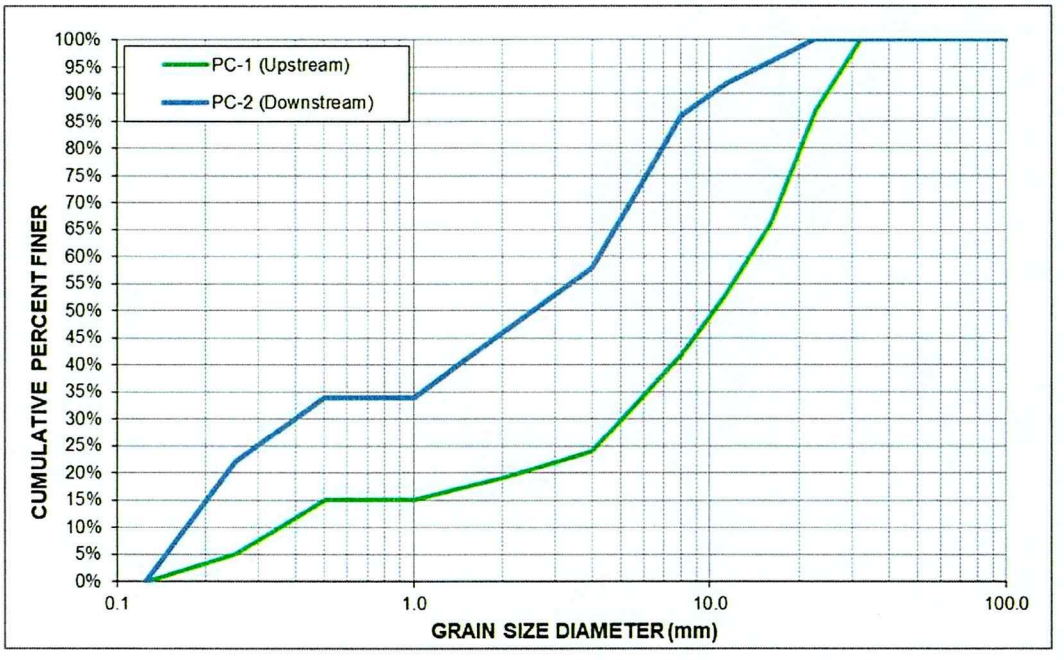

Figure 4-2. Gradation of streambed material from pebble counts occurring upstream and downstream of Crossing No. 3.

4.6 Geomorphic Site Conditions

As part of the overall stream simulation channel design, channel dimensions were measured for eight sections along the project reach, three downstream and 5 upstream. All sections measured were outside the influence of the crossing. Averages of active channel width, and bankfull width were computed and are provided in Table 2. These values were used to determine the appropriate dimensions for the channel within the new stream simulation crossing.

One channel cross section was surveyed upstream of the culvert as part of the geomorphic assessment and used to develop channel dimensions. Additionally, the topographic survey captured distinct breaklines at the thalweg, channel toe, and tops of bank extending approximately 100 feet downstream of the crossing and 140 feet upstream of the crossing, which aided in verifying typical channel dimensions within the project reach. The bankfull width ranged from 6.5 to 12.0 feet with an average 9.0 feet, and bankfull depth ranged between 1.4 and 2.2 feet. The active channel width, defined as the actively scoured bottom width of the channel, was relatively consistent at approximately 5.5 feet.

Table 2: Measured channel widths upstream and downstream of the Rawson Creek culvert No. 3 crossing.

Location	Active Channel Width (feet)	Bankfull Width (feet)	Bankfull Depth (feet)
Downstream of Crossing	5.0	8.5	1.5
	5.0	9.0	1.5
	6.5	12.0	1.4
Upstream of Crossing	7.5	11.5	1.5
	5.5	6.5	1.6
	5.5	7.5	2.0
	5.5	8.0	2.2
	5.5	9.0	2.0
Mean	**5.8**	**9.0**	**1.7**
Median	**5.5**	**8.8**	**1.6**
Min	**5.0**	**6.5**	**1.4**
Max	**7.5**	**12.0**	**2.2**

5 DESIGN DEVELOPMENT

The crossing design begins with developing the appropriate channel profile and dimensions and then determining the appropriate crossing structure. The preliminary design drawings are provided in Attachment 1.

5.1 Crossing Location

The current crossing is within a small bend in the channel. Although this is typically not an ideal location for a stream crossing, the location seems suitable for the replacement crossing given the small size of the stream and relative stability of the channel (i.e., no significant lateral migration occurring) The crossing would be realigned slightly to improve the approach angle and reduce potential scour to the downstream banks.

5.2 Design Profile

Figure 5-1 shows the proposed channel profile (Design) and potential future profile (Stable Channel). The overall length of regraded channel is approximately 70 feet. The design channel is placed to match the upstream and downstream channel bed elevations. Upstream of the crossing the channel would tie into an existing shallow pool and downstream would match the existing grade. The design channel slope is 0.9%, matching the slope of the aggraded downstream reach, but slightly less than the downstream 1.23% overall slope that neglects the aggraded reach.

Over time, the downstream aggraded reach may degrade towards the overall slope line shown in Figure 4-1. In the adjacent channel, wood is a major feature controlling the channel profile. While wood is not proposed to be placed in the channel bed for profile control, it is possible that buried wood will become exposed as the channel adjusts or during construction.

5.3 Design Channel Form and Dimensions

The crossing is on a slight meaner bend and the channel alignment appears to have been affected by land use on the current-day meadow. The proposed channel alignment both upstream and

downstream of the crossing was developed to improve the approach angle with the channel and reduce stress on the banks by straightening the flow line.

The channel dimensions for the project were based on the measured dimensions in Table 2. An active channel width of 6 feet and bankfull width and depth of 9 feet and 2 feet were applied. This yields a trapezoidal channel with side slopes of 1.3:1 (H:V). However, for final grading, the design channel could be laid back where the opportunity exists and the transitions would need to match existing banks.

On the outside of the meander, upstream and downstream of the crossing, rootwads at least 6 feet in diameter, can be added to provide bank protection. They would be tipped up and placed against the bank with the stem buried into the bank. They would help deflect high flows and protect the bank from scour. These could be added to the design drawings as part of the 65% design phase.

5.4 Streambed Material

Streambed material will be imported and placed into the graded channel bed to simulate the gradation of the natural channel. Given that the crossing is at the transition between the aggraded downstream reach and the steeper upstream reach, the gradation of the channel bed from upstream will be used for specifying the imported streambed material size ranges. It is anticipated that substrate removed from Morrison Creek near Fred Haight Drive as part of channel maintenance can be used for this project, similar to the plan for the Crossing No. 2 replacement.

5.5 Crossing Structure Type Selection

The proposed crossing must span the bankfull channel width and accommodate a streambed through the crossing at all elevations between the low and high VAP profiles. The bankfull width is approximately 9 feet. The site is constrained by the low roadway, providing minimal height above the stream channel. The current layout places the road surface over the crossing at the low point, such that flows overtopping the road return directly to the downstream channel. Additionally, there is no roadway fill at the crossing approaches, such that conveyance of floodplain flows is not interrupted by the road surface.

Stream simulation crossings are typically sized to convey the 100-year flood without going into pressurized flow conditions or overtopping of the roadway. However, this would require raising the roadway approaches several feet to place the soffit of the new crossing high enough to convey the 100-year flood. The fill associated with the raised roadway would extend into the existing meadow. There is the potential that this area would be classified as a one-parameter wetland under the California Coastal Act, and raising the road would be considered wetland fill requiring mitigation. For these reasons, the crossing types evaluated focused on structures that allowed infrequent flood flows (i.e. >5-year flood) to overtop the roadway rather than all of the flow going through the crossing. This provides for the channel forming flows, such as the 2-year flood, to be conveyed through the crossing unrestricted.

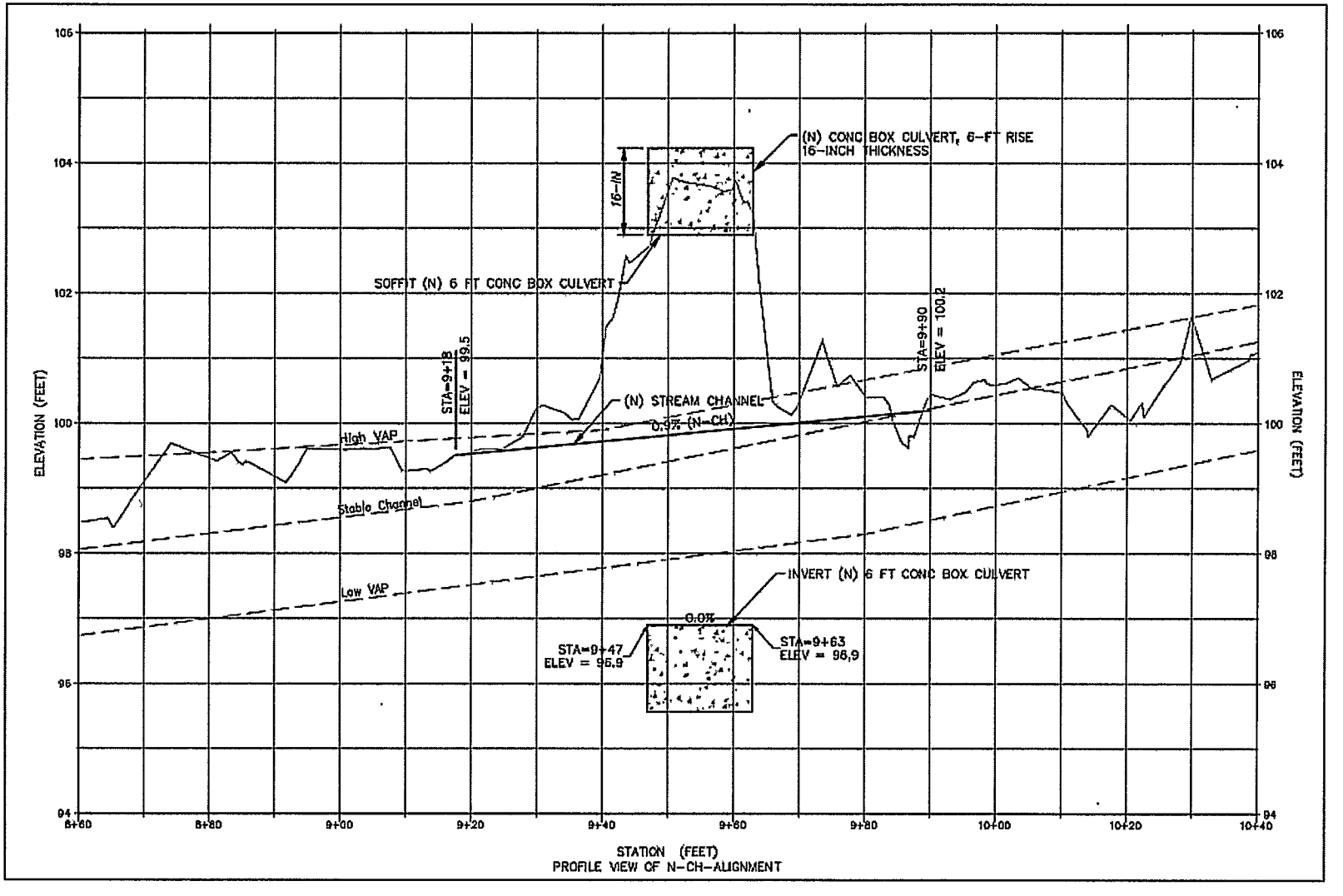

Figure 5-1: Longitudinal profile of new channel and crossing design, showing the predicted low and high VAP profiles based on existing features upstream and downstream the crossing, and the overall stable channel profile representing future conditions.

5.5.1 Options Considered but not Selected

Initial examination of crossing options included metal circular and pipe arch culverts as potential structure types. However, metal culvert options would require raising the road substantially to convey the 100-year flow and provide the required cover over the top of the culvert. To provide a bankfull channel width, much of a round or arch culvert would be buried below the streambed. This proved impractical, especially when the potential for vertical adjustment was taken into consideration.

A modular, channel spanning bridge, similar to the one planned for the downstream crossing replacement, was considered. However, these bridges and their precast footings, are not designed for overtopping by high flows, and the thickness of the bridge deck and H-beams would require raising the road as much as 4 feet.

Open bottom culverts, such as arch culverts set on footings were not considered desirable due to the poor soil conditions and potential for scour and settlement. Also, the amount of cover required requires raising the road substantially.

5.5.2 Preferred Crossing Structure Type

Given the low clearance for the road and need to maintain the channel width through the crossing, a pre-cast concrete box culvert was selected as the preferred structure type. It is the design intent to allow infrequent high flows to overtop the culvert and reenter the channel downstream. The top of the concrete would be the driving surface, avoiding the need for road fill on top of the crossing and minimizing the obstruction during high flows. The road surface would remain close to its current elevation, raising it by approximately 0.5 feet at its existing lowest spot. Evaluation of a concrete box culvert found a 12-foot wide by 6-foot-tall box culvert 16 feet long and embedded 3 feet below the design channel bed would provide continuity for the channel without creating a significant constriction in channel width.

Common practice is to use precast concrete box segments delivered to the site and installed. Due to the size of the culvert and weight of the segments they would be sized to be moved by a mid-sized excavator. A clamshell design, where the bottom half and top half segments are separate and assembled on site, reduces weight and is recommended for this crossing. The box culvert can be assembled in a single day using one excavator, however one advantage to the clamshell design, is that it allows for a channel bed and some of the banklines to be installed in the bottom half, before the top half is assembled.

5.6 Road Profile

The road profile would remain largely the same as in the current conditions. The approach to the crossing from east to west is about 4% and reaches elevation 104.2 ft at the sag in the road over the current culvert and slopes up about 2% to meet the level of the meadow. The crossing is currently in a sag within the roadway, so the change to the roadway profile is relatively minor. Using a box culvert as the road surface would create a 12-foot length of concrete driving surface that is 16 ft wide at the crossing. The top of the culvert would be flat in both the road and streamwise directions.

5.7 Hydraulic Capacity

A one-dimensional steady-state hydraulic model was developed for the proposed crossing using the HEC-RAS software (USACE, 2010). The model was used to evaluate hydraulic conveyance associated with the 5, 10, 25, 50 and 100-year flow. HEC-RAS results are provided in Attachment 3.

5.7.1 Model Development

The model domain extends 210 feet through the project area. A total of 21 cross sections were used to model the project reach. The cross sections were sampled from the proposed conditions surface as defined by the preliminary design plans (Attachment 1). Based on observed conditions and referenced to Chow (1959), the Manning's roughness coefficient (n) was set at 0.050 for the main channel between the specified bank markers. For overbank areas, the Manning's roughness coefficient of 0.100 was assigned to simulate the hydraulic obstructions created by brush and dense vegetation along the eucalyptus grove and 0.040 for the meadow adjacent to the channel. The proposed channel will have a channel and bank lines formed through the crossing, therefore the crossing was simulated with the bridge, where the bridge deck represented the top of the concrete box culvert which is the road surface, and the vertical bridge abutments represented the culvert walls. For the simulation, the deck was assumed to have a thickness of 16-inches. The dimensions and elevations were input using the bridge module, and ineffective flow areas were defined at the channel approaches to the crossing as 2:1 for the upstream contraction and 3:1 for the downstream expansion. Expansion and contraction coefficients were assigned for each cross section as 0.1 and 0.3 respectively, with the exception of the crossing approach sections and at the overflow location where they were 0.3 and 0.5.

Flow profiles were developed for the 2, 5, 10, 25, 50 and 100-year return flows as defined in Table 1. Upstream boundary conditions were defined as critical depth and downstream boundary conditions as normal depth with a channel slope of 0.60% representing the existing channel downstream of the crossing.

5.7.2 Model Results

The HEC-RAS results and water surface profiles for proposed conditions are provided in Attachment 3. Culvert capacity is measured at the face of the new crossing, the 10-year water surface (100 cfs) is at elevation 102.9 ft corresponding to the soffit of the proposed box culvert, and the 100-year water surface (190 cfs) is at elevation 104.3, which is 0.1 feet above the culvert top (Figure 5-2)and 16 cfs going over the crossing, with the rest going through the box culvert. Water velocities in the channel are generally around 3 ft/s at the culvert approach, and increase to between 4 and 6 ft/s downstream of the crossing.

During the 100-year return flow, when the culvert is under pressure flow, shear stress in the channel is between 1.35 and 0.99 (lb/sq ft) at the up and downstream extents of the culvert, respectively. In the adjacent channel shear stress is typically around 1 (lb/sq ft). However, at the 2-year and 5-year flow the channel shear stresses in that crossing is nearly identical to the shear stresses upstream and downstream of the project.

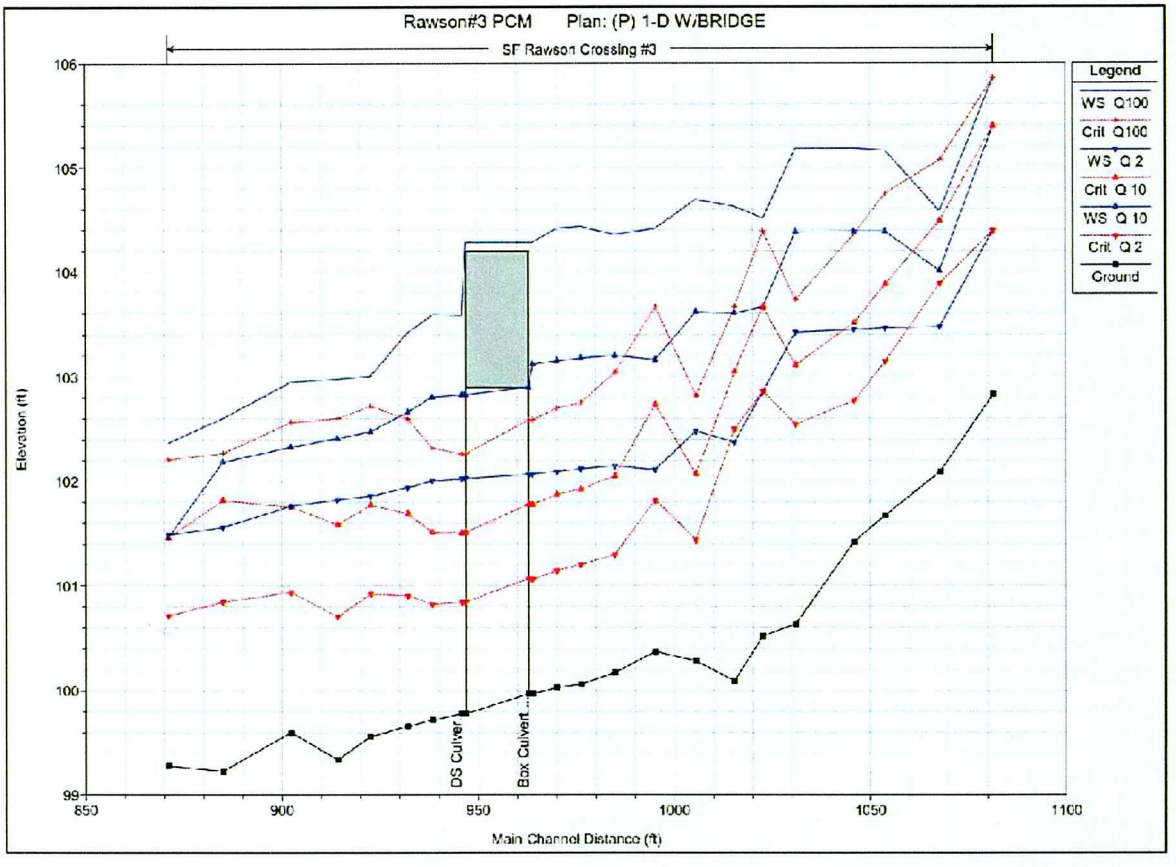

Figure 5-2. HEC RAS 1-D model results for the proposed culvert replacement at Q100 (190 cfs), Q10 (100 cfs) and Q2 (43 cfs). The culvert was simulated as a bridge to account for the natural streambed inside the crossing

5.7.3 Discussion of Shear Stress Results and Scour Potential

Based on the shear stress results reported in the HEC RAS analysis and reported mobility for ranges of particle diameters (USGS, 2008) the D84 of 22 mm from the upstream pebble count would be mobilized in the proposed crossing and adjacent channel reaches at the 2-year flow 43 cfs. Therefore, it is assumed that material would be mobilized and scoured during flows greater than the 2-year return event, including when the culvert is pressurized, it would be replenished during the receding limb of the peak flow.

In areas where high shear stress has the potential to scour the banks rootwads and rock will be placed along the streambank to provide stabilization.

5.8 Opinion of Probable Construction Cost

An Opinion of Probable Construction Cost (OPCC) was developed for this 30% concept design. It was developed with a 15% contingency to account for changes and refinements in the nest phases of design. The cost is for materials and construction only, and does not include permitting, construction oversite or biological services. The cost is estimated to be $137,600 (Attachment 4).

6 NEXT STEPS

This TM provides a summary of the basis of design for the stream crossing, and the preliminary design drawings are provided in Attachment 1 and an estimate of Probable Construction Cost in Attachment 4. These materials are provided for review by the project stakeholders, including staff from the fisheries resource agencies. Upon receipt of comments and questions, the project design will be developed to the 65% level and the estimate of construction cost will be updated. This provides stakeholders opportunity to review the fully developed design before they are finalized.

7 REFERENCES

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Attachments:

Attachment 1: Preliminary Design Plans

Attachment 2: Hydrologic Calculations

Attachment 3: HEC-RAS Results

Attachment 4: Opinion of Probable Construction Cost

SMITH RIVER ALLIANCE

PLANS FOR CONSTRUCTION OF

SOUTH FORK RAWSON CREEK CULVERT No. 3 REPLACEMENT

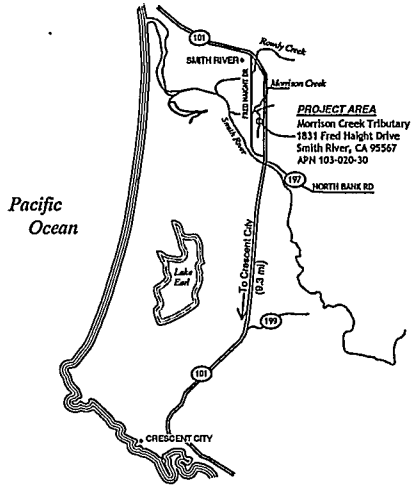
DECEMBER, 2020
35% DESIGN

Prepared For:

- SMITH RIVER ALLIANCE
- US FISH AND WILDLIFE SERVCE

Prepared By:

Michael Love & Associates, Inc.
PO Box 4477 • Arcata, CA 95518 • (707) 822-2411



LOCATION MAP
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SHEET INDEX	
Sheet Number	**Sheet Title**
1	TITLE SHEET
2	LEGEND AND ABBEVIATIONS
3	GENERAL NOTES
4	WATER MANAGEMENT
5	EXISTING CONDITIONS
6	NEW CROSSING LAYOUT
7	CROSING PROFILE
8	CROSSING DETAILS

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SMITH RIVER ALLIANCE
P.O. Box 2129 • Concord City, CA 95531

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SMITH RIVER ALLIANCE
RAWSON CREEK
CULVERT REPLACEMENT No. 3

1 - TITLE SHEET

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LEGEND AND SYMBOLS

EXISTING

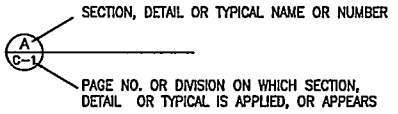
- FENCE LINE
- EDGE OF GRAVEL ROAD
- PROPERTY LINE
- 16 — CONTOUR AND ELEVATION
- CHANNEL THALWEG OR DRAINAGE
- 1+00 — ALIGNMENT STATIONING (FEET)
- CONTROL POINT/TEMPORARY BENCH MARK
- FLOW DIRECTION
- 4.5' RD — TREE OF DBH 6" AND GREATER, SIZE, AND TYPE
- STUMP
- HB-1 — EXPLORATORY BORING
- LARGE WOOD IN CHANNEL

NEW

- LIMIT OF DISTURBANCE (LOD)
- EDGE OF GRAVEL ROAD
- 16 — CONTOUR AND ELEVATION
- 1+00 — STATIONING (FEET)
- CHANNEL THALWEG
- TEMPORARY FISH EXCLUSION FENCING
- TEMPORARY EARTH DIKE
- TEMPORARY FILTER BAG
- FLOW DIRECTION
- ROOT WAD
- TREE TO BE REMOVED

ABBREVIATIONS

ABUT	ABUTMENT
AC	ASPHALT CONCRETE
AGG	AGGREGATE
ALD	ALDER
APPROX	APPROXIMATELY
BB	BEGIN BRIDGE
BRG	BRIDGE
BVC	BEGIN VERTICAL CURVE
CH	CHANNEL
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CONC	CONCRETE
CP	SURVEY CONTROL POINT
DBL	DOUBLE
DIAM	DIAMETER
EB	END BRIDGE
EG	EXISTING GROUND
EL, ELEV	ELEVATION
EUC	EUCALYPTUS
EVG	END VERTICAL CURVE
EXCAV	EXCAVATION
FG	FINISHED GROUND
FT	FOOT OR FEET
IN	INCHES
INV	INVERT
LBS	POUNDS
LOD	LIMIT OF DISTURBANCE
LOG	LIMIT OF GRADING
LOL	LAYOUT LINE
LT	LEFT
MAD	MADRONE
MAX	MAXIMUM
MBGR	METAL BEAM GUARD RAIL
MIN	MINIMUM
MP	MID POINT
MSE	MECHANICALLY STABILIZED EARTH
NTS	NOT TO SCALE
O.C.	ON CENTER
OG	ORIGINAL GROUND
OGRD	OLD GROWTH REDWOOD
PC, P/C	PRE-CAST
PG	PROPOSED GRADE
PSI	POUNDS PER SQUARE INCH
Q_{100}	PROJECT 100-YEAR RETURN PERIOD FLOW
R.C.	RELATIVE COMPACTION
R.D.	RELATIVE DENSITY
RD	ROAD
RDWD	REDWOOD
RSP	ROCK SLOPE PROTECTION
RT	RIGHT
RW	RETAINING WALL
RXR	RAILROAD
SPA	SPACING
SSP	STRUCTURAL STEEL PLATE
STA	STATION
T/R	TOP OF RAIL
TBD	TO BE DETERMINED
TBM	TEMPORARY BENCHMARK
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VC	VERTICAL CURVE
W/	WITH
WF	WIDE FLANGE
WSE	WATER SURFACE ELEVATION
#	NUMBER
%	PERCENT
(A)	EXISTING
(N)	NEW
ø	DIAMETER
1.5:1	HORIZONTAL: VERTICAL SLOPE



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P.O. Box 2139 - Crescent City, CA 95531

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SMITH RIVER ALLIANCE
RAWSON CREEK
CULVERT REPLACEMENT No. 3

2 - LEGEND AND ABBEVIATIONS

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GENERAL

1. SMITH RIVER ALLIANCE (SRA) IS THE CONTRACT OWNER (CO). THE TERM CONTRACT OWNER REPRESENTATIVE (COR) IS DEFINED AS ANY AUTHORIZED PROFESSIONAL DESIGNATED BY SRA. ALL IMPROVEMENTS SHALL BE ACCOMPLISHED UNDER THE APPROVAL, INSPECTION AND TO THE SATISFACTION OF THE CO OR COR.
2. CONTRACTOR AGREES TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE WORK AREA DURING THE COURSE OF CONSTRUCTION, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND SHALL NOT BE LIMITED TO NORMAL WORKING HOURS. THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE LANDOWNER, CO, AND ITS REPRESENTATIVES HARMLESS FROM ANY LIABILITY, REAL AND OR ALLEGED, IN CONJUNCTION WITH THE PERFORMANCE OF THIS PROJECT.
3. A SET OF SIGNED WORKING DRAWINGS SHALL BE KEPT ON SITE AT ALL TIMES ON WHICH CONTRACTOR SHALL RECORD VARIATIONS IN THE WORK, INCLUDING ALL EXISTING UTILITIES. THESE DRAWINGS SHALL BE SUBMITTED TO THE COR UPON COMPLETION OF WORK.
4. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE COR UPON DISCOVERING SIGNIFICANT DISCREPANCIES, ERRORS OR OMISSIONS IN THE PLANS. PRIOR TO PROCEEDING, THE COR SHALL HAVE THE PLANS REVISED TO CLARIFY IDENTIFIED DISCREPANCIES, ERRORS OR OMISSIONS.
5. PLACED MATERIALS NOT CONFORMING TO SPECIFICATIONS SHALL BE REMOVED AND REPLACED AS DIRECTED BY THE COR AT NO ADDITIONAL COST TO THE CO.
6. IN THE EVENT CULTURAL RESOURCES (I.E., HISTORICAL, ARCHAEOLOGICAL, AND PALEONTOLOGICAL RESOURCES, OR HUMAN REMAINS) ARE DISCOVERED DURING EXCAVATION, GRADING OR OTHER CONSTRUCTION ACTIVITIES, WORK SHALL BE HALTED WITHIN A 100 FOOT RADIUS OF THE FIND. A QUALIFIED ARCHEOLOGIST RETAINED BY THE COR SHALL BE CONSULTED FOR AN ON-SITE EVALUATION. ADDITIONAL MITIGATION MAY BE REQUIRED, AT CO'S EXPENSE PER THE ARCHEOLOGIST'S RECOMMENDATIONS. IF HUMAN BURIALS OR HUMAN REMAINS ARE ENCOUNTERED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE COUNTY CORONER.
7. IF HAZARDOUS MATERIALS OR WHAT APPEAR TO BE HAZARDOUS MATERIALS ARE ENCOUNTERED, STOP WORK IN THE AFFECTED AREA IMMEDIATELY AND CONTACT 911 OR THE APPROPRIATE AGENCY FOR FURTHER INSTRUCTION.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THEIR OWN WATER AND POWER FOR OPERATIONS, IRRIGATION AND DUST CONTROL. WATER SHALL NOT BE PUMPED FROM THE CREEK FOR THESE USES.
9. NOTED DIMENSIONS TAKE PRECEDENCE OVER SCALE.
10. COR WILL PROVIDE CONSTRUCTION STAKING. RESPONSIBILITY OF CONTRACTOR TO MAINTAIN OR REPLACE CONSTRUCTION STAKES.

SEQUENCE OF CONSTRUCTION

WORK PHASING SHALL OCCUR AS FOLLOWS, UNLESS OTHERWISE APPROVED BY COR:

1. SUBMIT NECESSARY SUBMITTALS FOR APPROVAL. ONCE APPROVED, THE CONTRACTOR MAY COMMENCE THE WORK UNLESS OTHERWISE DIRECTED.
2. MOBILIZATION
3. INSTALLATION OF FISH EXCLUSION DEVICES AND REMOVAL OF FISH FROM WORK AREA.
4. INSTALLATION OF TEMPORARY COFFERDAMS, CLEAR WATER DIVERSIONS, DE-WATERING, AND SEDIMENT CONTROL WITHIN WORK AREA AS NEEDED.
5. CLEARING AND GRUBBING OF WORK AREA.
8. REMOVAL OF EXISTING CULVERT, IN STREAM CONSTRUCTION, AND INSTALLATION OF NEW CROSSING.
9. RECONSTRUCTION OF ROAD AND RE-OPENING FOR PRIVATE ACCESS.
10. REMOVAL OF WATER MANAGEMENT DEVICES.
11. REMOVAL OF FISH EXCLUSION DEVICES.
12. STABILIZATION OF THE WORK AREA.
13. DEMOBILIZATION.
14. REMEDIATION AND REPAIR OF PRIVATE ROADWAY.

CONTRACTOR SHALL SUBMIT A DETAILED SCHEDULE PRIOR TO COMMENCING CONSTRUCTION.

CLEARING AND GRUBBING

1. CLEARING AND GRUBBING SHALL BE IN ACCORDANCE WITH SECTION EC-2 OF CASQA AND THE EROSION AND SEDIMENT CONTROL NOTES IN THE CONTRACT DOCUMENTS.
2. THE LIMIT OF DISTURBANCE DOES NOT DENOTE THE LIMIT OF CLEARING AND GRUBBING. THE EXTENT OF CLEARING SHALL BE MINIMIZED TO THE EXTENT POSSIBLE WITHIN THE LIMIT OF DISTURBANCE TO ALLOW MANEUVERABILITY OF EQUIPMENT.
3. EUCALYPTUS TREES DESIGNATED FOR REMOVAL SHALL BE SALVAGED WITH ROOTWAD, EXCAVATED AND CUT TO 20-FT LENGTHS. ROOT WADS SHALL REMAIN INTACT WITH STEM MIN 20-FT IN LENGTH. CUT LOGS AND ROOT WADS SHALL BE STOCKPILED AT A DESIGNATED LOCATION NEAR PROJECT SITE.
4. ALDER TREES, LIMBS AND SLASH SHALL BE CHIPPED AND USED FOR SITE STABILIZATION.
5. EXISTING TREE ROOTS OF TREES TO REMAIN WITHIN LIMITS OF EXCAVATION SHALL BE PRESERVED TO THE EXTENT POSSIBLE.
6. REMAINING ORGANIC MATERIAL FROM TREE REMOAL CLEARING AND GRUBBING SHALL BE CHIPPED AND USED FOR SITE STABILIZATION.
7. TREES NOT DESIGNATED FOR REMOVAL SHALL REMAIN AND BE PROTECTED.

EROSION & SEDIMENT CONTROL

GENERAL NOTES

1. AT MINIMUM THE CONTRACTOR SHALL EMPLOY THE FOLLOWING BEST MANAGEMENT PRACTICES (BMPS) AS APPLICABLE, AS DESCRIBED IN THE CURRENT CALIFORNIA STORMWATER BMP HANDBOOK FOR CONSTRUCTION (CASQA HANDBOOK) (WWW.CASQA.ORG):

EC-1 SCHEDULING
EC-2 PRESERVATION OF EXISTING VEGETATION
EC-8 WOOD MULCHING
SE-1 SILT FENCE
SE-5 FIBER ROLLS
WE-1 WIND EROSION CONTROL
NS-1 WATER CONSERVATION PRACTICES
NS-2 DEWATERING OPERATION
NS-5 CLEARWATER DIVERSION
NS-8 VEHICLE AND EQUIPMENT CLEANING
NS-9 VEHICLE AND EQUIPMENT FUELING
NS-10 VEHICLE AND EQUIPMENT MAINTENANCE
SS-9 EARTH DIKES AND DRAINAGE SWALES
SS-10 VELOCITY DISSIPATION DEVICES
WM-1 MATERIALS DELIVERY AND STORAGE
WM-2 MATERIAL USE
WM-3 STOCKPILE MANAGEMENT
WM-4 SPILL PREVENTION AND CONTROL
WM-5 SOLID WASTE MANAGEMENT
WM 8 CONCRETE WASTE MANAGEMENT
WM 9 SANITARY/SEPTIC WASTE MANAGEMENT

2. CONTRACTOR MUST ENSURE THAT THE CONSTRUCTION SITE IS STABILIZED PRIOR TO THE ONSET OF ANY RAIN EVENT TO PREVENT SEDIMENT DELIVERY TO WATERWAYS.
3. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO MINIMIZE EROSION AND PREVENT THE TRANSPORT OF SEDIMENT TO THE ADJACENT STREAM AND SENSITIVE AREAS. CONTRACTOR WILL BE RESPONSIBLE FOR ALL FINES AND CLEANUP OF ANY VIOLATIONS.
4. SUFFICIENT EROSION CONTROL SUPPLIES SHALL BE AVAILABLE ON-SITE AT ALL TIMES TO ADDRESS AREAS SUSCEPTIBLE TO EROSION DURING RAIN EVENTS.
5. MINIMIZE DISTURBANCE OF EXISTING VEGETATION TO THAT NECESSARY TO COMPLETE WORK.
6. ALL HEAVY EQUIPMENT SHALL BE STEAM CLEANED PRIOR TO ENTRY TO THE PROJECT SITE TO INHIBIT THE SPREAD OF EXOTIC SEED. ALL HEAVY EQUIPMENT SHALL BE LEAK FREE UPON ENTRY TO THE PROJECT SITE AND ANY LEAKS SHALL BE REPAIRED IMMEDIATELY.
7. ACTIVITIES SUCH AS VEHICLE WASHING ARE TO BE CARRIED OUT AT AN OFF-SITE FACILITY WHENEVER PRACTICAL.
8. THE CONTRACTOR, AS NECESSARY, SHALL IMPLEMENT OTHER BMPS SPECIFIED IN THE CASQA HANDBOOK DICTATED BY SITE CONDITIONS AND AS DIRECTED BY THE COR. THIS PLAN MAY NOT COVER ALL THE SITUATIONS THAT ARISE DURING CONSTRUCTION DUE TO UNANTICIPATED FIELD CONDITIONS. VARIATIONS MAY BE MADE TO THE PLAN IN THE FIELD SUBJECT TO THE APPROVAL OF OR AT THE DIRECTION OF THE COR.
9. THE CONTRACTOR SHALL MAKE ADEQUATE PREPARATIONS, INCLUDING TRAINING AND EQUIPMENT, TO CONTAIN SPILLS OF OIL AND OTHER HAZARDOUS MATERIALS. SPILL KITS SHALL BE PRESENT AT EACH WORK SITE TO INHIBIT THE SPREAD OF FLUID LEAKS ONTO THE GROUND OR SURROUNDING AREAS.
10. THE CONTRACTOR SHALL PROVIDE COVERED WASTE RECEPTACLE FOR COMMON SOLID WASTE AT CONVENIENT LOCATIONS ON THE JOB SITE AND PROVIDE REGULAR COLLECTION OF WASTES.
11. BOTH ACTIVE AND NON-ACTIVE SOIL AND MATERIAL STOCKPILES SHALL BE PROPERLY PROTECTED TO MINIMIZE SEDIMENT AND POLLUTANT TRANSPORT FROM THE CONSTRUCTION SITE (WM-3).
12. THE CONTRACTOR SHALL PROVIDE SANITARY FACILITIES OF SUFFICIENT NUMBER AND SIZE TO ACCOMMODATE CONSTRUCTION CREWS AND ENSURE ADEQUATE ANCHORAGE OF SUCH FACILITIES TO PREVENT TIPPING BY WEATHER OR VANDALISM.
13. THIS PLAN MAY NOT COVER ALL THE SITUATIONS THAT ARISE DURING CONSTRUCTION DUE TO UNANTICIPATED FIELD CONDITIONS. VARIATIONS MAY BE MADE TO THE PLAN IN THE FIELD SUBJECT TO THE APPROVAL OF OR AT THE DIRECTION OF THE COR.
14. PRIOR TO FINAL ACCEPTANCE, ALL DISTURBED AREAS SHALL BE PERMANENTLY STABILIZED WITH WOOD CHIPS BY CONTRACTOR AND TEMPORARY SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AS SPECIFIED.

EXCAVATION AND FILL

1. THE LIMITED GEOTECHNICAL DESIGN REPORT PREPARED BY SHN IS AVAILABLE UPON REQUEST.
2. EXCAVATION SHALL INCLUDE EXCAVATION AND HANDLING OF SATURATED SOILS. CONTRACTOR SHALL BE PREPARED TO DEWATER AND /OR TRANSPORT SATURATED SOIL IN A MANNER THAT PREVENTS EXCESS DISCHARGE OR SPILLAGE OF SOILS OR WATER WITHIN THE CONSTRUCTION ACCESS AREA OR ON ADJACENT PROPERTIES OR ROADWAYS. SHOULD ANY DISCHARGE OCCUR, THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMMEDIATE AND COMPLETE CLEAN UP. MULTIPLE HANDLING OF MATERIAL MAY BE NECESSARY.
3. EXCAVATED MATERIAL SHALL BE MOISTURE CONDITIONED TO ACHIEVE THE SPECIFIED COMPACTION FOR BACKFILL.
4. UNSUITABLE MATERIAL SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR FOR DISPOSAL IN AN APPROVED LOCATION. UNSUITABLE MATERIAL INCLUDES ORGANIC MATERIAL, CONCRETE, GROUTED RIPRAP, PIPES ALL AND OTHER MANMADE MATERIALS WITHIN THE LIMIT OF DISTURBANCE (LOD).
5. UNLESS OTHERWISE SPECIFIED, TOLERANCE FOR FINISHED GRADING SHALL BE ±0.2 FEET VERTICALLY AND ±0.5 FEET HORIZONTALLY.
6. SUITABLE EXCAVATED MATERIAL SHALL BE STOCKPILED IN THE DESIGNATED CONTRACTOR USE AREA.
7. GRADING MAY BE ADJUSTED AT DIRECTION OF COR TO AVOID TREES AND OTHER FEATURES.
8. THE GROUND SURFACE SHALL BE PREPARED TO RECEIVE FILL BY REMOVING VEGETATION, NON-COMPLYING FILL, TOPSOIL AND OTHER UNSUITABLE MATERIALS, SCARIFYING TO PROVIDE A BOND WITH THE NEW FILL.

UTILITY

1. ALL UTILITIES SHOWN (IF ANY) WERE LOCATED FROM ABOVE GROUND VISUAL STRUCTURES. NO UTILITY RESEARCH WAS CONDUCTED FOR THE SITE. NOTIFY UNDERGROUND SERVICE ALERT (DIGALERT) AT LEAST TWO DAYS PRIOR TO ANY GRADING OR EXCAVATION WITHIN THE SITE BY CALLING 811 OR 1-800-227-2600.
2. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO UTILITIES, FEATURES AND STRUCTURES LOCATED IN THE PROJECT AREA AND CONSTRUCTION ACCESS ROUTES. CONTRACTOR SHALL AVOID DISRUPTION OF ANY UTILITIES UNLESS PREVIOUSLY ARRANGED WITH COR.
3. CONSTRUCTION MAY TAKE PLACE IN THE VICINITY OF OVERHEAD UTILITY LINES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO BE AWARE OF AND OBSERVE THE MINIMUM CLEARANCES FOR WORKERS AND EQUIPMENT OPERATING NEAR HIGH VOLTAGE, AND COMPLY WITH THE SAFETY ORDERS OF THE CALIFORNIA DIVISION OF INDUSTRIAL SAFETY AS WELL AS OTHER APPLICABLE SAFETY REGULATIONS.
4. TELEPHONE, ELECTRIC, WATER AND OTHER UTILITY LINES SHALL BE PROTECTED DURING CONSTRUCTION TO PREVENT INTERRUPTION OF SERVICE.

CONSTRUCTION ACCESS:

1. CONTRACTOR WILL USE THE PRIMARY PRIVATE ROAD FOR CONSTRUCTION ACCESS.
2. CONTRACTOR USE AREAS ARE INDICATED IN THE DRAWINGS.
3. ANY ADDITIONAL AREAS TO BE USED MUST BE APPROVED BY THE COR.

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3 - GENERAL NOTES

DATE
DEC 2020
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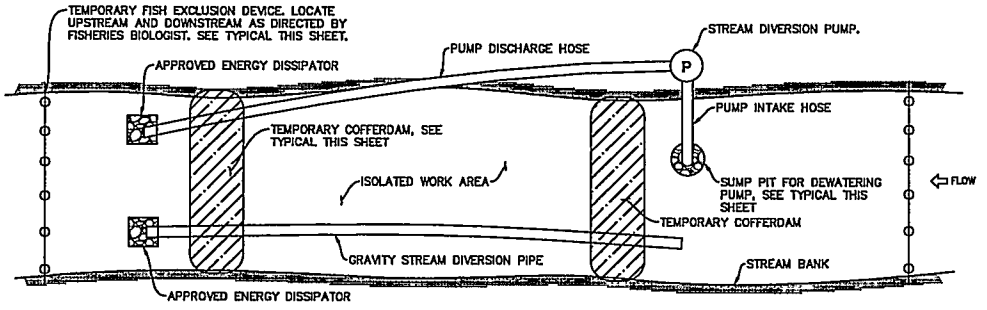
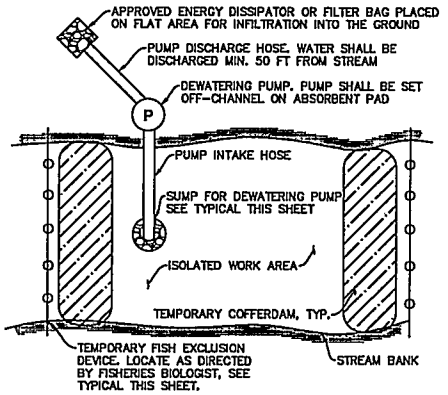
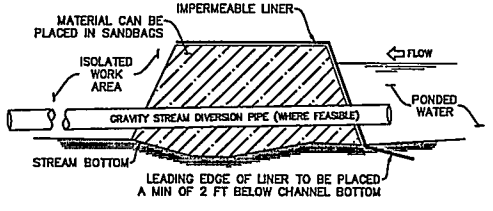
DESIGN
LLANOS / LOVE
DRAWN
LLANOS
SHEET
3 of 7



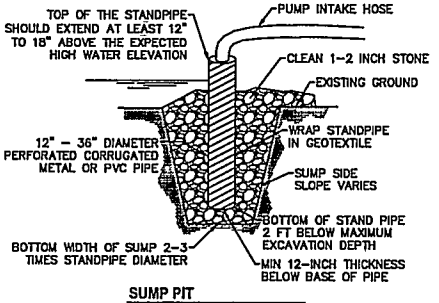
TEMPORARY CLEAR WATER DIVERSION
TYPICAL PLAN (NTS)



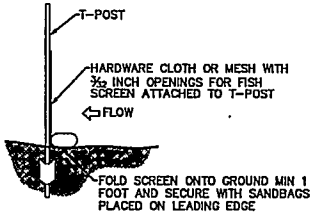
TEMPORARY NUISANCE AND POND DEWATERING MEASURES
TYPICAL PLAN (NTS)



TEMPORARY COFFERDAM
TYPICAL PROFILE (NTS)



SUMP PIT
TYPICAL SECTION (NTS)



TEMPORARY FISH EXCLUSION DEVICE
TYPICAL PROFILE (NTS)

1 TYP WATER MANAGEMENT
TYPICAL

WATER MANAGEMENT

GENERAL

1. THE WATER MANAGEMENT FEATURES (E.G. COFFERDAMS) SHOWN IN THE CONTRACT DRAWINGS ARE APPROXIMATE. THE CONTRACTOR IS TO DESIGN A WATER MANAGEMENT PLAN THAT MEETS THE CONTRACTORS APPROACH TO THE PROJECT WHILE MEETING PERMIT AND OTHER CONSTRAINTS.
2. THE OBJECTIVE OF WATER MANAGEMENT IS TO ISOLATE THE CHANNEL WORK SO THAT WORK IS COMPLETED IN DRY CONDITIONS. TO ACCOMPLISH THIS, THE CONTRACTOR MUST EMPLOY A CLEAR WATER DIVERSION SYSTEM AND A DEWATERING SYSTEM. THE CLEAR WATER DIVERSION SYSTEM BYPASSES CREEK WATER AROUND THE WORK AREA. THE DEWATERING SYSTEM REMOVES "NUISANCE" WATER (E.G. SEEPAGE) FROM WITHIN THE ISOLATED WORK AREA.
3. THE CONTRACTOR MUST SUBMIT A WATER MANAGEMENT PLAN FOR APPROVAL.
4. NO CONSTRUCTION ACTIVITIES ARE PERMITTED UNTIL THE WATER MANAGEMENT PLAN HAS BEEN APPROVED.

SUBMITTALS

THE WATER MANAGEMENT PLAN MUST INCLUDE THE FOLLOWING:

1. SUMMARY OF THE CONTRACTORS WATER MANAGEMENT APPROACH.
2. DESCRIBE THE APPROACH TO COORDINATE THE REMOVAL OF FISH AND OTHER SPECIES FROM THE ISOLATED WORK AREA.
3. DESCRIBE IN DETAIL, INCLUDING GRAPHICAL FIGURES, THE CLEAR WATER DIVERSION SYSTEM. THIS INCLUDES, BUT IS NOT LIMITED TO, LOCATION OF INFRASTRUCTURE, TYPE OF INFRASTRUCTURE, DESIGN FLOW, PIPE SIZE, PIPE MATERIAL, PIPE LENGTH, PIPE ROUTING, ETC., AND PUMP DETAILS, IF UTILIZED.
4. DESCRIBE IN DETAIL, INCLUDING GRAPHICAL FIGURES, THE DEWATERING SYSTEM. THIS INCLUDES, BUT IS NOT LIMITED TO, THE LOCATION OF INFRASTRUCTURE, TYPES OF EQUIPMENT, SIZE OF EQUIPMENT, DISCHARGE LOCATIONS, ETC.
5. DESCRIBE IN DETAIL THE PROCEDURES TO BE EXECUTED SHOULD THE CHANNEL FLOW INCREASE (I.E. BECAUSE OF STORM EVENT).

PRODUCTS

COFFERDAM

1. MAY BE CONSTRUCTED USING NATIVE OR IMPORTED MATERIAL PLACED IN BAGS (E.G. SAND BAGS, SUPERSACKS). NO COFFERDAM MATERIAL MAY BE RELEASED TO THE CHANNEL AT THE COMPLETION OF THE CONSTRUCTION WITHOUT APPROVAL. MATERIAL AND APPROACH TO BE DESCRIBED IN THE WATER MANAGEMENT PLAN.
2. THE IMPERMEABLE LINER MATERIAL TO BE USED SHALL BE IDENTIFIED IN THE WATER MANAGEMENT PLAN.

CLEAR WATER DIVERSION SYSTEM

1. GRAVITY SYSTEM IS PREFERRED. SYSTEM SHALL BE CAPABLE OF CONVEYING ALL OF THE STREAMS FLOW.
2. THE PIPE MATERIAL SHALL BE SELECTED FOR FLEXIBILITY AND DURABILITY TO ALLOW FOR THE OCCASIONAL RELOCATION DURING CONSTRUCTION.
3. THE CONTRACTOR SHALL USE RESTRAINED PIPE JOINTS OR USE FITTINGS AND COUPLINGS THAT PREVENT SEPARATION OF PIPES.
4. THE CONTRACTOR HAS THE OPTION TO USE PUMPING INSTEAD OF GRAVITY FOR THE CLEAR WATER DIVERSION, BUT GRAVITY IS PREFERRED. IF GRAVITY NOT UTILIZED, PRESENT REASONS WITHIN THE WATER MANAGEMENT PLAN.
5. THE PUMP AND PUMPING APPARATUS USED FOR THE CLEAR WATER DIVERSION SHALL BE OF THE SUBMERSIBLE TYPE WITH SUFFICIENT CAPACITY TO PUMP ALL THE STREAMS FLOW.
6. THE CONTRACTOR SHALL PROVIDE BACKUP POWER AND PUMPING EQUIPMENT TO ASSURE THAT THE CLEAR WATER DIVERSION REMAINS FUNCTIONAL THROUGHOUT THE TIME PERIOD THAT THE CHANNEL IS ISOLATED.

DEWATERING SYSTEM

1. THE CONTRACTOR SHALL FURNISH ALL MATERIALS, TOOLS, EQUIPMENT, FACILITIES AND SERVICES AS REQUIRED FOR PROVIDING THE NECESSARY DEWATERING WORK AND FACILITIES, AND PROVIDE BACKUP EQUIPMENT AS NECESSARY FOR REPLACEMENT AND FOR UNANTICIPATED EMERGENCIES.

EXECUTION

1. NO WORK MAY BEGIN UNTIL THE CONTRACTOR'S WATER MANAGEMENT PLAN HAS BEEN APPROVED.
2. PRIOR TO ANY INSTALLATION OF WATER MANAGEMENT FACILITIES, THE FISH REMOVAL WORK MUST BE COMPLETED.
3. INSTALL WATER MANAGEMENT SYSTEMS PER THE APPROVED WATER MANAGEMENT PLAN.
4. REFER TO CONTRACT DRAWING DETAILS FOR ADDITIONAL INFORMATION.
5. ONCE THE IN-CHANNEL WORK IS COMPLETED AND ACCEPTED, REMOVE WATER MANAGEMENT SYSTEMS PER THE APPROVED WATER MANAGEMENT PLAN AS AS DIRECTED.

AQUATIC SPECIES MANAGEMENT

GENERAL

- THE PROJECT AREA WILL LIKELY INCLUDE FISH AND OTHER SPECIES THAT NEED TO BE REMOVED PRIOR TO ANY IN-CHANNEL WORK, INCLUDING THE INSTALLATION OF WATER MANAGEMENT SYSTEMS. THE CONTRACTOR SHALL WORK WITH THE COR TO COORDINATE THE REMOVAL OF FISH AND OTHER SPECIES.
- NO WORK MAY BE COMPLETED UNTIL THE WATER MANAGEMENT PLAN HAS BEEN APPROVED.

PRODUCTS

- REFER TO DRAWING DETAILS FOR PRODUCT INFORMATION.

EXECUTION

- THE CONTRACTOR MUST COORDINATE WITH THE CONTRACT OWNER AND THEIR BIOLOGIST. IT IS THE CONTRACTORS RESPONSIBILITY TO NOTIFY THE CONTRACT OWNER AT LEAST ONE WEEK PRIOR TO NEEDING THE BIOLOGIST'S SERVICES.

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4 - WATER MANAGEMENT

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DEC 2020
SUBMITTAL
35% DESIGN
DESIGN
LLANOS / LOVE
DRAWN
LLANOS
SHEET
4 of 7

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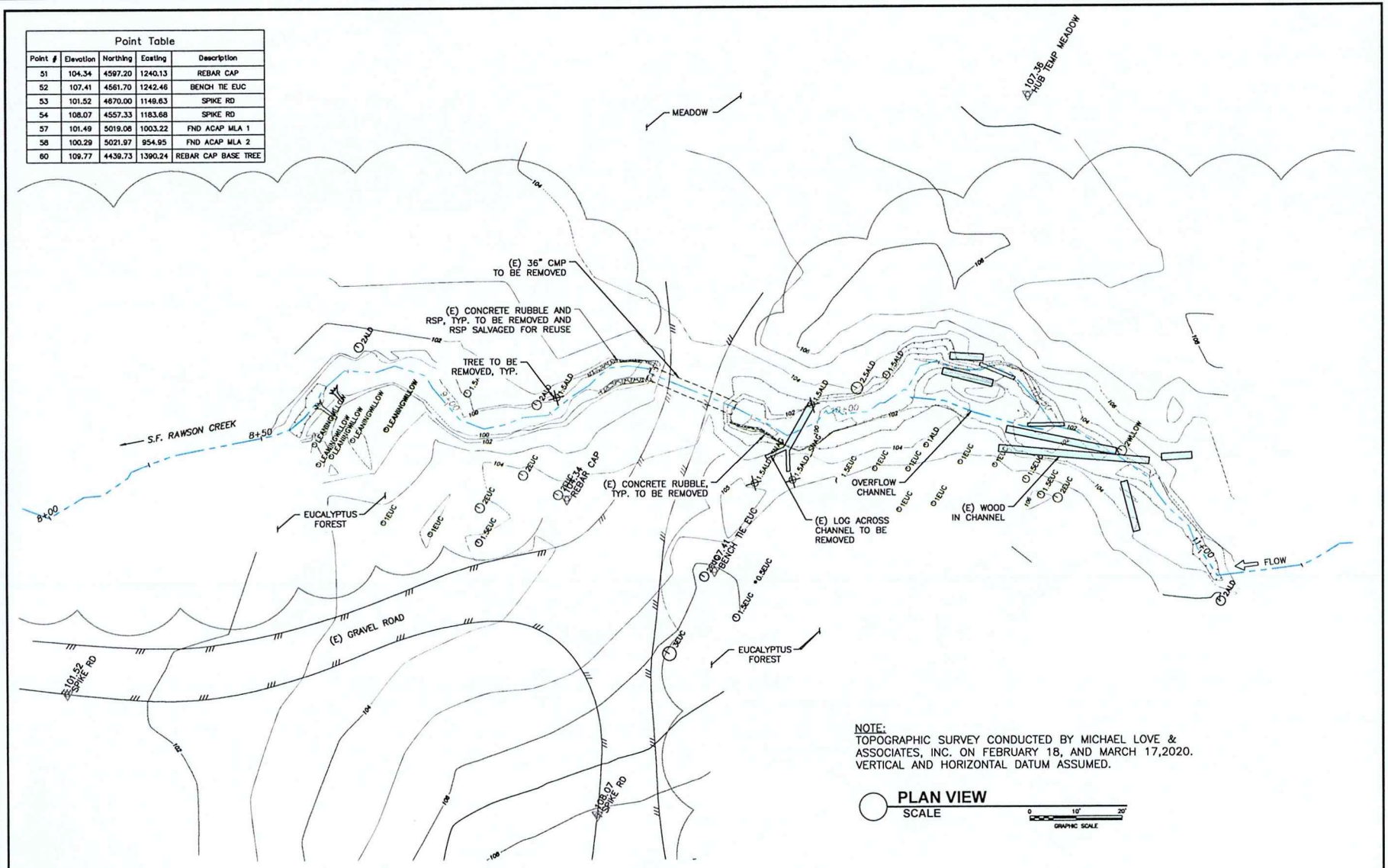
Point Table				
Point #	Elevation	Northing	Easting	Description
51	104.34	4597.20	1240.13	REBAR CAP
52	107.41	4561.70	1242.46	BENCH TIE EUC
53	101.52	4670.00	1149.63	SPIKE RD
54	108.07	4557.33	1183.68	SPIKE RD
57	101.49	5019.08	1003.22	FND ACAP MLA 1
58	100.29	5021.97	954.95	FND ACAP MLA 2
60	109.77	4439.73	1390.24	REBAR CAP BASE TREE



NOTE:
TOPOGRAPHIC SURVEY CONDUCTED BY MICHAEL LOVE & ASSOCIATES, INC. ON FEBRUARY 18, AND MARCH 17,2020. VERTICAL AND HORIZONTAL DATUM ASSUMED.

PLAN VIEW
SCALE 0 10' 20'
GRAPHIC SCALE

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5 - EXISTING CONDITIONS

DATE	
SUBMITTAL	DEC 2020
DESIGN	35% DESIGN
DRAWN	LLANOS / LOVE
SHEET	LLANOS
	5 of 7

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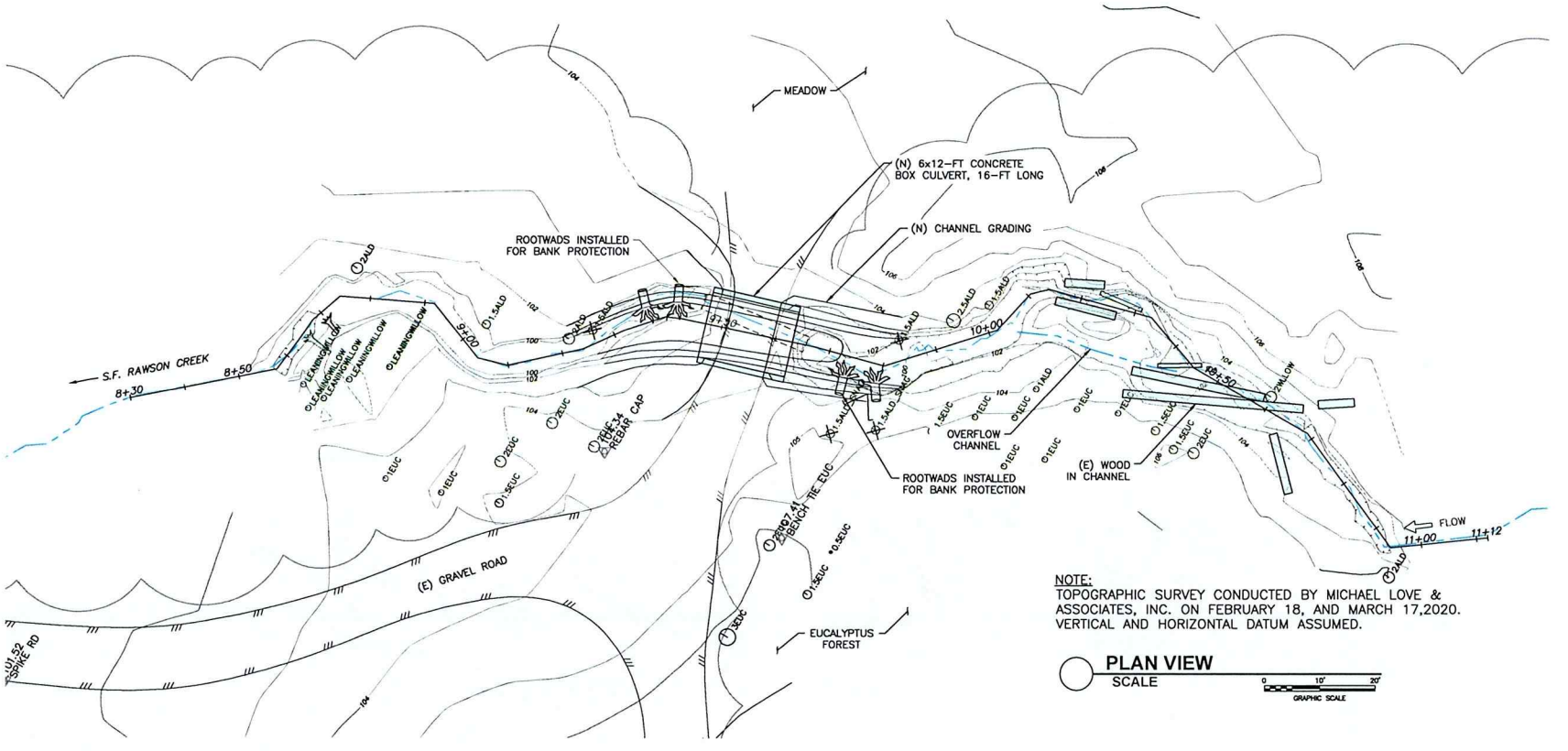
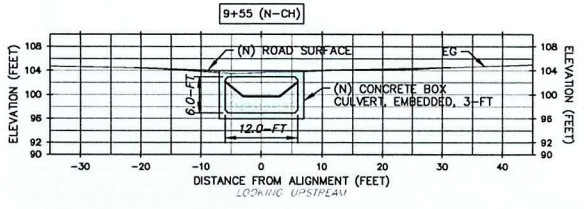


NOTE:
TOPOGRAPHIC SURVEY CONDUCTED BY MICHAEL LOVE & ASSOCIATES, INC. ON FEBRUARY 18, AND MARCH 17,2020. VERTICAL AND HORIZONTAL DATUM ASSUMED.

PLAN VIEW
SCALE 0 10' 20'
GRAPHIC SCALE



SECTION VIEW
SCALE 0 10' 20'
GRAPHIC SCALE

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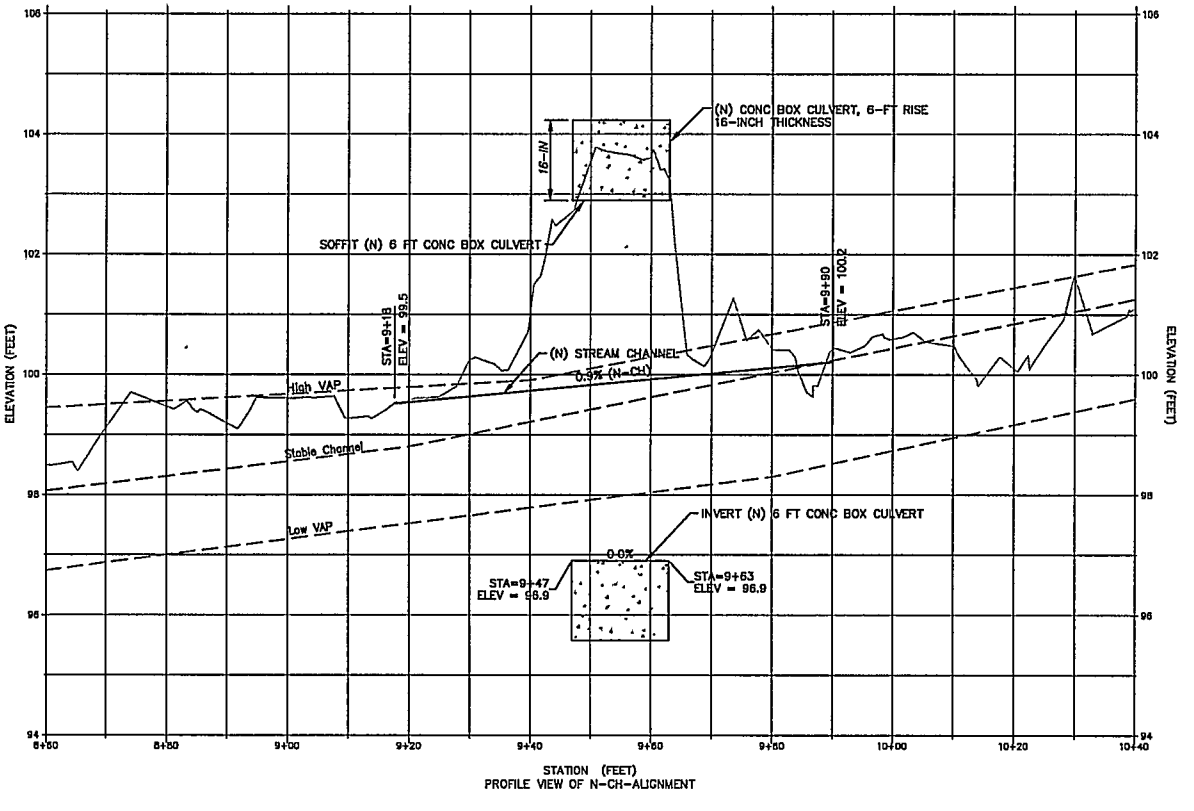
6 - NEW CROSSING LAYOUT

DATE	DEC 2020
SUBMITTAL	35% DESIGN
DESIGN	LLANOS / LOVE
DRAWN	LLANOS
SHEET	6 of 7



PROFILE VIEW
SCALE:
(VERTICAL EXAGGERATION 10:1)

GRAPHIC SCALE

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CROSSING PROFILE

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DEC 2020	SUBMITTAL
35% DESIGN	DESIGN
LLANOS / LOVE	DRAWN
LLANOS	SHEET
7 of 7	

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Attachment 2: Hydrologic Calculations

Peak Flow Calculation Summary
Rawson Creek at Crossing #3

Method	Q-1yr (cfs)	Q-1.5yr (cfs)	Q-2yr (cfs)	Q-5yr (cfs)	Q-10yr (cfs)	Q-25yr (cfs)	Q-50yr (cfs)	Q-100yr (cfs)
LPIII Analysis of Stream Gages (Average of 3)		32	43	75	100	134	161	190
North Coast Regional Regression Equations	36	63	45	82	108	143	169	197

[1]Peak Flow Calculation Summary - Rawson Creek
Rawson Creek Near Smith River, CA (41.904220°N, -124.139361°W)

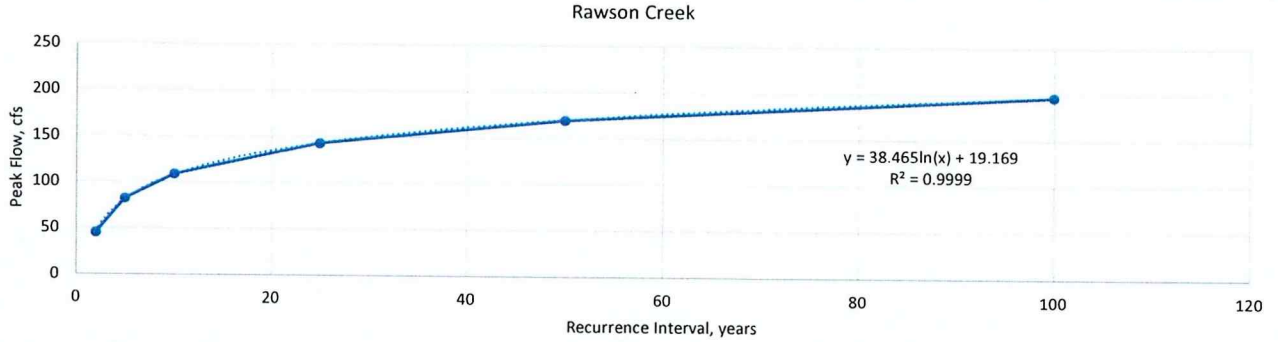
Reach	Q-1yr (cfs)	Q-1.5yr (cfs)	Q-2yr (cfs)	Q-5yr (cfs)	Q-10yr (cfs)	Q-25yr (cfs)	Q-50yr (cfs)	Q-100yr (cfs)	A Drainage Area (mi^2)	P Mean Annual Precipitation (in)
Rawson Creek	36	63	45	82	108	143	169	197	0.31	76.8

[1] Estimates using regional regression equations developed for the North Coast Region of California by the USGS (Gotvald, Barth, Veilleux, and Parrett, 2012).

$Q2\text{-yr} = 1.82\ A^{0.904}\ P^{0.983}$ $Q5\text{-yr} = 8.11\ A^{0.887}\ P^{0.772}$

$Q10\text{-yr} = 14.8\ A^{0.88}\ P^{0.696}$ $Q25\text{-yr} = 26.0\ A^{0.874}\ P^{0.628}$

$Q50\text{-yr} = 36.3\ A^{0.87}\ P^{0.589}$ $Q100\text{-yr} = 48.5\ A^{0.866}\ P^{0.556}$



Log Pearson Type III Probabilistic Analysis

Rawson Creek at Crossing #3

Peak flows were estimated using a Log-Pearson type III distribution as described in Bulletin 17B (Guidelines for Determining Flood Flow Frequency, 1982).

Stream Name	Location	Drainage Area (mi^2)	Recurrence Interval of Peak Flows						
			1.5-yr (cfs/mi^2)	2-yr (cfs/mi^2)	5-yr (cfs/mi^2)	10-yr (cfs/mi^2)	25-yr (cfs/mi^2)	50-yr (cfs/mi^2)	100-yr (cfs) (cfs/mi^2)
Little Lost Man Creek	Orick, CA	3.46	58.89	81.47	147.47	197.56	266.30	320.67	377.04
Lopez Creek	Smith River, CA	0.92	117.50	165.35	311.36	427.04	591.51	725.71	868.71
Harris Creek	Brookings, OR	1.05	137.37	172.92	270.36	341.61	438.52	515.36	595.97
		Average	104.59	139.91	243.06	322.07	432.11	520.58	613.91

Rawson Creek at Crossing #3							
Drainage Area (mi^2)	Q 1.5-yr (cfs)	Q 2-yr (cfs)	Q 5-yr (cfs)	Q 10-yr (cfs)	Q 25-yr (cfs)	Q 50-yr (cfs)	Q 100-yr (cfs)
0.31	32.42	43.37	75.35	99.84	133.95	161.38	190.31

Flood Frequency based on Annual Maximum Series

USGS 11482468 Little Lost Man C A Site No 2 Nr Orick Ca

Station #: 11482468

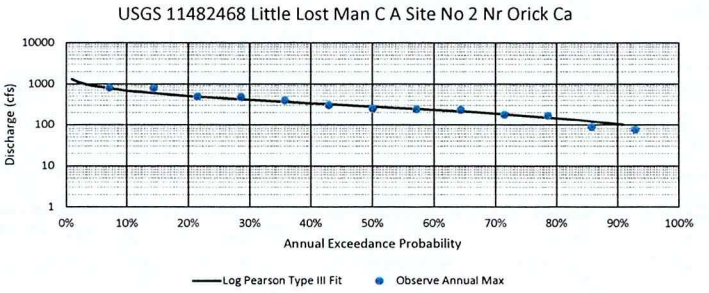
Drainage Area (sq. miles) 3.46

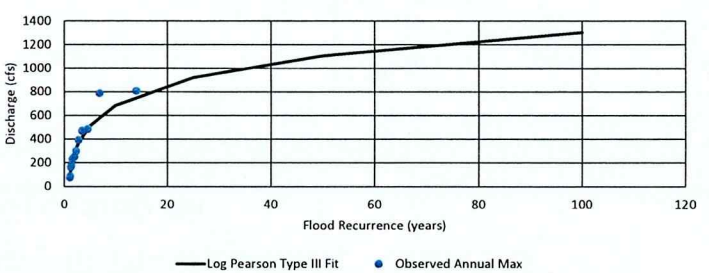
Maximum Daily Average Discharge

Water Year	Date of Peak	Discharge (cfs)
1975	03/18/75	808.0
1976	02/16/76	165.0
1977	09/28/77	88.0
1978	12/14/77	391.0
1979	01/11/79	177.0
1980	03/14/80	230.0
1981	12/02/80	240.0
1982	12/19/81	486.0
1985	11/12/84	252.0
1986	02/17/86	787.0
1987	01/03/87	76.0
1988	12/10/87	301.0
1989	11/22/88	471.0

RANK	Recurrence Interval (years)	Annual Exceedance Probability	Discharge (cfs)	Discharge (cms)	Log-Discharge (cfs)
1	14.00	0.07	808.0	22.88	2.91
2	7.00	0.14	787.0	22.29	2.90
3	4.67	0.21	486.0	13.76	2.69
4	3.50	0.29	471.0	13.34	2.67
5	2.80	0.36	391.0	11.07	2.59
6	2.33	0.43	301.0	8.52	2.48
7	2.00	0.50	252.0	7.14	2.40
8	1.75	0.57	240.0	6.80	2.38
9	1.56	0.64	230.0	6.51	2.36
10	1.40	0.71	177.0	5.01	2.25
11	1.27	0.79	165.0	4.67	2.22
12	1.17	0.86	88.0	2.49	1.94
13	1.08	0.93	76.0	2.15	1.88

Sample Size, n =	13		
Skewness =	1.03	1.03	-0.22
Mean=	344.00	9.74	2.44
Median=	252.00	7.14	2.40
Std Dev=	238.30	6.75	0.32
Outliers			
	Kn=	2.335	
	Q_{LOW}	49.08 cfs	
	Q_{HIGH}	1517.21 cfs	





Generalized Skew=	-0.3	A=	-0.312413121
Station Skewness (log Q)=	-0.22	B=	0.882842643
Station Mean (log Q)=	2.44	MSE	
Station Median (log Q)=	2.40	(station skew) =	0.38636
Station Std Dev (log Q)=	0.32		
Weighted Skewness (G_W)=	-0.26		

Log Pearson Type III Distribution

Return Period (years)	Exceedence Probability	Log-Pearson K	Est. Discharge [mean] (cfs)	Est. Discharge [median] (cfs)
1.1	0.909	-1.35010	101.2040	93.4561
1.2	0.833	-0.98622	132.2224	122.0998
1.5	0.667	-0.39751	203.7754	188.1749
2.0	0.500	0.04406	281.8712	260.2918
2.33	0.429	0.21941	320.6270	296.0805
2.4	0.417	0.25395	328.8678	303.6905
2.6	0.385	0.34239	350.9463	324.0787
2.8	0.357	0.41819	371.0468	342.6403
5.0	0.200	0.85180	510.2510	471.1874
10	0.100	1.24976	683.5435	631.2130
25	0.040	1.65620	921.4096	850.8687
50	0.020	1.90907	1109.5351	1024.5917
100	0.010	2.12948	1304.5725	1204.6976

Values From K-Table for Linear interpolation

Weighted Skewness =	-0.30	-0.20	-0.26
P	K	K	K
0.9	-1.30936	-1.30105	-1.30644
0.8	-0.82377	-0.83044	-0.82612
0.7	-0.48600	-0.49927	-0.49067
0.6	-0.20552	-0.22168	-0.21120
0.500	0.04993	0.03325	0.04406
0.429	0.22492	0.20925	0.21941
0.200	0.85285	0.84986	0.85180
0.100	1.24516	1.25824	1.24976
0.040	1.64329	1.67999	1.65620
0.020	1.88959	1.94499	1.90907
0.010	2.10294	2.17840	2.12948

Flood Frequency based on Annual Maximum Series

USGS 11533000 Lopez Creek Near Smith River, CA

Station #: 11533000

Drainage Area (sq. miles) 0.92

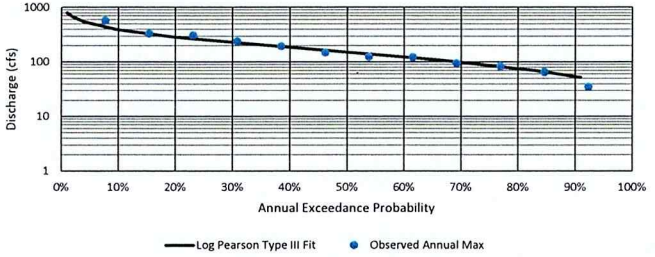
Maximum Daily Average Discharge

Water Year	Date of Peak	Discharge (cfs)
1962	11/23/61	305.0
1963	05/06/63	330.0
1964	01/19/64	65.0
1965	12/22/64	84.0
1966	01/06/66	149.0
1967	11/15/66	95.0
1968	02/23/68	239.0
1969	01/12/69	123.0
1970	01/22/70	195.0
1971	01/16/71	125.0
1972	03/02/72	570.0
1973	01/16/73	35.0

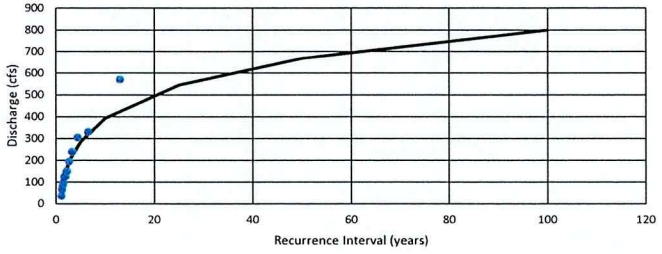
RANK	Recurrence Interval (years)	Annual Exceedance Probability	Discharge (cfs)	Discharge (cms)	Log-Discharge (cfs)
1	13.00	0.08	570.0	16.14	2.76
2	6.50	0.15	330.0	9.34	2.52
3	4.33	0.23	305.0	8.64	2.48
4	3.25	0.31	239.0	6.77	2.38
5	2.60	0.38	195.0	5.52	2.29
6	2.17	0.46	149.0	4.22	2.17
7	1.86	0.54	125.0	3.54	2.10
8	1.63	0.62	123.0	3.48	2.09
9	1.44	0.69	95.0	2.69	1.98
10	1.30	0.77	84.0	2.38	1.92
11	1.18	0.85	65.0	1.84	1.81
12	1.08	0.92	35.0	0.99	1.54

Sample Size, n =	12		
Skewness =	1.55	1.55	-0.09
Mean=	192.92	5.46	2.17
Median=	137.00	3.88	2.14
Std Dev=	150.71	4.27	0.34
Outliers			
Kn=	2.335		
Q_{LOW}	24.18 cfs		
Q_{HIGH}	906.90 cfs		

USGS 11533000 Lopez Creek Near Smith River, CA



USGS 11533000 Lopez Creek Near Smith River, CA



Generalized Skew=	-0.3	A=	-0.323103133
Station Skewness (log Q)=	-0.09	B=	0.917585181
Station Mean (log Q)=	2.17	MSE	
Station Median (log Q)=	2.14	(station skew) =	0.40201
Station Std Dev (log Q)=	0.34		
Weighted Skewness (G_W)=	-0.21		

Log Pearson Type III Distribution

Return Period (years)	Exceedence Probability	Log-Pearson K	Est. Discharge [mean] (cfs)	Est. Discharge [median] (cfs)
1.1	0.909	-1.34463	52.1529	48.0637
1.2	0.833	-0.98717	68.8283	63.4317
1.5	0.667	-0.40556	108.0957	99.6203
2.0	0.500	0.03463	152.1187	140.1915
2.33	0.429	0.21055	174.3725	160.7005
2.4	0.417	0.24548	179.1647	165.1169
2.6	0.385	0.33492	192.0437	176.9862
2.8	0.357	0.41159	203.8173	187.8367
5.0	0.200	0.85011	286.4517	263.9919
10	0.100	1.25716	392.8740	362.0700
25	0.040	1.67695	544.1903	501.5221
50	0.020	1.94040	667.6529	615.3043
100	0.010	2.17214	799.2170	736.5529

Values From K-Table for Linear interpolation

Weighted Skewness =	-0.30	-0.20	-0.21
P	K	K	K
0.9	-1.30936	-1.30105	-1.30174
0.8	-0.82377	-0.83044	-0.82989
0.7	-0.48600	-0.49927	-0.49817
0.6	-0.20552	-0.22168	-0.22034
0.500	0.04993	0.03325	0.03463
0.429	0.22492	0.20925	0.21055
0.200	0.85285	0.84986	0.85011
0.100	1.24516	1.25824	1.25716
0.040	1.64329	1.67999	1.67695
0.020	1.88959	1.94499	1.94040
0.010	2.10294	2.17840	2.17214

Flood Frequency based on Annual Maximum Series

USGS 14378800 Harris Creek near Brookings, OR

Station #: 14378800

Drainage Area (sq. miles) 1.05

Maximum Daily Average Discharge

Water Year	Date of Peak	Discharge (cfs)
1953	1/17/1953	436.0
1954	11/22/1953	297.0
1955	12/30/1954	439.0
1957	12/11/1956	251.0
1959	1/12/1959	109.0
1960	5/26/1960	136.0
1961	2/10/1961	118.0
1962	11/22/1961	205.0
1963	5/6/1963	186.0
1964	11/8/1963	84.0
1965	4/19/1965	104.0
1966	12/28/1965	128.0
1967	11/19/1966	149.0
1968	2/20/1968	269.0

RANK	Recurrence Interval (years)	Annual Exceedance Probability	Discharge (cfs)	Discharge (cms)	Log-Discharge (cfs)
1	15.00	0.07	436.0	12.35	2.64
2	7.50	0.13	439	12.43	2.64
3	5.00	0.20	297	8.41	2.47
4	3.75	0.27	269	7.62	2.43
5	3.00	0.33	251	7.11	2.40
6	2.50	0.40	205	5.80	2.31
7	2.14	0.47	186	5.27	2.27
8	1.88	0.53	149	4.22	2.17
9	1.67	0.60	136	3.85	2.13
10	1.50	0.67	128	3.62	2.11
11	1.36	0.73	118	3.34	2.07
12	1.25	0.80	109	3.09	2.04
13	1.15	0.87	104	2.94	2.02
14	1.07	0.93	84	2.38	1.92

Sample Size, n =	14		
Skewness =	1.08	1.08	0.39
Mean=	207.93	5.89	2.26
Median=	167.50	4.74	2.22
Std Dev=	117.17	3.32	0.23
Outliers			
	Kn=	2.335	
	Q_{LOW}	52.63 cfs	
	Q_{HIGH}	627.05 cfs	

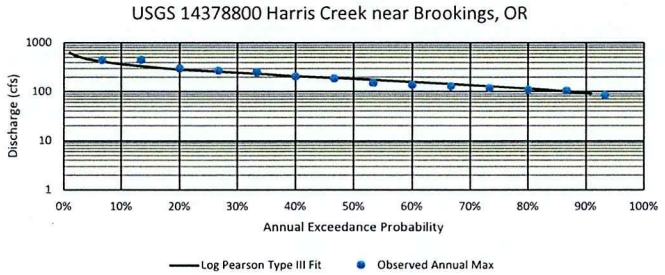
Generalized Skew=	-0.3	A=	-0.298683262
Station Skewness (log Q)=	0.39	B=	0.838220601
Station Mean (log Q)=	2.26	MSE	
Station Median (log Q)=	2.22	(station skew) =	0.37917
Station Std Dev (log Q)=	0.23		
Weighted Skewness (G_W)=	0.01		

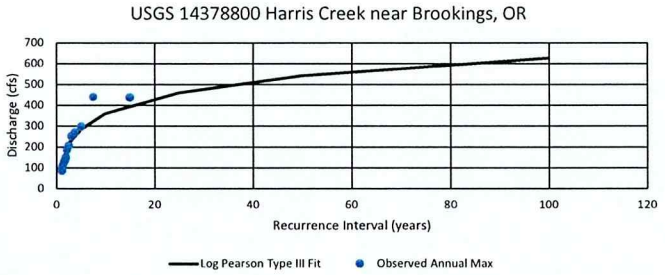
Log Pearson Type III Distribution

Return Period (years)	Exceedence Probability	Log-Pearson K	Est. Discharge [mean] (cfs)	Est. Discharge [median] (cfs)
1.1	0.909	-1.32072	90.1509	82.6108
1.2	0.833	-0.98822	107.5432	98.5485
1.5	0.667	-0.43491	144.2360	132.1724
2.0	0.500	-0.00109	181.5646	166.3789
2.33	0.429	0.17627	199.4788	182.7948
2.4	0.417	0.21259	203.3602	186.3515
2.6	0.385	0.30559	213.6461	195.7771
2.8	0.357	0.38530	222.8756	204.2347
5.0	0.200	0.84128	283.8738	260.1311
10	0.100	1.28222	358.6951	328.6945
25	0.040	1.75292	460.4482	421.9371
50	0.020	2.05724	541.1305	495.8713
100	0.010	2.33116	625.7721	573.4337

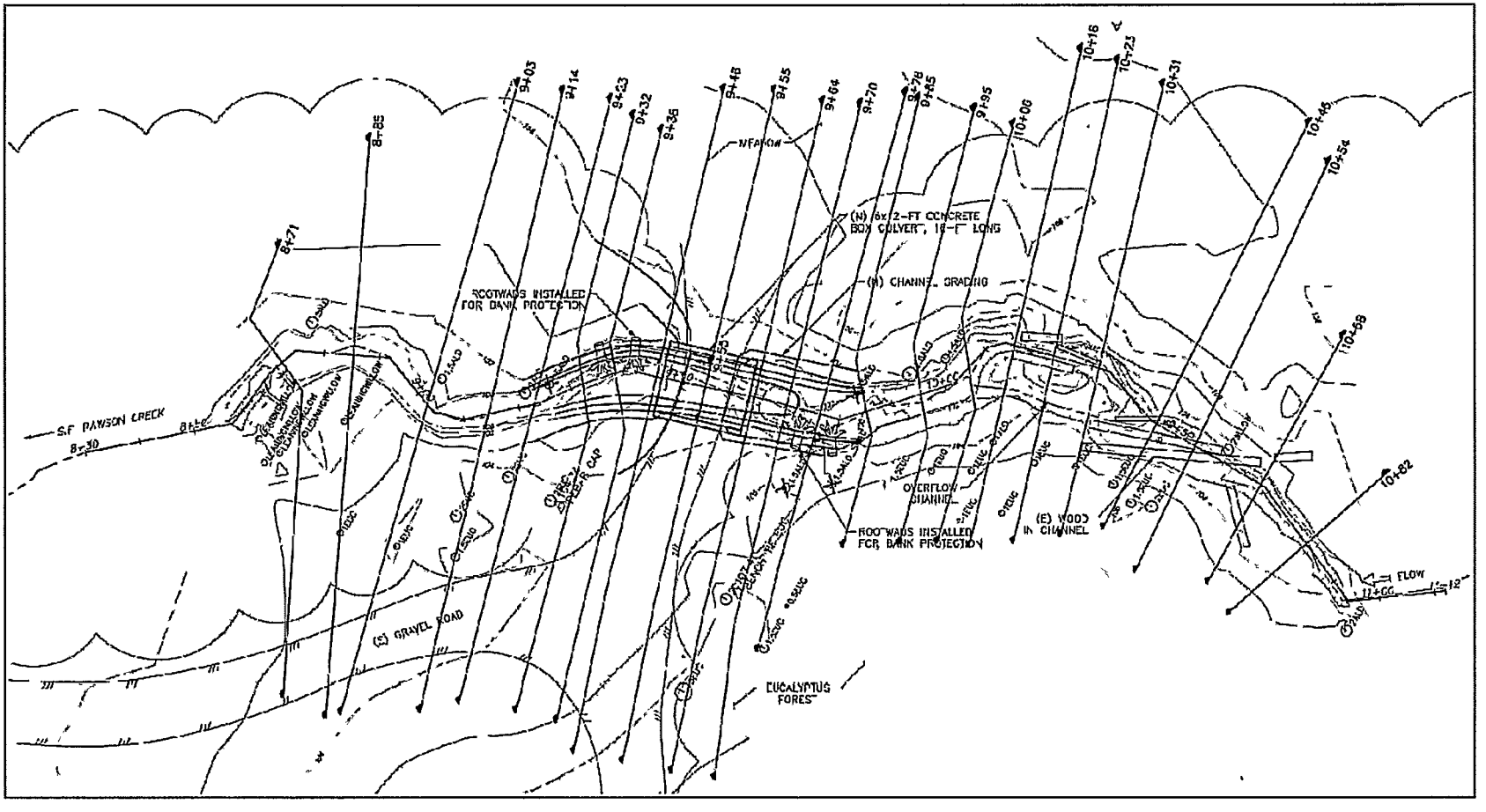
Values From K-Table for Linear interpolation

Weighted Skewness =	0.00	0.10	0.01
P	K	K	K
0.9	-1.28155	-1.27037	-1.28082
0.8	-0.84162	-0.84611	-0.84191
0.7	-0.52440	-0.53624	-0.52518
0.6	-0.25335	-0.26882	-0.25437
0.500	0.00000	-0.01662	-0.00109
0.429	0.17733	0.16111	0.17627
0.200	0.84162	0.83639	0.84128
0.100	1.28155	1.29178	1.28222
0.040	1.75069	1.78462	1.75292
0.020	2.05375	2.10697	2.05724
0.010	2.32635	2.39961	2.33116

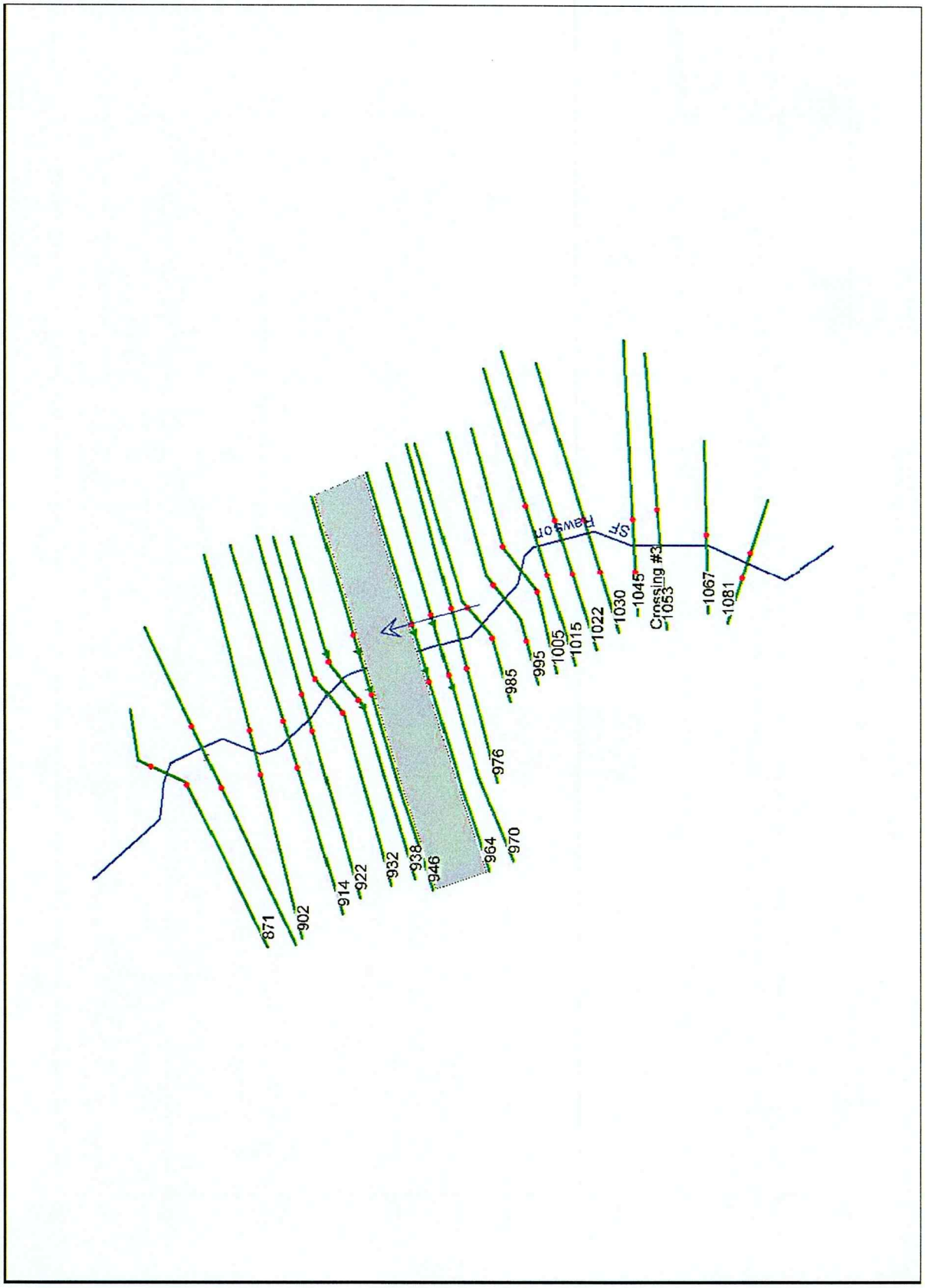


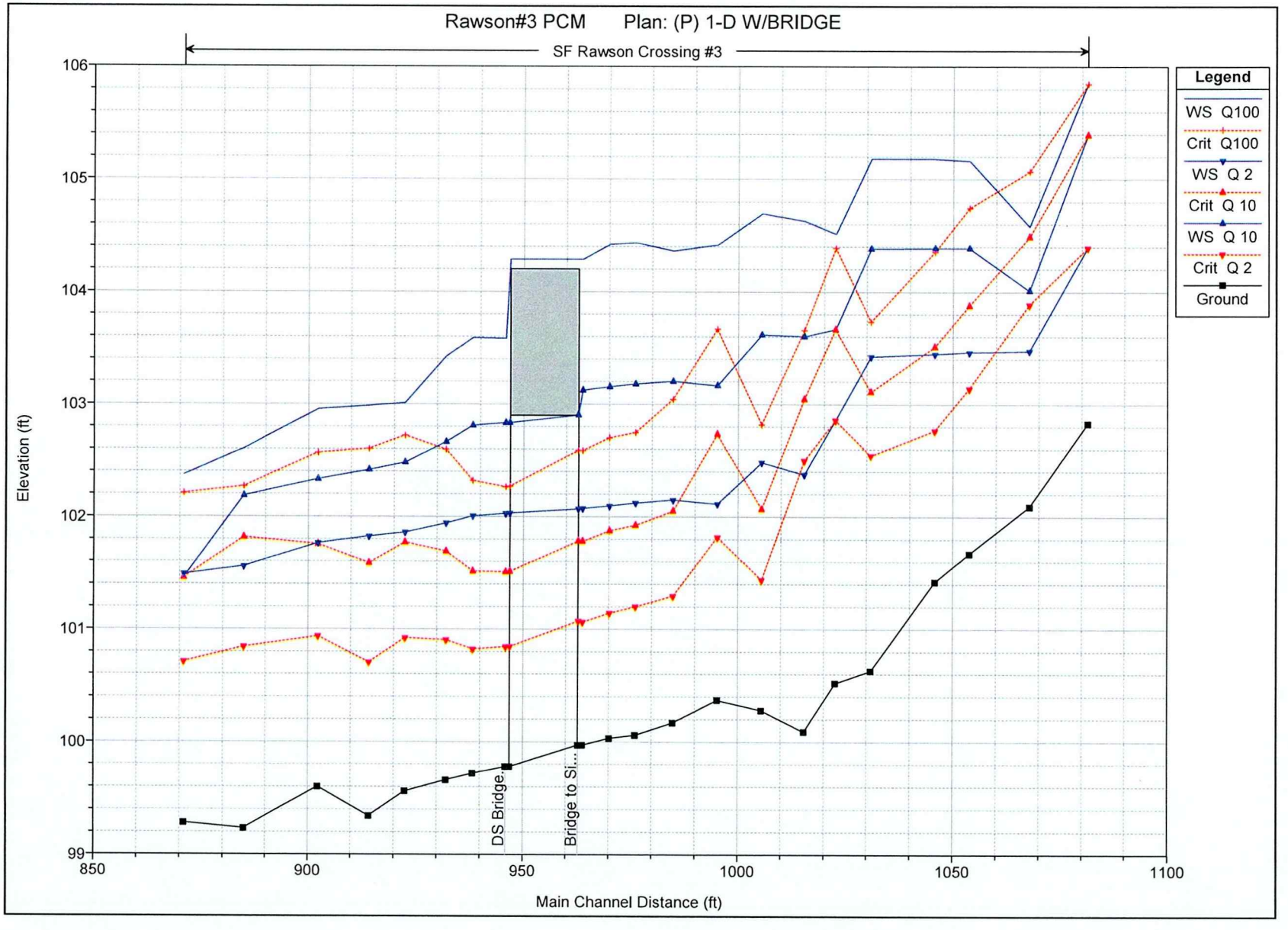


Attachment 3: HEC-RAS Results



HEC RAS Model domain for South Fork Rawson Creek, Crossing No. 3.


Hanson
St
Crossing #3
871
902
914
922
932
938
946
964
970
976
985
995
1005
1015
1022
1030
1045
1053
1067
1081


Rawson#3 PCM Plan: (P) 1-D W/BRIDGE
SF Rawson Crossing #3
Legend
WS Q100
Crit Q100
WS Q 2
Crit Q 10
WS Q 10
Crit Q 2
Ground
Elevation (ft)
106
105
104
103
102
101
100
99
850
900
950
1000
1050
1100
Main Channel Distance (ft)
DS Bridge...
Bridge to Si...

Plan: P 1-D SF Rawson Crossing #3 RS: 955 Profile: Q100

E.G. US. (ft)	104.57	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	104.29	E.G. Elev (ft)	104.57	104.51
Q Total (cfs)	190.00	W.S. Elev (ft)	104.29	104.29
Q Bridge (cfs)	174.21	Crit W.S. (ft)	102.59	102.27
Q Weir (cfs)	15.79	Max Chl Dpth (ft)	4.32	4.51
Weir Sta Lft (ft)	52.94	Vel Total (ft/s)	6.48	5.44
Weir Sta Rgt (ft)	95.60	Flow Area (sq ft)	29.32	34.96
Weir Submerg	0.00	Froude # Chl	0.56	0.46
Weir Max Depth (ft)	0.37	Specif Force (cu ft)	111.87	119.38
Min El Weir Flow (ft)	104.21	Hydr Depth (ft)	1.22	0.77
Min El Prs (ft)	102.90	W.P. Total (ft)	50.69	72.44
Delta EG (ft)	0.63	Conv. Total (cfs)		
Delta WS (ft)	0.70	Top Width (ft)	23.97	45.16
BR Open Area (sq ft)	27.32	Frctn Loss (ft)		
BR Open Vel (ft/s)	6.38	C & E Loss (ft)		
BR Sluice Coef		Shear Total (lb/sq ft)		
BR Sel Method	Press/Weir	Power Total (lb/ft s)		

Plan: P 1-D SF Rawson Crossing #3 RS: 955 Profile: Q 10

E.G. US. (ft)	103.30	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	103.12	E.G. Elev (ft)	103.30	103.00
Q Total (cfs)	100.00	W.S. Elev (ft)	102.90	102.83
Q Bridge (cfs)	100.00	Crit W.S. (ft)	101.78	101.51
Q Weir (cfs)		Max Chl Dpth (ft)	2.93	3.05
Weir Sta Lft (ft)		Vel Total (ft/s)	3.66	3.28
Weir Sta Rgt (ft)		Flow Area (sq ft)	27.32	30.44
Weir Submerg		Froude # Chl	0.43	0.36
Weir Max Depth (ft)		Specif Force (cu ft)	46.74	51.71
Min El Weir Flow (ft)	104.21	Hydr Depth (ft)	2.28	2.54
Min El Prs (ft)	102.90	W.P. Total (ft)	13.53	13.47
Delta EG (ft)	0.30	Conv. Total (cfs)	1297.2	1558.0
Delta WS (ft)	0.29	Top Width (ft)	12.00	12.00
BR Open Area (sq ft)	27.32	Frctn Loss (ft)		
BR Open Vel (ft/s)	3.66	C & E Loss (ft)		
BR Sluice Coef	0.37	Shear Total (lb/sq ft)	0.75	0.58
BR Sel Method	Press Only	Power Total (lb/ft s)	2.74	1.91

HEC-RAS Plan: P 1-D River: SF Rawson Reach: Crossing #3 Profile: Q 2

Reach	River Sta	Profile	Max Chl Dpth	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Chan
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
Crossing #3	1081	Q 2	1.56	102.83	104.39	104.39	104.92	0.007327	2.64	11.08	12.40	0.43	0.48
Crossing #3	1067	Q 2	1.38	102.09	103.47	103.89	104.60	0.124040	8.51	5.05	6.16	1.66	5.68
Crossing #3	1053	Q 2	1.79	101.67	103.46	103.14	103.72	0.017593	4.05	10.62	9.25	0.67	1.14
Crossing #3	1045	Q 2	2.02	101.42	103.44	102.77	103.59	0.008141	3.06	14.07	10.22	0.46	0.62
Crossing #3	1030	Q 2	2.79	100.63	103.42	102.54	103.49	0.003662	2.02	21.30	15.66	0.31	0.27
Crossing #3	1022	Q 2	2.34	100.52	102.86	102.86	103.36	0.059048	5.71	7.54	7.78	1.02	2.59
Crossing #3	1015	Q 2	2.28	100.09	102.37	102.50	102.89	0.070758	5.77	7.45	9.91	1.17	2.76
Crossing #3	1005	Q 2	2.20	100.28	102.48	101.44	102.55	0.003096	2.11	20.40	12.77	0.29	0.28
Crossing #3	995	Q 2	1.74	100.37	102.11	101.82	102.46	0.022412	4.70	9.15	7.03	0.73	1.52
Crossing #3	985	Q 2	1.98	100.17	102.15	101.29	102.28	0.006254	2.90	14.81	8.92	0.40	0.54
Crossing #3	976	Q 2	2.06	100.06	102.12	101.20	102.22	0.004888	2.58	16.64	10.60	0.36	0.42
Crossing #3	970	Q 2	2.06	100.03	102.09	101.14	102.19	0.004644	2.52	17.04	10.86	0.36	0.40
Crossing #3	964	Q 2	2.10	99.97	102.07	101.06	102.16	0.003992	2.42	17.80	11.05	0.33	0.36
Crossing #3	955 BR U	Q 2	2.10	99.97	102.07	101.07	102.16	0.004025	2.42	17.75	10.84	0.33	0.37
Crossing #3	955 BR D	Q 2	2.25	99.78	102.03	100.85	102.09	0.002534	2.06	20.87	11.57	0.27	0.26
Crossing #3	946	Q 2	2.25	99.78	102.03	100.84	102.09	0.002546	2.06	20.84	12.20	0.27	0.26
Crossing #3	938	Q 2	2.28	99.72	102.00	100.82	102.07	0.002843	2.09	20.59	12.22	0.28	0.27
Crossing #3	932	Q 2	2.28	99.66	101.94	100.90	102.04	0.004654	2.54	16.94	10.60	0.35	0.41
Crossing #3	922	Q 2	2.30	99.56	101.86	100.92	101.99	0.006333	2.87	15.01	9.61	0.40	0.53
Crossing #3	914	Q 2	2.48	99.34	101.82	100.71	101.93	0.004865	2.70	16.32	11.48	0.35	0.45
Crossing #3	902	Q 2	2.16	99.60	101.76	100.94	101.87	0.005493	2.69	16.57	15.37	0.38	0.46
Crossing #3	885	Q 2	2.32	99.23	101.55	100.84	101.73	0.011641	3.38	12.71	10.02	0.53	0.79
Crossing #3	871	Q 2	2.21	99.28	101.49	100.71	101.60	0.006011	2.70	16.14	13.50	0.40	0.48

HEC-RAS Plan: P 1-D River: SF Rawson Reach: Crossing #3 Profile: Q 5

Reach	River Sta	Profile	Max Chl Dpth	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Chan
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
Crossing #3	1081	Q 5	2.12	102.83	104.95	104.95	105.53	0.003580	2.24	18.80	15.59	0.31	0.32
Crossing #3	1067	Q 5	1.73	102.09	103.82	104.32	105.29	0.174188	9.74	7.70	10.15	1.97	7.56
Crossing #3	1053	Q 5	2.37	101.67	104.04	103.59	104.36	0.016090	4.55	16.49	11.16	0.66	1.33
Crossing #3	1045	Q 5	2.61	101.42	104.03	103.20	104.22	0.010023	3.57	21.03	14.34	0.52	0.82
Crossing #3	1030	Q 5	3.39	100.63	104.02	102.89	104.11	0.003567	2.43	30.92	16.87	0.31	0.36
Crossing #3	1022	Q 5	2.83	100.52	103.35	103.35	103.98	0.053704	6.34	11.82	9.53	1.00	2.96
Crossing #3	1015	Q 5	3.05	100.09	103.14	102.85	103.42	0.020013	4.24	17.70	14.92	0.69	1.26
Crossing #3	1005	Q 5	2.89	100.28	103.17	101.82	103.26	0.003419	2.49	30.10	15.76	0.32	0.37
Crossing #3	995	Q 5	2.30	100.37	102.67	102.36	103.15	0.025339	5.56	13.49	8.83	0.79	2.02
Crossing #3	985	Q 5	2.54	100.17	102.71	101.75	102.93	0.008457	3.71	20.22	10.52	0.47	0.83
Crossing #3	976	Q 5	2.62	100.06	102.68	101.64	102.85	0.006073	3.26	23.00	11.97	0.41	0.63
Crossing #3	970	Q 5	2.62	100.03	102.65	101.58	102.81	0.005800	3.18	23.56	12.47	0.41	0.60
Crossing #3	964	Q 5	2.65	99.97	102.62	101.49	102.77	0.005010	3.12	24.01	12.80	0.39	0.57
Crossing #3	955 BR U	Q 5	2.65	99.97	102.62	101.50	102.77	0.005052	3.13	23.94	11.75	0.39	0.57
Crossing #3	955 BR D	Q 5	2.79	99.78	102.57	101.25	102.69	0.003338	2.75	27.29	12.00	0.32	0.42
Crossing #3	946	Q 5	2.79	99.78	102.57	101.24	102.68	0.003357	2.75	27.24	14.28	0.32	0.42
Crossing #3	938	Q 5	2.82	99.72	102.54	101.24	102.65	0.003745	2.69	28.20	16.51	0.33	0.42
Crossing #3	932	Q 5	2.78	99.66	102.44	101.38	102.61	0.006208	3.31	22.88	13.67	0.42	0.65
Crossing #3	922	Q 5	2.75	99.56	102.31	101.44	102.53	0.009318	3.77	19.97	12.93	0.50	0.88
Crossing #3	914	Q 5	2.92	99.34	102.26	101.24	102.46	0.007141	3.59	22.05	14.83	0.44	0.76
Crossing #3	902	Q 5	2.60	99.60	102.20	101.37	102.36	0.006412	3.35	24.43	20.13	0.43	0.67
Crossing #3	885	Q 5	2.87	99.23	102.10	101.44	102.23	0.008218	2.88	26.10	28.27	0.46	0.57
Crossing #3	871	Q 5	2.69	99.28	101.97	101.16	102.13	0.006008	3.19	24.59	22.29	0.42	0.61

HEC-RAS Plan: P 1-D River: SF Rawson Reach: Crossing #3 Profile: Q 10

Reach	River Sta	Profile	Max Chl Dpth	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Chan
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
Crossing #3	1081	Q 10	2.57	102.83	105.40	105.40	105.86	0.002167	2.03	26.83	21.47	0.25	0.24
Crossing #3	1067	Q 10	1.92	102.09	104.01	104.49	105.64	0.164726	10.25	9.75	11.42	1.96	8.06
Crossing #3	1053	Q 10	2.72	101.67	104.39	103.88	104.75	0.017070	4.82	20.74	13.60	0.69	1.47
Crossing #3	1045	Q 10	2.96	101.42	104.38	103.51	104.61	0.009294	3.77	26.59	16.48	0.51	0.88
Crossing #3	1030	Q 10	3.75	100.63	104.38	103.11	104.49	0.003527	2.68	37.21	17.81	0.32	0.41
Crossing #3	1022	Q 10	3.14	100.52	103.66	103.66	104.36	0.051677	6.69	14.94	10.75	1.00	3.18
Crossing #3	1015	Q 10	3.51	100.09	103.60	103.05	103.84	0.011920	3.90	25.44	19.30	0.55	0.98
Crossing #3	1005	Q 10	3.34	100.28	103.62	102.07	103.72	0.003003	2.62	38.16	20.37	0.31	0.38
Crossing #3	995	Q 10	2.79	100.37	103.16	102.73	103.62	0.021148	5.44	18.39	10.99	0.74	1.86
Crossing #3	985	Q 10	3.03	100.17	103.20	102.05	103.43	0.007520	3.86	25.89	12.83	0.46	0.86
Crossing #3	976	Q 10	3.12	100.06	103.18	101.92	103.36	0.005655	3.42	29.25	13.32	0.41	0.67
Crossing #3	970	Q 10	3.12	100.03	103.15	101.87	103.32	0.005048	3.34	29.93	13.94	0.39	0.63
Crossing #3	964	Q 10	3.15	99.97	103.12	101.78	103.30	0.004353	3.33	30.00	14.37	0.37	0.60
Crossing #3	955 BR U	Q 10	2.93	99.97	102.90	101.78	103.30	0.005943	3.66	27.32	12.00	0.43	0.75
Crossing #3	955 BR D	Q 10	3.05	99.78	102.83	101.51	103.00	0.004120	3.28	30.44	12.00	0.36	0.58
Crossing #3	946	Q 10	3.05	99.78	102.83	101.51	103.00	0.004120	3.28	30.44	15.53	0.36	0.58
Crossing #3	938	Q 10	3.09	99.72	102.81	101.51	102.96	0.004474	3.12	32.59	19.08	0.37	0.55
Crossing #3	932	Q 10	3.00	99.66	102.66	101.69	102.90	0.007766	3.91	26.16	15.54	0.48	0.89
Crossing #3	922	Q 10	2.92	99.56	102.48	101.77	102.80	0.011997	4.55	22.28	14.66	0.58	1.24
Crossing #3	914	Q 10	3.07	99.34	102.41	101.59	102.69	0.010151	4.37	24.41	16.50	0.53	1.12
Crossing #3	902	Q 10	2.73	99.60	102.33	101.75	102.57	0.008998	4.09	27.15	22.76	0.51	0.98
Crossing #3	885	Q 10	2.95	99.23	102.18	101.82	102.39	0.010871	3.47	28.61	30.03	0.54	0.80
Crossing #3	871	Q 10	2.17	99.28	101.45	101.45	102.09	0.034835	6.42	15.72	13.18	0.97	2.71

HEC-RAS Plan: P 1-D River: SF Rawson Reach: Crossing #3 Profile: Q 25

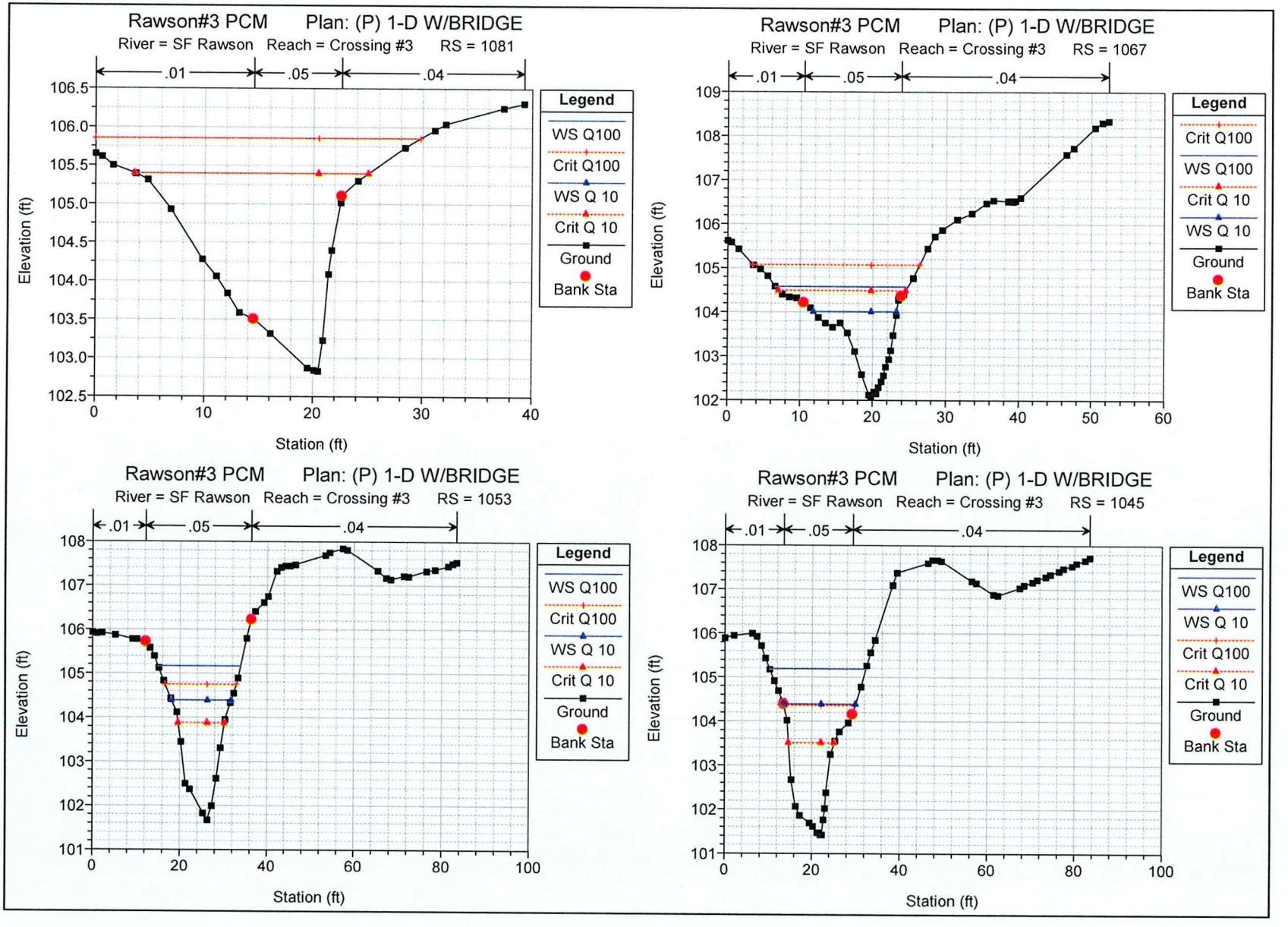
Reach	River Sta	Profile	Max Chl Dpth	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Chan
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
Crossing #3	1081	Q 25	2.75	102.83	105.58	105.58	106.16	0.002742	2.41	31.12	25.94	0.29	0.33
Crossing #3	1067	Q 25	2.18	102.09	104.27	104.60	105.94	0.137088	10.36	12.94	13.48	1.83	7.82
Crossing #3	1053	Q 25	3.05	101.67	104.72	104.26	105.14	0.018352	5.20	25.77	16.09	0.72	1.68
Crossing #3	1045	Q 25	3.31	101.42	104.73	103.92	105.00	0.008671	4.13	32.79	18.96	0.51	0.99
Crossing #3	1030	Q 25	4.10	100.63	104.73	103.37	104.88	0.003758	3.02	43.85	19.65	0.33	0.50
Crossing #3	1022	Q 25	3.61	100.52	104.13	104.13	104.76	0.043368	6.38	21.00	16.28	0.96	2.84
Crossing #3	1015	Q 25	3.92	100.09	104.01	103.37	104.30	0.008058	3.64	34.24	23.44	0.47	0.80
Crossing #3	1005	Q 25	3.77	100.28	104.05	102.37	104.19	0.002640	2.69	47.54	23.02	0.29	0.39
Crossing #3	995	Q 25	3.20	100.37	103.57	103.14	104.09	0.021163	5.76	23.25	12.85	0.76	2.03
Crossing #3	985	Q 25	3.43	100.17	103.60	102.43	103.90	0.007378	4.18	31.45	14.75	0.46	0.96
Crossing #3	976	Q 25	3.53	100.06	103.59	102.26	103.82	0.006408	3.82	35.08	14.90	0.44	0.81
Crossing #3	970	Q 25	3.53	100.03	103.56	102.22	103.78	0.005473	3.78	35.41	15.10	0.41	0.77
Crossing #3	964	Q 25	3.54	99.97	103.51	102.10	103.75	0.004811	3.86	34.70	15.45	0.40	0.77
Crossing #3	955 BR U	Q 25	2.93	99.97	102.90	102.12	103.75	0.010671	4.90	27.32	12.00	0.57	1.35
Crossing #3	955 BR D	Q 25	3.12	99.78	102.90	101.82	103.40	0.006777	4.29	31.25	12.00	0.47	0.98
Crossing #3	946	Q 25	3.38	99.78	103.16	101.81	103.40	0.004919	3.89	34.41	18.23	0.41	0.78
Crossing #3	938	Q 25	3.43	99.72	103.15	101.84	103.34	0.005047	3.56	38.37	23.09	0.40	0.69
Crossing #3	932	Q 25	3.30	99.66	102.96	102.06	103.27	0.009068	4.48	31.24	18.43	0.52	1.13
Crossing #3	922	Q 25	3.16	99.56	102.72	102.17	103.15	0.013576	5.24	26.15	17.17	0.63	1.58
Crossing #3	914	Q 25	3.31	99.34	102.65	102.08	103.02	0.012697	5.04	28.68	19.11	0.60	1.46
Crossing #3	902	Q 25	2.97	99.60	102.57	102.11	102.86	0.010443	4.60	33.26	28.27	0.55	1.22
Crossing #3	885	Q 25	3.19	99.23	102.42	102.04	102.69	0.008752	3.49	36.46	35.19	0.50	0.77
Crossing #3	871	Q 25	2.56	99.28	101.84	101.84	102.46	0.026536	6.37	21.84	18.90	0.88	2.50

HEC-RAS Plan: P 1-D River: SF Rawson Reach: Crossing #3 Profile: Q 50

Reach	River Sta	Profile	Max Chl Dpth	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Chan
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
Crossing #3	1081	Q 50	2.84	102.83	105.67	105.67	106.39	0.003201	2.68	33.58	27.77	0.31	0.40
Crossing #3	1067	Q 50	2.33	102.09	104.42	104.65	106.16	0.122690	10.58	15.23	16.88	1.77	7.84
Crossing #3	1053	Q 50	3.26	101.67	104.93	104.52	105.40	0.019221	5.49	29.30	17.49	0.75	1.85
Crossing #3	1045	Q 50	3.53	101.42	104.95	104.15	105.25	0.008552	4.39	37.07	20.52	0.52	1.08
Crossing #3	1030	Q 50	4.32	100.63	104.95	103.54	105.13	0.003930	3.26	48.32	21.50	0.34	0.57
Crossing #3	1022	Q 50	3.76	100.52	104.28	104.28	105.00	0.044903	6.76	23.71	18.38	0.99	3.11
Crossing #3	1015	Q 50	4.26	100.09	104.35	103.54	104.69	0.005376	3.26	42.63	26.46	0.39	0.61
Crossing #3	1005	Q 50	4.12	100.28	104.40	102.60	104.57	0.002146	2.60	56.08	25.39	0.27	0.35
Crossing #3	995	Q 50	3.68	100.37	104.05	103.41	104.50	0.016165	5.38	29.96	15.63	0.67	1.71
Crossing #3	985	Q 50	3.87	100.17	104.04	102.72	104.37	0.005487	4.00	38.30	17.06	0.41	0.84
Crossing #3	976	Q 50	4.01	100.06	104.07	102.51	104.29	0.005600	3.77	42.78	18.10	0.42	0.77
Crossing #3	970	Q 50	4.00	100.03	104.03	102.46	104.26	0.004821	3.84	41.98	19.93	0.40	0.76
Crossing #3	964	Q 50	4.00	99.97	103.97	102.34	104.22	0.004249	4.00	40.21	21.73	0.39	0.79
Crossing #3	955 BR U	Q 50	4.00	99.97	103.97	102.35	104.22		5.89	27.32		0.52	
Crossing #3	955 BR D	Q 50	4.19	99.78	103.97	102.04	104.22		5.15	31.25		0.44	
Crossing #3	946	Q 50	3.60	99.78	103.38	102.04	103.68	0.005558	4.35	37.03	21.12	0.44	0.95
Crossing #3	938	Q 50	3.66	99.72	103.38	102.10	103.60	0.005202	3.84	42.77	27.30	0.41	0.78
Crossing #3	932	Q 50	3.52	99.66	103.18	102.32	103.52	0.009571	4.79	35.56	21.79	0.54	1.26
Crossing #3	922	Q 50	3.30	99.56	102.86	102.50	103.39	0.014956	5.74	28.70	18.63	0.67	1.85
Crossing #3	914	Q 50	3.44	99.34	102.78	102.38	103.24	0.015562	5.69	31.45	23.83	0.66	1.85
Crossing #3	902	Q 50	3.11	99.60	102.71	102.31	103.04	0.011626	4.96	37.50	31.42	0.59	1.40
Crossing #3	885	Q 50	3.25	99.23	102.48	102.13	102.84	0.010390	3.90	38.58	36.32	0.55	0.95
Crossing #3	871	Q 50	2.99	99.28	102.27	102.03	102.73	0.005996	3.54	38.76	39.48	0.43	0.71

HEC-RAS Plan: P 1-D River: SF Rawson Reach: Crossing #3 Profile: Q100

Reach	River Sta	Profile	Max Chl Dpth	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Shear Chan
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(lb/sq ft)
Crossing #3	1081	Q100	3.02	102.83	105.85	105.85	106.64	0.002728	2.61	38.84	29.81	0.29	0.37
Crossing #3	1067	Q100	2.49	102.09	104.58	105.07	106.42	0.097971	10.32	17.99	18.30	1.61	7.14
Crossing #3	1053	Q100	3.49	101.67	105.16	104.75	105.66	0.018995	5.68	33.44	18.85	0.75	1.94
Crossing #3	1045	Q100	3.76	101.42	105.18	104.36	105.52	0.008078	4.55	41.91	22.01	0.51	1.12
Crossing #3	1030	Q100	4.55	100.63	105.18	103.73	105.40	0.003902	3.43	53.45	23.32	0.35	0.61
Crossing #3	1022	Q100	3.99	100.52	104.51	104.39	105.27	0.035809	6.55	28.22	21.10	0.91	2.81
Crossing #3	1015	Q100	4.53	100.09	104.62	103.66	105.03	0.004120	3.04	50.21	28.60	0.35	0.52
Crossing #3	1005	Q100	4.41	100.28	104.69	102.82	104.90	0.001869	2.58	63.83	27.53	0.25	0.33
Crossing #3	995	Q100	4.04	100.37	104.41	103.67	104.84	0.013611	5.26	37.00	22.39	0.63	1.59
Crossing #3	985	Q100	4.19	100.17	104.36	103.04	104.76	0.004815	4.01	44.09	19.03	0.39	0.82
Crossing #3	976	Q100	4.37	100.06	104.43	102.75	104.66	0.005222	3.86	49.75	20.17	0.41	0.79
Crossing #3	970	Q100	4.39	100.03	104.42	102.70	104.63	0.004824	3.71	52.34	22.34	0.39	0.73
Crossing #3	964	Q100	4.32	99.97	104.29	102.59	104.57	0.007282	4.27	44.92	23.97	0.48	0.99
Crossing #3	955 BR U	Q100	4.32	99.97	104.29	102.59	104.57		6.35	29.32	23.97	0.56	
Crossing #3	955 BR D	Q100	4.51	99.78	104.29	102.27	104.51		5.57	34.96	45.16	0.46	
Crossing #3	946	Q100	3.80	99.78	103.58	102.26	103.94	0.006278	4.82	39.43	24.08	0.47	1.15
Crossing #3	938	Q100	3.87	99.72	103.59	102.32	103.85	0.005282	4.07	47.02	30.99	0.42	0.85
Crossing #3	932	Q100	3.76	99.66	103.42	102.59	103.78	0.008863	4.92	41.53	27.11	0.53	1.29
Crossing #3	922	Q100	3.45	99.56	103.01	102.72	103.64	0.015902	6.17	31.49	20.35	0.70	2.10
Crossing #3	914	Q100	3.64	99.34	102.98	102.60	103.46	0.015760	5.89	36.75	28.95	0.68	1.95
Crossing #3	902	Q100	3.35	99.60	102.95	102.56	103.26	0.010349	4.83	45.57	35.74	0.56	1.30
Crossing #3	885	Q100	3.37	99.23	102.60	102.27	103.06	0.009874	3.99	43.08	38.79	0.54	0.97
Crossing #3	871	Q100	3.09	99.28	102.37	102.21	102.94	0.006001	3.65	42.64	40.71	0.44	0.75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Legend
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Crit Q100
WS Q 10
Crit Q 10
Ground
Bank Sta
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.04
Elevation (ft)
Station (ft)
Legend
Crit Q100
WS Q100
Crit Q 10
WS Q 10
Ground
Bank Sta
Rawson#3 PCM Plan: (P) 1-D W/BRIDGE
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.05
.04
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
WS Q 10
Crit Q 10
Ground
Bank Sta
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Station (ft)
Legend
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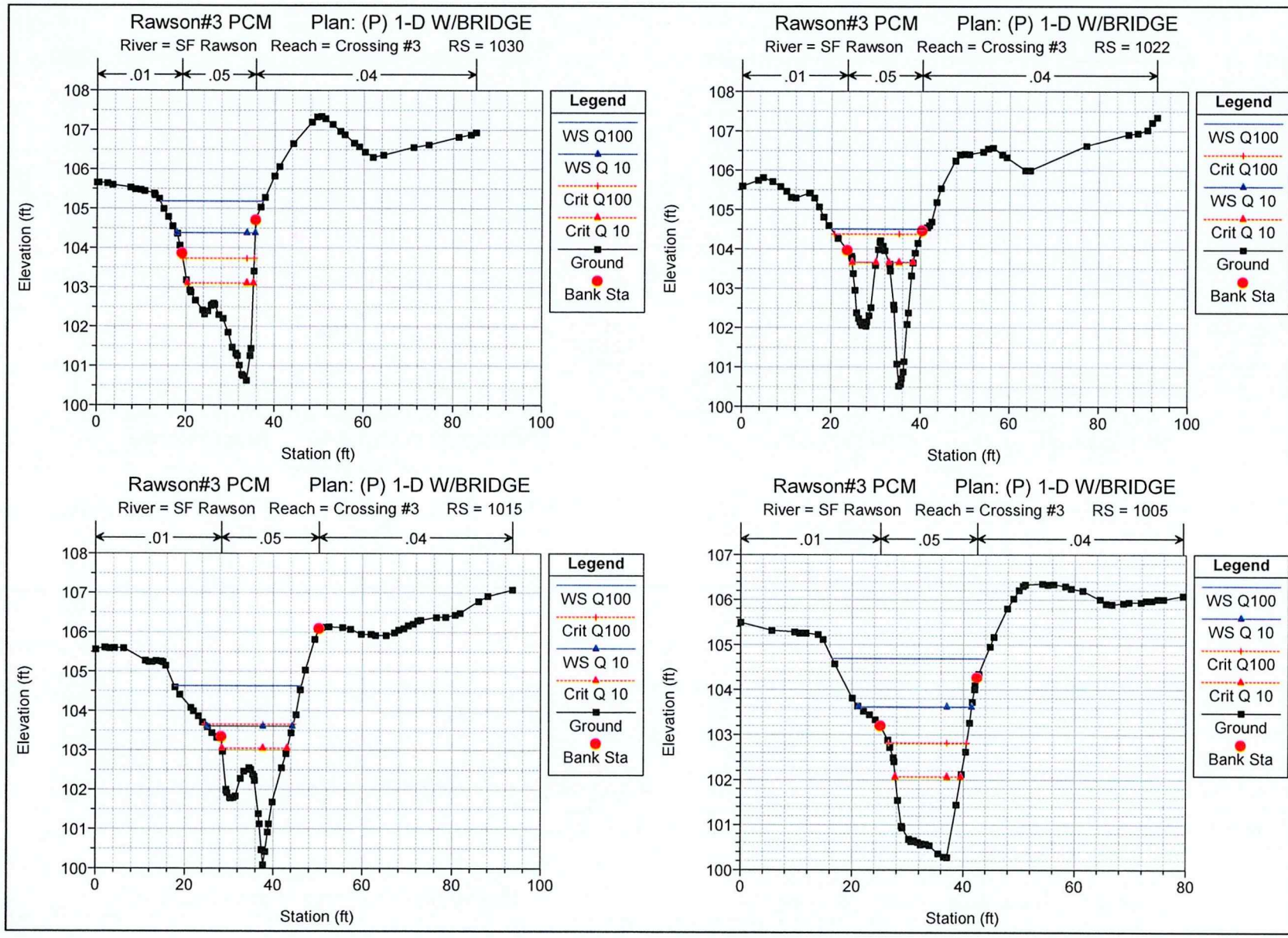
WS Q 10
Crit Q100
Crit Q 10
Ground
Bank Sta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Bank Sta
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Station (ft)
Legend
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Crit Q100
WS Q 10
Crit Q 10
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Bank Sta
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.05
.04
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
WS Q 10
Crit Q 10
Ground
Bank Sta
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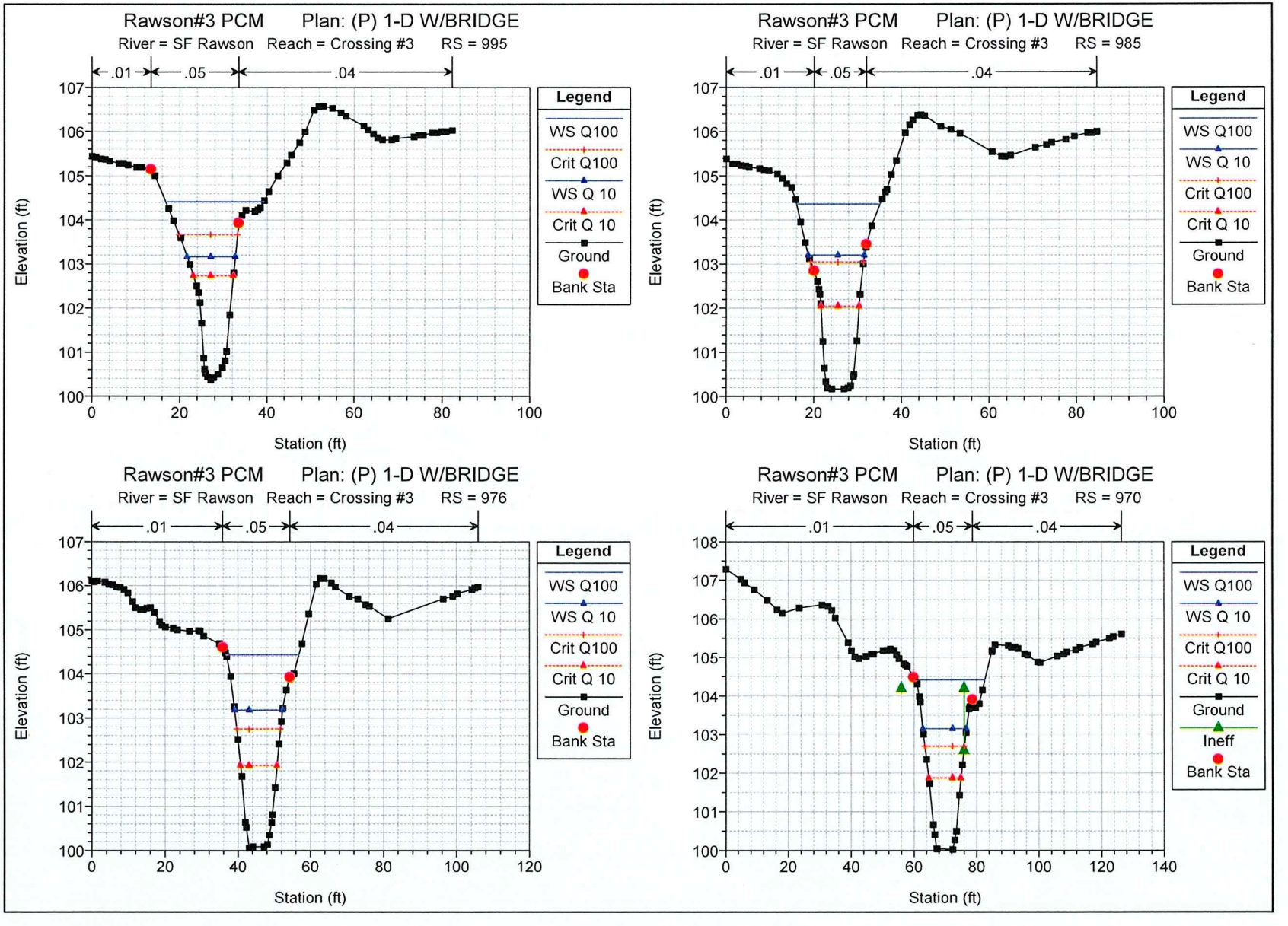
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q 10
Crit Q100
Crit Q 10
Ground
Bank Sta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Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
WS Q 10
Crit Q 10
Ground
Bank Sta
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.04
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q 10
Crit Q100
Crit Q 10
Ground
Bank Sta
Rawson#3 PCM Plan: (P) 1-D W/BRIDGE
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.05
.04
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q 10
Crit Q100
Crit Q 10
Ground
Bank Sta
Rawson#3 PCM Plan: (P) 1-D W/BRIDGE
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.05
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Elevation (ft)
Station (ft)
Legend
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Crit Q100
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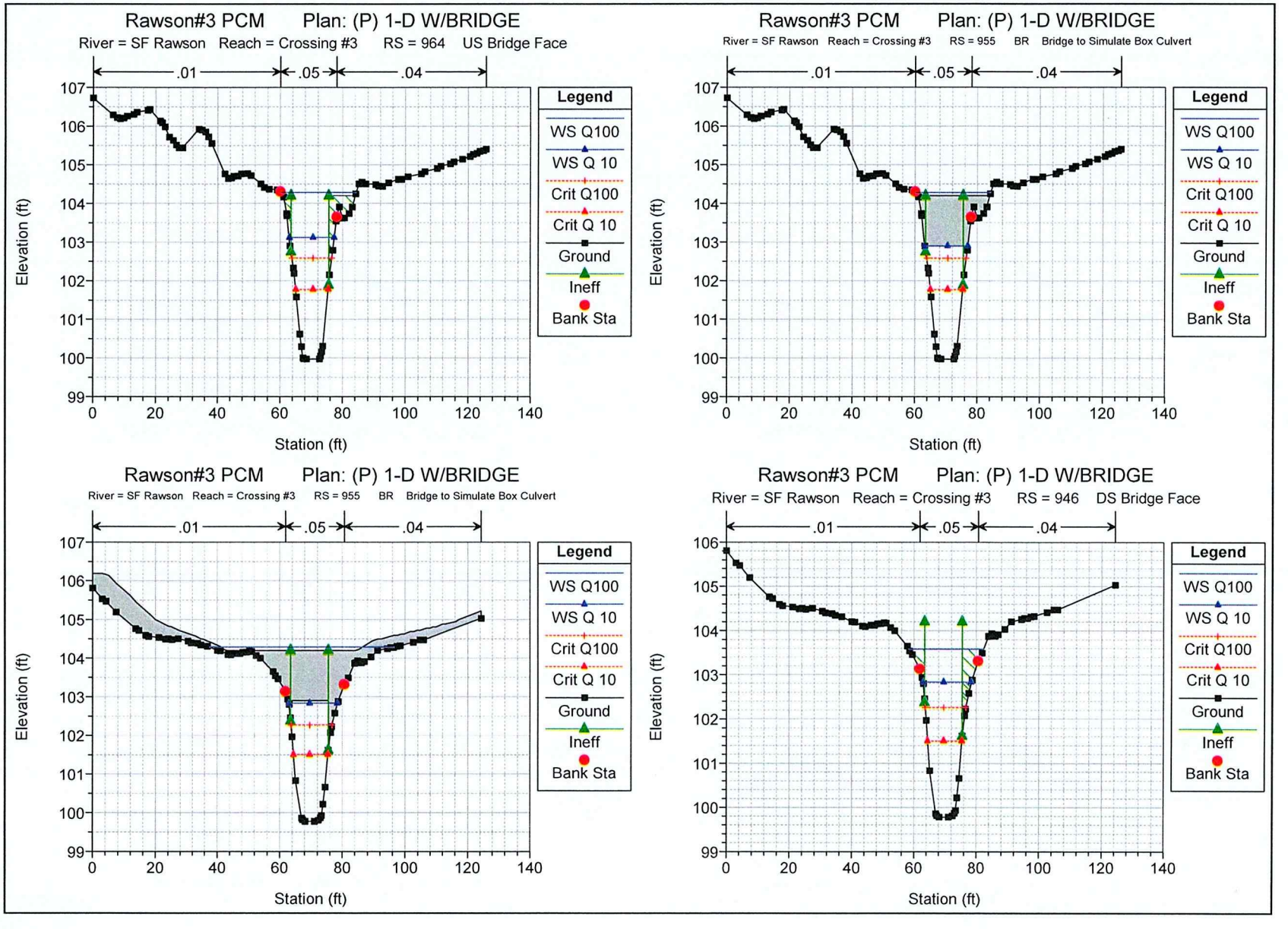
Ground
Ineff
Bank Sta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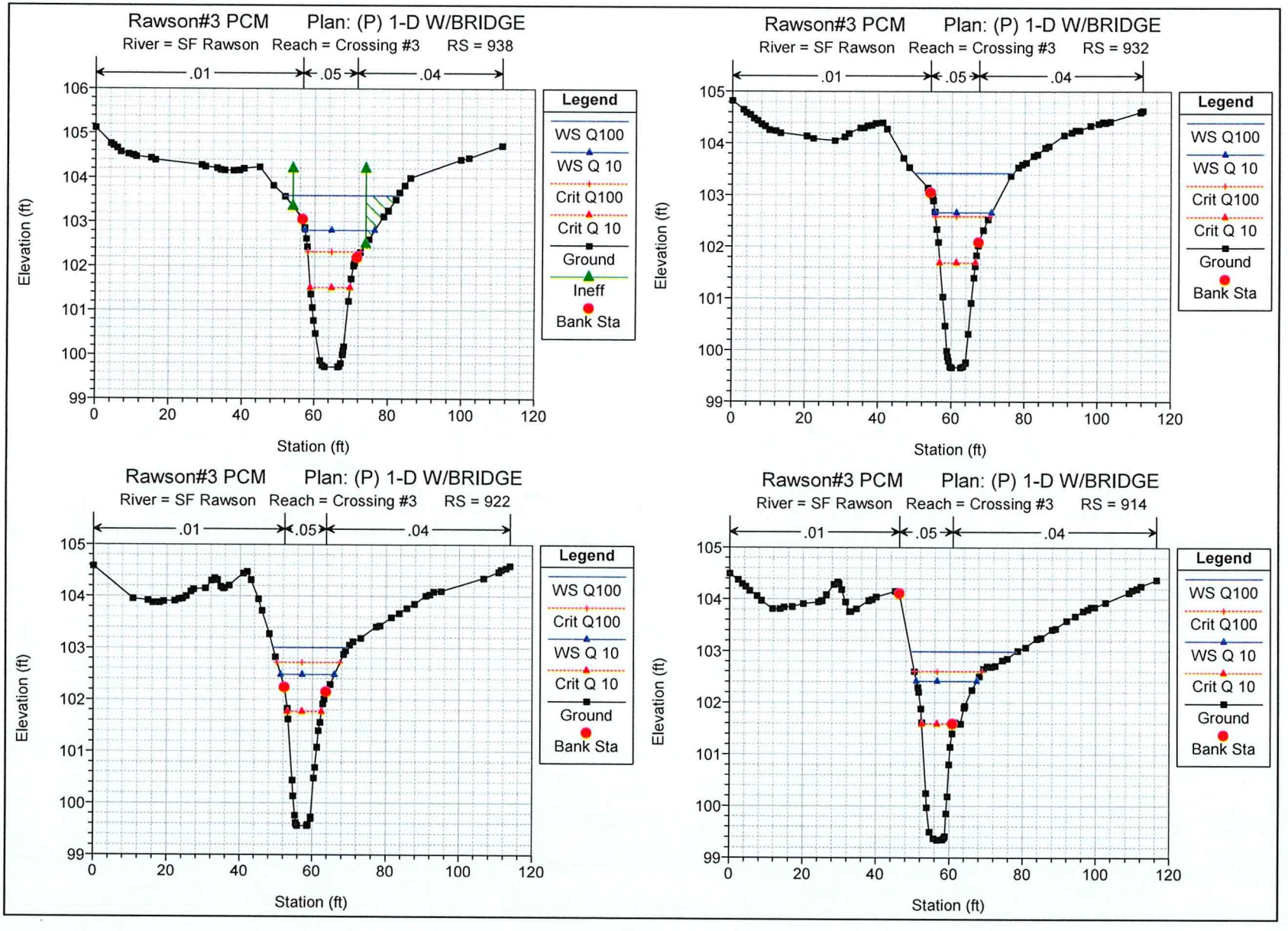
.05
.04
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q 10
Crit Q100
Crit Q 10
Ground
Ineff
Bank Sta
Rawson#3 PCM Plan: (P) 1-D W/BRIDGE
River = SF Rawson Reach = Crossing #3 RS = 955 BR Bridge to Simulate Box Culvert
.01
.05
.04
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q 10
Crit Q100
Crit Q 10
Ground
Ineff
Bank Sta
Rawson#3 PCM Plan: (P) 1-D W/BRIDGE
River = SF Rawson Reach = Crossing #3 RS = 955 BR Bridge to Simulate Box Culvert
.01
.05
.04
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q 10
Crit Q100
Crit Q 10
Ground
Ineff
Bank Sta
Rawson#3 PCM Plan: (P) 1-D W/BRIDGE
River = SF Rawson Reach = Crossing #3 RS = 946 DS Bridge Face
.01
.05
.04
Elevation (ft)
Station (ft)
Legend
WS Q100
WS Q 10
Crit Q100
Crit Q 10
Ground
Ineff
Bank Sta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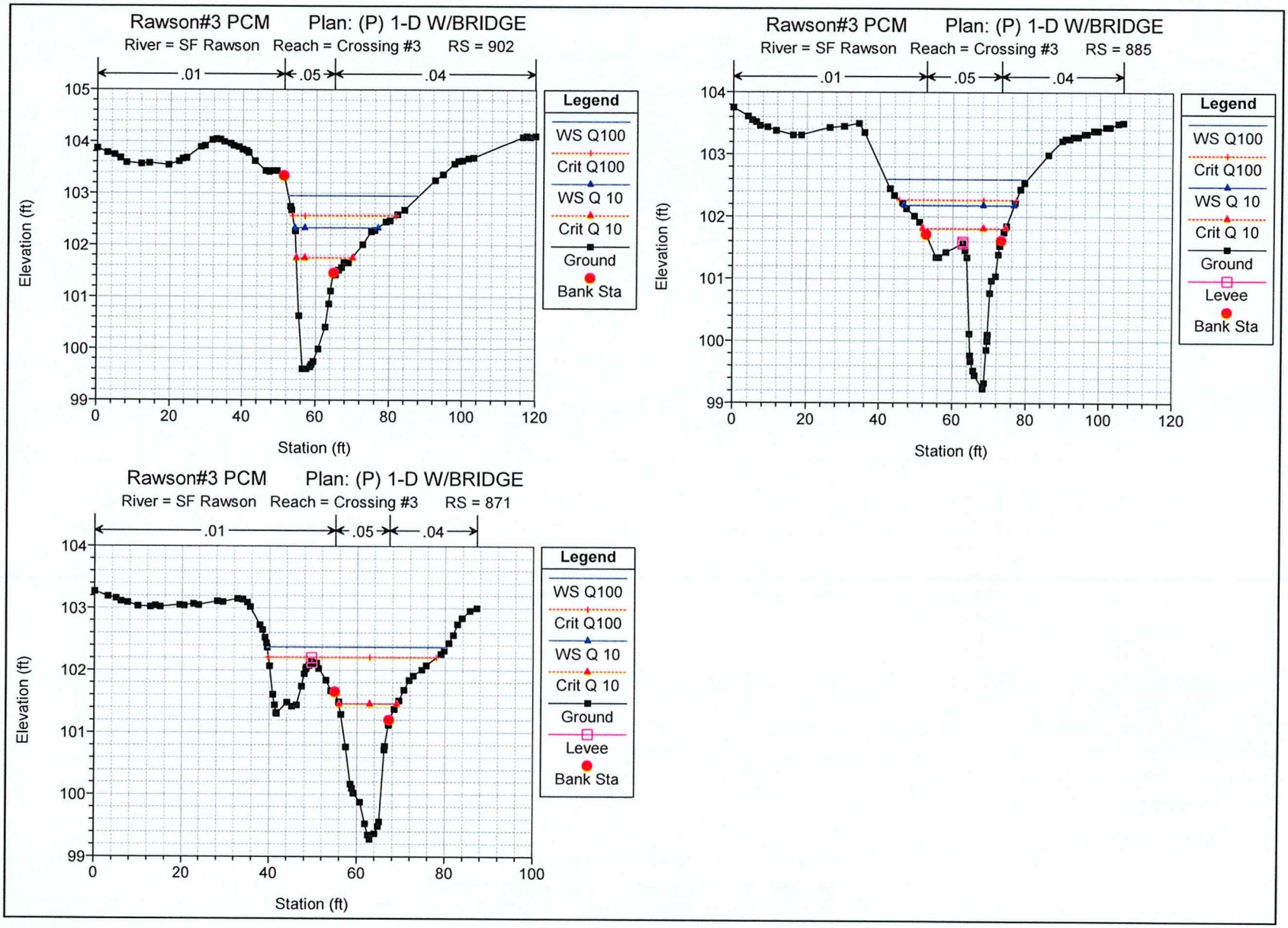
River = SF Rawson Reach = Crossing #3 RS = 938
.01
.05
.04
Legend
WS Q100
WS Q 10
Crit Q100
Crit Q 10
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Rawson#3 PCM Plan: (P) 1-D W/BRIDGE
River = SF Rawson Reach = Crossing #3 RS = 932
Rawson#3 PCM Plan: (P) 1-D W/BRIDGE
River = SF Rawson Reach = Crossing #3 RS = 922
Rawson#3 PCM Plan: (P) 1-D W/BRIDGE
River = SF Rawson Reach = Crossing #3 RS = 914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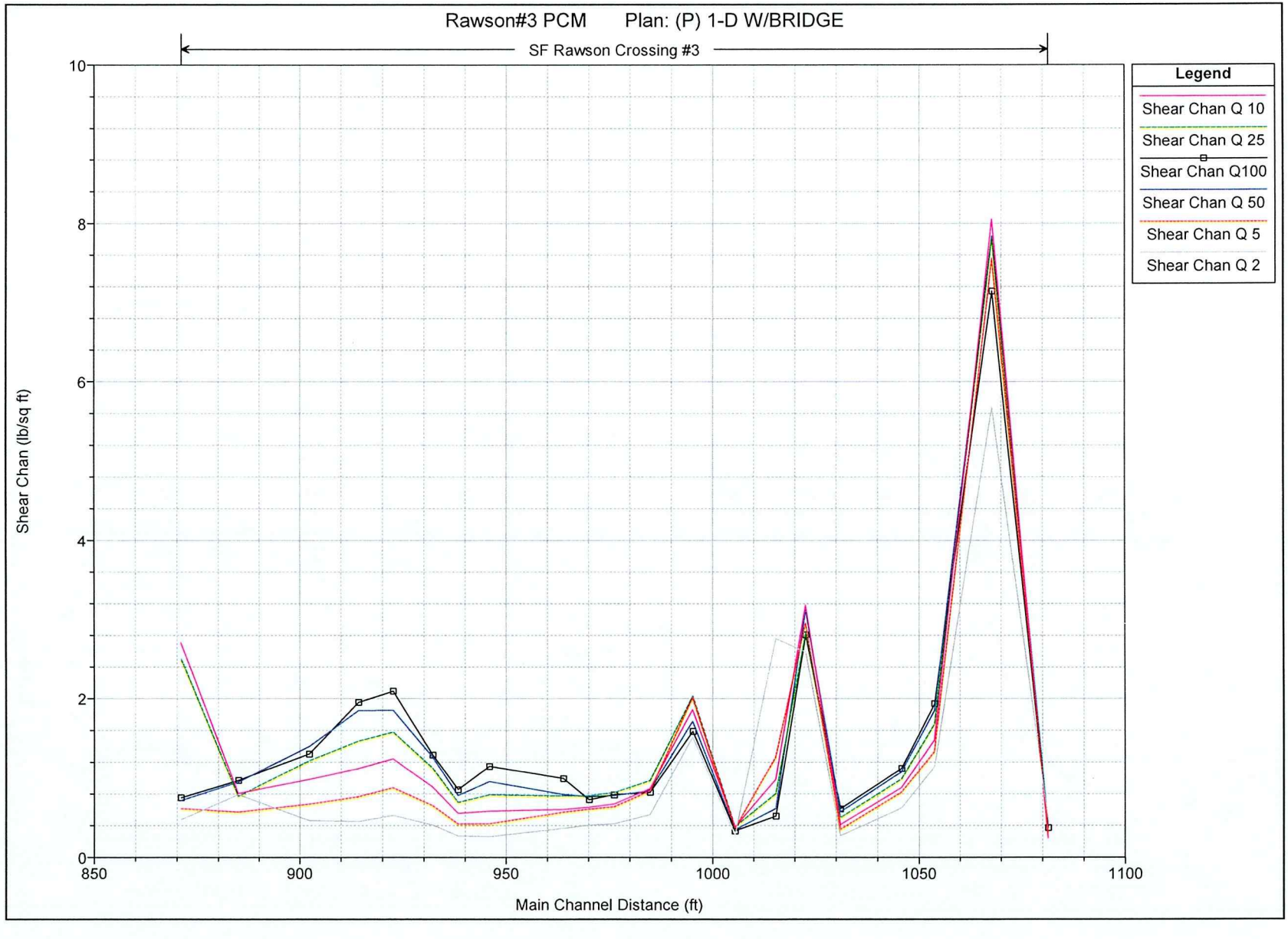
River = SF Rawson Reach = Crossing #3 RS = 902
.01
.05
.04
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
WS Q 10
Crit Q 10
Ground
Bank Sta
Rawson#3 PCM Plan: (P) 1-D W/BRIDGE
River = SF Rawson Reach = Crossing #3 RS = 885
.01
.05
.04
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
WS Q 10
Crit Q 10
Ground
Levee
Bank Sta
Rawson#3 PCM Plan: (P) 1-D W/BRIDGE
River = SF Rawson Reach = Crossing #3 RS = 871
.01
.05
.04
Elevation (ft)
Station (ft)
Legend
WS Q100
Crit Q100
WS Q 10
Crit Q 10
Ground
Levee
Bank Sta


Rawson#3 PCM Plan: (P) 1-D W/BRIDGE
SF Rawson Crossing #3
Legend
Shear Chan Q 10
Shear Chan Q 25
Shear Chan Q100
Shear Chan Q 50
Shear Chan Q 5
Shear Chan Q 2
Shear Chan (lb/sq ft)
Main Channel Distance (ft)
0
2
4
6
8
10
850
900
950
1000
1050
1100

Attachment 4: Opinion of Probable Construction Cost

Opinion of Probable Construction Cost for 30% Design Submittal

Rawson Crossing No.3 Replacement

Michael Love & Associates
Hydrologic Solutions
PO Box 4477 • Arcata, CA 95518 • (707) 822 -2411

1/10/2021

Item Description	Unit	Quantity	Unit Cost	Total Cost
Mobilization/Demonization (8%)	LS	1	$8,857	$8,900
Clearing and Grubbing	DAY	1	$5,014	$5,100
Tree Removal	EA	4	$1,500	$6,000
Water Management	DAY	15	$500	$7,500
General Excavation	CY	200	$25	$5,000
Furnish and Install Concrete Box Culvert 12x6x16-ft (Span x Rise x length)	LS	1	$45,242	$45,300
Furnish and install Structural backfill with compaction	TON	60	$193	$11,580
Embankment Backfill (Salvaged)	CY	75	$92	$6,934
Root Wad Bank Protection (includes excavating rootwad)	EA	4	$3,500	$14,000
Channel grading and finsh grading	CY	40	$25	$1,000
Furnish and Install Bankline Rock	TON	20	$150	$3,000
Furnish and Install Streambed Material	TON	60	$65	$3,900
Site Stabilization (Seed, Placement of Chip)	LS	1	$1,000	$1,000
Riparian Replanting (1 gal trees/shrubs)	EA	10	$40	$400
			Subtotal Construction	**$119,614**
			15% Contingency	**$17,942**
			TOTAL	**$137,556**

APP# GPA2001, R2001

Agent: LACO Associates

STAFF REPORT

APPLICANT: Green Diamond Resource Company

APPLYING FOR: General Plan Amendment from Timberland to Rural Residential one dwelling unit per three acres (RR 1/3) and Rezone from Timberland Preserve (TPZ) to Rural Residential – three acre minimum lot size with a Manufactured Housing Combining District (RR3-MFH). The TPZ Rezone is a 10-year rollout.

APN: 106-021-074 and -076 LOCATION: North end of Wonder Stump Road at Highway 101

PARCEL(S) SIZE: 212 ac.	EXISTING USE: Timberland	EXISTING STRUCTURES: None.

PLANNING AREA: 31 GENERAL PLAN: Timberland

ADJ. GEN. PLAN: Same, Rural Residential 1 du/3 ac.

ZONING: TPZ ADJ. ZONING: Same, RR-3, RR-3-MFH, and AE

1. PROCESSING CATEGORY: ☒ NON-COASTAL ☐ APPEALABLE COASTAL ☐ NON-APPEALABLE COASTAL ☐ PROJECT REVIEW APPEAL

2. FIELD REVIEW NOTES: DATE: October 4, 2019

☒ ENVIRONMENTAL HEALTH ☒ BUILDING INSP
☒ PLANNING ☒ ENGINEERING/SURVEYING

ACCESS: Wonder Stump Road ADJ. USES: Residential, Timberland, Agriculture
TOPOGRAPHY: Gently Sloped DRAINAGE: Surface

DATE OF COMPLETE APPLICATION: October 15, 2020

3. ERC RECOMMENDATION: Application complete. Post public hearing notice. Adopt Mitigated Negative Declaration and approve with conditions.

4. STAFF RECOMMENDATION:

LACO Associates, Inc. (LACO) has submitted an application on behalf of property owner Green Diamond Resource Company (GDRC) for a project located off Wonder Stump Road, west of Highway 101. The parcel in question is approximately 212-acres currently designated Timberland Preserve (TPZ) by the County Zoning and Timberland (TBR) by the County General Plan. GDRC proposes to amend the General Plan land use designation from TBR to RR 1/3 (Rural Residential, one dwelling unit per 3-acres).

After consideration of the identified resources and required buffer zones from each resource, the Site is

estimated to have a development potential of 167 acres. In the future, if a residential subdivision of the Site is proposed, the Site would allow for up to a maximum of 55 residential lots, assuming the requested land use and zoning designations of RR 1/3 and RR-3-MFH, respectively, are approved.

General Plan Amendment

The applicant has requested that the County approve a General Plan land use designation amendment for this parcel. Pursuant to California's *consistency law* [1]doctrine, zoning must be in conformance with the General Plan. While, practically speaking, this General Plan Amendment is being proposed in conjunction with the rezone application, the General Plan will technically be amended before the zoning change becomes final. If approved, the General Plan land use designation for this parcel will become RR 1/3, which will then allow for the consideration of the rezoning of the land, as discussed below.

According to the County General Plan, the RR Land Use Designation is intended to maintain the character of rural areas and to minimize the public services required by smaller lot development. Based upon physical conditions such as soils, drainage, natural hazards, traffic, and water quality and quantity – as well as existing lot sizes and uses – residential development may range from 1 du/3 ac. to 1 du/5 ac. In this case, the applicant has proposed one dwelling unit per three acres. The principal permitted use in areas designated Rural Residential is single family residential. Uses permitted within residential areas include single family residences with accessory buildings, light agricultural activities, and home occupations.

Staff and the ERC have analyzed the land use designation amendment request. Generally, the lands surrounding the project are a mix of rural residential, timberlands (last logged by GDRC in 2010), and undeveloped lands. The proposed land use amendment would follow the existing land use pattern in place around the project area and, in the opinion of staff, would not create any incompatible future land uses.

TPZ Rezone

The project area is presently zoned TPZ under the County zoning (DNCC §20.43). TPZ is a zoning classification applied to private timberland and State forests by local governments under the Forest Taxation Reform Act of 1976. Rezoning lands designated as TPZ involves a different process than rezoning non-TPZ lands due to how TPZ lands are treated under California state tax law as well as the associated conversion processes administered by the California Board of Forestry and Fire Protection. Unlike other lands, TPZ lands are valued according to their ability to grow timber (i.e. the "timber yield tax"). The timber yield tax is a property tax paid by timber owners when they harvest trees or timber. Land zoned TPZ is restricted for use to timber growing or compatible uses. In return for accepting these restrictions, which preserve the timberland, landowners receive reduced property tax assessments.

TPZ parcels may be rezoned to an alternate zone by a majority vote of the Board of Supervisors. The new zone becomes effective 10 years after BOS rezoning approval. The land is taxed on a gradually increasing scale so that at the end of the 10-year period the taxes are based completely on the new zoning. Alternatively, an owner may request the BOS to immediately rezone land from TPZ to an alternate zone. If a four-fifths majority of the BOS decides that the continued use of the land zoned TPZ is neither necessary nor desirable to accomplish the purpose of the timber yield tax, they may immediately rezone the property for a new use. GDRC has submitted application materials requesting a 10-year TPZ rollout changing the land use from a TPZ designation to a RR-3-MFH designation.

[1] AB 1301, McCarthy, 1971.

GDRC hired California Registered Forester Todd Truesdell to prepare an analysis to support the County's findings. The analysis was submitted July 10, 2019. Specifically, in his report Mr. Truesdell points out that, of the 212-acres in total project area, only about 55-acres or 26% will be converted with home site development and associated infrastructure of roads and drives. Given observed history of residential development on such rural forested lands, home site development is often limited to clearing of 1 acre or less. Homeowners tend to appreciate forested conditions on lots of this size and will retain trees to provide seclusion, screening and buffering from neighboring properties. The presumption is that even following development of the Site much of it will remain in a forested condition through time and any future tree or timber removals in the development and maintenance of residential parcels will remain subject to the Timber Yield Tax. The area west of Highway 101 and protected riparian areas (associated with Class I and II Watercourses flowing into Lake Earl) will not be harvested. Mr. Truesdell provides further analysis with respect to potential changes in tax revenue and concludes that the rezone will be in the public interest as it will generate higher property taxes for the County. According to Mr. Truesdell it will be 30 to 50 years before the property generates any significant yield tax revenue from timber harvests. He projects that, based on a 1% tax rate, the annual taxes on the property would increase from a present assessment of $363 annually to as much as $42,400 per year for all lands involved.

Future Subdivision Improvements

Future subdivision and development of residential units at the Site may require subdivision improvements, such as drainage feature and roadway improvements in accordance with County and/or California Department of Transportation (Caltrans) requirements, and may be deferred until specific development plans are proposed, pursuant to Section 66411.1 of the Subdivision Map Act. No specific subdivision and development plans for the Site are proposed at the time. Representatives of GDRC have indicated that they intend to create the proposed rural residential parcel to make it more attractive to a land developer.

CEQA Compliance

The California Environmental Quality Act (CEQA) is a statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. Every development project which requires a discretionary governmental approval will require at least some environmental review pursuant to CEQA, unless an exemption applies. The environmental review required imposes both procedural and substantive requirements. At a minimum, an initial review of the project and its environmental effects must be conducted. Depending on the potential effects, a further, and more substantial, review may be conducted. A project may not be approved as submitted if feasible alternatives or mitigation measures are not able to substantially lessen the significant environmental effects of the project.

County staff has prepared an initial study examining the project and its potential impacts. Based on this initial study staff has recommended the adoption of a Mitigated Negative Declaration with issues analyzed in the initial study either being classified as "Less Than Significant Impact with Mitigation Incorporated", "Less Than Significant Impact", or "No Impact". Special attention is paid in the initial study with respect to the conversion of timberlands, appropriate buffers to protect riparian areas, cultural resources, water quality, and noise attenuation.

Specifically, as this project involves the conversion of timberlands to a rural residential land use classification the initial study includes an analysis that concludes the impact will be less than significant due to the area not having significant timber resources as well as ample timberland areas being retained in the remainder area, along the riparian corridor, and upon the hillslope. As noted in the initial study,

the conversion of timberlands does require that CAL FIRE review the project and issue a Timberland Conversion Permit (TCP) exemption prior to the final approval of the rezoning of the TPZ lands by the County. Through the CEQA review process CAL FIRE did submit a comment letter to the County re-affirming the need to obtain a TCP prior to final approval.

Caltrans submitted a comment letter on the proposed project clarifying the US 101 segment dividing the project site is an access-controlled expressway. The State has acquired legal access rights to abutting parcels, in order to facilitate safety and mobility. New road approaches (driveways or public roads) directly to US 101 from these two parcels will not be permitted. If and when future development is proposed at the site, roadway improvements may be required including to roadway widening and/or additional access points. Currently, the only access to the parcel is from Wonder Stump Road. Caltrans references connecting the project to private rural roads located west of the property in order to facilitate access to Lake Earl Drive; however, the property owner has no legal access to utilize these roads. Additionally, any future development will also be required to comply with the County's Fire Safe Regulations and/or State Minimum Fire Safe Regulations which will require two access points.

Any improvements within a Caltrans Right of way will require an Encroachment Permit that conforms to Caltrans design standards and guidance. Encroachment permit applications are reviewed for consistency with State standards so applicants should schedule a pre-application meeting with Permit staff prior to submitting an application. As noted above, no access to US 101 from the parcel will be permitted; however, a future developer may be required to make improvements at the US 101 and Wonder Stump Road intersection.

As noted above, the timber within the riparian corridor associated with the tributaries to Lake Earl will be retained as this area is classified as an environmentally sensitive habitat area (riparian habitat). The applicant has prepared an assessment of this area which has resulted in the delineation of a stream transition line (STL) which identifies a line closest to the stream where riparian vegetation is permanently established. A Class I watercourse traverses the southwestern portion of the Site and becomes a Class II watercourse further to the east. Within the northern portion of the Site, a Class II watercourse enters Site from the north. Staff is recommending a buffer of 100-feet from the edge of the STL in which no development or vegetation modification may be allowed.

This project was first circulated to local Native American tribes pursuant to a state law[2] which requires that tribes be offered an opportunity to consult on projects prior to the determination of whether a Negative Declaration, Mitigated Negative Declaration, or an Environmental Impact Report will be prepared. In this case no tribe notified the County of their desire to consult and the Draft Mitigated Negative Declaration (DMND) was subsequently prepared. The DMND did result in a recommendation that a condition be included in the approval which requires, that if cultural resources are encountered, development should be halted until consultation with tribal representatives can be arranged to determine the significance of the resource.

The DMND references testing conducted by LACO on behalf of GDRC for feasibility of future onsite domestic wells. Results of that testing indicate stable groundwater elevation levels in the project area as well as the presence of an unconfined aquifer. Recharge of groundwater is indicated as being from surface infiltration. The submitted data suggests that sufficient water is available to allow for private wells to be developed on future parcels subject to certain parameters. Specifically, that drinking water should be sourced from the lowest attainable producing zone of the sands and gravels due to the

[2] AB 52, Gatto, 2014.

potential for degradation of water quality of the aquifer from surface contaminants as the groundwater is unconfined.

Finally, the DMND identifies measures necessary to reduce the impacts of transportation related noise from US Highway 101, US Highway 199 and State Route 197 on future housing by incorporating a "noise attenuation zone" as recommended in the Noise and Safety Element of the County's General Plan (Del Norte County General Plan, Policy 2.4.2). Specifically, a line parallel to Highway 101 is recommended to be shown on the Parcel Map depicting the appropriate Noise Attenuation Zone pursuant to the General Plan. More specifically, the line should be set 251 feet from the centerline of Highway 101.

Although no development is proposed at this time, future residential development is anticipated at the Site, including the development of up to 55 single family residences or manufactured homes. The future residential development would not be expected to generate noise in excess of what is common for residential uses once grading and construction are complete.

Preliminary Traffic Memorandum

A Preliminary Traffic Analysis technical memorandum (Preliminary Traffic Analysis) (see Appendix F) was prepared by LACO on August 27, 2019, in order to evaluate the potential traffic impacts that could occur under Site build out at proposed land use and zoning designations. The traffic circulation of the Existing, Future, and Future plus Project conditions were evaluated using level of service (LOS) and control delay. Intersections of interest include Wonder Stump Road and (1) Highway 101, (2) Elk Valley Cross Road, and (3) Kings Valley Road. The Preliminary Traffic Analysis found that the intersections of Wonder Stump Road and Elk Valley Cross Road and Wonder Stump Road and Kings Valley' Road are likely to experience an insignificant impact as a result of the anticipated future residential development. The intersection of Wonder Stump Road and Highway 101 is likely to be the primary route for vehicles traveling to and from the Site and was thus further analyzed in the Preliminary Traffic Analysis.

The project is subject to compliance with Senate Bill (SB) 743 which is a vehicle miles traveled (VMT) analysis replacing automobile delay and level of service (LOS) for transportation impacts under CEQA. The applicant has voluntarily agreed to the recommendations contained in the *2020 Del Norte Region SB 743 Implementation Plan*. Buildout of the project is expected to generate 524 average weekday, 546 average Saturday, and 475 average Sunday traffic trips, based on standard Institute of Transportation Engineers (ITE) trip generation rates. The project is expected to generate more than 110 average daily trips and therefore is not presumed to have a less-than-significant transportation impact under CEQA without VMT mitigation. Based on the methodology included in the *2020 Del Norte Region SB 743 Implementation Plan* mitigation for the VMT associated with 55 single family equivalents is needed. The General Plan Amendment, Rezone, and 10-year TPZ Rollout includes three recommended condition specific to SB 743 compliance. First is identifying the SB 743 mitigation location, second is developing road improvement plans for the approved SB 743 mitigation location, and third is recording a Notice of Requirement for SB 743 Implementation against the parcels associated with this General Plan Amendment, Rezone, and 10-year TPZ Rollout. As noted in condition 3, future VMT analysis will only be required for more than 55 single family equivalent lots.

Other Issues

While this project does not further subdivide new parcels within the proposed RR 1/3 area, LACO has conducted a preliminary evaluation for feasibility of future onsite sewage disposal systems. Based on field and laboratory investigation results provided in the preliminary sewage disposal report it has been demonstrated that the project site is suitable for use of individual on-site wastewater disposal fields to

serve the future single family residences pursuant to compliance with the requirements of the North Coast Regional Water Quality Control Board Basin Plan and the Del Norte On-Site Sewage Disposal Ordinance.

Staff and the ERC have reviewed this project. The California Department of Fish and Wildlife has also field reviewed this project and have been forwarded the DMND for review and comment. As of the writing of this Staff Report no comments have been received from any members of the public or any of the reviewing agencies other than the comment letters received from CAL FIRE and Caltrans. Staff recommends that the Planning Commission review this project and forward a recommendation to the BOS that the project should be approved. Findings and conditions are included below. The BOS will consider a resolution and an ordinance when they consider the General Plan Amendment and Rezone components of this project, respectively.

5. FINDINGS:

A. This project is consistent with the Standards and Policies of the General Plan and the Zoning Chapter of the Del Norte County Code;
B. An initial study has been prepared to evaluate the potential for adverse environmental impact;
C. A Mitigated Negative Declaration has been prepared pursuant to the California Environmental Quality Act which the County has considered in reviewing the project and making its decision;
D. Onsite environmental features including a stream and sensitive plants will be adequately protected with the inclusion of measures identified in the Mitigated Negative Declaration; and
E. This project is subject to the California Department of Fish and Wildlife CEQA Environmental Document filing fee unless the Department waives the fee.
F. SB 743 mitigation made conditions of approval.

6. CONDITIONS:

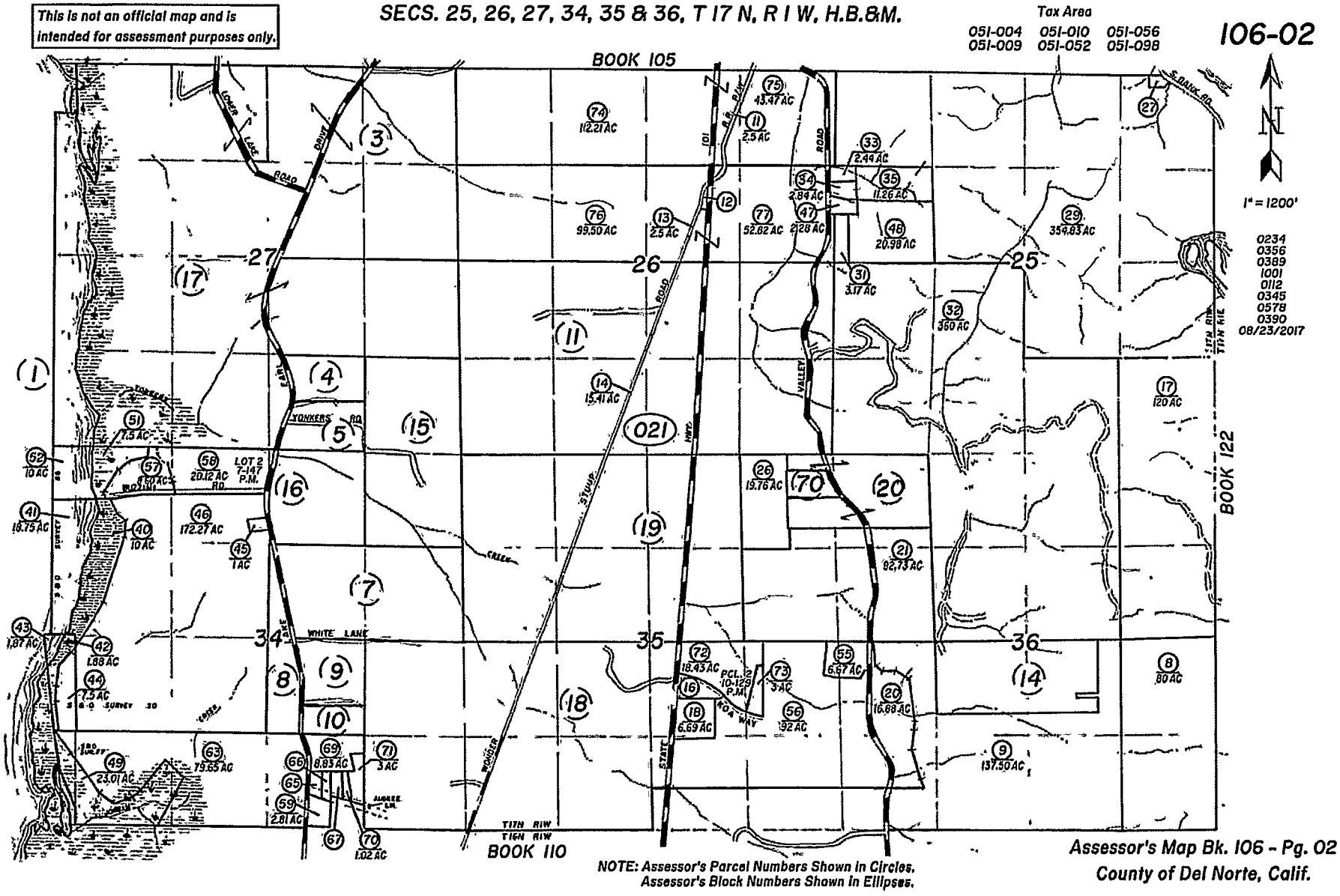
1) Within 6 months of the approval of the Rezone and General Plan Amendment by the Board of Supervisors, the applicant must propose mitigation consistent with the *2020 Del Norte Region SB 743 Implementation Plan* and acceptable to the Community Development Department Director. Examples of potential projects that may be used for mitigation are identified in Appendix B – Potential Projects for Use in VMT Mitigation of the *2020 Del Norte Region SB 743 Implementation Plan*;
2) Upon approval of SB 743 mitigation consistent with the *2020 Del Norte Region SB 743 Implementation Plan* and acceptable to the Community Development Department Director, and within 1 year of approval of the Rezone and General Plan Amendment by the Board of Supervisors, the applicant shall submit road improvement plans for the SB 743 mitigation to the Engineering and Surveying Division for review and acceptance. The plans shall be prepared by a California Registered Civil Engineer. The road improvement plans must include mitigation for at least the VMT impacts created by 55 single-family equivalents; and
3) Within 30 days of the approval of the Rezone and General Plan Amendment by the Board of Supervisors, a *Notice of Requirement for SB 743 Implementation* including the following condition must be recorded against the properties associated with this Rezone and General Plan Amendment:

> "The total vehicle miles traveled (VMT) impacts for the project (Rezone R2001 and General Plan Amendment GPA2001) were determined to be 55 single-family equivalents resulting from identified resources and required buffers from resources.

> The project area is estimated to have a development potential of 167 acres within the 211.71 total acres. Under the CEQA analysis for this project and corresponding VMT analysis only 55 residential lots have been evaluated and approved within the 211.71 total acres. Future VMT analysis will only be required for more than 55 single family equivalent lots. “

At the time of complete application for Rezone R2001 and General Plan Amendment GPA2001 the Community Development Department determined that payment in lieu of physical improvements to meet SB 743 mitigation obligations could not be accepted since the County does not have a bank of credits to purchase from for the purpose of VMT mitigation.

Prior to the issuance of a Certificate of Occupancy on each residential unit within the boundaries of the rezone and general plan amendment the anticipated vehicle miles traveled (VMT) must be mitigated to less than significant using the *2020 Del Norte Region SB 743 Implementation Plan*. Acceptable mitigation for each single-family (or the equivalent) includes the installation of either 0.5 curb ramp with asphalt patch; 15 linear feet of sidewalk with no curb and gutter; or 7.5 linear feet of sidewalk with curb, gutter, and asphalt patch; improvements must be functional upon completion to effectively mitigate VMT impacts (e.g. half of a curb ramp is not functional). The County Engineer may approve alternative improvements that effectively mitigate VMT impacts or require up to an additional 25% increase in area of constructed improvement if it would result in an infrastructure gap closure. At the time of permit issuance and if the County is willing to accept payment in lieu of physical improvements, the amount would be $1,275 per single-family (or equivalent), plus 25% for infrastructure gap closures, and an additional 50% for administration and compliance with public works construction obligations for public agencies which would total $2,390.63 in 2020 dollars. The $2,390.63 must be adjusted for inflation at the time of payment using the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W).”


This is not an official map and is intended for assessment purposes only.
SECS. 25, 26, 27, 34, 35 & 36, T 17 N, R 1 W, H.B.&M.
Tax Area
051-004 051-010 051-056
051-009 051-052 051-098
106-02
BOOK 105
BOOK 122
BOOK 110
1" = 1200'
0234
0356
0389
1001
0112
0345
0578
0390
08/23/2017
NOTE: Assessor's Parcel Numbers Shown in Circles.
Assessor's Block Numbers Shown in Ellipses.
Assessor's Map Bk. 106 - Pg. 02
County of Del Norte, Calif.

LACO EUREKA • UKIAH • SANTA ROSA 1-800-515-5054 www.lacoassociates.com	PROJECT FORT DICK FLATS GPA & REZONE	BY CMB	FIGURE 1
	CLIENT GREEN DIAMOND RESOURCE COMPANY	CHECK MMM	
	LOCATION HWY 101/WONDER STUMP ROAD, FORT DICK	DATE 2/4/2019	JOB NO. 6872.19
	LOCATION MAP		

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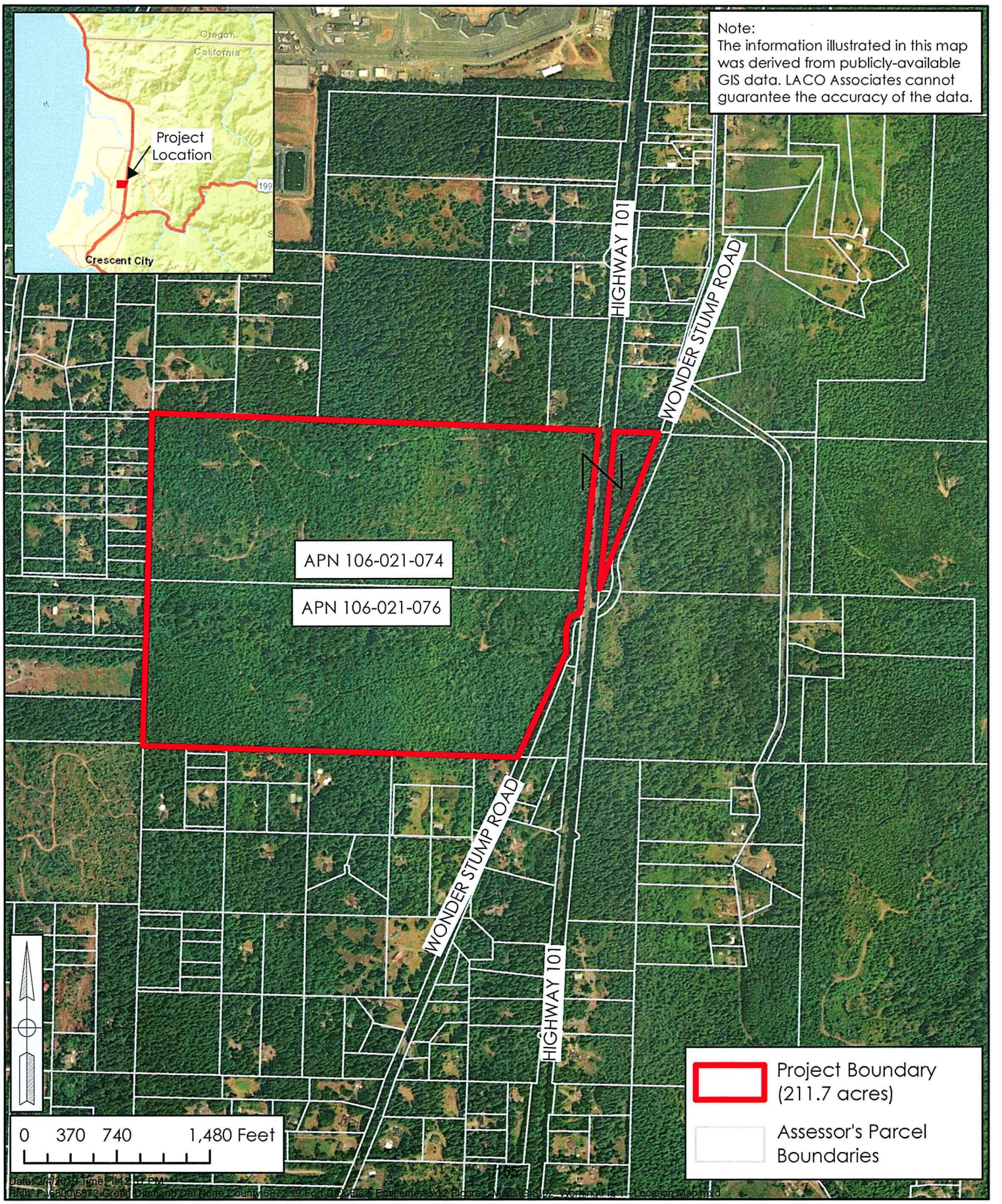

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LACO	PROJECT	FORT DICK FLATS GPA & REZONE	BY	CMB	FIGURE
EUREKA • UKIAH • SANTA ROSA	CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK	MMM	2
1-800-515-5054 www.lacoassociates.com	LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE	2/4/2019	JOB NO. 6872.19
		CURRENT LAND USE -- OVERALL AREA			

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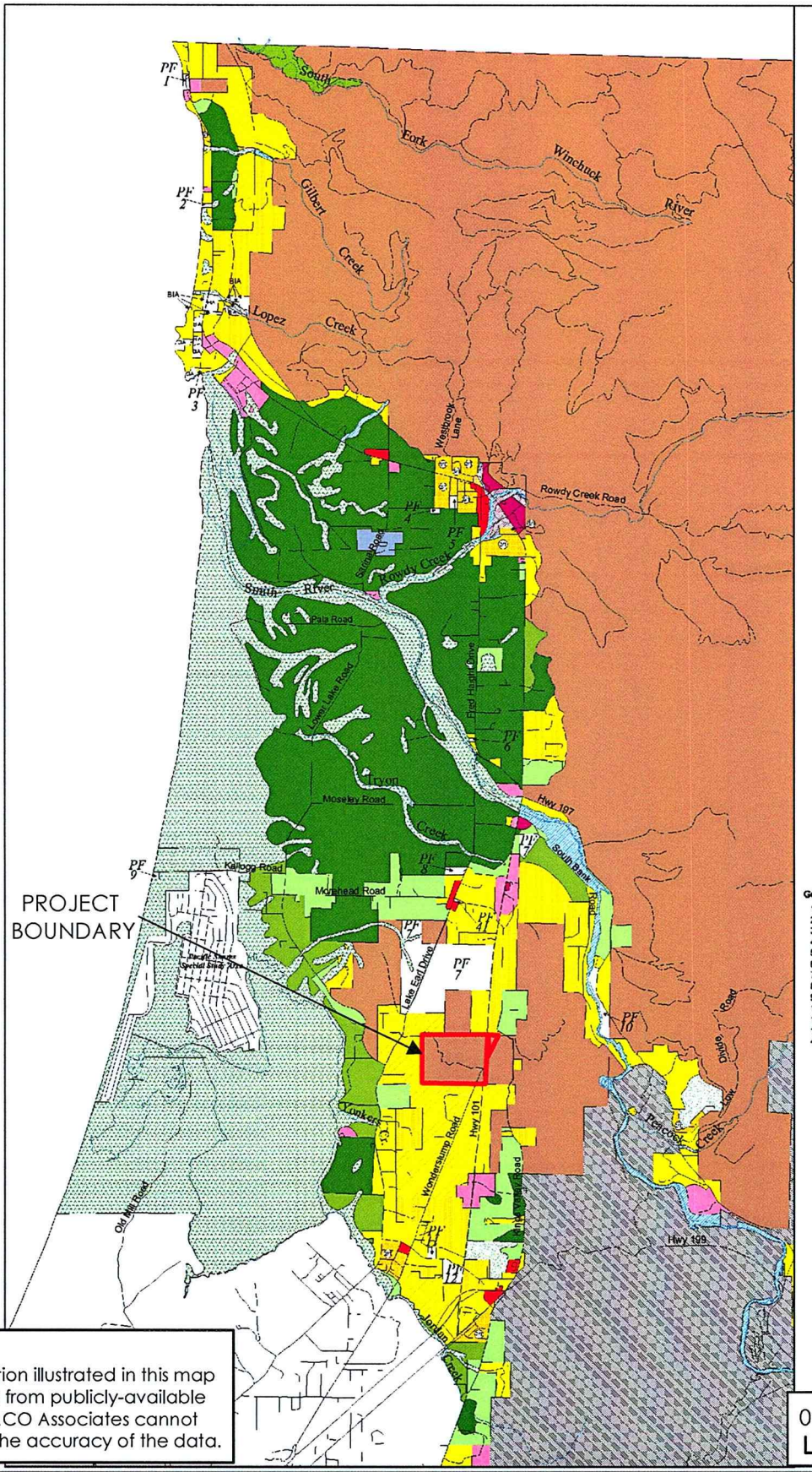

Note:
The information illustrated in this map was derived from publicly-available GIS data. LACO Associates cannot guarantee the accuracy of the data.

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LACO
EUREKA • UKIAH • SANTA ROSA
1-800-515-5054 www.lacoassociates.com

PROJECT	FORT DICK FLATS GPA & REZONE	BY CMB	FIGURE 4
CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK MMM	
LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE 2/4/2019	JOB NO. 6872.19
	CURRENT ZONING MAP		

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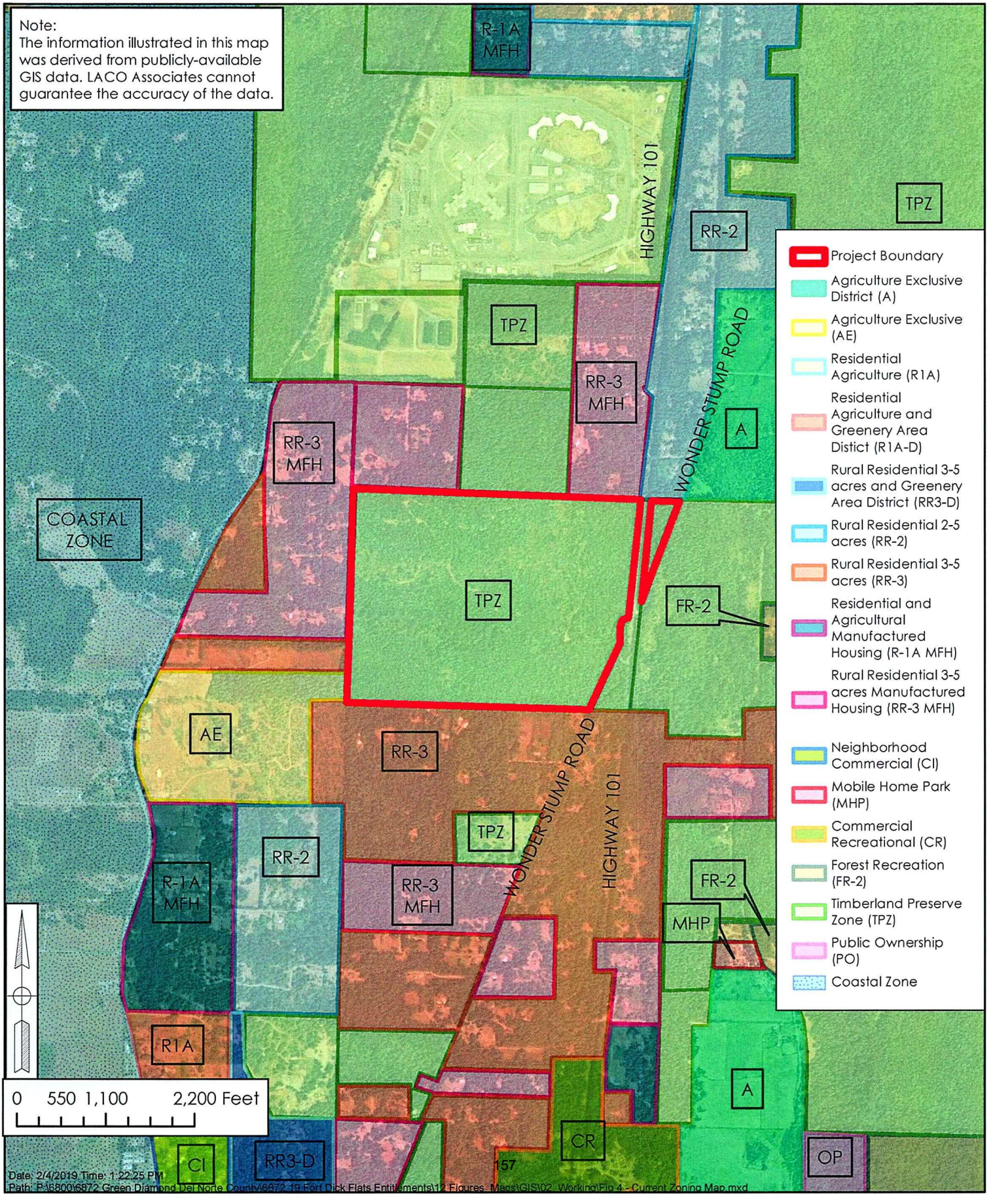

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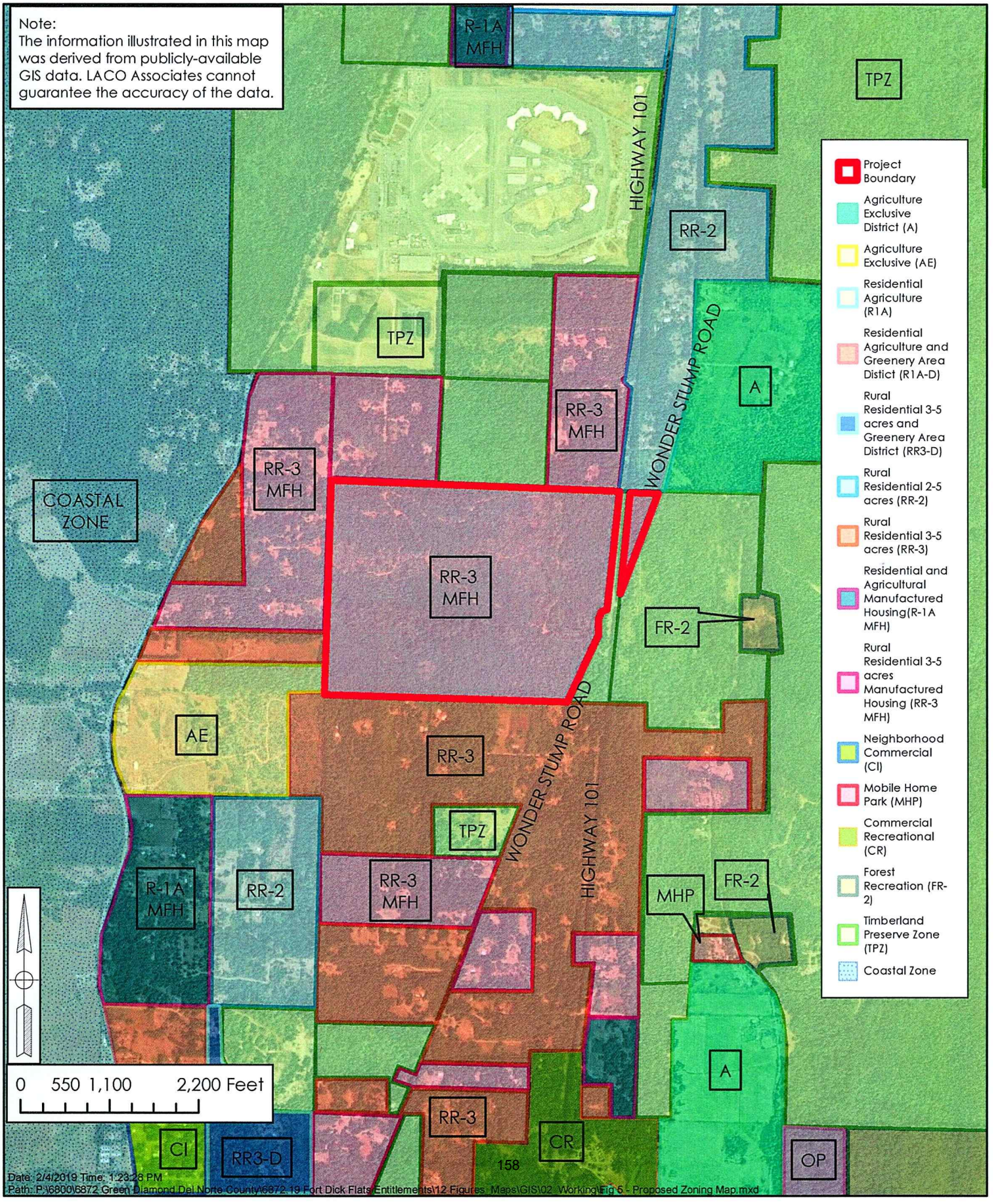
LACO	PROJECT	FORT DICK FLATS GPA & REZONE	BY	CMB	FIGURE
EUREKA • UKIAH • SANTA ROSA	CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK	MMM	5
1-800-515-5054 www.lacoassociates.com	LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE	2/4/2019	JOB NO. 6872.19
		PROPOSED ZONING MAP			

REUSE OF DOCUMENTS: This document and the ideas and design incorporated herein, as an instrument of professional service, is the property of LACO Associates and shall not be reused in whole or part for any other project without LACO Associates express written authorization.

Note:
The information illustrated in this map was derived from publicly-available GIS data. LACO Associates cannot guarantee the accuracy of the data.



Date: 2/4/2019 Time: 1:23:28 PM
Path: P:\6800\6872 Green Diamond Del Norte County\6872.19 Fort Dick Flats Entitlements\12 Figures_Maps\GIS\02_Working\Fig 5 - Proposed Zoning Map.mxd

LACO			
EUREKA • UKIAH • SANTA ROSA 1-800-515-5054 www.lacoassociates.com	PROJECT FORT DICK FLATS GPA & REZONE	BY CMB	FIGURE 3
	CLIENT GREEN DIAMOND RESOURCE COMPANY	CHECK MMM	
	LOCATION HWY 101/WONDER STUMP ROAD, FORT DICK	DATE 2/4/2019	JOB NO. 6872.19
	PROPOSED LAND USE		

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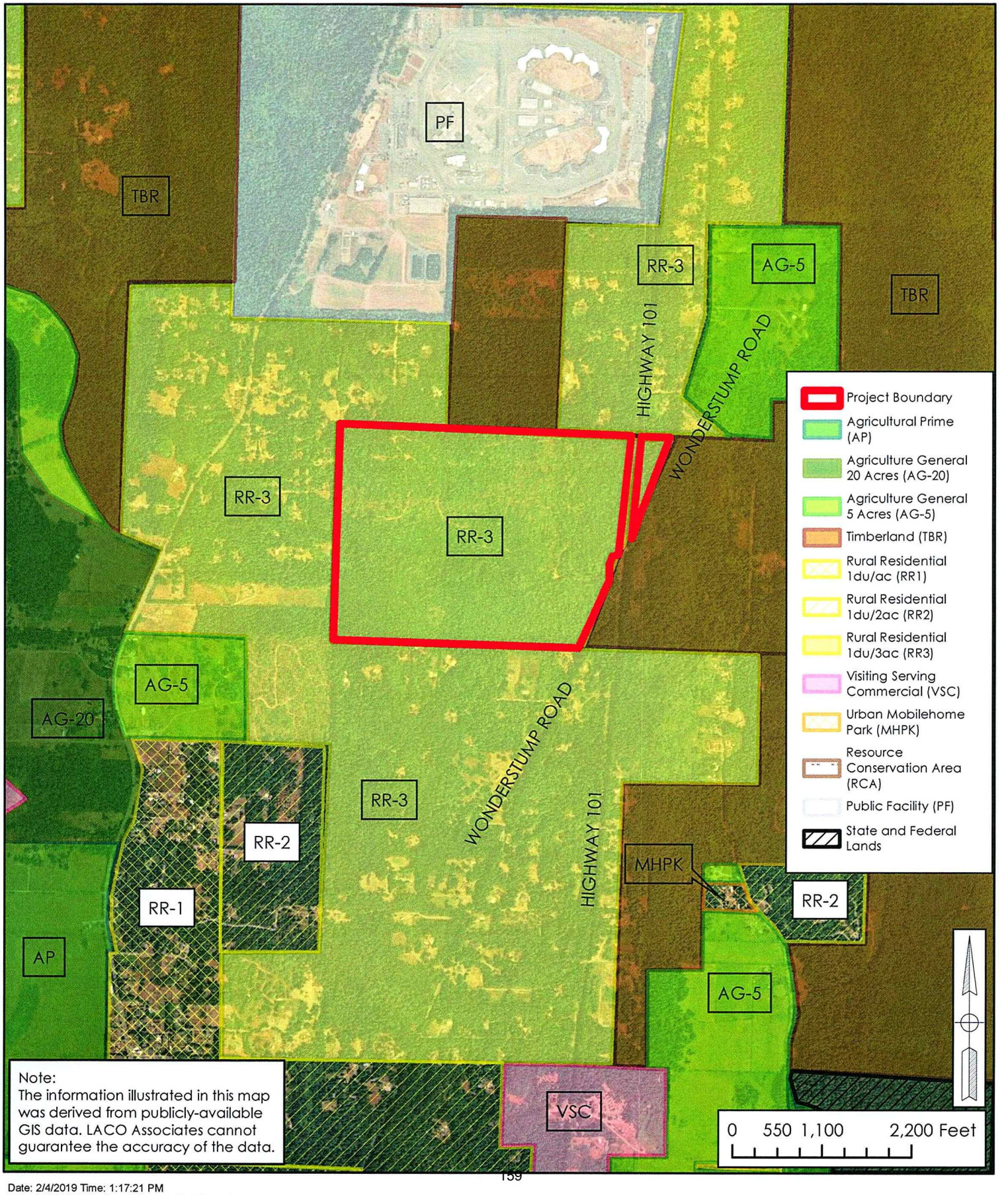

Note:
The information illustrated in this map was derived from publicly-available GIS data. LACO Associates cannot guarantee the accuracy of the data.

Date: 2/4/2019 Time: 1:17:21 PM
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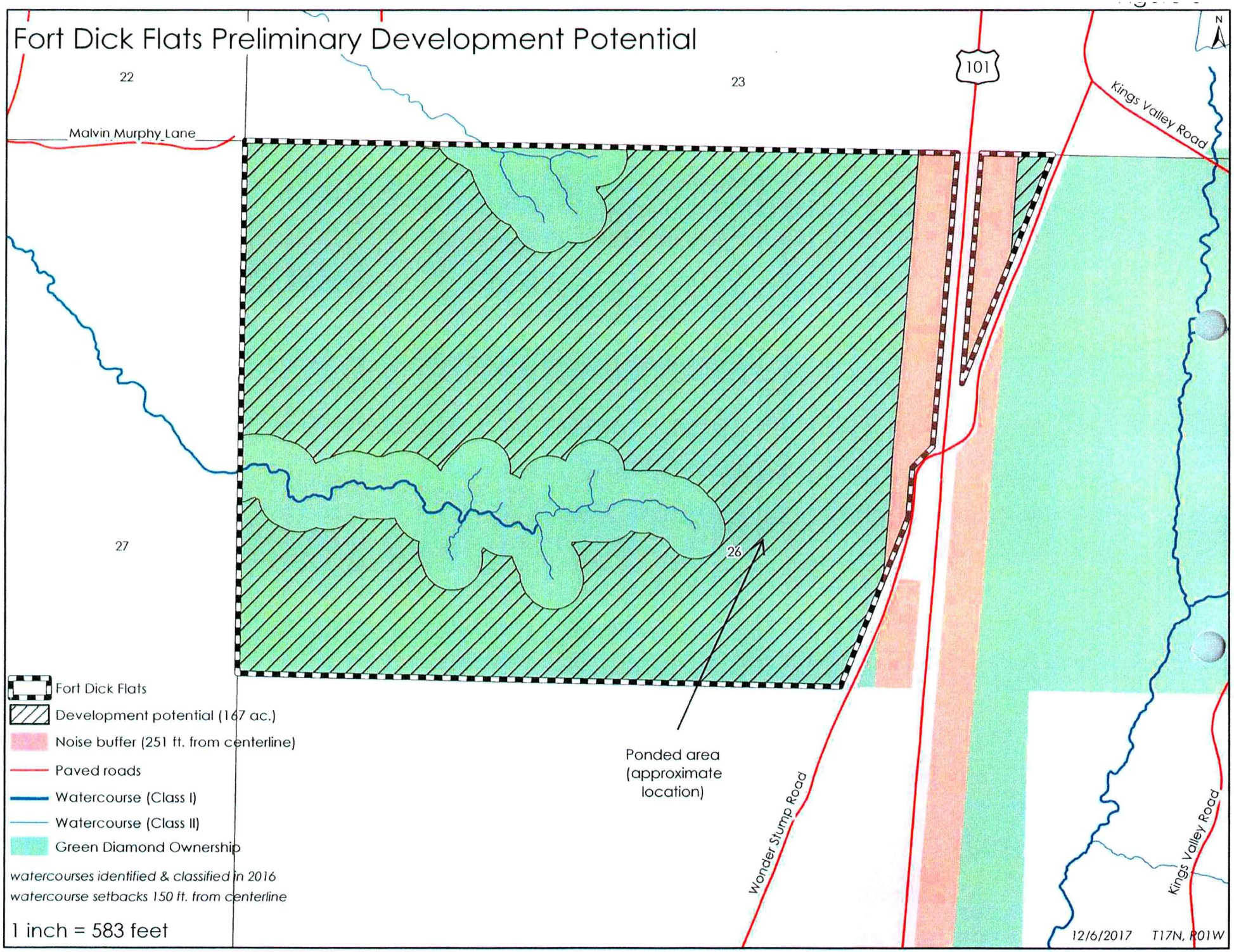
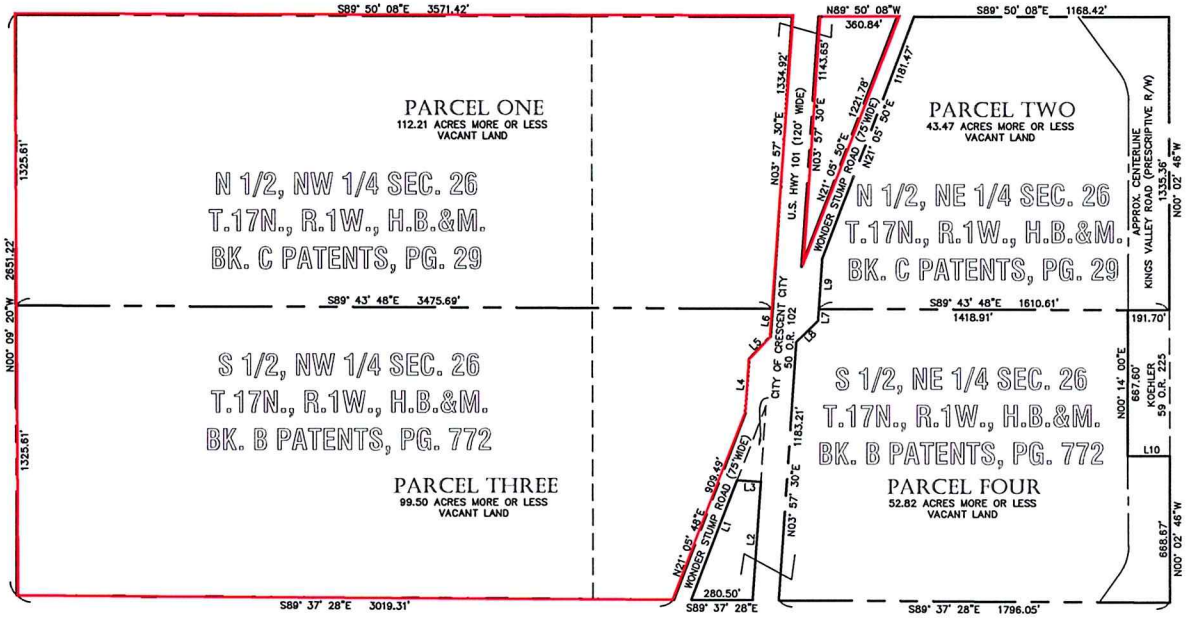

Fort Dick Flats Preliminary Development Potential
22
23
27
26
Malvin Murphy Lane
101
Kings Valley Road
Wonder Stump Road
Kings Valley Road
Ponded area (approximate location)
Fort Dick Flats
Development potential (167 ac.)
Noise buffer (251 ft. from centerline)
Paved roads
Watercourse (Class I)
Watercourse (Class II)
Green Diamond Ownership
watercourses identified & classified in 2016
watercourse setbacks 150 ft. from centerline
1 inch = 583 feet
12/6/2017 T17N, R01W
N

TENTATIVE MAP

CERTIFICATES OF COMPLIANCE

COUNTY OF DEL NORTE - STATE OF CALIFORNIA



LINE TABLE		
LINE	BEARING	DISTANCE
L1	N21° 05' 48"E	583.85'
L2	N03° 57' 30"E	540.33'
L3	N86° 00' 10"E	107.90'
L4	N03° 57' 30"E	249.25'
L5	N43° 52' 12"E	143.35'
L6	N03° 57' 30"E	128.80'
L7	N03° 57' 30"E	52.78'
L8	N45° 15' 27"E	139.40'
L9	N03° 57' 30"E	229.39'
L10	N90° 00' 00"E	194.95'

NOTE:

FOUR HISTORIC LEGAL PARCELS RESULT FROM PATENTS RECORDED IN BOOK B OF PATENTS, PAGE 772 AND BOOK C OF PATENTS, PAGE 29, EXCEPTING THEREFROM LANDS CONVEYED BY DEEDS RECORDED IN BOOK I OF DEEDS, PAGE 198, BOOK I OF DEEDS, PAGE 278, BOOK 50 OF OFFICIAL RECORDS, PAGE 102 AND BOOK 59 OF OFFICIAL RECORDS, PAGE 225. CONVEYANCE OF PUBLIC RIGHT-OF-WAY TO STATE OF CALIFORNIA BY DEED RECORDED IN BOOK 77 DEEDS, PAGE 442 DOES NOT CREATE SEPARATE PARCELS. PUBLIC RIGHT OF WAY TO KINGS VALLEY ROAD IS PRESCRIPTIVE OVER THIS PROPERTY.

APPLICANT

GREEN DIAMOND RESOURCE CO.
P.O. BOX 1089
ARCATA, CA 95518

ATTN: CRAIG COMPTON

PHONE NUMBER

(707) 668-4476

SITE ADDRESS

NO SITUS ADDRESS
CRESCENT CITY, CA 95531

ASSESSOR'S PARCEL NUMBER

106-021-010

DATE 04/07/2017	CERTIFICATES OF COMPLIANCE LANDS OF GREEN DIAMOND CRESCENT CITY, CALIFORNIA	KILLOPS LAND SURVEYING
DRAWN BY MEK		120 SURFSOUND COURT SMITH RIVER, CA 95567 TEL: (707) 487 - 6364
PROJECT NO. 15-271-02	MARK E. KILLOPS LS 5927	"Know Your Boundaries"

LACO

PROJECT DESCRIPTION

Fork Dick Flats General Plan Amendment and Zone Reclassification

Green Diamond Resource Company

Highway 101 and Wonder Stump Road, Fort Dick Area, Del Norte County, California

Assessor's Parcel Numbers (APNs) 106-021-074 and 106-021-076

LACO Project Number 6872.19

August 27, 2019

Green Diamond Resource Company (GDRCo) seeks planning entitlements for a general plan amendment (GPA) and a ten-year Timberland Preserve Zone (TPZ) reclassification for approximately 211.7 acres portion of the land known as Fort Dick Flats (308 total acres) (proposed project). The project area includes two legal parcels identified as Assessor's Parcel Numbers (APNs) 106-021-074 and -076, and located in the unincorporated community of Fort Dick in Del Norte County, California (Site). The Site is located west of Highway 101 and Wonder Stump Road, and includes the triangle-shaped area east of Highway 101 and west of Wonder Stump Road.

The Site is currently designated as "Timberland" (TBR) under the Del Norte County General Plan and is currently zoned as "Timberland Preserve Zone" (TPZ) under the Del Norte County Zoning Code. GDRCo would like to amend the existing land use and zoning designations to Rural Residential with one unit per three acres (RR3) and Rural Residential with three- to five-acre lot sizes and a Manufactured Housing combining district (RR-3 MFH), respectively. No development is currently proposed on-site. At this time, only a change in the Site's current land use and zoning designations, including a ten-year TPZ rollout, is being proposed for the Site. A subdivision or any associated development is not currently proposed; however, future residential development is anticipated on-site after the 10-year TPZ rollout is finalized. The MFH combining district would allow for more flexibility once future development is proposed, by allowing for either a conventional single family residential dwelling or a manufactured home on each potential 3 acre minimum lot.

The Site is undeveloped and is located outside of the Coastal Zone. The Site was last logged by GDRCo in 2010 and contains former logging roads throughout the Site. The Site is forested with young conifers and alders and contains stumps and thick underbrush. The topography of the Site and surrounding area is gently sloping. The Site is located at an elevation of approximately 125 feet above mean sea level and slopes to the west at an approximately 5 to 10 percent slope.

Access to the Site is via Wonder Stump Road, which runs adjacent to the southeastern portion of the Site. If and when future development is proposed at the Site, roadway improvements may be required, including but not limited to roadway widening and/or additional access points.

Surrounding uses include rural residential development and timberland to the north, south, east, and west of the Site. Additionally, Lake Earl is located approximately 0.9 miles west of the Site, the Smith River is located approximately 1.1 miles east of the Site, and the Pacific Ocean is located approximately 3.3 miles west of the Site. Pelican Bay State Prison is located approximately one-half mile to the north.

A Class I watercourse traverses the southwestern portion of the Site and becomes a Class II watercourse further to the east. Within the northern portion of the Site, a Class II watercourse enters the Site from the north.

Future Development Potential

The identified stream/wetland resources require a minimum building setback of a least 100 feet from the top of bank or outer edge of riparian vegetation, whichever is greater. Based on site characteristics and review

of the characteristics of the surrounding Fort Dick area, a 150-foot setback from the on-site Class I and Class II watercourses would likely adequately account for a riparian area of approximately 50 feet wide on either side of the identified watercourses. Additionally, a 251-foot noise buffer, measured from the centerline of Highway 101, is required at the Site, on either side of Highway 101, pursuant to the Del Norte County General Plan.

After consideration of the identified resources and required buffer zones from each resource, the Site is estimated to have a development potential of 167 acres (see Figure 6). In the future, if a residential subdivision of the Site is proposed, the Site would allow for up to a maximum of 55 residential lots, assuming the requested land use and zoning designations of RR3 and RR-3 MFH, respectively, are approved for the Site, as shown in Table 1 below.

Table 1: Development Potential of Site

Developable Acres*	Minimum Density (1 du/5 acres)**	Maximum Density (1 du/3 acres)**
167	33	55

** Developable area accounts for a 150 foot setback from the centerline of all identified Class I and II watercourses on-site, in addition to the 251 foot required setback from the centerline of Highway 101.*

*** Minimum and maximum densities calculated assuming the approval of GDRCo's requested modifications to the Site's current land use and zoning designations are approved.*

Due to the slow growth rate of the area, it is anticipated that construction would occur on-site as necessary to accommodate the anticipated housing needs of the area, which would likely occur over the course of many years. Before the anticipated future residential construction can begin, the 10-year TPZ rollout would need to be finalized and a subdivision would be necessary to divide the Site into individual 3 acre minimum lots.

CEQA Analysis

For a conservative approach, the analysis contained in the Draft CEQA Initial Study evaluated the maximum development potential of the Site, which includes future development of a single family residence or manufacture home on each potential lot (up to 55 maximum). The CEQA analysis determined the project (including future anticipated residential development) would not result in a significant impact and all potential impacts would be reduced to a less-than-significant impact with the incorporation of mitigation.

Future Subdivision Improvements

Future subdivision and development of residential units at the Site may require subdivision improvements, such as sidewalks, curbs, gutters, drainage features, and roadway improvements in accordance with County and/or California Department of Transportation (Caltrans) requirements, may be deferred until specific development plans are proposed, pursuant to Section 66411.1 of the Subdivision Map Act. No specific subdivision and development plans for the Site are proposed at the time.

Services and Utilities

The Site is currently undeveloped and forested and not served by utilities. Once development is proposed at the Site, electricity would be extended to the Site and provided by Pacific Power. Since the Site is not within the service boundary of any community services district, the Site is and would continue to not be served by community water or wastewater service. Future residential development anticipated at the Site is expected

to utilize on-site wells and wastewater treatment systems, such as conventional gravity, shallow low-pressure distribution, or Wisconsin mound on-site wastewater treatment systems. Since there is no natural gas service in the County, anticipated future residential development would utilize electricity and/or propane for household appliances, in addition to heating and cooking activities. Two local propane providers, Blue Star Gas and Suburban Propane, are located in Crescent City and serve the local area. Additionally, Recology Del Norte provides weekly curbside garbage, recycling, and green waste collection within Del Norte County, and would serve the anticipated future development.

Special Studies

Several special studies have been prepared for the proposed project and are summarized below:

Biological and Botanical Resources

A *Fort Dick Flats Preliminary Biological Survey* technical memorandum (Biological Report) (see Appendix D) was prepared by LACO on June 20, 2019, in order to determine if the Site contains sensitive biological resources, such as sensitive or special status species or habitat areas. A site visit was conducted on September 27, 2018. Prior to and during the survey, a number of resources were consulted to determine potential areas of sensitive plant and wildlife species occurrence in the vicinity of the Site, including the results of biological surveys completed by GDRCo. A portion of the Site, in addition to adjacent GDRCo-owned lands, were included under Timber Harvest Plan (THP) No. 01-09-009DEL. In anticipation of THP 1-09-009DEL, biological surveys were conducted by GDRCo biologists and examined the vegetated and aquatic habitats found on-site, including Class I and II streams, and conducted Northern Spotted Owl (NSO) and aquatic vertebrate surveys. During the September 2018 site visit, special habitat areas, such as habitat edges and wetlands, were assessed at interval cross sections to gain a representational sampling of habitat classification and structure.

The Site contains coastal coniferous forest, Class I and Class II stream courses, and seasonal wetland habitats. Preliminary mapping of the Site from GDRCo acknowledges the occurrence of two stream courses on-site and illustrates a 150-foot setback for each drainage (see Figure 6). The results of the aquatic vertebrate surveys conducted by GDRCo indicate that the Class I stream provides fish access to much of the drainage. No rare plant species, no NSO, and limited sensitive aquatic vertebrate species were detected under GDRCo's biological surveys. While sensitive aquatic vertebrates, including Northern Red-legged Frog (*Rana aurora*) and Southern torrent salamander (*Rhyacotriton vaiegatus*), were detected within the boundaries of THP 01-09-009DEL, these species were located east of Highway 101 and not within the boundaries of the Site. However, suitable habitat is present on or near the Site for several special-status species. The Biological Report recommends an official botanical survey and wetland delineation be completed prior to any Site development to determine the extent of riparian vegetation and top of bank to determine necessary setback distances from the on-site Class I and II watercourses in order to adequately protect these resources.

In addition, site visit photos from April 2008 provide evidence of ponding at road intersections or poorly drained low spots of the existing timber access road system and aquatic vertebrate use at one location has been documented. Since the ponded areas found on the existing timber access road system have not been adequately documented, the Biological Report recommends these locations be mapped in early spring to confirm biological function and value and mitigation proposed to locate, develop, and monitor successful pond development on-site. It is recommended that the location of the proposed mitigation area be an addition to the proposed Class I stream setback and be sized at a 1:1 replacement.

Preliminary Traffic Memorandum

A *Preliminary Traffic Analysis* technical memorandum (Preliminary Traffic Analysis) (see Appendix F) was prepared by LACO on August 27, 2019, in order to evaluate the potential traffic impacts that could occur under build out of the Site under the requested land use and zoning designations. The traffic circulation of the Existing, Future, and Future plus Project conditions were evaluated using level of service (LOS) and control delay. Intersections of interest include Wonder Stump Road and (1) Highway 101, (2) Elk Valley Cross Road, and (3) Kings Valley Road. The Preliminary Traffic Analysis found that the intersections of Wonder Stump Road and Elk Valley Cross Road and Wonder Stump Road and Kings Valley Road are likely to experience an insignificant impact as a result of the anticipated future residential development. The intersection of Wonder Stump Road and Highway 101 is likely to be the primary route for vehicles traveling to and from the Site and was thus further analyzed in the Preliminary Traffic Analysis.

Currently, the Wonder Stump Road/Highway 101 intersection operates at LOS A, indicating free-flow conditions. The analysis concluded that anticipated future build-out of the Site has the potential to generate approximately 53 morning (AM) and 70 afternoon (PM) peak-hour trips and that the intersection would be expected to continue to operate at LOS under the Future and Future plus Project conditions. The longest delay anticipated is 10 seconds during the AM peak-hour on Wonder Stump Road, which would still be considered LOS A.

Since there is no left-turn lane from Highway 101 onto Wonder Stump Road, the Preliminary Traffic Analysis note that there is the potential of traffic backing up on Highway 101 northbound, as vehicles wait to turn left onto Wonder Stump Road. The delay on northbound Highway 101 is not predicted to be significant. However, when anticipated future development is proposed for the Site, after completion of the 10-year TPZ rollout, it may become necessary to create a designated left-turn lane and should be further analyzed at the time future residential development is proposed. Due to the size of the property, the Preliminary Traffic Analysis recommends that additional access points also be analyzed. A formal Traffic Impact Study (TIS) is recommended prior to the approval of any residential development project on-site.

Preliminary On-Site Wastewater Treatment Evaluation

LACO was retained by GDRCo to determine the suitability of the Site for private on-site wastewater treatment systems. The results of LACO's analysis is provided in a letter to GDRCo, titled *Preliminary On-Site Wastewater Treatment Evaluation Test Results*, dated May 2, 2018 (see Appendix G). As provided in the letter, percolation tests were conducted to obtain preliminary data of the soils infiltration capacity and determine preliminary on-site wastewater treatment system designs.

LACO conducted an on-site wastewater treatment system exploration, in general accordance with the current Del Norte County Sewage Disposal Regulations, at six locations across the Site to determine the suitability of on-site wastewater treatment. Potential residential sites in the vicinity of two Piezometers (PZ; PZ-5 and PZ-6), located within the southern and southwestern portions of the Site, appear to be able to support conventional gravity on-site wastewater treatment systems. All other PZ locations (PZ-1 through PZ-4), located in the southeastern, northeastern, northwestern, and western portions of the Site, respectively, due to high groundwater elevations (between 2 and 5 feet below ground surface[bgs]) encountered during percolation testing would require shallow low-pressure distribution or Wisconsin mound on-site wastewater treatment systems.

Preliminary Groundwater Supply Assessment

On November 2, 2018, LACO prepared a *Preliminary Groundwater Supply Assessment Technical Memorandum* (Preliminary Groundwater Supply Assessment) (see Appendix H), to evaluate the feasibility of developing domestic well(s) on-site to serve future residential development anticipated at the Site. The Battery Formation is the principal acquirer in the southern two-thirds of the Smith River Plain and the local groundwater resource. Well yields within the Battery Formation and located near the Site are noted as generally large enough for domestic and limited irrigation uses. Based on existing available data published by the Department of Water Resources, preliminary findings of drilling explorations at the Site, and analysis of precipitation, groundwater levels, and expected future water usage, it appears that the Battery Formation is capable of supplying the minimum daily domestic waste supply required to serve the maximum number of residential lots anticipated at the Site in the future (55 lots).

The Preliminary Groundwater Supply Assessment provides several recommendations regarding the depth, siting, and sealing of the anticipated wells, in addition to completing a test well to confirm the aquifer has adequate capacity.

Foresters' Report

A *Fort Dick Flats Zone Reclassification Foresters' Report for Ten-Year-Roll-Out* (Foresters' Report; see Appendix I) was prepared by Blair Forestry Consulting, LLC for the project on July 10, 2019, to evaluate the current timber stock and its future harvesting potential, compatibility of the proposed GPA/ZR with the surrounding area, and the anticipated change in tax revenue for the County should the project be approved. As noted in the Foresters' Report, the Site is located adjacent the residentially-zoned areas, which are directly to the north, south, and west of the Site. The majority of the Site has been subject to evenaged harvesting (clearcutting) multiple times over the last 20 years, resulting in an average stand age of ±16 years, with scatter residual trees in the 50- to 80-year classes (generally located within the riparian areas).

It is noted in the Foresters' Report that the proposed land use and zoning designations are compatible with the adjacent land use and zoning designations and that future anticipated residential development would not adversely impact neighboring lands. It is the opinion of the Registered Professional Forester (RPF) who prepared the Foresters' Report that the land use and zoning designations proposed under the project and anticipated future residential development are better suited for the Site than continued timber production due to the young conifer stocking on the Site, surrounding land uses, proximity to existing development and infrastructure, and benefit to the County through increased tax revenue.

INITIAL STUDY and DRAFT MITIGATED NEGATIVE DECLARATION

FOR

FORT DICK FLATS GENERAL PLAN AMENDMENT AND ZONE RECLASSIFICATION

March 2021

Lead Agency:
County of Del Norte
Community Development Department
981 H Street, Suite 110
Crescent City, California 95531
(707) 464-7254

Prepared by:
LACO Associates
21 W. 4th Street
Eureka, California 95501
(707) 443-5054

Project No. GPA2001/R2001

TABLE OF CONTENTS

FIGURES AND APPENDICES

I. PROJECT SUMMARY

Date: March 2021

Project Title: Fort Dick Flats General Plan Amendment and Zone Reclassification

Lead Agency: County of Del Norte

Contact: Taylor Carsley, Planner
County of Del Norte
Community Development Department
981 H Street, Suite 110
Crescent City, California 95531
(707) 464-7254

Location: The project area (Site) is approximately 211.71 acres in size and includes two of the four legal parcels comprising the tract known as Fort Dick Flats (308 total acres), which include Assessor's Parcel Numbers (APNs) 106-021-074 (112.21 acres) and 106-021-076 (99.50 acres). The Site is located in the community of Fort Dick in Del Norte County, California, west of Highway 101 and Wonder Stump Road. The Site also includes the triangle-shaped area east of Highway 101 and west of Wonder Stump Road. Wonder Stump Road provides access to the Site (see Figure 1).

Coastal Zone: No

Affected Parcel(s): Assessor's Parcel Numbers (APNs) 106-021-074 and 106-021-076

Current County of Del Norte General Plan Land Use Designation: Timberland (TBR) (see Figure 2)

Proposed County of Del Norte County General Plan Land Use Designation: Rural Residential with one lot unit per three acres (RR3) (see Figure 3)

Current County of Del Norte Zoning Designation: Timberland Preserve Zone (TPZ) (see Figure 4)

Proposed County of Del Norte Zoning Designation: Rural Residential with three- to five-acre lot sizes and Manufactured Housing Combining District (RR-3 MFH) (see Figure 5)

Anticipated Permits and Approvals:

1) County of Del Norte General Plan Amendment and Zone Reclassification

Tribal Cultural Resources: Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?

On October 1, 2018, the Applicant's consultant (LACO Associates) prepared and submitted letters to two local Tribes, including the Tolowa Dee-ni' Nation and Elk Valley Rancheria, to seek input regarding any

specific areas within the project boundary that may be likely to harbor culturally valuable resources and therefore merit additional protection.

Correspondence was received from the Elk Valley Rancheria Tribal Historic Preservation Officer (THPO) on October 22, 2018, in which it was noted that the Site has the potential to contain archaeological materials, but are not aware of any specific sites that are of concern. The Elk Valley Tribe requested immediate notification, should any archaeological materials be located during the course of work.

A letter response was also received from the Tolowa Dee-ni' Nation THPO on October 26, 2018, in which it was noted the Site is located within their aboriginal territory, expressed concerns about the potential for cultural resources within the project area, and requested a site visit. In follow up correspondence dated November 12, 2018, it was noted that two representatives from the Tolowa Dee-ni' Nation walked a small portion of the Site, but were unable to make a determination.

CEQA Requirement:

The proposed project is subject to the requirements of the California Environmental Quality Act (CEQA). The Lead Agency is the County of Del Norte. The purpose of this Initial Study (IS) is to provide a basis for determining whether to prepare an Environmental Impact Report (EIR) or a Negative Declaration. This IS is intended to satisfy the requirements of the CEQA (Public Resources Code, Div. 13, Sec. 21000-21177) and the State CEQA Guidelines (California Code of Regulations, Title 14, Sec 15000-15387).

CEQA encourages lead agencies and applicants to modify their projects to avoid significant adverse impacts (CEQA Section 20180(c) (2) and State CEQA Guidelines Section 15070(b) (2)).

Section 15063(d) of the State CEQA Guidelines states that an IS shall contain the following information in brief form:

1) A description of the project including the project location
2) Identification of the environmental setting
3) Identification of environmental effects by use of a checklist, matrix, or other method, provided that entries on a checklist or other form are briefly explained to provide evidence to support the entries
4) Discussion of means to mitigate significant effects identified, if any
5) Examination of whether the project would be consistent with existing zoning, plans, and other applicable land use controls
6) The name of the person or persons who prepared and/or participated in the Initial Study

II. PROJECT DESCRIPTION

Green Diamond Resource Company (GDRCo) seeks planning entitlements for a general plan amendment (GPA) and a ten-year Timberland Preserve Zone (TPZ) reclassification for approximately 211.7 acres portion of the land known as Fort Dick Flats (308 total acres) (proposed project). The project area includes two legal parcels identified as Assessor's Parcel Numbers (APNs) 106-021-074 and -076, and located in the unincorporated community of Fort Dick in Del Norte County, California (Site). The Site is located west of Highway 101 and Wonder Stump Road, and includes the triangle-shaped area east of Highway 101 and west of Wonder Stump Road (see Figure 1).

The Site is currently designated as "Timberland" (TBR) under the Del Norte County General Plan and is currently zoned as "Timberland Preserve Zone" (TPZ) under the Del Norte County Zoning Code. GDRCo would like to amend the existing land use and zoning designations to Rural Residential with one unit per three acres (RR3) and Rural Residential with three- to five-acre lot sizes and a Manufactured Housing combining district (RR-3 MFH), respectively. At this time, only a change in the Site's current land use and zoning designations, including a ten-year TPZ rollout, is being proposed for the Site. A subdivision or any associated development is not currently proposed; however, future residential development is anticipated on-site after the 10-year TPZ rollout is finalized. The MFH combining district would allow for more flexibility once future development is proposed, by allowing for either a conventional single family residential dwelling or a manufactured home on each potential 3 acre minimum lot.

Future Development Potential

LACO Associates (LACO) prepared and delivered a letter to the County, titled *Development Potential of Green Diamond Resource Company's Fort Dick Flats Property* (Development Potential Letter), dated December 15, 2017 (see Appendix B), to provide the results of LACO's analysis and memorialize the development potential of the Site under GDRCo's requested land use and zoning designations. The property contains several constraint areas, including seasonal wetlands and Class I and II watercourses in the northern and southwestern portions of the Site, which require a minimum building setback of a least 100 feet from the top of bank or outer edge of riparian vegetation, whichever is greater. Based on Site characteristics and review of the characteristics of the surrounding Fort Dick area, LACO's analysis assumes a conservative 150 foot setback from the centerline of all on-site Class I and II watercourses, to account for a potential riparian area of approximately 50 feet from the identified watercourses. Additionally, as required per Table 2-1 (Future Traffic Noise Levels Along Del Norte County Roadways) from Section 2 (Safety and Noise) of the County's General Plan, a required 251-foot noise buffer on either side of Highway 101, as measured from the centerline of Highway 101, is also required. LACO also assumes that future development on-site would include any identified wetland(s) on as few new lots as possible per California Department of Fish and Wildlife (CDFW) general guidelines to protect the resource and minimize multiple owners and managers.

After consideration of the identified resources and required buffer zones from each resource, the Site is estimated to have a development potential of 167 acres (see Figure 6). In the future, if a residential subdivision of the Site is proposed, the Site would allow for up to a maximum of 55 residential lots, assuming the requested land use and zoning designations of RR3 and RR-3 MFH, respectively, are approved for the Site, as shown in Table 1 below.

Table 1: Development Potential of Site

Developable Acres*	Minimum Density (1 du/5 acres)**	Maximum Density (1 du/3 acres)**
167	33	55

** Developable area accounts for a 150 foot setback from the centerline of all identified Class I and II watercourses on-site, in addition to the 251 foot required setback from the centerline of Highway 101.*

*** Minimum and maximum densities calculated assuming the approval of GDRCo's requested modifications to the Site's current land use and zoning designations are approved.*

For a conservative approach, the analysis contained in this Initial Study will evaluate the maximum development potential of the Site, which includes future development of a single family residence or manufacture home on each potential lot (up to 55 maximum). While second dwelling units are permitted with issuance of a use permit, in accordance with Section 20.00.20 (Application) of the Del Norte County Code, there are very specific requirements for when a second unit may be permitted. Pursuant to Section 20.00.30 of the Del Norte County Code, a second single-family unit may be permitted if:

- The subject parcel is within an R, RR, FR, CR, A or AE zone district;
- The second unit is consistent with the allowable density of the applicable General Plan designation and zoning designation (i.e., the subject parcel consists of a minimum of twice the minimum parcel size required by the general plan and zoning);
- The second unit must be situated on the subject parcel so that the parcel could be subdivided, under standards applicable at the time of application, without resulting in two dwellings on one parcel;
- The second unit shall comply with height, setback, lot coverage, architectural standards, site plan review, fees, charges and other zoning requirements generally applicable to residential placement in the zone in which the property is located at the time for application of the building permit; and
- Each dwelling shall be provided with separate utility connections (although a shared well may be approved by the health department).

Pursuant to Sections 20.00.40 (Senior Second Units) and 20.00.50 (Invalid Family Care), temporary second units may be permitted on-site for immediate family members of the primary residents of the parcel and are either seniors (62 years or older) and/or requiring invalid care. However, once the occupant(s) of the second dwelling unit no longer reside in the unit or qualify for the use permitted, the temporary unit or portion of the primary residence utilized as a second unit shall be removed and/or no longer used for second dwelling purposes (including removal of the kitchen facilities and any duplicate utilities).

Since the analysis assumes that one single family residence or manufactured home would be developed per each 3 acre lot, permanent second units would not be allowed on-site. Although temporary second units may be permitted, these units are not included in our analysis, as they would only be temporary in nature and eventually removed from the applicable lot. As such, the analysis contained in this Initial Study assumes full build-out of the Site would equate to 55 residences on-site.

Additionally, while up to 167 acres of the Site may be potentially developed in the future, Blair Forestry Consulting, LLC (2019) estimates that anticipated future development on-site is anticipated to result in the removal of approximately 55 acres (approximately 26 percent) of trees out of the total developable acreage. Such area would be utilized for home site development and associated infrastructure of roads and drives. Although 167 acres is the total allowable developable area on-site (which accounts for necessary buffer areas), given observed history of residential development on rural forested lands, such as

the Site, home site development is typically limited to clearing of one (1) acre or less, as trees are often retained to provide seclusion screening, and buffering from neighboring properties. However, in order to analyze the project's "worst-case scenario", the analysis contained in this Initial Study assumes the entire developable area (167 acres) may be cleared and developed in the future.

Due to the slow growth rate of the area, it is anticipated that construction would occur on-site as necessary to accommodate the anticipated housing needs of the area, which would likely occur over the course of many years. Before the anticipated future residential construction can begin, the 10-year TPZ rollout would need to be finalized and a subdivision would be necessary to divide the Site into individual 3 acre minimum lots.

Site Access

The Site is currently accessed via Wonder Stump Road, which runs adjacent to the southeastern portion of the Site. If and when future development is proposed at the Site, roadway improvements may be required, including but not limited to roadway widening and/or additional access points.

Future Subdivision Improvements

Future subdivision and development of residential units at the Site may require subdivision improvements, such as sidewalks, curbs, gutters, drainage features, and roadway improvements in accordance with County and/or California Department of Transportation (Caltrans) requirements, may be deferred until specific development plans are proposed, pursuant to Section 66411.1 of the Subdivision Map Act. No specific subdivision and development plans for the Site are proposed at the time.

Services and Utilities

The Site is currently undeveloped and forested and not served by utilities. Once development is proposed at the Site, electricity would be extended to the Site and provided by Pacific Power. Since the Site is not within the service boundary of any community services district, the Site is and would continue to not be served by community water or wastewater service. Future residential development anticipated at the Site is expected to utilize on-site wells and wastewater treatment systems, such as conventional gravity, shallow low-pressure distribution, or Wisconsin mound on-site wastewater treatment systems. Since there is no natural gas service in the County, anticipated future residential development would utilize electricity and/or propane for household appliances, in addition to heating and cooking activities. Two local propane providers, Blue Star Gas and Suburban Propane, are located in Crescent City and serve the local area. Additionally, Recology Del Norte provides weekly curbside garbage, recycling, and green waste collection within Del Norte County, and would serve the anticipated future development.

Special Studies

Several special studies have been prepared for the proposed project and are summarized below:

Biological and Botanical Resources

A *Fort Dick Flats Preliminary Biological Survey* technical memorandum (Biological Report) (see Appendix D) was prepared by LACO on June 20, 2019, in order to determine if the Site contains sensitive biological resources, such as sensitive or special status species or habitat areas. A site visit was conducted on September 27, 2018. Prior to and during the survey, a number of resources were consulted to determine potential areas of sensitive plant and wildlife species occurrence in the vicinity of the Site, including the results of biological surveys completed by GDRCo. A portion of the Site, in addition to adjacent GDRCo-owned lands, were included under Timber Harvest Plan (THP) No. 01-09-009DEL. In anticipation of THP 1-09-009DEL, biological surveys were conducted by GDRCo biologists and examined the vegetated and

aquatic habitats found on-site, including Class I and II streams, and conducted Northern Spotted Owl (NSO) and aquatic vertebrate surveys. During the September 2018 site visit, special habitat areas, such as habitat edges and wetlands, were assessed at interval cross sections to gain a representational sampling of habitat classification and structure.

The Site contains coastal coniferous forest, Class I and Class II stream courses, and seasonal wetland habitats. Preliminary mapping of the Site from GDRCo acknowledges the occurrence of two stream courses on-site and illustrates a 150-foot setback for each drainage (see Figure 6). The results of the aquatic vertebrate surveys conducted by GDRCo indicate that the Class I stream provides fish access to much of the drainage. No rare plant species, no NSO, and limited sensitive aquatic vertebrate species were detected under GDRCo's biological surveys. While sensitive aquatic vertebrates, including Northern Red-legged Frog (*Rana aurora*) and Southern torrent salamander (*Rhyacotriton vaiegatus*), were detected within the boundaries of THP 01-09-009DEL, these species were located east of Highway 101 and not within the boundaries of the Site. However, suitable habitat is present on or near the Site for several special-status species. The Biological Report recommends an official botanical survey and wetland delineation be completed prior to any Site development to determine the extent of riparian vegetation and top of bank to determine necessary setback distances from the on-site Class I and II watercourses in order to adequately protect these resources.

In addition, site visit photos from April 2008 provide evidence of ponding at road intersections or poorly drained low spots of the existing timber access road system and aquatic vertebrate use at one location has been documented. Since the ponded areas found on the existing timber access road system have not been adequately documented, the Biological Report recommends these locations be mapped in early spring to confirm biological function and value and mitigation proposed to locate, develop, and monitor successful pond development on-site. It is recommended that the location of the proposed mitigation area be an addition to the proposed Class I stream setback and be sized at a 1:1 replacement.

Preliminary Traffic Memorandum

A *Preliminary Traffic Analysis* technical memorandum (Preliminary Traffic Analysis) (see Appendix F) was prepared by LACO on August 27, 2019, in order to evaluate the potential traffic impacts that could occur under build out of the Site under the requested land use and zoning designations. The traffic circulation of the Existing, Future, and Future plus Project conditions were evaluated using level of service (LOS) and control delay. Intersections of interest include Wonder Stump Road and (1) Highway 101, (2) Elk Valley Cross Road, and (3) Kings Valley Road. The Preliminary Traffic Analysis found that the intersections of Wonder Stump Road and Elk Valley Cross Road and Wonder Stump Road and Kings Valley Road are likely to experience an insignificant impact as a result of the anticipated future residential development. The intersection of Wonder Stump Road and Highway 101 is likely to be the primary route for vehicles traveling to and from the Site and was thus further analyzed in the Preliminary Traffic Analysis.

Currently, the Wonder Stump Road/Highway 101 intersection operates at LOS A, indicating free-flow conditions. The analysis concluded that anticipated future build-out of the Site has the potential to generate approximately 53 morning (AM) and 70 afternoon (PM) peak-hour trips and that the intersection would be expected to continue to operate at LOS under the Future and Future plus Project conditions. The longest delay anticipated is 10 seconds during the AM peak-hour on Wonder Stump Road, which would still be considered LOS A.

Since there is no left-turn lane from Highway 101 onto Wonder Stump Road, the Preliminary Traffic Analysis note that there is the potential of traffic backing up on Highway 101 northbound, as vehicles wait to turn

left onto Wonder Stump Road. The delay on northbound Highway 101 is not predicted to be significant. However, when anticipated future development is proposed for the Site, after completion of the 10-year TPZ rollout, it may become necessary to create a designated left-turn lane and should be further analyzed at the time future residential development is proposed. Due to the size of the property, the Preliminary Traffic Analysis recommends that additional access points also be analyzed. A formal Traffic Impact Study (TIS) is recommended prior to the approval of any residential development project on-site.

Preliminary On-Site Wastewater Treatment Evaluation

LACO was retained by GDRCo to determine the suitability of the Site for private on-site wastewater treatment systems. The results of LACO's analysis is provided in a letter to GDRCo, titled *Preliminary On-Site Wastewater Treatment Evaluation Test Results*, dated May 2, 2018 (see Appendix G). As provided in the letter, percolation tests were conducted to obtain preliminary data of the soils infiltration capacity and determine preliminary on-site wastewater treatment system designs.

LACO conducted an on-site wastewater treatment system exploration, in general accordance with the current Del Norte County Sewage Disposal Regulations, at six locations across the Site to determine the suitability of on-site wastewater treatment. Potential residential sites in the vicinity of two Piezometers (PZ; PZ-5 and PZ-6), located within the southern and southwestern portions of the Site, appear to be able to support conventional gravity on-site wastewater treatment systems. All other PZ locations (PZ-1 through PZ-4), located in the southeastern, northeastern, northwestern, and western portions of the Site, respectively, due to high groundwater elevations (between 2 and 5 feet below ground surface[bgs]) encountered during percolation testing would require shallow low-pressure distribution or Wisconsin mound on-site wastewater treatment systems.

Preliminary Groundwater Supply Assessment

On November 2, 2018, LACO prepared a *Preliminary Groundwater Supply Assessment Technical Memorandum* (Preliminary Groundwater Supply Assessment) (see Appendix H), to evaluate the feasibility of developing domestic well(s) on-site to serve future residential development anticipated at the Site. The Battery Formation is the principal acquirer in the southern two-thirds of the Smith River Plain and the local groundwater resource. Well yields within the Battery Formation and located near the Site are noted as generally large enough for domestic and limited irrigation uses. Based on existing available data published by the Department of Water Resources, preliminary findings of drilling explorations at the Site, and analysis of precipitation, groundwater levels, and expected future water usage, it appears that the Battery Formation is capable of supplying the minimum daily domestic waste supply required to serve the maximum number of residential lots anticipated at the Site in the future (55 lots).

The Preliminary Groundwater Supply Assessment provides several recommendations regarding the depth, siting, and sealing of the anticipated wells, in addition to completing a test well to confirm the aquifer has adequate capacity.

Foresters' Report

A *Fort Dick Flats Zone Reclassification Foresters' Report for Ten-Year-Roll-Out* (Foresters' Report; see Appendix I) was prepared by Blair Forestry Consulting, LLC for the project on July 10, 2019, to evaluate the current timber stock and its future harvesting potential, compatibility of the proposed GPA/ZR with the surrounding area, and the anticipated change in tax revenue for the County should the project be approved. As noted in the Foresters' Report, the Site is located adjacent the residentially-zoned areas, which are directly to the north, south, and west of the Site. The majority of the Site has been subject to evenaged harvesting (clearcutting) multiple times over the last 20 years, resulting in an average stand age

of ±16 years, with scatter residual trees in the 50- to 80-year classes (generally located within the riparian areas).

It is noted in the Foresters' Report that the proposed land use and zoning designations are compatible with the adjacent land use and zoning designations and that future anticipated residential development would not adversely impact neighboring lands. It is the opinion of the Registered Professional Forester (RPF) who prepared the Foresters' Report that the land use and zoning designations proposed under the project and anticipated future residential development are better suited for the Site than continued timber production due to the young conifer stocking on the Site, surrounding land uses, proximity to existing development and infrastructure, and benefit to the County through increased tax revenue.

III. PROJECT SETTING AND LOCATION

The Site, approximately 211.71 acres in size, includes two of the four legal parcels comprising the property known as Fort Dick Flats, identified as Assessor's Parcel Numbers (APNs) 106-021-074 (112.21 acres) and 106-021-076 (99.50 acres). The entire Fort Dick Flats property totals approximately 308 acres and straddles Highway 101 between Lake Earl Drive and Kings Valley Road, in the community of Fort Dick in Del Norte County, California. Fort Dick is located approximately 5 miles north of Crescent City and approximately 15 miles south of the California-Oregon state line. Wonder Stump Road bisects the Fort Dick Flats property and provides access to the Site. As shown in Figure 1, the Site is located west of Highway 101, in addition to the triangle-shaped area east of Highway 101 and west of Wonder Stump Road.

The Site is currently undeveloped and is located outside of the Coastal Zone. The Site was last logged by GDRCo in 2010 and contains former logging roads throughout the Site. The Site is forested with young conifers and alders and contains stumps and thick underbrush. The topography of the Site and surrounding area is gently sloping. The Site is located at an elevation of approximately 125 feet above mean sea level and slopes to the west at an approximately 5 to 10 percent slope.

Although the U.S. Fish and Wildlife Service's (USFWS) *National Wetlands Inventory* does not show any wetlands or riparian habitat within the boundaries of the Site, several constraint areas, including seasonal wetlands and Class I and II watercourses in the northern and southwestern portions of the Site (tributaries to Yonkers Creek and Camp Six Creek) were identified on-site during surveys completed as part of the Timber Harvest Plan (THP) prepared in 2009 for a portion of the Site and adjacent GDRCo lands. The identified resources require a minimum building setback of a least 100 feet from the top of bank or outer edge of riparian vegetation, whichever is greater. Additionally, a 251-foot noise buffer, measured from the centerline of Highway 101, is required at the Site, on either side of Highway 101, pursuant to the Del Norte County General Plan.

Surrounding uses include rural residential development and timberland to the north, south, east, and west of the Site. Additionally, Lake Earl is located approximately 0.9 miles west of the Site, the Smith River is located approximately 1.1 miles east of the Site, and the Pacific Ocean is located approximately 3.3 miles west of the Site. Pelican Bay State Prison is located approximately one-half mile to the north.

IV. ENVIRONMENTAL EFFECTS

An environmental checklist follows this section, and addresses all potential adverse effects resulting from the proposed project. No significant adverse effects are expected from any of the proposed activities.

V. ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a **"Potentially Significant Impact"** or "**Potentially Significant Unless Mitigation Incorporated**" as indicated by the checklists on the following pages.

X	Aesthetics		Agriculture and Forestry Resources	X	Air Quality
X	Biological Resources	X	Cultural Resources		Energy
X	Geology/Soils	X	Greenhouse Gas Emissions		Hazards & Hazardous Materials
	Hydrology/Water Quality		Land Use/Planning		Mineral Resources
	Noise		Population/Housing		Public Services
	Recreation	X	Transportation	X	Tribal Cultural Resources
X	Utilities/Service Systems		Wildfire		Mandatory Findings of Significance

An explanation for all checklist responses is included, and all answers take into account the whole action involved and the following types of impacts: off-site and on-site; cumulative and project-level; indirect and direct; and construction and operational. The explanation of each issue identifies (a) the threshold of significance, if any, used to evaluate each question; and (b) the mitigation measure identified, if any, to reduce the impact to less than significance. All mitigation measures are provided in the Mitigation Monitoring and Reporting Program (MMRP) (see Appendix A).

In the checklist the following definitions are used:

"**Potentially Significant Impact**" means there is substantial evidence that an effect may be significant.

"**Potentially Significant Unless Mitigation Incorporated**" means the incorporation of one or more mitigation measures can reduce the effect from potentially significant to a less than significant level.

"**Less Than Significant Impact"** means that the effect is less than significant and no mitigation is necessary to reduce the impact to a lesser level.

"**No Impact"** means that the effect does not apply to the proposed project, or clearly will not impact nor be impacted by the proposed project.

DETERMINATION: (To be completed by the Lead Agency on the basis of this initial evaluation)

☐	I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
☒	I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
☐	I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
☐	I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
☐	I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Taylor Carsley
Signature

March 23, 2021
Date

Taylor Carsley, Planner
Name and Title

I. **AESTHETICS**. Except as provided in Public Resources Code Section 21099, would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	☐	☒	☐	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☒	☐	☐
d) Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?	☐	☒	☐	☐

Thresholds of Significance: The project would have a significant effect on aesthetics if it would have a substantial adverse effect on a scenic vista; substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway; substantially degrade the existing visual character or quality of public views of the site and its surroundings (if the project is in a non-urbanized area) or conflict with applicable zoning and other regulations governing scenic quality (if the project is in an urbanized area); or create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area.

DISCUSSION

The approximately 211.7-acre Site is currently forested and undeveloped. The Site is located adjacent to Highway 101 and is bisected in the southeastern portion of the Site by Wonder Stump Road. The Site was last logged by GDRCo in 2010 and contains former logging roads throughout the Site. The Site is forested with young conifers and alders and contains stumps and thick underbrush. The Site contains several constraint areas, including seasonal wetlands and Class I and II watercourses (tributaries to Yonkers Creek and Camp Six Creek), which were identified in the northern and southwestern portions of the Site, during surveys completed as part of the Timber Harvest Plan (THP) prepared in 2009 for the Site and adjacent GDRCo lands. The identified resources require a minimum building setback of a least 100 feet from the top of bank or outer edge of riparian vegetation, whichever is greater. Additionally, a 251-foot noise buffer, measured from the centerline of Highway 101, is required at the Site, on either side of Highway 101.

Surrounding uses include rural residential development and timberland to the north, south, east, and west of the Site. Additionally, Lake Earl is located approximately 0.9 miles west of the Site, the Smith River is located approximately 1.1 miles east of the Site, and the Pacific Ocean is located approximately 3.3 miles west of the Site. Pelican Bay State Prison is located approximately a half a mile to the north.

I.a) Although views of the Site constitute forested views, the Site is not located within a County-mapped or designated scenic vista area. However, pursuant to Policy 6.B.1 of Section 6 (Scenic Resources) of the Del Norte County General Plan, "*the County should support the maintenance and enhancement of the scenic qualities of Highways 101, 197, and 199, while ensuring the improvement of these routes and the economic viability of the area they serve*." Although no development is currently proposed on-site, residential development is anticipated at the Site in the future, including a maximum build-out of 55 single family residences or manufactured homes, after the 10-year TPZ rollout is finalized. The anticipated future

residential development may substantially impact the existing visual character or quality of public views of the Site and its surroundings, since up to 167 acres of the Site could be cleared in order to accommodate the anticipated future development, although many trees are likely to be retained on-site in order to provide seclusion, screening, and buffering from neighboring properties. As provided in the *Fort Dick Flats Zone Reclassification Foresters' Report for Ten-Year-Roll-Out* (Foresters' Report; see Appendix I), prepared by Blair Forestry Consulting, LLC on July 10, 2019, it is likely that the majority of the Site would remain forested and only about 55 acres (26 percent of the Site), or 1 acre of clearing per individual parcel, would be cleared to accommodate home site development and associated infrastructure of roads and drives, consistent with observed history of residential development on rural forested lands. However, in order to evaluate the maximum build-out of the Site, the analysis contained in this Initial Study assumes the entire "developable area" would be cleared.

In order to minimize potential visual impacts associated with anticipated future development of the Site and maintain existing forested views to the maximum extent feasible, pursuant to Mitigation Measure AES-1, the project developer and contractor shall retain existing trees along the Site's boundaries to provide visual screening of the Site and anticipated future residential development. With mitigation incorporated, a less than significant impact would occur

I.b) Within Del Norte County, there are several eligible State scenic highways, including Highway 101, 197, and 199. In addition, a 12-mile portion of Highway 101 within Del Norte Redwoods State Park is an Officially Designated State Scenic Highway (Caltrans, 2018); however, this is located south of the Site. While up to 167 acres may be cleared on-site in order to accommodate anticipated future residential development, the portion of Highway 101 adjacent to the Site is neither officially designated or an eligible State scenic highway Caltrans, 2018). As a result, no impact would occur.

I.c) Currently, forested views of the Site are visible from Highway 101 and Wonder Stump Road. The proposed project does not involve any development at the time. However, future residential development is anticipated at the Site, including the development of up to 55 single family residences or manufactured homes spanning approximately 167 acres. As discussed above, the anticipated future development at the Site may substantially impact the existing visual character or quality of public views of the Site and its surroundings, as up to 167 acres of the Site could be cleared in order to accommodate the anticipated future development. While the Site is currently designated and zoned as Timberland (TBR) and Timberland Preserve Zone (TPZ), a GPA/ZR is requested to amend the existing land use and zoning designations to Rural Residential with one unit per three acres (RR3) and Rural Residential with three- to five-acre lot sizes and a Manufactured Housing combining district (RR-3 MFH), respectively, which would allow for future residential development on-site.

In order to minimize potential visual impacts associated with anticipated future development of the Site, the project developer and contractor, pursuant to Mitigation Measure AES-1, shall retain existing trees along the Site boundaries to the maximum extent feasible in order to provide visual screening of the Site and anticipated future residential development and maintain existing views from Highway 101 and surrounding properties. With mitigation incorporated, a less than significant impact would occur.

I.d) Any development on-site would increase light and glare and impact nighttime views as compared to existing conditions, as the Site is currently undeveloped. Future anticipated development at the Site could clear up to 167 acres of the Site and result in the construction of housing and other features, including but not limited to internal roadways, sidewalks, curb, gutters, and street lighting. Future development on the Site would be required to use muted colors and materials with low reflectivity for exterior siding, downward

facing and hooded night lighting, and exterior landscaping, per Mitigation Measure AES-2, below, to help mitigate the impact of light and glare from new construction on the surrounding area. With incorporation of Mitigation Measure AES-2, a less than significant impact would occur.

MITIGATION MEASURES

AES-1: In order to maintain existing forested views, minimize potential visual impacts, and provide visual screening of the Site and anticipated future residential development, the project developer and contractor shall retain existing trees along the Site's boundaries to the maximum extent feasible.

AES-2: The County shall require future development on-site to use materials and building techniques to minimize impacts from street and building lighting on day and nighttime views, including the use of: hooded flood lights to prevent off-site light pollution; low reflectivity building materials, treated windows, and muted colors to limit daytime glare; and exterior landscaping to shade buildings and decrease reflectivity to neighboring developments and Highway 101.

FINDINGS

The proposed project would have a **Less Than Significant Impact with Mitigation Incorporated** on Aesthetics.

II. AGRICULTURE AND FORESTRY RESOURCES. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g), timberland (as defined by PRC section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☒	☐
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☒	☐
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forestland to non-forest use?	☐	☐	☐	☒

Thresholds of Significance: The project would have a significant effect on agriculture and forestry resources if it would convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (hereafter "farmland"), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural uses; conflict with existing zoning for agricultural use or a Williamson Act contract; conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g), timberland (as defined by PRC section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g)); Result in the loss of forest land or conversion of forest land to non-forest use; or involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forestland to non-forest use.

DISCUSSION

The Site is currently undeveloped and forested and is located outside of the Coastal Zone. The Site was last logged by GDRCo in 2010 and contains former logging roads throughout the Site.

Currently, the Site is designated as "Timberland" (TBR) under the Del Norte County General Plan (see Figure 2) and is currently zoned as "Timberland Preserve Zone" (TPZ) under the Del Norte County Zoning Code (see Figure 4). GDRCo would like to amend the existing land use and zoning designations to Rural Residential with one lot unit per three acres (RR3) and Rural Residential with three- to five-acre lot sizes and a Manufactured Housing combining district (RR-3 MFH), respectively (see Figures 3 and 5). No development is currently proposed on-site under the project. Del Norte County is one of five California counties (in addition to San Francisco, Imperial, Inyo, and Yuba Counties) that do not offer Williamson Act contracts (Department of Conservation, 2017).

II.a) To date, the Department of Conservation's Farmland Mapping and Monitoring Program (FMMP) has not created an Important Farmland map for Del Norte County. The Site was last logged by GDRCo in 2010. Additionally, the Site is not currently utilized for agricultural use, nor has the Site been historically utilized for

such use. Since the Site is not mapped by the FMMP, the proposed project and anticipated future residential development would not results in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to a non-agricultural use. No impact would occur.

II.b) The Site is not designated or zoned for agricultural use, nor is the Site under a Williamson Act contract. No impact would occur.

II.c-d) While the proposed project and anticipated future residential development at the Site would cause rezoning of timberland zoned TPZ and result in the loss of forest land or conversion of forest land to non-forest use, a significant impact is not anticipated. As described above, the approximately 211.7-acre Site is currently designated as "Timberland" (TBR) under the Del Norte County General Plan (see Figure 2) and is currently zoned as "Timberland Preserve Zone" (TPZ) under the Del Norte County Zoning Code (see Figure 3). GDRCo would like to amend the existing land use and zoning designations to Rural Residential with one lot unit per three acres (RR3) and Rural Residential with three- to five-acre lot sizes and a Manufactured Housing combining district (RR-3 MFH), respectively. No development is currently proposed on-site under the project, although future residential development is anticipated on-site. As shown on Figures 2-5, the requested land use and zoning designations would be consistent with surrounding designations. Additionally, a vast amount of timberland would remain north, northeast, east, and southeast of the Site after completion of the requested general plan amendment and zone reclassification, including adjacent GDRCo-owned property to the east and other GDRCo-owned land located further east, northeast, and southeast of the Site.

Due to the identified resources on-site and required buffer distances from each resource, the Site is anticipated to have a development potential of 167 acres (see Figure 6). Based on the respective land use and zoning designations requested for the Site, full build-out of the Site would allow for up to a maximum of 55 residential lots and residences (conventional single family residences or manufactured homes). As a result, up to 167 acres of the Site could be cleared in the future once development of the Site is proposed. A portion of the Site, in addition to adjacent GDRCo lands, was included under a prior Timber Harvest Plan (THP) and harvested in 2009.

The Del Norte County General Plan values commercial timberland and encourages the conservation of this use, as illustrated in several policies in Section 1 (Natural Resources/Conservation) of the County General Plan. However, as noted in Part I (General Plan Summary) of the County General Plan, Del Norte County's timber industry has declined; between the 10-year period of 1985 and 1995, the volume of timber harvested declined by 68.5 percent and resulted in the closure of more than 35 lumber mills. No more operating mills remain in Del Norte County. The County General Plan also notes that more than 146,000 acres of privately held redwood and fir forestland is located in the County. Additionally, according to the U.S. Department of Agriculture (USDA)'s *California's Forest Resources: Forest Inventory and Analysis, 2001-2010*, dated February 2016, Del Norte County has approximately 627,300 total acres of forestland. Should GDRCo's request for a general plan amendment and zone reclassification of the Site be approved, this would result in a reduction of approximately 211.17 acres of land designated and zoned as TBR and TPZ, respectively. However, as noted above, after consideration of the identified resources and required buffer zones from each resource, the Site is estimated to have a development potential of 167 acres. Since up to 167 acres of timberland may be cleared to accommodate the anticipated future development, this would equate to an approximately 0.11 percent reduction in the County's privately-owned forestland and an approximately 0.03 percent reduction in the County's total amount of forestland.

As discussed above, should the requested GPA/ZR be approved, a vast amount of timberland would remain within the County. Additionally, since the proposed project and anticipated future residential development would be consistent with surrounding land use and zoning designations (see Figures 3 and 5) and development, which includes rural residential land use and zoning designations and development to the north, south, east, and west of the Site. It would be at least 10 years before development could begin on-site, as it would be 10 years until the TPZ rollout is finalized and a subsequent subdivision would be necessary to divide the Site into individual 3 acre minimum lots. Due to the slow growth rate of the area, it is anticipated that construction would occur on-site as necessary to accommodate the anticipated housing needs of the area, which would likely occur over the course of many years. A less than significant impact would occur.

II.e) The proposed project would not involve other changes in the existing environment which, due to their location or nature, could result in conversion of farmland, to non-agricultural use or conversion of forest land to non-forest use. No impact would occur.

MITIGATION MEASURES

No mitigation required.

FINDINGS

The proposed project would have a **Less Than Significant Impact** on Agricultural and Forestry Resources.

III. AIR QUALITY. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☒	☐	☐
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☒	☐	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☒	☐	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☒	☐	☐

Thresholds of Significance: The project would have a significant effect on air quality if it would conflict with or obstruct implementation of applicable air quality plans; result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard; expose sensitive receptors to substantial pollutant concentrations; or result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

DISCUSSION

The Site is located within the North Coast Air Basin (NCAB), which includes all of Humboldt, Del Norte, Trinity, and Mendocino Counties, as well as a portion of Sonoma County, and is subject to North Coast Unified Air Quality Management District (NCUAQMD) requirements. The NCUAQMD is responsible for monitoring and enforcing local, State, and federal air quality standards in Humboldt, Del Norte, and Trinity Counties. Air quality standards are set for emissions that may include, but are not limited to, visible emission, particulate matter, and fugitive dust. The NCUAQMD is designated as "unclassified" or "attainment", or within allowable limits, with respect to all federal and State air quality standards, within the exception of the State 24-hour standard for breathable particulate matter of 10 microns or less (PM_{10}) in Humboldt County only (NCUAQMD, Air Quality & CEQA).

Previously, the three counties comprising the NCUAQMD were classified as "nonattainment", or outside of allowable limits, for the California ambient air quality standards for PM_{10}. In 1995, the NCUAQMD prepared and adopted a PM_{10} Attainment Plan (the Plan), which identified cost effective control measures that can be implemented to reduce ambient PM_{10} levels to within California standards. The Plan should be used cautiously as it is not a document that is required for the District to come into attainment for the state standard. More information on California standards and the draft PM_{10} Attainment Plan can be found on NCUAQMD's website, http://www.ncuaqmd.org/index.php, or by contacting a local representative.

The proposed project involves a general plan amendment and zone reclassification. A subdivision or any associated development is not currently proposed; however, future residential development is anticipated on-site. Based on prior analysis by LACO (see Appendix B), after consideration of the identified resources and required buffer zones from each resource, the Site is estimated to have a development potential of 167 acres (see Figure 6). In the future, if a residential subdivision of the Site is proposed, the Site would allow for up to a maximum of 55 residential lots, assuming the requested land use and zoning designations of RR3 and RR-3 MFH, respectively, are approved for the Site.

The proposed project, including anticipated future residential development on-site, and its emission sources are subject to NCUAQMD rules and regulations contained in the most recent version of the *Rules and Regulations of the North Coast Unified AQMD*. During anticipated future construction at the site, the contractor would be expected to use heavy construction machinery and temporary air pollutant emissions would be associated with site preparation, grading, excavation, and construction on the site; however, the project would be required to comply with policies regarding the control of fugitive dust during these activities, which have been established by NCUAQMD (see Mitigation Measure AIR-1), and all construction equipment would be required to be maintained in good working condition (see Mitigation Measure AIR-2). Once construction is complete, emissions from operation of the project would be comprised of direct and indirect emissions, including exhaust and fugitive dust from the operation of personal vehicles, in addition to the burning of fossil fuels associated with heating and cooking activities. Continued compliance with NCUAQMD emissions standards would be required once the anticipated residences have been constructed (see Mitigation Measure AIR-1).

NCUAQMD has not formally adopted significance thresholds for use in evaluating project impacts under CEQA, but rather utilizes the Best Available Control Technology (BACT) emission rates for stationary sources as defined and listed in Table 2, below. NCUAQMD does not currently have any thresholds for toxics, but recommends the use of the latest version of the California Air Pollution Control Officers Association's (CAPCOA) *Health Risk Assessments for Proposed Land Use Project* (available at: http://www.capcoa.org/wp-content/uploads/2012/03/CAPCOA_HRA_LU_Guidelines_8-6-09.pdf) to evaluate and reduce air pollution impacts from new development, which includes recommended mitigation measures to help reduce air pollution impacts anticipated under proposed project (NCUAQMD - Air).

Table 2. NCUAQMD Significance Thresholds

Pollutant	Significance Thresholds	
	Daily (pounds per day)	Annual (tons per year)
Carbon monoxide (CO)	500	100
Fluorides (F)	15	3
Hydrogen sulfide (H_2S)	50	10
Lead (Pb)	3.2	0.6
Nitrogen oxides (NOx)	50	40
Particulate matter (PM_{10})	80	15
Particulate matter ($PM_{2.5}$)	50	10
Reactive organic compounds (ROC)	50	40
Reduced sulfur compounds	50	10
Sulfur oxides (SOx)	80	40
Sulfuric acid mist (H_2SO_4)	35	7
Total reduced sulfur compounds	50	10

Source: North Coast Unified Air Quality Management District (NCUAQMD) Rules and Regulations. Regulation 1, Rule 110. Best Available Control Technology (BACT). July 9, 2015. Available at: http://www.ncuaqmd.org/files/rules/reg%201/Rule%20110.pdf.

Air quality impacts anticipated under the expected future development of the Site were modeled using the California Emissions Estimator Model (CalEEMod) to quantify potential criteria pollution and greenhouse gas (GHG) emissions associated with both construction and operation of the anticipated future development on-site. The model quantifies direct emissions from construction and operation activities (including vehicle use), as well as indirect emissions, such as GHG emissions from energy use, solid waste disposal, vegetation planting and/or removal, and water use (CalEEMOD, 2017). Since vehicles are known

to be a major pollution contributor, producing significant amounts of NOx, CO, O_3, and particulate matter, they must also be considered when evaluating potential air quality impacts of a proposed project. Further, the model identifies mitigation measures to reduce criteria pollutants and GHG emissions along with calculating the benefits achieved from measures chosen by the user (CalEEMOD, 2017).

The CalEEMOD results in their entirety are included in Appendix C. The CalEEMod model assumes default assumptions for residential construction and that no demolition would be required for the future residential development anticipated on-site, as the Site is currently undeveloped. The analysis assumes the anticipated future residential construction on the Site would break ground in April 2030 (after approval of the 10-year TPZ reclassification and anticipated subsequent subdivision) and be constructed over an approximately 15 year period (assuming 5 work days per week), and would be completed in June 2045; however, it is not known at this time when the Site may be subdivided and when the anticipated future residential development would occur on the Site, or if all potential lots would be developed at the same time. Whether construction occurs all at once or is spread out over the course of many months or years, it is likely that build-out of the Site would take a total of 15 years to complete. One limitation of the CalEEMod model is that it only allows for the user to assume that construction would occur all at once, even if breaks would occur in construction.

The CalEEMod analysis includes basic construction- and operational-level mitigation measures, including watering exposed areas; reducing vehicle speeds and utilizing soil stabilizer on unpaved roads; replacing ground cover of area disturbed; utilizing low-VOC paints and cleaning supplies; installing low-flow faucets and fixtures; and utilizing a water-efficient irrigation system and landscape. The results of the CalEEMod analysis are shown in Table 3 below, which represents the total amount of emissions anticipated over the 15-year construction period and under operation of the project.

Table 3. CalEEMod Results for Anticipated Future Construction and Operation of the Site

	Emissions (tons/year)				
Pollutant	Modeled Unmitigated Construction Emissions	Modeled Mitigated Construction Emissions (including % reduction)	Modeled Unmitigated Operational Emissions	Modeled Mitigated Operational Emissions (including % reduction)	Annual Thresholds
Carbon monoxide (CO)	2.9985	2.9985 (no change)	6.7482	6.7482 (no change)	100
Nitrogen oxides (NOx)	1.7400	1.7400 (no change)	0.5700	0.5700 (no change)	40
Particulate matter (PM_{10}) (total)	1.7939	0.8442 (-43.61%)	1.2994	1.2994 (no change)	15
Particulate matter ($PM_{2.5}$) (total)	0.8187	0.3964 (-41.47%)	0.7924	0.7924 (no change)	10
Reactive organic gases (ROG)	1.1807	1.1807 (no change)	4.3875	4.3473 (-0.92%)	40
Sulfur oxides (SO_2)	0.0084	0.0084 (no change)	0.0142	0.0142 (no change)	40

Source: CalEEMod Model Results, July 2, 2019, Appendix C.

As shown in Table 3, above, the projected emissions associated with construction of the anticipated future residential development at the Site would be well-below NCUAQMD's annual thresholds of significance for

carbon monoxide (CO), nitrogen oxides (NO_x), particulate matter (PM_{10} and $PM_{2.5}$), reactive organic gases (ROG), and sulfur oxides (SO_2) without any mitigation; however, with implementation of standard mitigation measures during future Site construction, PM_{10} and $PM_{2.5}$ emissions associated with construction would be further reduced. Unmitigated operational emissions would also be well-below NCUAQMD's annual thresholds of significance. With the implementation of mitigation measures, ROG emissions associated with operation of the Site at full build-out would be further reduced.

The Site is located in a fairly rural area, with rural residential development located north, west, and south of the Site, Highway 101 located immediately east of the Site, and forested land located north and east of the Site. Since residences are considered sensitive receptors, numerous sensitive receptors are located in the vicinity of the Site, with the nearest located approximately 88 feet west of the Site.

As noted above, compliance with NCUAQMD emissions standards would be required during construction and operation of the project (see Mitigation Measure AIR-1), as well requiring construction equipment to be maintained in good condition at all times to minimize excessive exhaust emissions (see Mitigation Measure AIR-2). In addition, truck idling would be required to be limited to a maximum of five minutes pursuant to State law, which would further reduce anticipated exhaust emissions. Implementation of these mitigation and compliance measures would help minimize potential air quality impacts associated with the project and future anticipated residential development.

III.a-b) As noted in the discussion above, the NCUAQMD is designated as "unclassified" or "attainment" for all federal and State air quality standards, within the exception of the State 24-hour PM_{10} standard in Humboldt County only. Any use or activity that generates unnecessary airborne particulate matter may be of concern to NCUAQMD and has the potential to create significant project-specific and cumulative effects to air quality. The proposed project includes a general plan amendment and zone reclassification. A subdivision or any associated development is not currently proposed; however, future residential development is anticipated on-site, including construction of up to 55 residences on 55 individual lots. Although development is not currently proposed, anticipated future development would be required to include air quality protective measures and comply with NCUAQMD regulations. As such, the proposed project would not obstruct implementation of California standards or the draft PM_{10} Attainment Plan.

The anticipated future residential development anticipated as a result of the proposed project would generate both construction and operational emissions, although construction emissions would only be temporary in nature and would cease once construction is completed on-site. No demolition would be required, as the Site does not contain existing development. As shown in Table 3, above, the anticipated emissions associated with site preparation, grading, building construction, paving, and architectural coating would be well-below NCUAQMD's annual thresholds of significance for the six listed criteria pollutants, including carbon monoxide (CO), nitrogen oxides (NO_x), particulate matter (PM_{10} and $PM_{2.5}$, both fugitive and exhaust), and sulfur dioxide (SO_2) without any mitigation. While full build-out of the Site would result in approximately 524 average daily weekday trips, 545 average daily Saturday trips, and 474 average daily Sunday trips per the CalEEMod analysis (see Appendix C), all operational emissions would also be well-below NCUAQMD's annual thresholds of significance without any mitigation. With implementation of standard mitigation measures during project construction and operation, PM_{10} and $PM_{2.5}$ emissions associated with project construction and ROG emissions associated with project operation would be further reduced.

In order to reduce exhaust emissions and control fugitive dust during construction and operation of the project, the proposed project would be required to comply with NCUAQMD emissions standards (see

Mitigation Measure AIR-1). Additionally, all construction equipment utilized on-site would be required to be kept in good working condition (see Mitigation Measure AIR-2) and, pursuant to State law, truck idling on-site would be limited to less than five minutes, which would further reduce potential air quality impacts associated with the anticipated future residential development on-site. With the incorporation Mitigation Measures AIR-1 and AIR-2, the proposed project would not conflict with or obstruct implementation of federal, state or NCUAQMD standards, or NCUAQMD's Attainment Plan; violate any air quality standard; or result in a considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard. As such, with mitigation incorporated, a less than significant impact would occur.

III.c) Sensitive receptors are defined as people that have an increased sensitivity to air pollution or environmental contaminants, and include, but are not limited to, schools, parks and playground, day care centers, nursing homes, hospitals, and residential dwelling units. As discussed above, the Site is located in a fairly rural area, with rural residential development located north, west, and south of the Site, Highway 101 located immediately east of the Site, and forested land located north and east of the Site. Numerous residences and sensitive receptors are located in the vicinity of the Site, with the nearest residence located approximately 88 feet west of the Site.

Although the project does not involve any development at this time, future anticipated residential development is anticipated on-site, including the construction of up to 55 single family residences or manufactured homes. Construction and operation of the future residential development expected on-site would be anticipated to create exhaust and fugitive dust. As provided in Table 3, above, emissions associated with the future residential development would not exceed NCUAQMD's annual thresholds of significance for six different pollutants during project construction and operation. Temporary emissions expected from construction equipment to be utilized at the Site would be occur for only a short period of time and may slightly impact sensitive receptors in the vicinity of the Site, including residents living near the project Site. Mitigation Measures AIR-1 and AIR-2, which require suppression of fugitive dust during construction and operation, pursuant to Rule-1-430 (Fugitive Dust Emissions) of Chapter IV (Prohibitions) of Regulation 1 (Air Pollution Control Rules) of the NCUAQMD's *Rules and Regulations* and maintaining all construction equipment in good working, potential fugitive dust and exhaust emissions associated with both construction and operation of the anticipated future residential development at the Site would be minimized. In addition, pursuant to State law, truck idling on-site would be limited to a maximum of five minutes, further reducing potential emissions and impacts to nearby sensitive receptors. With mitigation incorporated, a less than significant impact would occur.

III.d) The proposed project and anticipated future residential development at the Site would not result in other emissions adversely affecting a substantial number of people. Temporary odors and dust, typical of construction sites and equipment use, may be generated at the time anticipated future residential development begins, during the construction phase. Anticipated operational emissions associated with operation of the future on-site development would be comprised of direct and indirect emissions, including exhaust and fugitive dust from the operation of personal vehicles. As previously discussed, numerous sensitive receptors are located in close proximity to the Site, with the nearest sensitive receptor to the Site, a residence, located approximately 88 feet west of the Site. With the implementation of Mitigation Measures AIR-1 and AIR-2, which require suppression of fugitive dust during construction and operation, pursuant to Rule-1-430 (Fugitive Dust Emissions) of Chapter IV (Prohibitions) of Regulation 1 (Air Pollution Control Rules) of the NCUAQMD's *Rules and Regulations* and maintaining all construction equipment in good working order, fugitive dust and exhaust emissions would be minimized. Furthermore, by limiting truck idling on-site a

maximum of five minutes pursuant to State law, potential air quality impacts would be further reduced. With mitigation incorporated, a less than significant impact would occur.

MITIGATION MEASURES

AIR-1: At all times, the project shall be constructed and operated in compliance with Rule 104, Subsection D (Fugitive Dust Emissions) of the NCUAQMD's *Rules and Regulations* to reduce the amount of fugitive dust generated by construction and operation of the project. The project contractor and operator shall be required to do the following:

- Spray exposed soils with water during grading on a daily basis.
- Suspend earthmoving and trenching activities when winds exceed 20 mph.
- Cover haul-truck loads.
- Remove tracked dirt from the paved roads adjacent to the construction zone and provide a tire wash station at the Site's entrances to reduce the amount of tracked dirt leaving the Site.
- Immediately after grading, plant ground cover in disturbed areas or otherwise cover exposed disturbed areas in a manner preventing windblown dust from leaving the project Site.

AIR-2: At all times, construction equipment utilized on-site shall be maintained in good condition to minimize excessive exhaust emissions.

FINDINGS

The proposed project would have a **Less Than Significant Impact with Mitigation Incorporated** on Air Quality.

IV. BIOLOGICAL RESOURCES. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☒	☐	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☒	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

Thresholds of Significance: The project would have a significant effect on biological resources if it would 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; have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service; have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means; interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites; conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

DISCUSSION

A *Fort Dick Flats Preliminary Biological Survey* (Biological Report) was prepared by LACO Associates on June 20, 2019 (see Appendix D), in order to determine if the Site contains sensitive biological resources, such as sensitive or special status species or habitat areas. As noted in the Biological Report, a site visit was conducted by LACO's Senior Botanist, Gary Lester, on September 27, 2018, which involved a total of approximately 3 hours of survey time. Prior to and during the survey, a number of resources were consulted

to determine potential areas of sensitive plant and wildlife species occurrence in the vicinity of the Site, including the California Department of Fish and Wildlife (CDFW) Natural Diversity Database (CNDDB) – Crescent City Quad, USGS 7.5-minute Crescent City quadrangle topographic map, and aerial photography. Additionally, the botanical, Northern Spotted Owl, and aquatic vertebrate survey results from pre-harvest surveys conducted by GDRCo biologists for Timber Harvest Plan (THP) 1-09-009DEL were reviewed. During the September 2018 site visit, special habitat areas, such as habitat edges and wetlands, were assessed at interval cross sections to gain a representational sampling of habitat classification and structure.

Mixed evergreen vegetation occurs throughout Site, including the following: scattered mature and widespread young growth coast redwood (*Sequoia sempervirens*), Douglas-fir (*Pseudotsuga menziesii*), Sitka spruce (*Picea sitchensis*), and Monterey pine (*Pinus radicata*). A sub-canopy composition exists of red alder (*Alnus rubra*), cascara (*Frangula purshiana*), Scouler's willow (*Salix scouleriana*), California bay (*Umbellularia californica*), and red elderberry (*Sambucus racemosa*). Understory/shrub woody vegetation present at the Site includes the following species: Himalaya blackberry (*Rubus armenicus*), thimbleberry (*Rubus parviflorus*), salmonberry (*Rubus ispectabilis*), California blackberry (*Rubus ursinus*), coyote brush (*Baccharis pilularis*), and sword fern (*Polystichum munitum*). The Class I and Class II stream courses support a variety of wetland species such as skunk cabbage (*Lysichiton americanum*), water parsley (*Oenanthe sarmentosa*), slough sedge (*Carex obnupta*), and small-headed bulrush (*Scirpus microcarpus*). Seasonal freshwater habitats were noted along the main road system throughout the parcel and one was documented with photographs taken while occupied by Pacific tree frog (*Pseudacris regilla*) larvae. The CNDDB lists historical observations for 42 sensitive plant species within the USGS 7.5-minute Crescent City quadrangle (LACO, 2019a).

Although the U.S. Fish and Wildlife Service's (USFWS) *National Wetlands Inventory* does not show any wetlands or riparian habitat within the boundaries of the Site, the Site was found to contain several constraint areas, including seasonal wetlands and Class I and II watercourses (tributaries to Yonkers Creek and Camp Six Creek), which were identified in the northern and southwestern portions of the Site, during surveys completed as part of the Timber Harvest Plan (THP) prepared in 2009 for a portion of the Site and adjacent GDRCo lands. In anticipation of THP 1-09-009DEL, biological surveys were conducted by GDRCo biologists and examined the vegetated and aquatic habitats found on-site, including Class I and II streams, and conducted Northern Spotted Owl (NSO) and aquatic vertebrate surveys. The results of the aquatic vertebrate surveys conducted by GDRCo indicate that the Class I stream provides fish access to much of the drainage. No rare plant species, no NSO, and limited sensitive aquatic vertebrate species were detected under GDRCo's biological surveys. While sensitive aquatic vertebrates, including Northern Red-legged Frog (*Rana aurora*) and Southern torrent salamander (*Rhyacotriton vaiegatus*), were detected within the boundaries of THP 01-09-009DEL, these species were located east of Highway 101 and not within the boundaries of the Site (LACO, 2019a). However, suitable habitat is present on or near the Site for several special-status species, including bird species protected under the Migratory Bird Treaty Act (MBTA) or other regulations.

Site visit photos from April 2008 provide evidence of ponding at road intersections or poorly drained low spots of the existing timber access road system and aquatic vertebrate use at one location has been documented. Since the ponded areas found on the existing timber access road system have not been adequately documented, the Preliminary Biological Survey recommends these locations be mapped prior to Site development, in early spring, to confirm biological function and value and mitigation proposed to locate, develop, and monitor successful pond development on-site. It is recommended that the location of

the proposed mitigation area be an addition to the proposed Class I stream setback and be sized at a 1:1 replacement (LACO, 2019a).

As recommended by the California Department of Fish and Wildlife (CDFW), anticipated future residential development at the Site should observe a minimum building setback of 100 feet from the top of bank or outer edge of riparian vegetation, whichever is greater (Olson, 2017). Preliminary mapping of the Site from GDRCo acknowledges the occurrence of two stream courses on-site and illustrates a 150-foot setback for each drainage (see Figure 6). Based on Site characteristics and review of the characteristics of the surrounding Fort Dick area, the analysis contained in this Initial Study assumes a conservative 150 foot setback from the centerline of all on-site Class I and II watercourses, to account for a potential riparian area of approximately 50 feet from the identified watercourses; however, this is an estimate. Future development of the Site would be required to conduct further investigation of the wetland and riparian features, which will yield more specific setback requirements. Per the Biological Report, a stream transition line and/or wetland delineation shall occur prior to any Site development to determine the extent of riparian vegetation and top of bank to determine necessary setback distances from the on-site Class I and II watercourses in order to adequately protect these resources (LACO, 2019a).

Due to the identified resources on-site and required buffer distances from each resource, including a 251-foot noise buffer, measured from the centerline of Highway 101, on either side of Highway 101, the Site is anticipated to have a development potential of 167 acres. Based on the respective land use and zoning designations requested for the Site, full build-out of the Site would allow for up to a maximum of 55 residential lots and residences (conventional single family residences or manufactured homes). As a result, up to 167 acres of the Site could be cleared in the future once development of the Site is proposed. A portion of the Site, in addition to adjacent GDRCo lands, was included under a prior THP and harvested in 2009.

Urban run-off and other "non-point source" (NPS) discharges are regulated by the 1972 Federal Clean Water Act (CWA) through the National Pollutant Discharge Elimination System (NPDES) permit program. The NPDES Program is a federal program which has been delegated to the State of California for implementation through the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCB) across the state (SWRCB – NPDES, 2018). Because future development on-site would disturb more than one acre, it would be required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity, Construction General Permit Order No. 2009-0009-DWG. Construction activities subject to this permit includes clearing, grading, and disturbances to the ground (such as stockpiling or excavation), all of which would be anticipated under future on-site development. The Construction General Permit requires the development of a Stormwater Pollution Prevention Plan (SWPPP) (SWRCB – Construction, 2018) to outline how the project would minimize the discharge of sediment and other pollutants, including specifying which Best management Practices (BMPs) would be implemented.

IV.a) At this time, the proposed project does not involve any physical changes or construction on the ground; however, future residential development is anticipated on-site, including the development of up to 55 single family residences or manufactured homes spanning approximately 167 acres. As discussed above, the Site is known to contain constraint areas, including Class I and II watercourses and seasonal wetland areas. The results of the aquatic vertebrate surveys conducted by GDRCo indicate that the Class I stream provides fish access to much of the drainage. No rare plant species, no NSO, and limited sensitive aquatic vertebrate species were detected under GDRCo's surveys. While sensitive aquatic vertebrates, including Northern Red-legged Frog (*Rana aurora*) and Southern torrent salamander (*Rhyacotriton*

vaiegatus), were detected within the boundaries of THP 01-09-009DEL, these species were located east of Highway 101 and not within the boundaries of the Site. It is important to note that GDRCo's surveys included only a portion of the Site, in addition to adjacent GDRCo-owned lands. As discussed above, suitable habitat is present on or near the Site for several special-status species, and, as a result, there is the potential for previously unrecorded special status species to be located within the boundaries of the Site.

To minimize potential impacts to candidate, sensitive, or special status species, including birds protected under the MBTA or other regulations, once future residential development is proposed on-site, several recommendations were included in the Biological Report and are included as Mitigation Measures BIO-1 through BIO-3, below. Prior to any development on-site, an official botanical survey and wetland delineation (Mitigation Measure BIO-1), and survey of the ponded areas on the existing timber access road system shall occur (Mitigation Measure BIO-2) to determine the extent of sensitive resources on-site and determine appropriate buffer distances and size of mitigation area to be developed (at a 1:1 replacement ratio). In addition, it is recommended that tree removal or site clearing on-site be conducted outside of the bird nesting season (which typically occurs between March 1-August 1); however, should these activities be proposed during the bird nesting season, a qualified biologist shall conduct nesting surveys to determine the presence of vulnerable nests within 100 feet for passerines and 300 feet for raptors from the area to be cleared, and any active nests identified within the specified distances shall be allowed to complete their nesting or until a biologist determines they are no longer in use before they may be removed (see Mitigation Measure BIO-3). In addition, standard Best Management Practices (BMPs) would be required to be implemented by the project contractor once anticipated future residential development occurs on-site, to ensure compliance with the Clean Water Act (33 U.S.C. §1251 et seq. (1972)). Such BMPs may include the use of straw bales, fiber rolls, and/or silt fencing structures to assure the minimization of erosion resulting from construction and to avoid runoff into sensitive habitat areas, limiting ground disturbance to the minimum necessary, and stabilizing disturbed soil areas as soon as feasible after construction is completed. The SWPPP required under the project will also be required to specify the particular BMPs to be implemented by the proposed project.

With the implementation of BMPs and with mitigation incorporated, the proposed project and anticipated future residential development would not 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 CDFW or the USFWS, and a less than significant impact would occur.

IV.b-c) Although the USFWS' *National Wetlands Inventory* does not show any wetlands or riparian habitat within the boundaries of the Site, the Site was found to contain several constraint areas, including seasonal wetlands and Class I and II watercourses (tributaries to Yonkers Creek and Camp Six Creek), which were identified in the northern and southwestern portions of the Site, during surveys completed as part of the THP prepared in 2009 for a portion of the Site and adjacent GDRCo lands. Currently, preliminary mapping for the Site includes a buffer of 150 feet from the centerline of the identified watercourses. However, as described above, several recommendations from the Biological Report (included as Mitigation Measures BIO-1 through BIO-3) are required, which would minimize potential impacts to riparian habitat and wetlands. Prior to any development on-site, an official botanical survey and wetland delineation (Mitigation Measure BIO-1), and survey of the ponded areas on the existing timber access road system shall occur (Mitigation Measure BIO-2) to determine the extent of sensitive resources on-site and determine appropriate buffer distances and size of mitigation area to be developed (at a 1:1 replacement ratio). In addition, since there is the potential for special status bird species, including birds protected under the MBTA, to be located on-site, it is recommended that tree removal and/or site clearing occur outside of the

bird nesting season (which typically occurs between March 1-August 1 each year). However, should tree removal or site clearing be necessary to occur during the bird nesting season, it is recommended that nesting surveys be completed by a qualified biologist to determine the presence of vulnerable nests (within 100 feet for passerines and 300 feet for raptors, from the area to be cleared). It is recommended that any active nests identified within the abovementioned distances be allowed to complete their nesting or until the biologist determines that they are no longer active before removal may occur (see Mitigation Measure BIO-3). As previously discussed, standard BMPs would also be required to be implemented by the project contractor once anticipated future residential development occurs on-site, which may include the use of straw bales, fiber rolls, and/or silt fencing structures to assure the minimization of erosion resulting from construction and to avoid runoff into sensitive habitat areas, limiting ground disturbance to the minimum necessary, and stabilizing disturbed soil areas as soon as feasible after construction is completed. The SWPPP required under the project will also be required to specify the particular BMPs to be implemented by the proposed project.

With the implementation of standard BMPs and with mitigation incorporated, a less than significant impact would occur.

IV.d) Although no development is currently proposed, future residential development on-site is anticipated. Preliminary mapping indicates the Site has a maximum development potential of 167 acres (see Figure 6), which is currently undeveloped and forested land. Once anticipated development occurs on-site, it is possible that the majority of trees within the Site's developable area may be cleared, although some trees may be left to provide character or visual screening (as required per Mitigation Measure AES-1). Pursuant to Mitigation Measure AES-1, the project developer and contractor shall retain existing trees along the Site's boundaries to the maximum extent feasible in order to maintain existing forested views, minimize potential visual impacts, and provide visual screening of the Site and anticipated future residential development. While anticipated development at the Site would remove existing trees, a vast amount of timberland would remain north, northeast, east, and southeast of the Site, including adjacent GDRCo-owned property to the east and other GDRCo-owned land located further east, northeast, and southeast of the Site.

In order to protect sensitive habitats, the proposed project would be required to implement adequate buffers around the Class I and II watercourses located on-site and standard BMPs once anticipated future residential development occurs to ensure the minimization of erosion resulting from construction and to avoid runoff into sensitive habitat areas, with specific BMPs to be implemented listed in the SWPPP required under the project. With mitigation implemented, a less than significant impact would occur.

IV.e) Section 1 (Natural Resources/Conservation) of the Del Norte County General Plan includes specific goals and policies for "maintenance and enhancement of Del Norte County's rich natural assets" and biological resources, such as marine, water, soils, wildlife habitat, air, and forestry resources. A subdivision or any associated development is not currently proposed; however, future residential development is anticipated on-site after the 10-year TPZ rollout is finalized, including the construction of up to 55 single family residences or manufactured homes. Before the anticipated future residential construction can begin, the 10-year TPZ rollout would need to be finalized and a subdivision would be necessary to divide the Site into individual 3 acre minimum lots, which would require discretionary review. Since future development at the Site would be required to be designed in such a way as to minimize impacts to sensitive areas, including respective setbacks from constraint areas identified on and adjacent to the Site, including Class I and II watercourses and Highway 101, a less than significant impact would occur.

IV.f) There are no adopted Habitat Conservation Plans, Natural Community Conservation Plans, or other local, regional, or state habitat conservation plans that cover the project site. Therefore, no impact would occur.

MITIGATION MEASURES

Refer to Mitigation Measure AES-1 in Section I, Aesthetics, above.

BIO-1: A botanical survey and wetland delineation shall occur prior to applicable subdivision approval(s) to determine the extent of riparian vegetation and top of bank and to determine necessary setback distances from the on-site Class I and II watercourses so that these resources are adequately protected. If Class I or II watercourses do not exist on a proposed project site, the necessity of an official botanical survey and wetland delineation will be required on an as-needed basis to be determined by Community Development Department staff.

BIO-2: Prior to a subdivision approval of lands encompassing any ponded areas on the existing timber access road system, potentially affected ponded areas shall be surveyed and mapped in early spring to confirm biological function and value. If necessary, mitigation shall be proposed to locate, develop, and monitor successful pond development on-site. The location of the proposed mitigation area shall be an addition to the proposed Class I stream setback and shall be sized at a 1:1 replacement.

BIO-3: Due to the potential for several special status bird species, including bird species protected under the Migratory Bird Treaty Act (MBTA) to be present within the project boundaries, any proposed tree removal or site clearing shall be conducted outside of the bird nesting season, which occurs between March 1st and August 1st each year. If tree removal and/or site clearing is proposed during the bird nesting season, then a qualified biologist shall determine the presence of vulnerable nests, within 100 feet for passerines and 300 feet for raptors, of the proposed tree removal area and/or area to be cleared. Any active nests within the abovementioned distances shall be allowed to complete their nesting or until the qualified biologist determines they are no long active before removal may occur.

FINDINGS

The proposed project would have a **Less Than Significant Impact with Mitigation Incorporated** on Biological Resources.

V. **CULTURAL RESOURCES**. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☐	☒	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐
c) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☒	☐	☐

Thresholds of Significance: The project would have a significant effect on cultural resources if it would cause a substantial adverse change in the significance of a historical resource as defined in §15064.5; cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5; or disturb any human remains, including those interred outside of formal cemeteries.

DISCUSSION

On October 1, 2018, GDRCo's consultant prepared and delivered a Record Search Request to the Northwest Information Center (NWIC) to evaluate the potential to encounter archaeological or historic resources at the Site, particularly when anticipated future residential development occurs on-site. As previously discussed, the proposed project involves a general plan amendment and zone reclassification and does not involve any development at this time. However, future residential development at the Site is anticipated, including the development of up to 55 single family residences or manufactured homes.

A Records Search Results letter from NWIC, dated October 17, 2018 (see Appendix E), noted that two prior archaeological/cultural resource studies have been conducted on-site and cover approximately 90 percent of the Site [S-015153 (Peak & Associates, Inc. 1993) and S-011902 (Roscoe 1989)]. The NWIC letter states that three resources have been recorded at the Site, including two recorded Native American archaeological resources [P-08-000364 (Projectile Point #1) and P-08-000365 (Projectile Point #2)] and one historic-period cultural resource (P-08-000363, 467 Plank Road). There are no recorded buildings or structures within or adjacent to the Site. Additionally, there are no Native American resources in or adjacent to the Site referenced in the reviewed ethnographic literature. Further, the 1952 USGS Crescent City 15-minute topographic quadrangle fails to depict any buildings or structures within the Site and there is a low possibility of identifying any buildings or structures 45 years or older on-site.

Based on an evaluation of the environmental setting and features associated with known sites, Native American resources in this part of Del Norte County have been found in terraces near ridgelines, near intermittent or perennial watercourses, and in particular concentration near lake or coastal shorelines. The Site contains a gently sloped wooded area approximately one mile east of Lake Earl, with at least one watercourse within the project area. Given these environmental factors, there is a moderate potential for additional unrecorded Native American resources at the Site.

Review of historical literature and maps indicated mid-19th century historic-period activity within the Site. The General Land Office Survey Plat for Township 17 North/Range 1 West (1856) depicts a "wagon road" within the project area, which may be associated with P-08-000363 (467 Plank Road). Although the presence of a historic-period road does not necessarily indicate additional historic-period activity, the accessibility of the Site does contribute to its potential archaeological sensitivity. As a result, there is a moderate potential for unrecorded historic-period archaeological resources at the Site.

Given the identified resources on-site, including two recorded Native American archaeological resources and one historic-period cultural resource, in addition to the moderate potential for additional unrecorded Native American resources and historic-period archaeological resources at the Site, several recommendations were provided by NWIC, including recommending further assessment of the identified resources, further archival and field study due to the passage of time since the previous Site survey (S-015153, Peak and Associates, Inc.), and protocol in the event any resources are encountered during project construction (see Mitigation Measures CULT-1 through CULT-4, below).

Tribal Consultation

On October 19, 2018, the Applicant's consultant delivered tribal consultation request letters to the two local Tribes, including the Elk Valley Rancheria and the Tolowa Dee-ni' Nation. In an e-mail response dated October 22, 2018, the Elk Valley Rancheria requested that the Tribe be immediately notified in the event archaeological materials are encountered on-site. In a letter dated October 26, 2018, the Tolowa Dee-ni' Nation requested to visit the Site. A representative from Elk Valley Rancheria and the Tolowa Dee-ni' Nation visited the Site on November 9, 2018, but were unable to make a determination.

V.a) There is no existing development present on the Site. As noted above, there are no recorded buildings or structures within or adjacent to the Site and the 1952 USGS Crescent City 15-minute topographic quadrangle fails to depict any buildings or structures within the Site. No impact would occur.

V.b-c) There is the possibility that archaeological resources and/or human remains could exist on the project Site. As noted above, based on an evaluation of the environmental setting and features associated within known Native American resource sites and due to the project's location within a gently sloped wooded area approximately one mile east of Lake Earl, with at least one watercourse within the project area, NWIC states there is a moderate potential for unrecorded Native American resources at the Site. Additionally, review of historical literature and maps indicated mid-19th century historic-period activity within the Site. The General Land Office Survey Plat for Township 17 North/Range 1 West (1856) depicts a "wagon road" within the project area, which may be associated with P-08-000363 (467 Plank Road). Although the presence of a historic-period road does not necessarily indicate additional historic-period activity, the accessibility of the Site does contribute to its potential archaeological sensitivity. As a result, there is a moderate potential for unrecorded historic-period archaeological resources at the Site.

Several recommendations were provided by NWIC, including recommending further assessment of the identified resources, further archival and field study due to the passage of time since the previous Site survey (S-015153, Peak and Associates, Inc.), and protocol in the event any resources are encountered during project construction (see Mitigation Measures CULT-1 through CULT-3). At the request of the Elk Valley Rancheria, Mitigation Measure CULT-2 also requires the local Tribes (Elk Valley Rancheria and Tolowa Dee-Ni' Nation) to be immediately notified if archaeological materials are encountered on-site. In addition, specific procedures to follow (pursuant to Public Resources Code Sections 5097 and 7050.5) are included as Mitigation Measure CULT-4 in the event human remains are discovered on-site during project construction. With mitigation included, a less than significant impact would occur.

MITIGATION MEASURES

CULT-1: Prior to a subdivision approval on lands encompassing or with the potential to affect the following resources, a professional archaeologist shall assess the two recorded archaeological resources (P-08-000364 and P-08-000365) and provide project-specific recommendations. In addition, at the time future anticipated residential development is proposed, further archival and field study for the area proposed for

development shall occur and be required as part of the entitlements application submittal. Field study may include, but is not limited to, pedestrian survey, hand auger sampling, shovel test units, or geoarchaeological analyses as well as other common methods used to identify the presence of archaeological resources.

CULT-2: If archaeological resources are encountered during construction, work shall be temporarily halted in the vicinity of the discovered materials and a qualified archaeologist and the local tribes (Elk Valley Rancheria and Tolowa Dee-ni' Nation) shall be immediately contacted. Workers shall avoid altering the materials and their context until a qualified professional archaeologist, in collaboration with the local tribes, has evaluated the situation and provided appropriate recommendations. Project personnel shall not collect cultural resources. [Native American resources include chert or obsidian flakes, projectile points, mortars, and pestles; and dark friable soil containing shell and bone dietary debris, heat-affected rock, or human burials. Historic-period resources include stone or adobe foundations or walls; structures and remains with square nails; and refuse deposits or bottle dumps, often located in old wells or privies.]

CULT-3: Any identified cultural resources shall be recorded on DPR 523 historic resource recordation forms, available online from the Office of Historic Preservation's website: http://ohp.parks.ca.gov/default.asp?page_id=1069.

CULT-4: If human remains are encountered on-site, all work must stop in the immediate vicinity of the discovered remains and the County Coroner and a qualified archaeologist must be notified immediately so that an evaluation can be performed. If the remains are deemed to be Native American and prehistoric, the Native American Heritage Commission (NAHC) must be contacted by the Coroner so that a "Most Likely Descendant" can be designated and further recommendations regarding treatment of the remains is provided.

FINDINGS

The proposed project would have a **Less Than Significant Impact with Mitigation Incorporated** on Cultural Resources.

VI. ENERGY. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy, or wasteful use of energy resources, during project construction or operation?	☐	☐	☒	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☒	☐

Thresholds of Significance: The project would have a significant effect on energy if it would result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy, or wasteful use of energy resources, during project construction or operation; or require or result in the construction of new water or wastewater facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

DISCUSSION

On October 7, 2015, Governor Edmund G. Brown, Jr. signed into law Senate Bill (SB) 350, known as the Clean Energy and Pollution Reduction Act of 2015 (De León, Chapter 547, Statutes of 2015), which sets ambitious annual targets for energy efficiency and renewable electricity aimed at reducing greenhouse gas (GHG) emissions. SB 350 requires the California Energy Commission to establish annual energy efficiency targets that will achieve a cumulative doubling of statewide energy efficiency savings and demand reductions in electricity and natural gas final end uses by January 1, 2030. This mandate is one of the primary measures to help the state achieve its long-term climate goal of reducing GHG emissions to 40 percent below 1990 levels by 2030. The proposed SB 350 doubling target for electricity increases from 7,286 gigawatt hours (GWh) in 2015 up to 82,870 GWh in 2029. For natural gas, the proposed SB 350 doubling target increases from 42 million of therms (MM) in 2015 up to 1,174 MM in 2029 (CEC, 2017).

The anticipated future development at the Site would be subject to Part 5 (California Energy Code) of Title 24 of the California Code of Regulations (CCR), which contains performance and prescriptive compliance approaches for achieving energy efficiency for residential and non-residential buildings throughout California.

VI.a-b) At this time, no development is proposed under the project. However, future residential development is proposed on-site, including the construction of 55 single-family residences. The anticipated future development at the Site is not expected to result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy or wasteful use of energy resources, nor would the proposed project conflict with or obstruct a State or local plan for renewable energy or energy efficiency. As discussed above, the anticipated future development at the Site would be subject to Part 5 (California Energy Code) of Title 24 of the CCR, which contain energy conservation standards applicable to residential and non-residential buildings throughout California to ensure new and existing buildings achieve energy efficiency and preserve outdoor and indoor environmental quality. A less than significant impact would occur.

MITIGATION MEASURES

No mitigation required.

FINDINGS

The proposed project would have a **Less Than Significant Impact** on Energy.

VII. GEOLOGY AND SOILS. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☒	☐
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii) Strong seismic ground shaking?	☐	☐	☒	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv) Landslides?	☐	☐	☒	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☒	☐
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐

Thresholds of Significance: The project would have a significant effect on geology and soils if it would directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault, strong seismic ground shaking, seismic-related ground failure, including liquefaction, or landslides; result in substantial soil erosion or the loss of topsoil; be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse; be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property; have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater; or directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

DISCUSSION

As stated in the Del Norte County General Plan (2003), no active or potentially active earthquake faults have been identified within the County. However, due to the proximity of several active seismic sources offshore to the west, including the Cascadia subduction zone (DOC - Fault, 2015), the Site is considered to be located within a seismically active region in which large earthquakes may be expected to occur during

the economic lifespan (50 years) of any development on the Site. The Site is not located within an Alquist-Priolo Special Studies Zone (DOC – Regulatory, 2015), nor are there any Alquist-Priolo Special Studies Zones within Del Norte County (DOC – Alquist, 2018).

Per LACO's *Preliminary On-Site Wastewater Treatment Evaluation Test Results* letter, dated May 2, 2018, the Site is located on an uplifted marine terrace with soils composed of consolidated sandy clay loam, sandy loam, and loamy sand. The geology is mapped as the Battery Formation, Pleistocene marine terrace, and sand dune deposits comprising gravels and sands, with silty clays (LACO, 2018c). The two specific soil types underlying the project Site include the following:

- Timmons and Lepoil soils, 0 to 2 percent slopes (Soil Type #185), covering approximately 71 percent of the Site and located within the central, eastern, and two small areas in the western portion of the Site; and
- Timmons and Lepoil soils, 2 to 9 percent slopes (Soil Type #186), located in the western portion of the Site, covering approximately 29 percent of the Site (Web Soil Survey, 2017).

The Timmons and Lepoil soil type (0 to 2 percent slopes), covering the majority of the project Site (71 percent), is comprised of loam and clay loam, is well drained, has a depth to water table of more than 80 inches, and is not considered a hydric soil (one factor indicative of wetlands). This soil type does not experience flooding or ponding. The characteristics of the Site's other soil type (the Timmons and Lepoil soil type (2 to 9 percent slopes) [Soil Type #186]) are very similar to the characteristics of Soil Type #185, although this soil type is comprised of loam and sandy clay loam. Both soil types have high available water storage, about 11.2 inches (NRCS, 2017).

Per the California Department of Conservation's landslide inventory, no historical landslides have been mapped within the Site; the nearest mapped historic landslide is approximately 0.4 miles east of the Site (DOC - Geologic, 2018). The Site and surrounding area are not mapped as areas of potential liquefaction (CalOES, 2015).

Any development which occurs subsequent to the project entitlements, such as the anticipated future residential development, including a single family residence or manufactured home on each of the 55 potential lots, would be subject to the Del Norte County General Plan and Zoning Code, in addition to the latest version of the California Building Code (CBC), to reduce any potential geological risks.

VII.a.i-ii) As discussed above, the Site is not located within an Alquist-Priolo Special Studies Zone (DOC – Regulatory, 2015), nor are there any Alquist-Priolo Special Studies Zones within Del Norte County (DOC – Alquist, 2018). However, due to the proximity of several active seismic sources offshore to the west, including the Cascadia subduction zone (DOC - Fault, 2015), the Site is considered to be located within a seismically active region in which large earthquakes may be expected to occur during the economic lifespan (50 years) of any development on the Site. Anticipated future residential development at the Site would be subject to the Del Norte County General Plan and Zoning Code, as well as the latest version of the CBC, which would reduce any potential geological risks. A less than significant impact would occur.

VII.a.iii) Although the Site has high groundwater levels (LACO, 2018a), the Site and surrounding area is not mapped as an area of potential liquefaction (CalOES, 2015). Because anticipated future development at the Site would be required to adhere to the requirements of the latest version of the CBC and the County General Plan and Zoning Code, a less than significant impact would occur.

VII.a.iv) The potential for landslides to occur at the Site is considered low. The topography of the Site and surrounding area is gently sloping, with slopes generally between 5 and 10 percent. Per the California Department of Conservation's landslide inventory, no historical landslides have been mapped within the Site; the nearest mapped historic landslide is approximately 0.4 miles east of the Site (DOC - Geologic, 2018). A less than significant impact would occur.

VII.b) Although no development is proposed under the project at this time, future residential development at the Site is anticipated, which would require site preparation, excavation, and grading; however, the anticipated future residential development would not result in substantial soil erosion or the loss of topsoil. Any development which occurs subsequent to the proposed project would be subject to the Del Norte County General Plan and Zoning Code, which include environmental protections. Additionally, as a condition of approval, the County will require that standard BMPs be implemented by the project contractor once anticipated future residential development occurs on-site, which may include the use of straw bales, fiber rolls, and/or silt fencing structures to assure the minimization of erosion resulting from construction and to avoid runoff into sensitive habitat areas, limiting ground disturbance to the minimum necessary, and stabilizing disturbed soil areas as soon as feasible after construction is completed. The SWPPP required under the project will also be required to specify the particular BMPs to be implemented by the proposed project. With the required condition of approval, the proposed project and anticipated future development would not result in substantial soil erosion or the loss of topsoil and a less than significant impact would occur.

VII.c) As previously discussed, the potential for landslides to occur at the Site is considered low. The topography of the Site and surrounding area is gently sloping, with slopes generally between 5 and 10 percent. Per the California Department of Conservation's landslide inventory, no historical landslides have been mapped within the Site; the nearest mapped historic landslide is approximately 0.4 miles east of the Site (DOC - Geologic, 2018). Additionally, due to the Site's topography, the potential for lateral spreading, should strong ground shaking and liquefaction occur, is considered low.

As described above, the Site is not located within a mapped Alquist-Priolo special studies zone; however, the Site is located within a seismically active region and would be likely to experience strong ground shaking during the economic lifespan of any development on-site. Although no development is proposed at this time, future residential development is anticipated to occur at the Site, including the construction of up to 55 single family residences or manufactured homes. Any development which occurs subsequent to the proposed project would be subject to the Del Norte County General Plan and Zoning Code, in addition to the latest version of the CBC. With adherence to the required standards, potential geological risks would be minimized and a less than significant impact would occur.

VII.d) No known expansive soils are located at the Site. Expansive soils generally comprise cohesive, fine-grained clay soils and represent a significant structural hazard to buildings founded on them, especially where seasonal fluctuations in soil moisture occur at the foundation-bearing depth. The subsurface soils at the Site are predominantly loam, clay loam, and sandy clay loam, with a plasticity rating of 8.8 to 10.6 percent (Web Soil Survey, 2017), indicating the soils are unlikely to be affected by seasonal wetting and drying. Since anticipated future residential development at the Site would not be constructed on expansive soil, no impact would occur.

VII.e) As the Site is not located within the service boundary of any community services district, the Site is and would continue to not be served by community water or wastewater service. Anticipated future residential development at the Site would be anticipated to utilize on-site wells and wastewater treatment systems.

LACO was retained by GDRCo to determine the suitability of the Site for private on-site wastewater treatment systems. The results of LACO's analysis is provided in a letter to GDRCo, titled *Preliminary On-Site Wastewater Treatment Evaluation Test Results*, dated May 2, 2018 (see Appendix G). As provided in the letter, percolation tests were conducted to obtain preliminary data of the soils infiltration capacity and determine preliminary on-site wastewater treatment system designs.

LACO conducted an on-site wastewater treatment system exploration, in general accordance with the current Del Norte County Sewage Disposal Regulations, at six locations across the Site to determine the suitability of on-site wastewater treatment. Potential residential sites in the vicinity of two Piezometers (PZ; PZ-5 and PZ-6), located within the southern and southwestern portions of the Site, appear to be able to support conventional gravity on-site wastewater treatment systems. All other PZ locations (PZ-1 through PZ-4), located in the southeastern, northeastern, northwestern, and western portions of the Site, respectively, due to high groundwater elevations (between 2 and 5 feet below ground surface[bgs]) encountered during percolation testing would require shallow low-pressure distribution or Wisconsin mound on-site wastewater treatment systems. Since the use of septic tanks or alternative wastewater disposal systems could be adequately supported on-site, a less than significant impact would occur.

VII.f) There is the possibility that unique paleontological resources or sites or unique geologic features could exist on the project Site, as the Site has not yet been substantially excavated. However, with the incorporation of Mitigation Measure GEO-1, below, which contains specific requirements in the event any fossils or fossil-bearing deposits are encountered during anticipated future residential development at the Site, a less than significant impact would occur.

MITIGATION MEASURES

GEO-1: In the event that fossils or fossil-bearing deposits are discovered during anticipated future residential construction on-site, the contractor shall notify a qualified paleontologist to examine the discovery and excavations within 50 feet of the find shall be temporarily halted or diverted. The area of discovery shall be protected to ensure that fossils are not removed, handled, altered, or damaged until the Site is properly evaluated and further action is determined. The paleontologist shall document the discovery as needed, in accordance with Society of Vertebrate Paleontology standards (Society of Vertebrate Paleontology 1995), evaluate the potential resource, and assess the significance of the finding under the criteria set forth in CEQA Guidelines Section 15064.5. The paleontologist shall notify the appropriate agencies to determine procedures that would be followed before construction is allowed to resume at the location of the find. If the project proponent determines that avoidance is not feasible, the paleontologist shall prepare an excavation plan for mitigating the effect of the project based on the qualities that make the resource important. The plan shall be submitted to the County of Del Norte for review and approval prior to implementation.

FINDINGS

The proposed project would have a **Less Than Significant Impact with Mitigation Incorporated** on Geology and Soils.

VIII. GREENHOUSE GAS EMISSIONS. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Generate greenhouse gas emissions (GHG), either directly or indirectly, that may have a significant impact on the environment?	☐	☒	☐	☐
b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

Thresholds of Significance: The project would have a significant effect on greenhouse gas emissions if it would generate greenhouse gas emissions (GHG), either directly or indirectly, that may have a significant impact on the environment; or conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

DISCUSSION

The Site is located within the North Coast Air Basin (NCAB) and is subject to North Coast Unified Air Quality Management District (NCUAQMD) requirements. The NCUAQMD is responsible for monitoring and enforcing federal, State, and local air quality standards in Humboldt, Del Norte, and Trinity Counties.

The Global Warming Solutions Act of 2006, also known as Assembly Bill (AB) 32, is a State law that establishes a comprehensive program to reduce GHG emissions from all sources throughout the State. AB 32 requires the State to reduce its total GHG emissions to 1990 levels by 2020, a reduction of approximately 15 percent below emissions expected under a "business as usual" scenario. Pursuant to AB 32, the California Air Resources Board (CARB) must adopt regulations to achieve the maximum technologically feasible and cost-effective GHG emission reductions. The following major GHGs and groups of GHGs being emitted into the atmosphere are included under AB 32: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3) (CARB, 2014). Assembly Bill (AB) 1803, which became law in 2006, made CARB responsible to prepare, adopt, and update California's GHG inventory. The 2020 GHG emissions limit statewide, equal to the 1990 level, is 431 million metric tonnes of carbon dioxide equivalent ($MMTCO_2e$) (CARB, 2017). Pursuant to Executive Order S-3-05, California has a reduction target to reduce GHG emissions to 80 percent below 1990 levels (CARB, 2014).

In 2016, California's total GHG emissions were estimated to be 429.4 million metric tons of CO_2e ($MMTCO_2e$) by CARB. As shown in Table 4 below, the transportation sector accounts for the largest percentage of California's GHG emissions (41 percent) (CARB, 2018).

Table 4. California's GHG Emissions by Economic Sector

Economic Sector	Percentage of California's Total GHG Emissions
Transportation	41%
Industrial	23%
Electricity (in state)	10%
Agriculture	8%
Residential	7%
Electricity (imports)	6%
Commercial	5%
Not Specified	<1%
Total	**100%**

Source: California Air Resources Board (CARB). California Greenhouse Gas Emission Inventory – 2018 Edition. Accessed September 25, 2018. Available at: https://www.arb.ca.gov/cc/inventory/data/data.htm.

As provided in the *Del Norte County 2016 Regional Transportation Plan* (November 2016), prepared by Green Dot Transportation Solutions for the Del Norte County Local Transportation Commission, GHG inventories specific to Del Norte County do not yet exist. However, it is important to note that rural areas, such as Del Norte County, generally have higher GHG emissions per capita than urban areas (Green Dot, 2016).

The California Emissions Estimator Model (CalEEMod) was utilized to quantify potential criteria pollution and greenhouse gas (GHG) emissions associated with both construction and operation of the future residential development anticipated at the Site. The model quantifies direct emissions from construction and operational activities (including vehicle use), as well as indirect emissions, such as GHG emissions from energy use, solid waste disposal, vegetation planting and/or removal, and water use. Further, the model identifies mitigation measures to reduce criteria pollutants and GHG emissions along with calculating the benefits achieved from measures chosen by the user (CalEEMOD). The results of the CalEEMod analysis in their entirety are included in Appendix C.

Although no development is proposed at this time at the Site, emissions in the vicinity of the project site would be anticipated to increase once the anticipated future residential development at the Site occurs. According to the CalEEMod results for the proposed future development, construction (unmitigated and mitigated) of the proposed project would result in approximately 16.98 to 823.30 $MTCO_2e$ per year, with an average of 321.17 $MTCO_2e$ per year. The unmitigated operational emissions of CO_2 equivalent gasses would be approximately 873.39 $MTCO_2e$ per year, while mitigated operational emission of CO_2 equivalent gasses are estimated to be approximately 871.14 $MTCO_2e$ per year, a 0.26 percent reduction.

Specific GHG emissions data is not available for Del Norte County. However, the maximum GHG emissions expected under the anticipated future residential development at the Site would equate to approximately 0.0002 percent (unmitigated and mitigated construction and mitigated operational) of California's total GHG emissions recorded in 2016.

VIII.a) At this time, no development is currently proposed on-site. Based on the land use and zoning designations requested by GDRCo, up to 55 residential lots could be created and developed on the Site in the future. Although the project does not involve any activities that would increase GHGs or cause GHGs to vary substantially from current levels at this time, anticipated future residential development on-site would be anticipated to increase GHGs, and, as discussed above, the annual GHG emissions anticipated under

the proposed project would equate to approximately 0.0002 percent (unmitigated and mitigated construction and mitigated operational) of California's total GHG emissions recorded in 2016.

As described in Section III, Air Quality, above, two mitigation measures (Mitigation Measures AIR-1 and AIR-2) are required in order to reduce potential air quality impacts associated with the project, including requiring compliance with NCUAQMD standards and regulations and maintaining all construction equipment in good working condition. With the incorporation of Mitigation Measures, AIR-1 and AIR-2, potential GHG emissions associated with the anticipated future residential development on-site would be reduced, and a less than significant impact would occur.

VIII.b) The proposed project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. Currently, there is no adopted plan or policy in the County specifically related to GHG emissions. While the County's General Plan does not currently contain goals directly related to reducing GHGs and climate change, it does include other relevant policies and goals that would have an effect in reducing GHG emissions, with which the proposed project would comply. Since the proposed project would not conflict with local, NCUAQMD, State, or federal regulations pertaining to GHG emissions, a less than significant impact would occur.

MITIGATION MEASURES

See Mitigations Measures AIR-1 and AIR-2

FINDINGS

The proposed project would have a **Less Than Significant Impact with Mitigation Incorporated** on Greenhouse Gas Emissions.

IX. HAZARDS AND HAZARDOUS MATERIALS. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of 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?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites complied pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f) Impair implementation of, or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☒	☐

Thresholds of Significance: The project would have a significant effect on hazards and hazardous materials if it were to 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; emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school; be located on a site which is included on a list of hazardous materials sites complied pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment; result in a safety hazard or excessive noise for people residing or working in the project area if located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport; or impair the implementation of, or physically interfere with an adopted emergency response plan or emergency evacuation plan; or expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires.

DISCUSSION

A material is considered hazardous if it appears on a list of hazardous materials prepared by a federal, state, or local agency, or has characteristics defined as hazardous by a federal, state, or local agency. Chemical and physical properties such as toxicity, ignitability, corrosiveness, and reactivity cause a substance to be considered hazardous. These properties are defined in the California Code of Regulations (CCR), Title 22, §66261.20-66261.24. A "hazardous waste" includes any hazardous material that is discarded,

abandoned, or will be recycled. Therefore, the criteria that render a material hazardous also cause a waste to be classified as hazardous (California Health and Safety Code, §25117).

The Site is currently vacant and forested and contains various unmaintained dirt roads and skid trails scattered throughout the Site. The Site does not include any known hazardous waste sites, as mapped by the State Water Resources Quality Control Board (SWRQCB) or the California Department of Toxic Substances Control (DTSC). As provided on SWRQCB's GeoTracker database, two listed sites are located approximately half mile north of the project Site at Pelican Bay State Prison, including a leaking underground storage tank (LUST) Cleanup Site and a Cleanup Program Site, both of which are completed and cases closed.

IX.a-b) Future development on the Site may require the routine transport, use, or disposal of hazardous materials common to residential development, as well as the grading and construction process, such as gasoline, diesel fuel, hydraulic fluids, oils, and lubricants, in addition to cleaning solvents and household cleaning supplies. However, the types and quantities of hazardous materials to be used are not expected to pose a significant risk to the public and/or environment and would be managed in accordance with federal, State, and local regulations. Since the transport, use, and storage of any hazardous materials at the Site would be required to be conducted in accordance with all federal, State, and local regulations, a less than significant impact would occur.

IX.c) The two schools located nearest to the Site are Redwood Elementary School, located approximately 1.75 miles north of the Site, and Sunset High School, located approximately 1.83 miles south of the Site. As there are no schools located within one-quarter mile of the Site, no impact would occur.

IX.d) The Site has not been identified on a list of hazardous materials sites compiled pursuant to Government Code §65962. A records search was conducted using the State Water Resources Control Board's (SWRCB) GeoTracker database and the State of California Department of Toxic Substance Control's (DTSC) EnviroStor database. Since no hazards waste or materials sites have been identified on the Site, no impact would occur.

IX.e) The Site is not included in an airport land use plan and is not within two miles of a public airport or public use airport. The nearest airport to the Site is the Del Norte County Regional Airport (also known as Jack McNamara Field), a public airport, which is located approximately 5.7 miles southwest of the Site. As a result, the proposed project, including anticipated future residential development, would not result in a safety hazard for people residing or working at or near the Site. No impact would occur

IX.f) Per Section 2 (Safety and Noise) of the Del Norte County General Plan, the County has an existing emergency operations plan. Several policies in the General Plan address continued maintenance and updating of the County Emergency Operations Plan, expanding the Emergency Operations Plan to address emergency transportation, shelter, and medical services, and coordinating with various agencies to update and maintain an evacuation and access plan with alternative routes for efficient emergency operations following a large-scale disaster.

Since anticipated future residential development at the Site would be required to be designed and developed in accordance with all design standards and requirements, in addition to all land use plans, policies, and regulations, a less than significant impact would occur.

IX.g) The Site is located within the State Responsibility Area (SRA) and is classified as having a "Moderate" fire hazard severity rating (CalFire, 2012). As discussed in the *Countywide Fire Services Municipal Service Review and Sphere of Influence Update* (Countywide Fire Services MSR), adopted on May 23, 2016, by the Del Norte County Local Agency Formation Commission (LAFCo), the Site is located within the service boundaries of the Fort Dick Fire Protection District (FPD), which provides fire suppression, hazardous material responses, and emergency medical services to a service area of 30 square miles and approximately 6,270 residents (LAFCo, 2016).

The Site is currently vacant and forested. Although no development is proposed at this time, future residential development is anticipated at the Site. Based on Site constraints and required buffers, the Site is estimated to have a development potential of 167 acres and would allow for up to a maximum of 55 residential lots, assuming the requested land use and zoning designations of RR3 and RR-3 MFH, respectively, are approved for the Site. In order to accommodate the anticipated future residential development, it is estimated that most, if not all, trees would be removed from the Site, which would greatly reduce the Site's potential for wildland fire at the Site. Should a fire occur at the Site, the Fort Dick FPD operates two stations in close proximity to the Site:

- Station #1 (Kings Valley Station), located at 6534 Kings Valley Road, approximately 1.4 miles north of the Site; and
- Station #2 (Lake Earl Station), located at 4190 Lake Earl Drive, approximately 3 miles southwest of the Site (LAFCo, 2016).

Additionally, the Fort Dick FPD has mutual aid agreements with neighboring fire service providers including: Crescent FPD, Smith River FPD, Gasquet FPD, Klamath FPD, Crescent City Volunteer Fire Department, Pelican Bay State Prison Fire Department, US National Park Service, US Forest Service, and CalFire. The Fort Dick FPD also has mutual aid agreements with a number of fire districts in Oregon, such as Winchuck FPD, Harbor FPD, Brookings FPD and Pistol River FPD (LAFCo, 2016). In a letter received from Randy L. Crawford, Fort Dick FPD Fire Chief, dated October 26, 2017 (see Appendix J), Mr. Crawford expressed concerns associated with the proposed project and anticipated future residential development. Specifically, concerns were raised with respect to the increase in demand for fire services and how sufficient fire flow would be provided. It is important to note that development would not occur for at least 10 years, after the 10 year TPZ rollout is finalized, and that future development plans will be evaluated at the time of submittal to ensure sufficient fire protection services and adequate fire flow is provided.

CalFire is responsible for the suppression of wildland fires within the SRA and approximately 85 percent of the Fort Dick FPD's boundaries are located within a designated SRA. CalFire stations are staffed during declared fire season, typically June to October, and engines may respond to calls other than wildland fires if they are available and the call will not affect their core responsibilities. Although the State is responsible for wildland fire suppression within the SRA, CalFire relies on local fire departments to respond to such incidents and provide initial attack to ensure that the fires are suppressed at the earliest possible stage (LAFCo, 2016).

There are no elements of the project that would exacerbate the risk of wildland fire at the Site. No development is proposed at this time, although future residential development is anticipated on-site. As previously discussed, the Site has a development potential of approximately 167 acres and may result in the development of up to 55 single family residences or manufactures homes on-site, each on 3-acre minimum lots. While some trees may be left to provide character or visual screening (as required per Mitigation Measure AES-1), it is possible that the majority of trees on-site would be removed during construction. Since the Site is located within the SRA, anticipated future development on-site would be

required to comply with Title 19 (SRA Fire Safe Regulations) of the Del Norte County Code, which prescribe standards pertaining to emergency access and egress, signing and building numbering, emergency water, and fuel modification. Additionally, the Site is not considered a "high" fire hazard area. Due to the slow growth rate of the area, it is anticipated that construction would occur on-site as necessary to accommodate the anticipated housing needs of the area, which would likely occur over the course of many years. Before the anticipated future residential construction can begin, the 10-year TPZ rollout would need to be finalized and a subdivision would be necessary to divide the Site into individual 3 acre minimum lots. If and when the Site is proposed for subdivision (a discretionary approval) in the future, in at least 10 years, the applicable fire districts would be consulted at that time to ensure the subdivision and anticipated development would meet all standards pertaining to fire safety and service ratios.

Because the Site is served by CalFire, Fort Dick FPD, and numerous other FPDs through mutual aid agreements, it is anticipated that future development at the Site would be served by sufficient fire protection services. A less than significant impact would occur.

MITIGATION MEASURES

No mitigation required.

FINDINGS

The proposed project would have a **Less Than Significant Impact** on Hazards or Hazardous Materials.

X. HYDROLOGY AND WATER QUALITY. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☒	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☒	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner, which would:	☐	☐	☒	☐
i) Result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐
ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☒	☐
iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐
iv) Impede or redirect flood flows?	☐	☐	☒	☐
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☒

Thresholds of Significance: The project would have a significant effect on hydrology and water quality if it would violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality; substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin; substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner, which would result in substantial erosion or siltation on- or off-site, substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site, create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff, or impede or redirect flows; in flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation; or conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

DISCUSSION

The Site and surrounding area are located outside of the Coastal Zone and is within an "Area of Minimal Flood Hazard", as shown on the Federal Emergency Management Agency's (FEMA) flood maps 06015C0207F (very northern portion of Site) and 06015C0209F (FEMA, n.d.). Although the USFWS's *National Wetlands Inventory* does not show any wetlands or riparian habitat within the boundaries of the Site, several constraint areas, including Class I and II watercourses (tributaries to Yonkers Creek and Camp Six Creek), were identified in the northern and southwestern portions of the Site, during surveys completed as part of the Timber Harvest Plan (THP) prepared in 2009 for a portion of the Site and adjacent GDRCo lands.

The identified resources require a minimum building setback of a least 100 feet from the top of bank or outer edge of riparian vegetation, whichever is greater.

Currently, the approximately 211.7-acre Site is forested and undeveloped. The Site is located adjacent to Highway 101 and is bisected in the southeastern portion of the Site by Wonder Stump Road. The Site was last logged by GDRCo in 2010 and contains former logging roads throughout the Site. Since the Site is not within the service boundary of any community services district, the Site is and would continue to not be served by community water or wastewater service. Anticipated future residential development at the Site would be anticipated to utilize on-site wells and wastewater treatment systems, such as conventional gravity, shallow low-pressure distribution, or Wisconsin mound on-site wastewater treatment systems.

As the Site is currently undeveloped, stormwater at the Site tends to infiltrate the soil. However, excess stormwater runoff from the Site is in the form of sheet flow. Although no development is proposed at this time, future anticipated residential development is anticipated at the Site, including the construction of up to 55 single family residences or manufactured homes on each potential 3 acre lot (55 total). Due to an increase in impervious surfaces at the Site, it is anticipated that surface run-off would increase. However, because of the ample lot sizes anticipated under a future subdivision, it is anticipated that a considerable amount of stormwater would continue to infiltrate on-site under future residential development.

Urban run-off and other "non-point source" (NPS) discharges are regulated by the 1972 Federal Clean Water Act (CWA) through the National Pollutant Discharge Elimination System (NPDES) permit program. The NPDES Program is a federal program which has been delegated to the State of California for implementation through the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCB) across the state (SWRCB – NPDES, 2018). Because anticipated future residential development on-site would disturb more than one acre of land, it would be required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity, Construction General Permit Order No. 2009-0009-DWG. Construction activities subject to this permit includes clearing, grading, and disturbances to the ground (such as stockpiling or excavation), all of which would be anticipated under future on-site development. The Construction General Permit requires operators of such construction sites to implement stormwater controls and develop a Stormwater Pollution Prevention Plan (SWPPP) (SWRCB – Construction, 2018) to outline how the project would minimize the discharge of sediment and other pollutants and identify specific Best Management Practices (BMPs) to be implemented. Such BMPs may include straw bales, fiber rolls, and/or silt fencing structures to assure the minimization of erosion resulting from construction and to avoid runoff into sensitive habitat areas (including the identified Class I and II waterways identified on-site), limit ground disturbance to the minimum necessary, and stabilize disturbed soil areas as soon as feasible after construction is completed.

As previously discussed, LACO prepared a *Preliminary Groundwater Supply Assessment Technical Memorandum* (Preliminary Groundwater Supply Assessment) (see Appendix H), dated November 2, 2018, to evaluate the feasibility of developing domestic well(s) on-site to serve future residential development anticipated at the Site. The Battery Formation is the principal acquirer in the southern two-thirds of the Smith River Plain and the local groundwater resource. Well yields within the Battery Formation and located near the Site are noted as generally large enough for domestic and limited irrigation uses. Based on existing available data published by the Department of Water Resources, preliminary findings of drilling explorations at the Site, and analysis of precipitation, groundwater levels, and expected future water usage, it appears that the Battery Formation is capable of supplying the minimum daily domestic waste supply required to serve the maximum number of residential lots anticipated at the Site in the future (55 lots). The Preliminary Groundwater Supply Assessment provides several recommendations regarding the depth, siting, and

sealing of the anticipated wells, in addition to completing a test well to confirm the aquifer has adequate capacity.

X.a) Although no development is currently proposed, future residential development is anticipated on-site. As discussed above, because the Site is not within the service boundary of any community services district, the Site is and would continue to not be served by community water or wastewater service. Anticipated future residential development at the Site would be anticipated to utilize on-site wells and wastewater treatment systems, such as conventional gravity, shallow low-pressure distribution, or Wisconsin mound on-site wastewater treatment systems. All systems developed on-site would be required to be developed in accordance with all development standards. Since anticipated future residential development at the Site would disturb more than one acre of land, future on-site development proposal(s) spanning more than one acre in size would be required to comply with the SWRCB's Construction General Permit and include a SWPPP that describes how the project would minimize discharging sediment and other pollutants, including specific BMPs to be implemented during construction of the anticipated future residential development on-site.

As noted in LACO's Preliminary Groundwater Supply Assessment, dated November 2, 2018 (see Appendix H), the proposed number of units (up to 55 single family residents or manufactured homes) could cause potential impact to the water quality due to the concentration of onsite wastewater treatment systems and may require further study; however, there are several areas to the north, south, and west with similar residential densities to that which is proposed that do not appear to have groundwater impacts from on-site wastewater treatment systems. In the report, it is noted that wells are required to be sited a minimum horizontal distance of 100 feet from any disposal field in accordance with current water well and NCRWQCB's North Coast Basin Plan standards. It is recommended, where feasible, that disposal field setbacks greater than 100 feet be maintained to reduce the potential for wastewater discharge to affect the domestic water source. Additionally, all new water wells shall be constructed by a licensed well-drilling contractor in accordance with the American Water Works Association Standards and the California Department of Water Resources' Water Well Standards (LACO, 2018a). The County will include LACO's recommendations included in the Preliminary Groundwater Supply Assessment as conditions of approval. Adherence to the recommendations and compliance with the conditions of approval would ensure a less than significant impact would occur.

X.b) The proposed project, including anticipated future residential development of up to 55 single family residences or manufactures homes on-site, would not be anticipated to substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin. As noted above, due to an increase in impervious surfaces at the Site once future anticipated residential occurs, it is anticipated that surface run-off would increase; however, because of the ample lot sizes anticipated under a future subdivision, it is anticipated that a considerable amount of stormwater would continue to infiltrate on-site under future residential development. Additionally, as discussed in the Preliminary Groundwater Supply Assessment (LACO, 2018a), it is expected that the Battery Formation, the local groundwater resource, would be capable of supplying the minimum daily domestic water supply requirements needed to serve the maximum amount of development expected on-site in the future, with the anticipated usage well-below the annual input due to rainfall. A less than significant impact would occur.

X.c.i-ii) The proposed project and anticipated future residential development would not result in substantial erosion or siltation on- or off-site, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site. The anticipated future residential development on-site would

introduce new impermeable surfaces, as the Site is currently undeveloped. However, due to the ample lot sizes (3 acre minimum) anticipated under a future subdivision, it is anticipated that a considerable amount of stormwater would continue to infiltrate on-site under future residential development. As previously discussed, once anticipated future residential development is proposed for the Site, a SWPPP would be required and during construction, the project contractor would be required to implement BMPs, which may include the use of straw bales, fiber rolls, and/or silt fencing structures to assure the minimization of erosion resulting from construction and to avoid runoff into sensitive habitat areas, limiting ground disturbance to the minimum necessary, and stabilizing disturbed soil areas as soon as feasible after construction is completed. A less than significant impact would occur.

X.c.iii) The County of Del Norte is responsible for storm drainage within all unincorporated areas of the County; however, the majority of the County, including the project area, does not have stormwater conveyance systems, but rather follows a more natural drainage pattern before either infiltrating or entering a waterway. Adjacent to the Site, Highway 101 and Wonder Stump Road are graded and elevated to allow runoff to drain off either side of the road. There is no existing curb, gutter, and sidewalk adjacent to or in the vicinity of the Site, although it is anticipated that these features would be a requirement once anticipated future residential development is proposed on-site.

Since the Site is currently undeveloped, stormwater at the Site tends to infiltrate the soil. However, excess stormwater runoff from the Site is in the form of sheet flow. Although no development is proposed at this time, future anticipated residential development is anticipated at the Site, including the construction of up to 55 single family residences or manufactured homes, one per each potential 3 acre minimum lot. Due to an increase in impervious surfaces at the Site, it is anticipated that surface run-off would increase. However, because of the ample lot sizes anticipated under a future subdivision, it is anticipated that a considerable amount of stormwater would continue to infiltrate on-site under future residential development.

Additionally, as discussed under Section X, Hydrology and Water Quality, above, because future development on-site would disturb more than one acre, it would be required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity, Construction General Permit Order No. 2009-0009-DWG. Construction activities subject to this permit includes clearing, grading, and disturbances to the ground (such as stockpiling or excavation), all of which would be anticipated under future on-site development. The Construction General Permit requires the development of a Stormwater Pollution Prevention Plan (SWPPP) (SWRCB – Construction, 2018) to outline how the project would minimize the discharge of sediment and other pollutants. A less than significant impact would occur.

X.c.iv) As noted above, the Site and surrounding area are located within an "Area of Minimal Flood Hazard", as shown on the Federal Emergency Management Agency's (FEMA) flood maps 06015C0207F (very northern portion of Site) and 06015C0209F (FEMA, n.d.). As previously discussed, the Site contains a gently sloped wooded area. Specifically, the Site is located at an elevation of approximately 125 feet above mean sea level and slopes to the west at an approximately 5 to 10 percent slope. Due to the Site's location outside of a flood zone and the topography of the Site, a less than significant impact would occur.

X.d) The topography of the Site and surrounding area is gently sloping, with slopes generally between 5 and 10 percent. The Site is located outside of the coastal zone boundary and as discussed above, the Site and surrounding area is not within a flood zone. As shown on Del Norte County's GIS Interactive Map (2013) and the California Department of Conservation's tsunami inundation map for the Crescent City Quadrangle (2018), the Site is also located outside of the tsunami evacuation zone. The Site is located approximately 0.9 miles east of Lake Earl and the potential for seiches to occur is minimal. A significant

amount of pollution is not anticipated under the project and there are no elements of the project or anticipated future residential development that would increase the potential for inundation at the Site. As such, future anticipated development at the site would not be subject to inundation by seiche, tsunami, or mudflow. No impact would occur.

X.e) The proposed project would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan, as there are no such plans applicable to the Site. No impact would occur.

MITIGATION MEASURES

No mitigation required.

FINDINGS

The proposed project would have a **Less Than Significant Impact** on Hydrology and Water Quality.

XI. **LAND USE AND PLANNING**. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Physically divide an established community?	☐	☐	☒	☐
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?	☐	☐	☒	☐

THRESHOLDS OF SIGNIFICANCE: The project would have a significant effect on land use and planning if it would physically divide an established community or 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.

DISCUSSION

The Site is currently designated as "Timberland" (TBR) under the Del Norte County General Plan and is currently zoned as "Timberland Preserve Zone" (TPZ) under the Del Norte County Zoning Code. GDRCo would like to amend the existing land use and zoning designations to Rural Residential with one lot unit per three acres (RR3) and Rural Residential with three- to five-acre lot sizes and a Manufactured Housing combining district (RR-3 MFH), respectively. At this time, only a change in the Site's current land use and zoning designations, including a ten-year TPZ rollout, is being proposed for the Site. A subdivision or any associated development is not currently proposed; however, future residential development is anticipated on-site after the 10-year TPZ rollout is finalized. Although the Site is currently vacant and forested, up to 55 residential units may be developed on-site on 3 acre minimum lots, spanning approximately 167 total acres. The MFH combining district would allow for more flexibility once future development is proposed, by allowing for either a conventional single family residential dwelling or a manufactured home on each 3 acre minimum lot.

XI.a) The proposed project and anticipated future residential development would not physically divide an established community. As noted above, future residential development is anticipated at the Site, although no development is proposed under the project at this time. The proposed project, which involves a GPA/ZR to amend the Site's current land use and zoning designations to RR3 and RR-3 MFH, respectively, would be consistent with surrounding residential land use and zoning designations (see Figures 2 through 5). Additionally, future residential development anticipated at the Site would be consistent with surrounding uses, which includes rural residential development immediately to the north, south, and east of the Site. A less than significant impact would occur.

XI.b) As discussed above, the Site is currently designated as TBR under the Del Norte County General Plan and is currently zoned as TPZ under the Del Norte County Zoning Code. GDRCo would like to amend the existing land use and zoning designations to RR3 and RR-3 MFH, respectively. Since the anticipated future development anticipated on-site would be required to be developed in accordance with all land use plans, policies, and regulations, including the recommended mitigation measures included in this Initial Study, a less than significant impact would occur.

MITIGATION MEASURES

No mitigation required.

FINDINGS

The proposed project would have a **Less Than Significant Impact** on Land Use and Planning.

XII. MINERAL RESOURCES. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

THRESHOLDS OF SIGNIFICANCE: The project would have a significant effect on mineral resources if it would result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state or result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

DISCUSSION

The Site is not located in an area of known rock, aggregate, sand, or other mineral resource deposits of local, regional, or State residents. There are no known mineral resources of significance on the Site that would be made unavailable by the proposed project. Furthermore, the parcel is not utilized for Surface Mining and Reclamation Act (SMARA) (CA Dept. of Conservation, 2015, and USGS, n.d.).

XII.a-b) The project area does not contain mineral resources that are of value locally, to the region, or to residents. The project area is not identified as a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan. Therefore, the proposed project would not interfere with materials extraction or otherwise cause a short-term or long-term decrease in the availability of mineral resources. No impact would occur.

MITIGATION MEASURES

No mitigation required.

FINDINGS

The proposed project would have **No Impact** on Mineral Resources.

XIII. NOISE. Would the project result in:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standard established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☒	☐	☐
c) For a project located within the vicinity of private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

THRESHOLDS OF SIGNIFICANCE: The project would have a significant effect on noise if it would result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standard established in the local general plan or noise ordinance, or applicable standards of other agencies; or generation of excessive groundborne vibration or groundborne noise levels; or expose people residing or working in the project area to excessive noise levels (for a project located within the vicinity of a private airstrip or an airport or an airport land use plan, or where such as plan has not been adopted, within two miles of a public airport or public use airport).

DISCUSSION

Section 2 (Safety and Noise) of the Del Norte County General Plan includes goals and policies related to noise within the County. The Site is located adjacent to Highway 101 and is located between Highway 199 and State Route 197. As provided in Table 2-1 (Future Traffic Noise Levels Along Del Norte County Roadways) of Section 2 of the County's General Plan, this roadway segment has a daily traffic volume of approximately 13,900 vehicles and experiences the following noise levels, as illustrated in Table 5, below:

Table 5. Current Noise Levels Along Highway 101

Segment	Noise Level 100 ft. from Centerline (L_{dn})	Contour Distances (in feet from Centerline)		
		70 L_{dn}	65 L_{dn}	60 L_{dn}
Highway 199 to State Route 197	71	177	251	1,166

Source: Table 2-1, Section 2 (Safety and Noise), Del Norte County General Plan, January 28, 2003.

Based on the information provided in Table 5, above, the very eastern portion of the Site experiences noise levels in excess of 70 L_{dn}; however, the majority of the Site, within the central and western potions of the Site, experiences noise levels of 60 L_{dn} or less. Per Policy 2.H.1 of the County General Plan, single family residential uses, such as what is anticipated at the Site in the future, are considered to be "noise sensitive." Pursuant to Policy 2.H.2, the development of new noise sensitive land uses adjacent to existing or planned transportation, such as the future residential development anticipated on-site, which is located adjacent to Highway 101, would require a noise impact analysis in areas where current or future exterior noise levels from transportation sources exceeds 65 CNEL/L_{dn}. In order to assure the anticipated future residential uses would be constructed in an area with acceptable noise levels, it is recommended that a noise buffer of 251 feet from the centerline of Highway 101 be observed (see Mitigation Measure NOISE-1).

XIII.a) Although no development is proposed at this time, future residential development is anticipated at the Site, including the development of up to 55 single family residences or manufactured homes. However, the future residential development would not be expected to generate noise in excess of what is common for residential uses once grading and construction are complete.

In order to assure the anticipated future residential uses would be constructed in an area with acceptable noise levels, it is recommended that a noise buffer of 251 feet from the centerline of Highway 101 be observed (see Mitigation Measure NOISE-1). Based on the data provided in Table 5, above, by implementing a minimum 251-foot noise buffer from Highway 101, this would ensure anticipated residential development on-site would be limited to areas with noise levels of 65 or less L_{dn}. In compliance with Policy 2.H.4 of the Del Norte County General Plan and as required by Mitigation Measure NOISE-2, below, once the anticipated future residences are proposed on-site, they shall be designed so that indoor noise levels do not exceed 45 CNEL/L_{dn}.

During construction activities, there would be a temporary increase in ambient noise levels at the Site. The initial clearing and grading of the Site would require the use of heavy equipment. Numerous sensitive receptors (specifically, residences) are located in the vicinity of the Site, with the nearest located approximately 88 feet west of the Site. As required under Mitigation Measure NOISE-3, below, neighboring landowners shall be notified of any subdivision applications being considered for approval creating additional residential lots allowing for such construction activities. In addition, Mitigation Measure NOISE-4 requires noise-reducing measures, including requiring all equipment driven by internal combustion engines shall be equipped with mufflers, locating noise-generating uses and construction staging areas as far as practicable from sensitive receptors, prohibiting unnecessary idling, and limiting once operation of equipment or outside construction may occur. It is anticipated that construction associated with the future residential development anticipated on-site would generally occur between the hours of 8:00am to 5:00pm Monday through Friday. Construction outside of these hours may occur but in no case shall operation of equipment or outside construction occur between 11:00 p.m. and 7:00 a.m (see Mitigation Measure NOISE-4).

Post-construction noise associated with operation of the proposed project would be generated through future residential traffic. The primary sources of operational noise associated with the proposed project would be vehicles traveling to and leaving from the 55 maximum residential units (single family residences or manufactured homes) anticipated on-site in the future. As provided in the CalEEMod air quality analysis results, dated July 2, 2019 (see Appendix C), full build-out of the Site is anticipated to result in approximately 524 average weekday, 546 average Saturday, and 475 average Sunday traffic trips. However, given the Site's location adjacent to Highway 101, a main source of noise within the vicinity of the Site, the minimal noise levels associated with the anticipated residences, and the compatibility of the anticipated uses with existing uses surrounding the subject Site, in addition to the incorporation of Mitigation Measures NOISE-1 through NOISE-4, a less than significant impact would occur.

XIII.b) As noted above, the initial clearing and grading of the Site would require the use of heavy equipment, which would cause temporary ground borne vibration and ground borne noise exceeding normally allowable limits. However, these impacts are associated with construction and would be temporary in nature. With implementation of Mitigation Measures NOISE-3 and NOISE-4, a less than significant impact would occur.

XIII.c) The Site is not included in an airport land use plan, within the vicinity of a private airstrip, and is not within two miles of a public airport or public use airport. The nearest airport to the Site is the Del Norte

County Regional Airport (also known as Jack McNamara Field), a public airport, which is located approximately 5.7 miles southwest of the Site. As a result, the proposed project, including anticipated future residential development, would not result in a safety hazard for people residing or working at or near the Site. No impact would occur.

MITIGATION MEASURES

NOISE-1: Future development on-site shall observe a minimum setback of 251 feet from the centerline of Highway 101.

NOISE-2: All future residential uses proposed on-site shall be designed to ensure that indoor noise levels do not exceed 45 CNEL/L_{dn}.

NOISE-3: Neighboring landowners shall be notified of the consideration of subdivision applications creating lots allowing for the future ability to generate significant construction-related noise.

NOISE-4: All equipment driven by internal combustion engines shall be equipped with mufflers, which are in good condition and appropriate for the equipment. The construction contractor shall utilize "quiet" models of air compressors and other stationary noise sources where technology exists. At all times during project construction, stationary noise-generating equipment shall be located as far as practicable from sensitive receptors and placed so that emitted noise is directed away from residences. Unnecessary idling of internal combustion engines shall be prohibited. Construction staging areas shall be established at locations that would create the greatest distance between the construction-related noise sources and noise-sensitive receptors nearest the project Site during all project construction activities, to the extent feasible. The construction contractor shall designate a "noise disturbance coordinator" who shall be responsible for responding to any local complaints about construction noise. The disturbance coordinator shall be responsible for determining the cause of the noise complaint (e.g., starting too early, poor muffler, etc.) and instituting reasonable measures as warranted to correct the problem. A telephone number for the disturbance coordinator shall be conspicuously posted at the construction site. Operation of equipment or outside construction shall not occur between the nighttime hours of 11:00 p.m. and 7:00 a.m.

FINDINGS

The proposed project would have a **Less Than Significant Impact with Mitigation Incorporated** on Noise.

XIV. POPULATION AND HOUSING. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Induce substantial unplanned population growth in an area, either directly (e.g., by proposing new homes and/or businesses) or indirectly (e.g., through extension of roads or other infrastructure)?	☐	☐	☒	☐
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

THRESHOLDS OF SIGNIFICANCE: The project would have a significant effect on population and housing if it would induce substantial unplanned population growth in an area, either directly (e.g., by proposing new homes and/or businesses) or indirectly (e.g., through extension of roads or other infrastructure); or displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere.

DISCUSSION

The Site is located near Fort Dick, a small incorporated community in rural Del Norte County, California. Fort Dick is located approximately 5 miles north of Crescent City and approximately 15 miles south of the California-Oregon state line. U.S. Census data for years 2000 and 2010 is not available for this community; however, in 2016, the U.S. Census Bureau estimated the community of Fort Dick to have a population of 830 residents and 344 housing units (2012-2016), which equates to an average household size of 2.41 persons per household. For Del Norte County as a whole, the population increased by 4 percent between 2000 (27,507 residents) and 2010 (28,610 residents) (U.S. Census Bureau, n.d.).

Although no development is proposed at the Site at this time, future residential development is anticipated, including the construction of 55 new single family residences or manufactured homes, one per each potential 3 acre minimum lot. Based on the data from the U.S. Census Bureau, it is estimated that full build-out of the Site would result in approximately 133 residents residing at the Site. However, due to the slow growth rate of the area, it is anticipated that construction would occur on-site as necessary to accommodate the anticipated housing needs of the area, which would likely occur over the course of many years.

XIV.a) The proposed project involves a general plan amendment and zone reclassification and does not involve the development of any new homes, businesses, or the extension of infrastructure at this time. However, future residential development is anticipated at the Site, including the potential development of up to 55 single family residences or manufactured homes. The Site is not currently served by community water or sanitary sewer systems, nor would such systems serve the anticipated future development; rather, the anticipated future residential development would be served by on-site wells and wastewater systems. Once development occurs on-site, the Site would continue to be accessed from Wonder Stump Road, although roadway improvements may be required.

As discussed above, full build-out of the Site would be anticipated to result in approximately 133 residents at the Site, which is currently undeveloped and uninhabited. Based on the U.S. Census Bureau data provided above, the increase in population anticipated at the Site under maximum build-out equates to an approximately 16 percent increase in the community of Fort Dick's current estimated population. Due to the slow growth rate of the area, it is anticipated that construction would occur on-site as necessary to accommodate the anticipated housing needs of the area, which would likely occur over the course of

many years. It is possible that some of the anticipated residents at the Site may already live locally, thus lowering the amount of new residents relocating to the area. Since the proposed project would not induce substantial population growth or displace any existing residents or housing, a less than significant impact would occur.

XIV.b) The project would not result in the demolition of any existing structures on-site, as the Site is currently vacant. As a result, the proposed project would not displace any existing residents or housing and no impact would occur.

MITIGATION MEASURES

No mitigation required.

FINDINGS

The proposed project would have a **Less Than Significant Impact** on Population and Housing.

XV. PUBLIC SERVICES. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Fire protection?	☐	☐	☒	☐
b) Police protection?	☐	☐	☒	☐
c) Schools?	☐	☐	☒	☐
d) Parks?	☐	☐	☒	☐
e) Other public facilities?	☐	☐	☒	☐

THRESHOLDS OF SIGNIFICANCE: The project would have a significant effect on public services if it would result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or result in the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for (a) fire protection, (b) police protection, (c) schools, (d) parks, or (e) other public facilities**.**

DISCUSSION

As previously discussed, the proposed project involves a general plan amendment and zone reclassification and does not involve any development at this time. However, future residential development at the Site is anticipated, including the potential development of up to 55 single family residences or manufactured homes. Based on data from the U.S. Census Bureau (2012-2016), as provided in Section XIV (Population and Housing), above, it is estimated that full build-out of the Site would result in approximately 133 residents residing at the Site. The increase in population anticipated at the Site under maximum build-out equates to an approximately 16 percent increase in the community of Fort Dick's current estimated population. Due to the slow growth rate of the area, it is anticipated that construction would occur on-site as necessary to accommodate the anticipated housing needs of the area, which would likely occur over the course of many years.

XV.a) As discussed under Section IX, Hazards and Hazardous Materials, above, the Site is located within the State Responsibility Area (SRA) and is classified as having a "Moderate" fire hazard severity rating (CalFire, 2012). Per the *Countywide Fire Services Municipal Service Review and Sphere of Influence Update* (Countywide Fire Services MSR), adopted on May 23, 2016, by the Del Norte County Local Agency Formation Commission (LAFCo), the Site is located within the service boundaries of the Fort Dick Fire Protection District (FPD), which provides fire suppression, hazardous material responses, and emergency medical services to a service area of 30 square miles and approximately 6,270 residents (LAFCo, 2016).

The Site is currently vacant and forested. Although no development is proposed at this time, future residential development is anticipated at the Site. Based on Site constraints and required buffers, the Site is estimated to have a development potential of 167 acres and would allow for up to a maximum of 55 residential lots, assuming the requested land use and zoning designations of RR3 and RR-3 MFH, respectively, are approved for the Site. In order to accommodate the anticipated future residential development, it is estimated that most trees would be removed from the Site, which would greatly reduce

the potential for a forest fire at the Site. However, should a fire occur at the Site, the Fort Dick FPD operates two stations in close proximity to the Site:

- Station #1 (Kings Valley Station), located at 6534 Kings Valley Road, approximately 1.4 miles north of the Site; and
- Station #2 (Lake Earl Station), located at 4190 Lake Earl Drive, approximately 3 miles southwest of the Site (LAFCo, 2016).

Additionally, the Fort Dick FPD has mutual aid agreements with neighboring fire service providers including: Crescent FPD, Smith River FPD, Gasquet FPD, Klamath FPD, Crescent City Volunteer Fire Department, Pelican Bay State Prison Fire Department, US National Park Service, US Forest Service, and Cal Fire. The Fort Dick FPD also has mutual aid agreements with a number of fire districts in Oregon, such as Winchuck FPD, Harbor FPD, Brookings FPD and Pistol River FPD (LAFCo, 2016).

Cal Fire is responsible for the suppression of wildland fires within the SRA and approximately 85 percent of the Fort Dick FPD's boundaries are located within a designated SRA. Cal Fire stations are staffed during declared fire season, typically June to October, and engines may respond to calls other than wildland fires if they are available and the call will not affect their core responsibilities. Although the State is responsible for wildland fire suppression within the SRA, Cal Fire relies on local fire departments to respond to such incidents and provide initial attack to ensure that the fires are suppressed at the earliest possible stage (LAFCo, 2016).

The Fort Dick FPD has expressed concerns with the project in a letter dated October 26, 2017 (see Appendix J), specifically related to the increase in residential units within their service territory and ability of the Site to meet the fire flow requirements. Proposed development in the future would demonstrate the ability to meet the requirements under the California Fire Code and applicable Fire Safe Regulations such as needing on site water storage. There are no elements of the project that would exacerbate the risk of wildland fire at the Site. No development is proposed at this time, although future residential development is anticipated at the Site. As previously discussed, the Site has a development potential of approximately 167 acres. While some trees may be left to provide character or visual screening (as required per Mitigation Measure AES-1), it is possible that the majority of trees on-site would be removed during construction. Since the Site is located within the SRA, anticipated future development on-site would be required to comply with Title 19 (SRA Fire Safe Regulations) of the Del Norte County Code, which prescribes standards pertaining to emergency access and egress, signing and building numbering, emergency water, and fuel modification.

Since the Site is served by Cal Fire, Fort Dick FPD, and numerous other FPDs through mutual aid agreements and is not considered a "high" fire hazard area, future development at the Site would be served by sufficient fire protection services and a less than significant impact would occur.

XV.b) Police protection services within the County are provided by the Del Norte County Sheriff's Office. Per the Sheriff's Office website, the Sheriff's Office comprises a patrol division, jail division, civil office, court security, Countywide emergency communications, special operations with boating safety and waterways program, and search and rescue (County - Sheriff's Office, 2013). The Sheriff's Office station is located at 650 5th Street in Crescent City, approximately 6.2 miles southwest of the Site.

As noted above, anticipated future development at the Site is expected to occur over the course of many years and would result in a population increase of approximately 133 residents at the Site at full build-out, which equates to an approximately 16 percent increase in the community of Fort Dick's current estimated

population. As discussed above, due to the slow growth rate of the area, it is anticipated that construction would occur on-site as necessary to accommodate the anticipated housing needs of the area, which would likely occur over the course of many years. As such, a significant population increase which may impact the ability of the Sheriff's Office to serve the community or require the construction of a new facility is not anticipated, and no change to the FPD's current service ratio would occur. A less than significant impact would occur.

XV.c) The two schools located nearest to the Site are Redwood Elementary School, located approximately 1.75 miles north of the Site, and Sunset High School, located approximately 1.83 miles south of the Site. As previously discussed, full build-out of the Site under the proposed land use and zoning designations would result in development of up to 55 single family residences or manufactured homes on-site. Based on U.S. Census Bureau data, full build-out of the Site would result in a total of 133 residents. Population data for the Fort Dick area indicates that approximately 13.1 percent of the area's residents are school aged (ages 5 to 19) (U.S. Census Bureau, 2012-2016). Based on this information, it appears that approximately 18 of the Site's 133 total anticipated residents would be students. Since a significant number of new students would not be expected at the Site under full build-out, it is likely that these new students could be accommodated at the local schools and that no new schools or alternations to existing schools would be required. A less than significant impact would occur.

XV.d) As provided in Table 5-1 (County Recreational Areas) of Section 5 (Recreational and Cultural Resources) of the Del Norte County General Plan, the County includes 26 recreational areas, including County, State, and national park lands. Furthermore, 57 coastal and river access locations within the County are available to the public, as provided in Table 5-2 (Coastal and River Public Access) of the County's General Plan.

The Site is located near the following neighborhood and regional parks and recreational facilities:

- Lake Earl, located approximately 0.91 miles west of the Site;
- Crescent City/Redwoods KOA, located approximately 1.06 miles south of the Site;
- Ruby van Deventer County Park, located approximately 1.21 miles northeast of the Site;
- Redwoods RV Resort, located approximately 1.54 miles north of the Site;
- Florence Keller County Park and Campground, located approximately 1.97 miles south of the Site;
- Del Norte Golf Course, located approximately 2.18 miles east of the Site;
- Peterson Memorial Trail, located approximately 2.45 miles southeast of the Site;
- Tolowa Dunes State Park, located approximately 3.00 miles northwest of the Site; and
- Jedediah Smith Redwoods State Park and Campground, located approximately 3.50 miles southeast of the Site.

Existing local parks and recreational facilities may experience a slight increase in the number of users; however, a significant population increase is not anticipated as a result of the project, nor does the County specify a specific parkland requirement. Therefore, no new parks or alternations to existing parks would be required. A less than significant impact would occur.

XV.e) There are no elements of the proposed project or anticipated future residential development that would significantly impact other public facilities, such as regional hospitals or libraries, since a significant population is not anticipated and would be likely to occur over many years. Additionally, there are no components of the proposed project or anticipated future development at the Site that would increase population to the extent that new or physically-altered public facilities would be required. A less than significant impact would occur.

MITIGATION MEASURES

No mitigation required.

FINDINGS

The proposed project would have a **Less Than Significant Impact** on Public Services.

XVI. RECREATION. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐
b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☒	☐

THRESHOLDS OF SIGNIFICANCE: The project would have a significant effect on recreation if it would increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated, or include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

DISCUSSION

As provided in Table 5-1 (County Recreational Areas) of Section 5 (Recreational and Cultural Resources) of the Del Norte County General Plan, the County includes 26 recreational areas, including County, State, and national park lands. Furthermore, 57 coastal and river access locations within the County are available to the public, as provided in Table 5-2 (Coastal and River Public Access) of the County's General Plan.

The Site is located near the following neighborhood and regional parks and recreational facilities:

- Lake Earl, located approximately 0.91 miles west of the Site;
- Crescent City/Redwoods KOA, located approximately 1.06 miles south of the Site;
- Ruby van Deventer County Park, located approximately 1.21 miles northeast of the Site;
- Redwoods RV Resort, located approximately 1.54 miles north of the Site;
- Florence Keller County Park and Campground, located approximately 1.97 miles south of the Site;
- Del Norte Golf Course, located approximately 2.18 miles east of the Site;
- Peterson Memorial Trail, located approximately 2.45 miles southeast of the Site;
- Tolowa Dunes State Park, located approximately 3.00 miles northwest of the Site; and
- Jedediah Smith Redwoods State Park and Campground, located approximately 3.50 miles southeast of the Site.

XVI.a) As previously discussed, the proposed project involves a general plan amendment and zone reclassification and does not involve any development at this time. However, future residential development at the Site is anticipated, including the potential development of up to 55 single family residences or manufactured homes. Based on data from the U.S. Census Bureau, as provided in Section XIV (Population and Housing), above, it is estimated that full build-out of the Site would result in approximately 133 residents residing at the Site. Although the increase in population anticipated at the Site under maximum build-out equates to an approximately 16 percent increase in the community of Fort Dick's current estimated population, the proposed project and anticipated future residential development would not be anticipated to substantially increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated. A less than significant impact would occur.

XVI.b) The County of Del Norte does not have a specific parkland requirement. As previously discussed, no development is proposed at the Site at this time, although future residential development, including up to 55 single family residences or manufactured homes, is anticipated on-site. Future development may include plans for recreational facilities on-site; however, no specific development plans have been developed for the Site. Should recreational facility(ies) be proposed on-site in the future, BMPs designed to mitigate adverse impacts from the construction of recreational facilities would be prescribed when specific permits are sought by a developer at a future date. A less than significant impact would occur

MITIGATION MEASURES

No mitigation required.

FINDINGS

The proposed project would have a **Less Than Significant Impact** on Recreation.

XVII. TRANSPORTATION. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☒	☐	☐
b) Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☒	☐	☐
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
d) Result in inadequate emergency access?	☐	☐	☒	☐

THRESHOLDS OF SIGNIFICANCE: The project would have a significant effect on transportation if it would conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities; conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b); substantially increase hazards due to a geometric design features (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment); or result in inadequate emergency access.

DISCUSSION

The project Site is located adjacent to Highway 101 and Wonder Stump Road. The California Department of Transportation (Caltrans) is responsible for maintaining all California highways, including Highways 101, 169, 197, and 199 within Del Norte County. The Roads Division of the County's Community Development Department is responsible for maintaining County roads and streets, which comprises 194 miles of paved and 109 miles of unpaved roads, in addition to 33 bridges located throughout the County (County - Roads, 2013). A *Del Norte County 2016 Regional Transportation Plan* (Regional Transportation Plan), was prepared in November 2016 by Green Dot Transportation Solutions for the Del Norte County Local Transportation Commission. The purpose of the Regional Transportation Plan is to serve as a "guide to the development of a coordinated and balanced multi-modal regional transportation system that is financially constrained to the local, State, and Federal revenues anticipated over the twenty-year life of the plan" (Green Dot, 2016).

While no development is proposed on-site at this time, it is anticipated that up to 55 single family residences or manufactured homes may be developed on-site in the future, due to the requested residential zoning and land use designations requested for the Site by the Applicant. As discussed under Section XIV, Population and Housing, based on the data from the U.S. Census Bureau, it is estimated that full build-out of the Site would result in approximately 133 residents residing at the Site. However, due to the slow growth rate of the area, it is anticipated that construction would occur on-site as necessary to accommodate the anticipated housing needs of the area, which would likely occur over the course of many years.

Preliminary Traffic Analysis

A *Preliminary Traffic Analysis* technical memorandum (Preliminary Traffic Analysis) (see Appendix F) was prepared by LACO on August 27, 2019, in order to evaluate the potential traffic impacts that could occur under build out of the Site under the requested land use and zoning designations. The traffic circulation of the Existing, Future, and Future plus Project conditions were evaluated using level of service (LOS) and control delay. Intersections of interest include Wonder Stump Road and (1) Highway 101, (2) Elk Valley Cross Road, and (3) Kings Valley Road. The Preliminary Traffic Analysis found that the intersections of Wonder Stump Road and Elk Valley Cross Road and Wonder Stump Road and Kings Valley Road are likely to

experience an insignificant impact as a result of the anticipated future residential development. The intersection of Wonder Stump Road and Highway 101 is likely to be the primary route for vehicles traveling to and from the Site and was thus further analyzed in the Preliminary Traffic Analysis.

Currently, the Wonder Stump Road/Highway 101 intersection operates at Level of Service (LOS) A, indicating free-flow conditions. The analysis concluded that anticipated future build-out of the Site has the potential to generate approximately 53 morning (AM) and 70 afternoon (PM) peak-hour trips and that the intersection would be expected to continue to operate at LOS A under the Future and Future plus Project conditions. The longest delay anticipated is 10 seconds during the AM peak-hour on Wonder Stump Road, which would still be considered LOS A.

Since there is no left-turn lane from Highway 101 onto Wonder Stump Road, the Preliminary Traffic Analysis note that there is the potential of traffic backing up on Highway 101 northbound, as vehicles wait to turn left onto Wonder Stump Road. The delay on northbound Highway 101 is not predicted to be significant. However, when future development is proposed, it may become necessary to create a designated left-turn lane and should be further analyzed at the time future residential development is proposed. Due to the size of the property, the Preliminary Traffic Analysis recommends that additional access points also be analyzed. Additionally, a formal Traffic Impact Study (TIS) is recommended in the Preliminary Traffic Analysis prior to the approval of any residential development project on-site.

Table 8-1 (Caltrans State Highway Route Concepts) in the Del Norte County General Plan provides the Caltrans-adopted goals for the local highways, including Highway 101. As shown in Table 8-1, Caltrans is planning for the segment from Route 199 to the Oregon Border, which includes the portion of Highway 101 adjacent to the subject Site, to eventually become a four-lane expressway/freeway. However, Policy 8.A.8 of the General Plan notes that "full construction of these concepts may not occur or be necessary during the planning period of this General Plan (i.e., by 2020), and supports development of such concepts into an overall 50-year highway plan which addresses the need for and location of freeway/expressway improvements."

Vehicle Miles Traveled

Beginning on July 1, 2020, Senate Bill (SB) 743 requires that automobile delay and level of service (LOS) no longer be utilized as the performance measure to determine transportation impacts of projects under CEQA. VRPA Technologies, Inc. prepared a draft *Del Norte Region SB 743 Implementation Plan* (Draft SB 743 Implementation Plan) in June 2020 for the Del Norte Local Transportation Commission, which has not yet been officially adopted by the County. The Draft SB 743 Implementation Plan "provides recommendations at a regional level for the conduct of CEQA transportation analyses using [Vehicle Miles Traveled] VMT to incorporate SB 743." While the Draft SB 743 Implementation Plan provides recommendations, the final authority is given by CEQA to lead agencies to determine methodologies and thresholds related to SB 743. Since the County has not yet adopted any thresholds of significance related to SB 743 implementation, the Applicant voluntarily agrees to the recommendations contained in the Draft SB 743 Implementation Plan, including respective mitigation.

As previously discussed, the results of the CalEEMod analysis conducted on July 2, 2019 (see Appendix C) indicate that full build-out of the Site is expected to result in approximately 524 average weekday, 546 average Saturday, and 475 average Sunday traffic trips, based on standard Institute of Transportation Engineers (ITE) trip generation rates. Under the Draft SB 743 Implementation Plan, since the project would be expected to generate more than 110 average daily trips, the project cannot be presumed to have a less-than-significant transportation impact and further analysis must be conducted under SB 743.

Thresholds of significance for VMT analysis in the Draft SB 743 Implementation Plan are partially based upon the Governor's Office and Planning and Research's (OPR) December 2018 *Technical Advisory on Evaluating Transportation Impacts in CEQA* (OPR Technical Advisory), with refinements made to reflect conditions in the County. Per the Draft SB 743 Implementation Plan, a significant transportation impact would occur for residential projects if the project VMT per capita equals or exceeds the average VMT per capita for the Traffic Analysis Zone (TAZ) in which the project is located.

Several case studies are provided in Appendix C of the Draft SB 743 Implementation Plan. In particular, Case Study #3 ("Rolling" Rural Residential Project) is a hypothetical project. Although this hypothetical project is smaller in scale than the proposed project (200 acres and 50 residential lots), it is similar in nature to what is proposed under the proposed project and also involves a 10-year rollout of TPZ-zoned land to Rural Residential. One other notable difference is that the potential project evaluated in Case Study #3 is located in TAZ 104, while the proposed project is located within TAZ 102, per Figure 3-2 (Del Norte Regional Traffic Analysis Zones) of the Draft SB 743 Implementation Plan. This case study involves an evaluation of potential impacts, as well as potential mitigation to reduce impacts to a less-than-significant level. Due to the similar scale and nature of the case study, the SB 743 analysis presented in Section XVII.b follows the methodology provided in the Draft SB 743 Implementation Plan for Case Study #3.

XVII.a) The proposed project would not conflict with a plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities. Level of Service (LOS) is used to rank traffic operation on various types of facilities based on traffic volumes and roadway capacity using a series of letter designations ranging from A to F. Generally, LOS A represents free flow conditions and LOS F represents forced flow or breakdown conditions. Pursuant to Policy 8.B.6 of Section 8 (Transportation and Circulation) of the Del Norte County General Plan, the County considers LOS C operation on all roadway segments to be the minimum acceptable LOS standard, except for any intersections with any State highway, including Highway 101, where LOS D is considered acceptable. The California Department of Transportation (Caltrans) strives to maintain operation at the transition from LOS C to LOS D. Since the four intersections evaluated under the Traffic Impact Study are located along Highway 101 within Caltrans' jurisdiction, LOS D is considered the standard acceptable threshold for the study intersections.

As noted above, full build-out of the Site is expected to result in 133 residents at the Site and full build-out may occur over the course of many years, due to the area's slow growth rate. In addition, it is expected that construction would not begin for at least 10+ years, until after the 10-year TPZ rollout is completed. As provided in the Preliminary Traffic Analysis, the study area currently experiences LOS A, and is expected to remain as LOS A under Future and Future plus Project conditions. In addition, anticipated future residential development on-site would be required to be developed in accordance to all plans, ordinances, and polices. As a result, there are no components of the project that would be anticipated to significantly impact transit, roadway, bicycle or pedestrian facilities. However, due to the length of time until development may potentially occur on-site, it is recommended in the Preliminary Traffic Analysis that a formal TIS be conducted prior to the approval of any residential development project on-site, which is included as Mitigation Measure TRANS-1, below.

With mitigation incorporated, a less than significant impact would occur.

XVII.b) The proposed project would not conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b), which states:

"(1) Land Use Projects. Vehicle miles traveled exceeding an applicable threshold of significance may indicate a significant impact. Generally, projects within one-half mile of either an existing major transit stop or a stop along an existing high quality transit corridor should be presumed to cause a less than significant transportation impact. Projects that decrease vehicle miles traveled in the project area compared to existing conditions should be considered to have a less than significant transportation impact.

"(2) Transportation Projects. Transportation projects that reduce, or have no impact on, vehicle miles traveled should be presumed to cause a less than significant transportation impact. For roadway capacity projects, agencies have discretion to determine the appropriate measure of transportation impact consistent with CEQA and other applicable requirements. To the extent that such impacts have already been adequately addressed at a programmatic level, a lead agency may tier from that analysis as provided in Section 15152."

The proposed project is not considered a transportation project. The Site is located immediately adjacent to Highway 101, the main thoroughfare through the area. However, as per the methodology presented in the Draft SB 743 Implementation Plan, since the future anticipated residential development on-site would result in greater than 110 vehicle trips per day (specifically, approximately 524 average weekday, 546 average Saturday, and 475 average Sunday traffic trips as provided by the July 2019 CalEEMod results; see Appendix C), the project cannot be presumed to have a less-than-significant transportation impact and further analysis must be conducted under SB 743.

As provided in the Draft SB 743 Implementation Plan, the Site is located within TAZ 102, which has an average daily per capita VMT of 7.96 miles. Since the anticipated future residential development would be similar in size and scale and would be consistent with existing surrounding residences, there is no reason to assume that the proposed project would result in either a higher or lower VMT per capital than the average for TAZ 102 in which the Site is located. As a result, since project VMT per capita is assumed to be equal to or greater than the VMT per capita of TAZ 102 in which the Site is located, a significant VMT impact can be assumed and mitigation that facilitates walking, bicycling, or transit would be required.

Based on the methodology provided in the Del Norte Region SB 743 Implementation Plan, mitigation may be in the form of improvements or in-lieu payments if the County is able and accepts. Per each single family home equivalent, the in-lieu cost is $1,275 per unit (or equivalent) plus 25% for infrastructure gap closures, and an additional 50% for administration and compliance with public works construction obligations for public agencies. Since the County is unable to accept in-lieu payments at this time, mitigation would necessarily be in the form of physical transportation infrastructure improvements. This land use action directly allows for the ability for future on-site development to be carried out slowly, over many years. Future, on-site development may be fragmented so as to not meet the threshold for causing a significant transportation impact while the current project as a whole clearly does. The general plan and zoning amendment, not only future development actions, is implicated by the impacts created from future development actions, such as subdivisions. Transportation impacts caused by future on-site development activities would be mitigated at the time of future development; however the effects of this project as a whole must be considered and mitigated as well. A notice being recorded against the subject property, presumably acting as a parent parcel for potential future development activities would tie the current project to future actions such as subdivisions. In addition, the submission of improvement plans to be used for future development activities would mitigate the subject project's contribution toward creating VMT impacts.

With mitigation incorporated, per the findings of the Draft SB 743 Implementation Plan, a one percent reduction in the project's VMT levels per capita (0.08) would be anticipated, reducing the project-related VMT to 7.88 miles per capita, which is below the average VMT per capita in the TAZ in which the project is located. After mitigation, a less than significant impact would occur.

XVII.c) There are no specific design features being proposed as part of this project; however, anticipated future residential development at the Site would not be anticipated to substantially increase hazards due to design features or incompatible uses. Future development plan(s) for the Site would be required to comply with all standards, including, but not limited to, site access, roadway width, and turning radii. As such, anticipated future development of the Site would not create a significant impact that could not be mitigated with future design improvements as development warrants. Further, anticipated future residential development on-site would be consistent with surrounding rural residential development. A less than significant impact would occur.

XVII.d) The proposed project would not result in inadequate emergency access. Although no development is proposed at the Site at this time, future anticipated residential development would be required to meet pertinent design criteria to provide adequate emergency access in accordance with all design standards and requirements and would be evaluated once specific development proposal(s) are proposed at the site. Specifically, the ability for a future project design to comply with the Del Norte County Fire Safe Regulations, governing emergency ingress and egress, has been demonstrated. The demonstration uses two access points off Wonder Stump Road, technically creating two points of emergency access and not creating dead-end roads. See Appendix K for these figures. A less than significant impact would occur.

MITIGATION MEASURES

TRANS-1: Due to the length of time until future anticipated residential development may occur on-site and the potential amount of development which may be developed on the Site, a traffic study shall be required at the time a major subdivision is proposed for the Site and included as part of the entitlement application submitted to the County of Del Norte Community Development Department. Other or subsequent subdivision applications may trigger the need for further formal traffic studies based on future need.

TRANS-2: At the time the Notice of Determination is posted, the applicant shall record a Notice of Requirement for SB 743 Implementation that must be recorded against the properties associated with this general plan and zoning amendment. "The total vehicle miles traveled (VMT) impacts for this project (GPA2001/R2001) were determined to be 55 single family equivalents. At the time of circulating the environmental document for this project, the Community Development Department determined that payment in lieu of physical improvements to meet SB 743 mitigation obligations could not be accepted since the County does not have a bank of credits to purchase from for the purpose of VMT mitigation."

TRANS-3: Due to the length of time until development will occur on-site (a minimum of 10 years, following completion of the 10-year TPZ rollout), should increased development fees be adopted by the County, the development fees or improvements equivalent to the current County development fee rate at the time of occupancy will be required for each respective unit developed on-site.

FINDINGS

The proposed project would have a **Less Than Significant Impact with Mitigation Incorporated** on Transportation.

XVIII. TRIBAL CULTURAL RESOURCES. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code §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 §5020.1(k)?	☐	☒	☐	☐
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 §5024.1? In applying the criteria set forth in subdivision (c) of Public Resources Code §5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

Thresholds of Significance: The project would have a significant effect on Tribal Cultural Resources if it would cause a substantial adverse change in the significance of a cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code §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 listed or eligible for listing in the California Register of Historical Places or in a local register of historical resources as defined in Public Resources Code §5020.1(k), or is 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 §5024.1.

DISCUSSION

On October 1, 2018, GDRCo's consultant prepared and delivered a Record Search Request to the Northwest Information Center (NWIC) to evaluate the potential to encounter archaeological or historic resources at the Site, particularly when anticipated future residential development occurs on-site. As previously discussed, the proposed project involves a general plan amendment and zone reclassification and does not involve any development at this time. However, future residential development at the Site is anticipated, including the development of up to 55 single family residences or manufactured homes.

A Records Search Results letter from NWIC, dated October 17, 2018 (see Appendix E), noted that two prior archaeological/cultural resource studies have been conducted on-site and cover approximately 90 percent of the Site [S-015153 (Peak & Associates, Inc. 1993) and S-011902 (Roscoe 1989)]. The NWIC letter states that three resources have been recorded at the Site, including two recorded Native American archaeological resources [P-08-000364 (Projectile Point #1) and P-08-000365 (Projectile Point #2)] and one historic-period cultural resource (P-08-000363, 467 Plank Road). There are no recorded buildings or structures within or adjacent to the Site. Additionally, there are no Native American resources in or adjacent to the Site referenced in the reviewed ethnographic literature. Further, the 1952 USGS Crescent City 15-minute

topographic quadrangle fails to depict any buildings or structures within the Site and there is a low possibility of identifying any buildings or structures 45 years or older on-site.

Based on an evaluation of the environmental setting and features associated with known sites, Native American resources in this part of Del Norte County have been found in terraces near ridgelines, near intermittent or perennial watercourses, and in particular concentration near lake or coastal shorelines. The Site contains a gently sloped wooded area approximately one mile east of Lake Earl, with at least one watercourse within the project area. Given these environmental factors, there is a moderate potential for additional unrecorded Native American resources at the Site.

Review of historical literature and maps indicated mid-19th century historic-period activity within the Site. The General Land Office Survey Plat for Township 17 North/Range 1 West (1856) depicts a "wagon road" within the project area, which may be associated with P-08-000363 (467 Plank Road). Although the presence of a historic-period road does not necessarily indicate additional historic-period activity, the accessibility of the Site does contribute to its potential archaeological sensitivity. As a result, there is a moderate potential for unrecorded historic-period archaeological resources at the Site.

Given the identified resources on-site, including two recorded Native American archaeological resources and one historic-period cultural resource, in addition to the moderate potential for additional unrecorded Native American resources and historic-period archaeological resources at the Site, several recommendations were provided by NWIC, and are included as Mitigation Measures CULT-1 through CULT-4 in Section V, Cultural Resources, above.

Tribal Consultation

On October 19, 2018, the Applicant's consultant delivered tribal consultation request letters to the two local Tribes, including the Elk Valley Rancheria and the Tolowa Dee-ni' Nation. In an e-mail response dated October 22, 2018, the Elk Valley Rancheria requested that the Tribe be immediately notified in the event archaeological materials are encountered on-site. In a letter dated October 26, 2018, the Tolowa Dee-ni' Nation requested to visit the Site. A representative from Elk Valley Rancheria and the Tolowa Dee-ni' Nation visited the Site on November 9, 2018, but were unable to make a determination.

XVIII.a.i-ii) As previously discussed under Section V, Cultural Resources, above, and as noted above, three resources have been recorded at the Site, including two recorded Native American archaeological resources [P-08-000364 (Projectile Point #1) and P-08-000365 (Projectile Point #2)] and one historic-period cultural resource (P-08-000363, 467 Plank Road). There are no recorded buildings or structures within or adjacent to the Site. Due to the characteristics of the Site, there is a moderate potential for additional unrecorded Native American and historic-period archaeological resources at the Site.

Several recommendations were provided by NWIC, including recommending further assessment of the identified resources, further archival and field study due to the passage of time since the previous Site survey (S-015153, Peak and Associates, Inc.), and protocol in the event any resources are encountered during project construction (see Mitigation Measures CULT-1 through CULT-3). At the request of the Elk Valley Rancheria, Mitigation Measure CULT-2 also requires the local Tribes (Elk Valley Rancheria and Tolowa Dee-Ni' Nation) to be immediately notified if archaeological materials are encountered on-site. In addition, specific procedures to follow (pursuant to Public Resources Code Sections 5097 and 7050.5) are included as Mitigation Measure CULT-4 in the event human remains are discovered on-site during project construction. With mitigation included, a less than significant impact would occur.

MITIGATION MEASURES

(See Cultural Resources section for Mitigation Measures CULT-1, CULT-2, CULT-3, and CULT-4).

FINDINGS

The proposed project would have a **Less Than Significant Impact with Mitigation Incorporated** on Tribal Cultural Resources.

XVIX. UTILITIES AND SERVICE SYSTEMS. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☒	☐
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?	☐	☒	☐	☐
c) Result in a determination by the wastewater treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e) Comply with federal, State, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☒	☐

THRESHOLDS OF SIGNIFICANCE: The project would have a significant effect on utilities and service systems if it would require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects; not have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years; result in a determination by the wastewater treatment provider, which serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the provider's existing commitments; generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals; or not comply with federal, State, and local management and reduction statutes and regulations related to solid waste.

DISCUSSION

The Site is currently undeveloped and forested and not served by utilities. Once development is proposed at the Site, electricity would be extended to the Site and provided by Pacific Power. Since the Site is not within the service boundary of any community services district, the Site is and would continue to not be served by community water or wastewater service. Anticipated future residential development at the Site is expected to utilize on-site wells and wastewater treatment systems, such as conventional gravity, shallow low-pressure distribution, or Wisconsin mound on-site wastewater treatment systems. Since there is no natural gas service in the County, anticipated future residential development would utilize electricity and/or propane for household appliances, in addition to heating and cooking activities. Two local propane providers, Blue Star Gas and Suburban Propane, are located in Crescent City and serve the local area. Additionally, Recology Del Norte provides weekly curbside garbage, recycling, and green waste collection within Del Norte County, and would serve the anticipated future development.

Water Service

The project area is not located within the service boundary of any community services district and is therefore not served by community water. As a result, anticipated future residential development at the Site would utilize on-site wells. Per LACO's *Preliminary Groundwater Supply Assessment Technical Memorandum* (Preliminary Groundwater Supply Assessment) (see Appendix H), dated November 2, 2018, it appears the Battery Formation (the principal acquirer in the southern two-thirds of the Smith River Plain and the local groundwater resource) is capable of supplying the minimum daily domestic waste supply required to serve the maximum number of residential lots anticipated at the Site in the future (55 lots). However, in order for additional confidence in the development potential of the water resource at the Site, it is recommended that a test well be installed within the Battery Formation and an extended period pumping test be performed at a later date, prior to development approvals (LACO, 2018a).

Wastewater Service

Since the Site is not within the service boundary of any community services district, the Site is and would continue to not be served by community wastewater service. Anticipated future residential development at the Site is expected to utilize on-site wastewater treatment systems. Per LACO's *Preliminary On-Site Wastewater Treatment Evaluation Test Results* letter, dated May 2, 2018 (see Appendix G), potential residential sites located within the southern and southwestern portions of the Site appear to be able to support conventional gravity on-site wastewater treatment systems. Potential residential sites within the southeastern, northeastern, northwestern, and western portions of the Site would require shallow low-pressure distribution or Wisconsin mound on-site wastewater treatment systems, due to high groundwater elevations encountered during percolation testing.

Storm Drainage System

The County of Del Norte is responsible for storm drainage within all unincorporated areas of the County; however, the majority of the County, including the project area, does not have stormwater conveyance systems, but rather follows a more natural drainage pattern before either infiltrating or entering a waterway. Adjacent to the Site, Highway 101 and Wonder Stump Road are graded and elevated to allow runoff to drain off either side of the road. There is no existing curb, gutter, and sidewalk adjacent to or in the vicinity of the Site.

Since the Site is currently undeveloped, stormwater at the Site tends to infiltrate the soil. However, excess stormwater runoff from the Site is in the form of sheet flow. Although no development is proposed at this time, future anticipated residential development is anticipated at the Site, including the construction of up to 55 single family residences or manufactured homes, one per each potential 3 acre minimum lot. Due to an increase in impervious surfaces at the Site, it is anticipated that surface run-off would increase. However, because of the ample lot sizes anticipated under a future subdivision, it is anticipated that a considerable amount of stormwater would continue to infiltrate on-site under future residential development.

As discussed under Section X, Hydrology and Water Quality, above, because future development on-site would disturb more than one acre, it would be required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity, Construction General Permit Order No. 2009-0009-DWG. Construction activities subject to this permit includes clearing, grading, and disturbances to the ground (such as stockpiling or excavation), all of which would be anticipated under future on-site development. The Construction General Permit requires the development of a Stormwater Pollution Prevention Plan (SWPPP) (SWRCB – Construction, 2018) to outline how the project would minimize the discharge of sediment and other pollutants.

Solid Waste Service

Recology Del Norte provides weekly residential and commercial solid waste, recycling, and green waste collection services to customers in Del Norte County. Solid waste collected from the surrounding area is transported to the Del Norte County Transfer Station in Crescent City, which is then disposed of at the Dry Creek Landfill operated by Rogue Disposal and Recycling, located in Eagle Point, Oregon (Ward, 2018), approximately 80 miles northeast of the Site. Del Norte County exported 19,262 tons of solid to the Dry Creek Landfill in 2017 (CalRecycle – Disposal, 2018). There are no active landfills in Del Norte County (CalRecycle - Solid, 2018).

The Dry Creek Landfill was opened in 1972 and was expanded to a regional facility in 1999. In addition to standard wastes, the Dry Creek Landfill is permitted to accept special wastes, including contaminated soil and materials with asbestos. The landfill has a projected operational life exceeding 100 years (Rogue, 2018).

XVIX.a) The Site is not currently served by existing water, wastewater, storm drainage, electricity, natural gas, or telecommunication services, as the Site is currently undeveloped. However, only electricity, natural gas, and telecommunication services would be extended to the Site to serve the anticipated future residential development once development is proposed. Future development at the Site would require the use of on-site wells and septic systems, as the surrounding area is not currently served by community water or wastewater service.

As discussed in Section X, Hydrology and Water Quality, above, since the Site is currently undeveloped, stormwater at the Site tends to infiltrate the soil, although excess stormwater runoff from the Site is in the form of sheet flow. Due to an increase in impervious surfaces at the Site, it is anticipated that surface run-off would increase. However, due to the ample lot sizes anticipated under a future subdivision, it is anticipated that a considerable amount of stormwater would continue to infiltrate on-site under future residential development, even though the amount of impervious surfaces at the Site would increase under the anticipated development.

All future development at the Site would be required to implement best management practices (BMPs). Since future development on-site would disturb more than one acre, it would be required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity, Construction General Permit Order No. 2009-0009-DWG, and prepare a Stormwater Pollution Prevention Plan (SWPPP), outlining how the project would minimize the discharge of sediment and other pollutants. The SWPPP would be required to specify specific BMPs to be implemented by the project contractor, which may include the use of straw bales, fiber rolls, and/or silt fencing structures to assure the minimization of erosion resulting from construction and to avoid runoff into sensitive habitat areas, limiting ground disturbance to the minimum necessary, and stabilizing disturbed soil areas as soon as feasible after construction is completed. In addition, all utility providers extending services to the Site would also be required to implement BMPs to minimize any potential impacts. A less than significant impact would occur.

XVIX.b) As discussed above, the project area is not located within the service boundary of any community services district and is therefore not served by community water. As a result, anticipated future residential development at the Site would utilize on-site wells. Per LACO's Preliminary Groundwater Supply Assessment (see Appendix H), dated November 2, 2018, it appears the Battery Formation (the principal acquirer in the southern two-thirds of the Smith River Plain and the local groundwater resource) is capable of supplying the minimum daily domestic waste supply required to serve the maximum number of residential lots anticipated at the Site in the future (55 lots). However, in order for additional confidence in the

development potential of the water resource at the Site, it is recommended in the Preliminary Groundwater Supply Assessment that a test well should be installed within the Battery Formation and an extended period pumping test be performed at a later date, prior to development approvals, which is included as Mitigation Measure UTIL-1, below. The test well would more accurately measure the saturated thickness and the aquifer parameters, transmissivity and hydraulic conductivity to determine the aquifer capacity of the Battery Formation at the Site. With mitigation incorporated, a less than significant impact would occur.

XVIX.c) As discussed above, the Site is not within the service boundary of any community services district, and, as a result, the Site is and would continue to not be served by community wastewater service. Anticipated future residential development at the Site would therefore utilize on-site wastewater treatment systems. Per LACO's *Preliminary On-Site Wastewater Treatment Evaluation Test Results* letter, dated May 2, 2018 (see Appendix G), potential residential sites located within the southern and southwestern portions of the Site appear to be able to support conventional gravity on-site wastewater treatment systems. Potential residential sites within the southeastern, northeastern, northwestern, and western portions of the Site would require shallow low-pressure distribution or Wisconsin mound on-site wastewater treatment systems, due to high groundwater elevations encountered during percolation testing. No impact would occur.

XVIX.d-e) Although the anticipated future residential development would increase the amount of solid waste generated, as the Site is currently vacant and undeveloped, the proposed project would not generate solid waste in excess of State or local standards or the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals. In addition, the project would comply with federal, State, and local management and reduction statutes and regulations related to solid waste. Recology Del Norte provides weekly residential and commercial solid waste, recycling, and green waste collection services to customers in Del Norte County and would also serve the Site, once anticipated future residential development occurs.

There are no active landfills in Del Norte County (CalRecycle - Solid, 2018). As a result, solid waste collected from the surrounding area is transported to the Del Norte County Transfer Station in Crescent City, which is then disposed of at the Dry Creek Landfill operated by Rogue Disposal and Recycling, located in Eagle Point, Oregon, approximately 80 miles northeast of the Site (Ward, 2018). The Dry Creek Landfill has a projected operational life exceeding 100 years (Rogue, 2018).

Since the landfill that would serve the Site has sufficient capacity and there are no elements of the project that would generate waste in excess of typical residential uses, a less than significant impact would occur.

MITIGATION MEASURES

UTIL-1: Prior to approval of future development on-site, a test well shall be installed within the Battery Formation, an extended period pumping test performed, and the results of the extended period pumping test provided to the County of Del Norte for review and acceptance.

FINDINGS

The proposed project would have a **Less Than Significant Impact with Mitigation Incorporated** on Utilities and Service Systems.

XX. WILDFIRE. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☒	☐
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☒	☐
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage challenges?	☐	☐	☒	☐

THRESHOLDS OF SIGNIFICANCE: The project would have a significant effect on wildfire if it would impair an adopted emergency response plan or emergency evacuation plan; due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire; require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment; or expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage challenges.

DISCUSSION

Fire protection services at the Site are provided by both the Fort Dick Fire Protection District (FPD) and the California Department of Forestry and Fire Protection (CalFire), as the Site is located within the State Responsibility Area (SRA). The entire Site is classified as having a "Moderate" fire hazard severity rating (CalFire, 2012).

Per the *Countywide Fire Services Municipal Service Review and Sphere of Influence Update* (Countywide Fire Services MSR), adopted on May 23, 2016, by the Del Norte County Local Agency Formation Commission (LAFCo), the Site is located within the service boundaries of the Fort Dick FPD, which provides fire suppression, hazardous material responses, and emergency medical services to a service area of 30 square miles and approximately 6,270 residents. The Fort Dick FPD operates two stations in close proximity to the Site:

- Station #1 (Kings Valley Station), located at 6534 Kings Valley Road, approximately 1.4 miles north of the Site; and
- Station #2 (Lake Earl Station), located at 4190 Lake Earl Drive, approximately 1.4 miles southwest of the Site (LAFCo, 2016).

Additionally, the Fort Dick FPD has mutual aid agreements with neighboring fire service providers including: Crescent FPD, Smith River FPD, Gasquet FPD, Klamath FPD, Crescent City Volunteer Fire Department, Pelican Bay State Prison Fire Department, US National Park Service, US Forest Service, and CalFire. The Fort

Dick FPD also has mutual aid agreements with a number of fire districts in Oregon, such as Winchuck FPD, Harbor FPD, Brookings FPD and Pistol River FPD (LAFCo, 2016).

CalFire is responsible for the suppression of wildland fires within the SRA and approximately 85 percent of the Fort Dick FPD's boundaries are located within a designated SRA. CalFire stations are staffed during declared fire season, typically June to October, and engines may respond to calls other than wildland fires if they are available and the call will not affect their core responsibilities. Although the State is responsible for wildland fire suppression within the SRA, CalFire relies on local fire departments to respond to such incidents and provide initial attack to ensure that the fires are suppressed at the earliest possible stage (LAFCo, 2016).

There are no elements of the project that would exacerbate the risk of wildland fire at the Site. No development is proposed at this time, although future residential development is anticipated at the Site. As discussed under Section XV, Public Services, above, in a letter received from Randy L. Crawford, Fort Dick FPD Fire Chief, dated October 26, 2017 (see Appendix J), Mr. Crawford expressed concerns associated with the proposed project and anticipated future residential development. Specifically, concerns were raised with respect to the increase in demand for fire services and how sufficient fire flow would be provided. It is important to note that development would not occur for at least 10 years, after the 10 year TPZ rollout is finalized, and that future development plans will be evaluated at the time of submittal to ensure sufficient fire protection services and adequate fire flow is provided. Additionally, as previously discussed, the Site has a development potential of approximately 167 acres. While some trees may be left to provide character or visual screening (as required per Mitigation Measure AES-1), it is possible that the majority of trees on-site would be removed during construction. Since the Site is located within the SRA, anticipated future development on-site would be required to comply with Title 19 (SRA Fire Safe Regulations) of the Del Norte County Code, which prescribe standards pertaining to emergency access and egress, signing and building numbering, emergency water, and fuel modification.

XX.a) The proposed project would not be anticipated to impact an adopted emergency response plan or emergency evacuation plan. Although no development is currently proposed, future residential development is anticipated at the Site. Since future development would be required to meet State and local standards for defensible space and emergency access, a less than significant impact would occur.

XX.b) The Site is currently forested and undeveloped. Uses surrounding the Site in all directions include timberland and rural residential development, similar to what is anticipated at the Site in the future. The topography of the Site and surrounding area is gently sloping. The Site is located at an elevation of approximately 125 feet above mean sea level and slopes to the west at an approximately 5 to 10 percent slope. While some trees may be left to provide character or visual screening (as required per Mitigation Measure AES-1), it is possible that the majority of trees on-site (up to 167 acres under full build-out of the Site) would be removed during construction.

As previously discussed, because the Site is located within the SRA, anticipated future residential development at the Site would be subject to the County's fire safe regulations, as enumerated in Title 19 (SRA Fire Safe Regulations) of the Del Norte County Code, which specify standards pertaining to emergency access and egress, signing and building numbering, emergency water, and fuel modification. Compliance with these standards would result in a less than significant impact.

XX.c) Although no development is currently proposed, future residential development is anticipated on-site, which would require the installation and maintenance of associated infrastructure, including but not limited

to roads, emergency water, power lines, and on-site wells and wastewater systems. Once development is proposed at the Site, it would be required to be designed and maintained in accordance with all rules and regulations, including the County's fire safe regulations, which specify standards pertaining to emergency access and egress, signing and building numbering, emergency water, and fuel modification.

The Site is currently undeveloped and forested and not served by utilities. Once development is proposed at the Site, electricity would be extended to the Site and provided by Pacific Power. Since the Site is not within the service boundary of any community services district, the Site is and would continue to not be served by community water or wastewater service. Future residential development anticipated at the Site is expected to utilize on-site wells and wastewater treatment systems, such as conventional gravity, shallow low-pressure distribution, or Wisconsin mound on-site wastewater treatment systems. Since there is no natural gas service in the County, anticipated future residential development would utilize electricity and/or propane for household appliances, in addition to heating and cooking activities.

During future grading and construction on the Site, including the extension of infrastructure to serve the Site, appropriate best management practices (BMPs) would be required, which would minimize the potential for wildfire to occur. A less than significant impact would occur.

XX.d) The proposed project and anticipated future residential development on the Site would not be anticipated to expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of run-off, post-fire slope instability, or drainage changes. As noted above, the topography of the Site and surrounding area is gently sloping. The Site is located at an elevation of approximately 125 feet above mean sea level and slopes to the west at an approximately 5 to 10 percent slope. Downslope of the Site is rural residential development and forested land. Since slopes are gradual on and near the Site, the residential development anticipated to occur on-site in the future would not occur on steep slopes and would be located outside of all required stream and noise setbacks. Additionally, due to an increase in impervious surfaces at the Site, it is anticipated that surface run-off would increase. However, because of the ample lot sizes anticipated under a future subdivision, it is anticipated that a considerable amount of stormwater would continue to infiltrate on-site under future residential development. A less than significant impact would occur.

MITIGATION MEASURES

No mitigation required.

FINDINGS

The proposed project would have a **Less Than Significant Impact** on Wildfire.

XXI. MANDATORY FINDINGS OF SIGNIFICANCE.	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☒	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects).	☐	☐	☒	☐
c) Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐

THRESHOLDS OF SIGNIFICANCE: The project would have a significant effect on mandatory findings of significance if it would have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory; have impacts that are individually limited, but cumulatively considerable ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.); or have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly.

DISCUSSION

As previously discussed, the proposed project involves a general plan amendment and zone reclassification and does not involve any development at this time. However, future residential development at the Site is anticipated within the developable portion of the Site (identified as 167 acres; see Figure 6), including the development of up to 55 single family residences or manufactured homes on 3-acre minimum parcels.

XXI.a) As discussed under Section IV, Biological Resources, a *Fort Dick Flats Preliminary Biological Survey* (Biological Report) was prepared by LACO Associates (LACO) on June 20, 2019 (see Appendix C), to identify if the Site contains sensitive biological resources, such as sensitive or special status species or habitat areas, including riparian and wetland areas, and to recommend appropriate setbacks. The biological survey detected no sensitive plant or wildlife species within the project area; however, suitable habitat is present on or near the Site for several special-status species. In addition, the Site was found to contain a Class I and II watercourse. Several recommendations are included in the Biological Report (included as Mitigation Measures BIO-1 through BIO-3 in Section IV, Biological Resources, above) to

minimize potential impacts to the Class I and II drainages and special status species that have the potential to be present on-site.

Based on site characteristics and review of the characteristics of the surrounding Fort Dick area, a 150-foot setback from the on-site Class I and II watercourses would likely adequately account for a riparian area approximately 50 feet wide on either side of the identified watercourses; however, this is an estimate and a stream transition line/wetland delineation is recommended prior to any Site development to determine the extent of riparian vegetation and top of bank to determine suitable setback distances to ensure adequate protection of the Class I and II watercourses resources. It is also recommended that the ponded areas found on-site be further evaluated in early spring to confirm biological function and value and determine appropriate mitigation. Since there is the potential (although limited) for several special status bird species, including bird species protected under the Migratory Bird Treaty Act (MBTA), to be present on the Site, it is strongly recommended that any tree removal and site clearing occur outside of the bird nesting season, which typically occurs between March 1-August 1 each year, to avoid harming such species and to avoid the expense and time consuming effort of surveying the Site for nests. However, tree removal/site clearing be proposed during the bird nesting season, it is recommended that a qualified biologist conduct nesting surveys to identify the presence of vulnerable nests (within 100 feet for passerines and 300 feet for raptors). Recommended protocol is also provided in the event active nests are identified. In addition, standard Best Management Practices (BMPs) would be required to be implemented by the project contractor once anticipated future residential development occurs on-site, to ensure compliance with the Clean Water Act (33 U.S.C. §1251 et seq. (1972)). Such BMPs may include the use of straw bales, fiber rolls, and/or silt fencing structures to assure the minimization of erosion resulting from construction and to avoid runoff into sensitive habitat areas, limiting ground disturbance to the minimum necessary, and stabilizing disturbed soil areas as soon as feasible after construction is completed

Regarding archaeological and historical resources, on October 1, 2018, GDRCo's consultant prepared and delivered a Record Search Request to the Northwest Information Center (NWIC) to evaluate the potential to encounter archaeological or historic resources at the Site, particularly when anticipated future residential development occurs on-site. A Records Search Results letter from NWIC, dated October 17, 2018 (see Appendix E), noted that two prior archaeological/cultural resource studies have been conducted on-site and cover approximately 90 percent of the Site [S-015153 (Peak & Associates, Inc. 1993) and S-011902 (Roscoe 1989)]. The NWIC letter states that three resources have been recorded at the Site, including two recorded Native American archaeological resources [P-08-000364 (Projectile Point #1) and P-08-000365 (Projectile Point #2)] and one historic-period cultural resource (P-08-000363, 467 Plank Road). There are no recorded buildings or structures within or adjacent to the Site. Additionally, there are no Native American resources in or adjacent to the Site referenced in the reviewed ethnographic literature. Further, the 1952 USGS Crescent City 15-minute topographic quadrangle fails to depict any buildings or structures within the Site and there is a low possibility of identifying any buildings or structures 45 years or older on-site.

The NWIC letter noted there is a moderate potential for additional unrecorded Native American resources and unrecorded historic-period at the Site. Given the identified resources on-site, including two recorded Native American archaeological resources and one historic-period cultural resource, in addition to the moderate potential for additional unrecorded Native American resources and historic-period archaeological resources at the Site, several recommendations were provided by NWIC and are included as Mitigation Measures CULT-1 through CULT-4, under Section V, Cultural Resources, of this Initial Study.

Recommendations included in the Biological Study and the NWIC response letter have been incorporated into the Initial Study as mitigation, which would minimize any potential impacts to a less-than-significant level. A less than significant impact would occur.

XXI.b) There are no elements of the project that would result in a cumulatively considerable impact. Preventative measures (Best Management Practices) would be implemented during project construction to minimize potential impacts. In addition, with mitigation incorporated, all potential impacts associated with the proposed project would be reduced to a less-than-significant level. A less than significant impact would occur.

XXI.c) The project would not generate any potential direct or indirect environmental effect that would have a substantial adverse impact on human beings including, but not limited to, exposure to geologic hazards, air quality, water quality, traffic hazards, noise, and fire hazards. With mitigation incorporated, all potential impacts associated with the proposed project would be reduced to a less-than-significant level. A less than significant impact would occur.

MITIGATION MEASURES

No mitigation required.

FINDINGS

The proposed project would have a **Less Than Significant Impact** on Mandatory Findings of Significance.

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FIGURES

LACO	PROJECT	FORT DICK FLATS GPA & REZONE	BY	CMB	FIGURE
EUREKA • UKIAH • SANTA ROSA	CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK	MMM	1
1-800-515-5054 www.lacoassociates.com	LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE	2/4/2019	JOB NO.
		LOCATION MAP			6872.19

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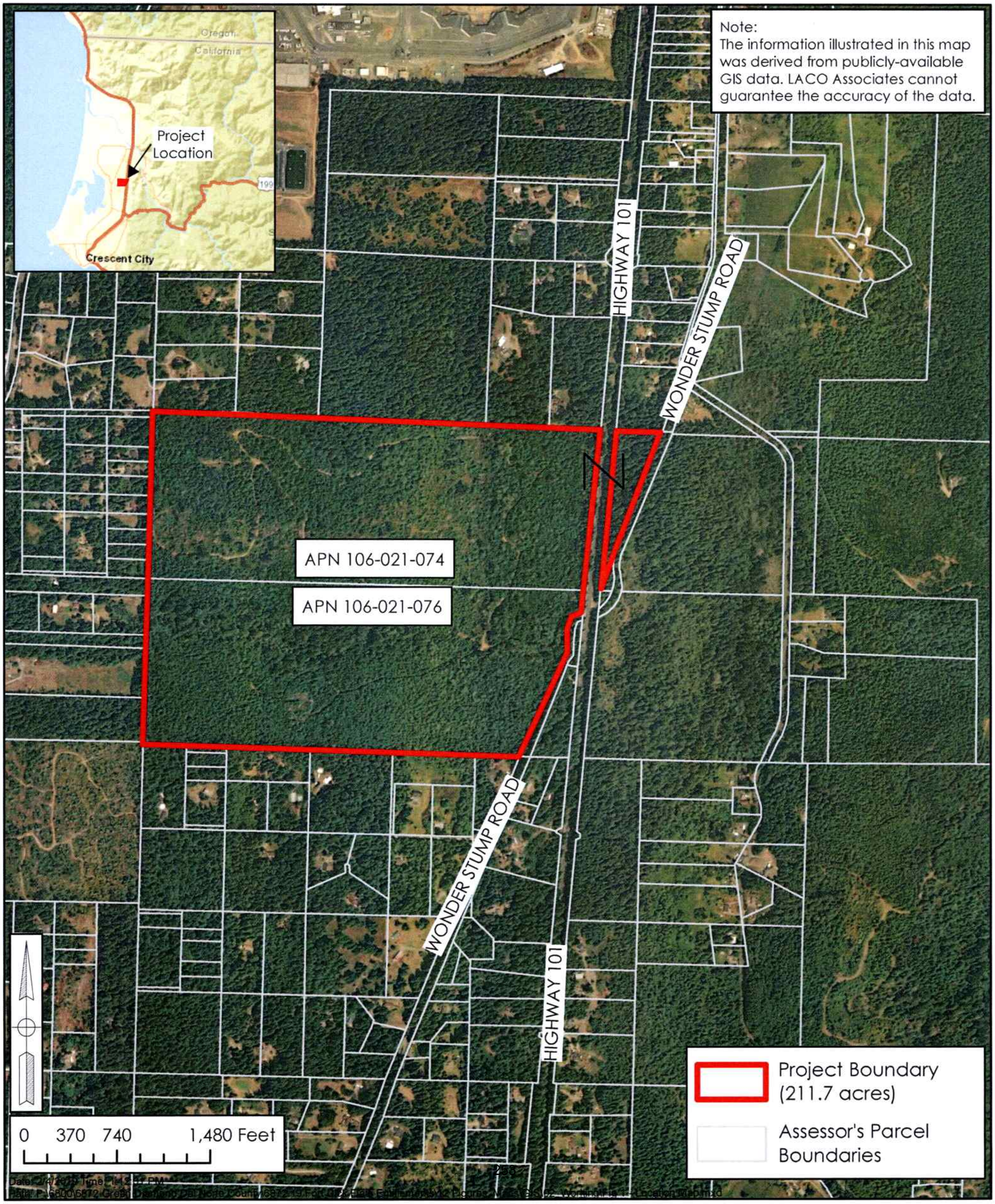

LACO EUREKA • UKIAH • SANTA ROSA 1-800-515-5054 www.lacoassociates.com	PROJECT	FORT DICK FLATS GPA & REZONE	BY	CMB	FIGURE 2
	CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK	MMM	
	LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE	2/4/2019	JOB NO. 6872.19
		CURRENT LAND USE -- OVERALL AREA			

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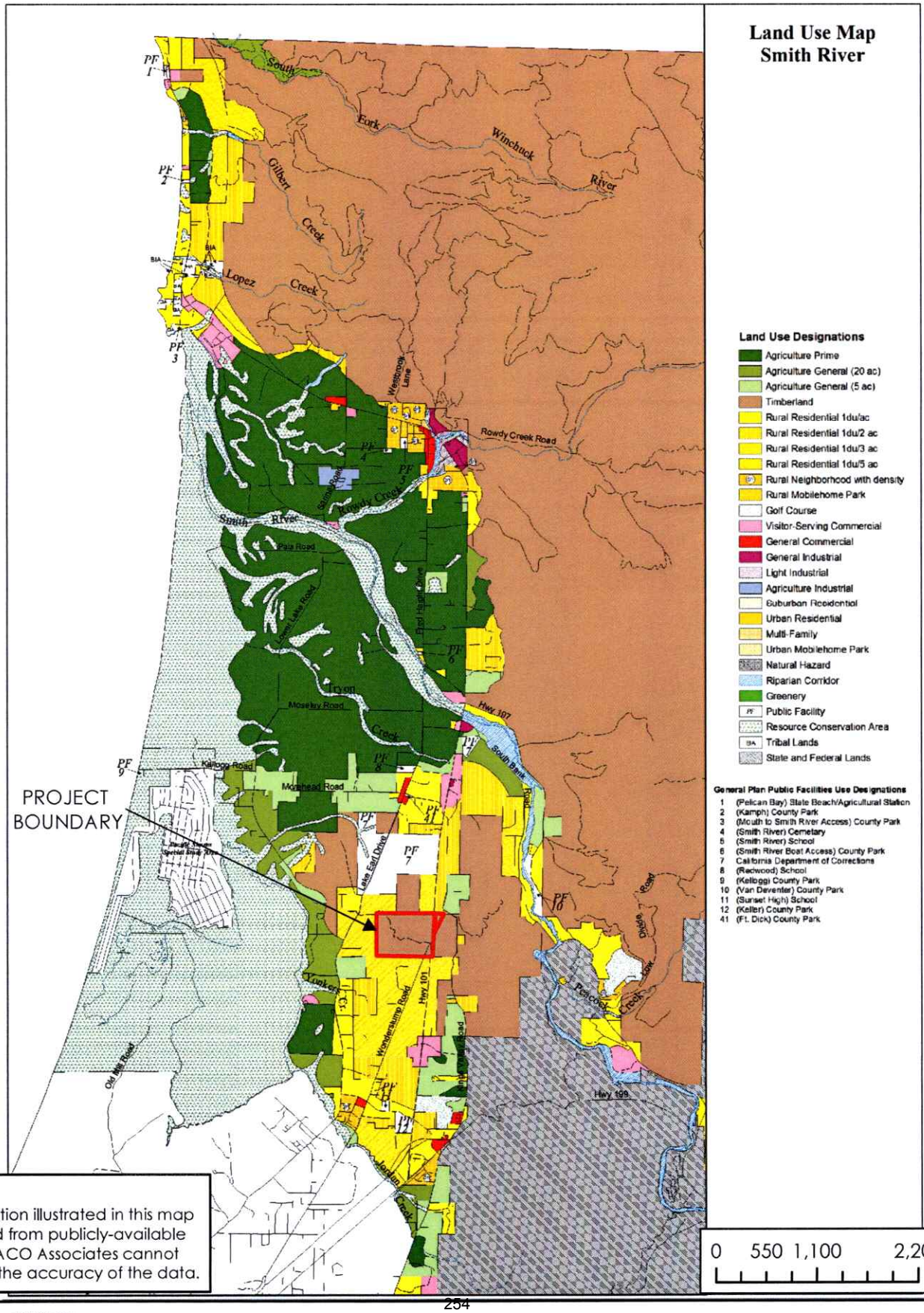

Note:
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LACO EUREKA • UKIAH • SANTA ROSA 1-800-515-5054 www.lacoassociates.com	PROJECT	FORT DICK FLATS GPA & REZONE	BY	CMB	FIGURE
	CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK	MMM	3
	LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE	2/4/2019	JOB NO.
		PROPOSED LAND USE			6872.19

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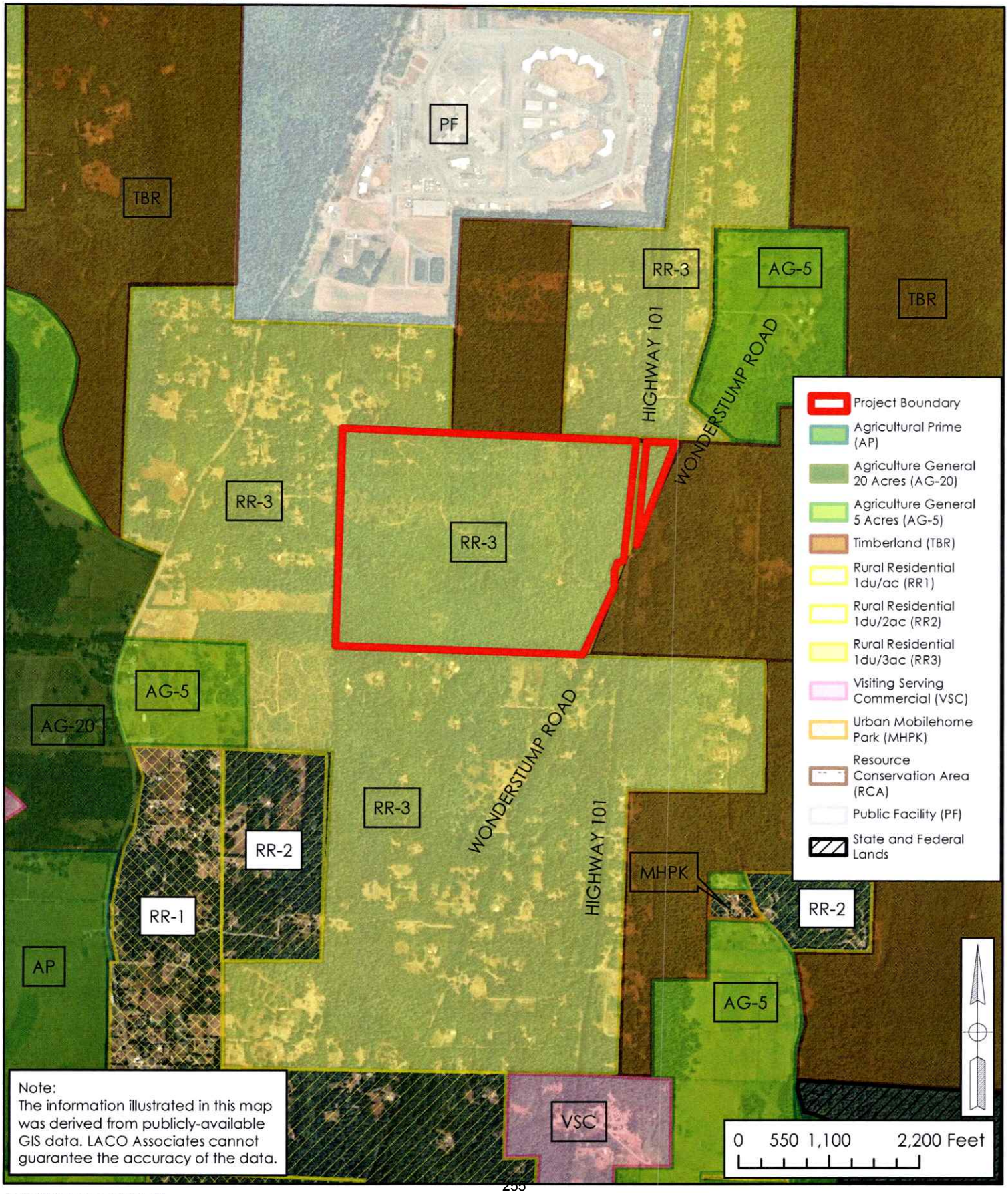

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PROJECT	FORT DICK FLATS GPA & REZONE	BY CMB	FIGURE 4
CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK MMM	
LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE 2/4/2019	JOB NO. 6872.19
	CURRENT ZONING MAP		

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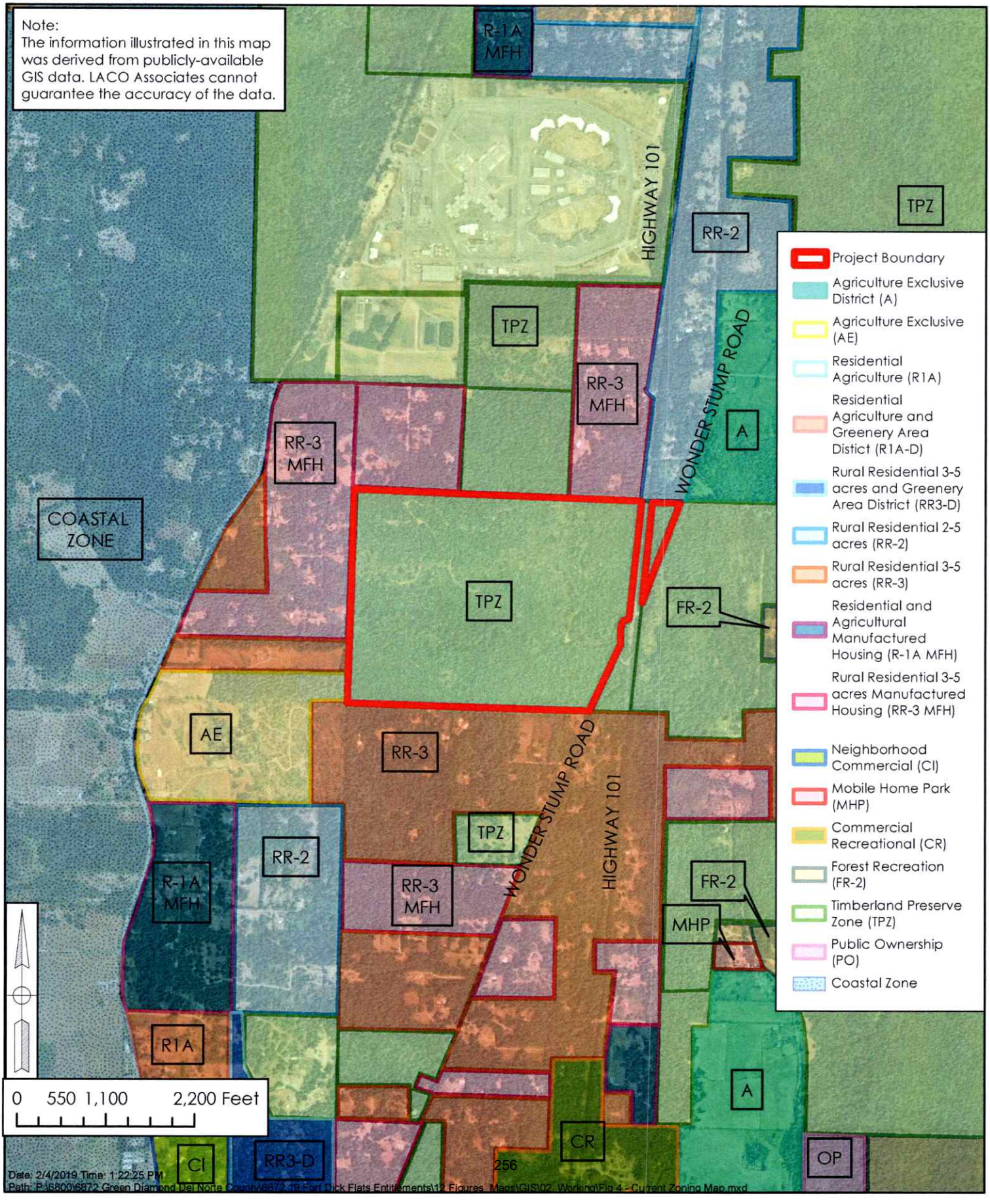

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LACO EUREKA • UKIAH • SANTA ROSA 1-800-515-5054 www.lacoassociates.com	PROJECT	FORT DICK FLATS GPA & REZONE	BY	CMB	FIGURE
	CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK	MMM	5
	LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE	2/4/2019	JOB NO.
		PROPOSED ZONING MAP			6872.19

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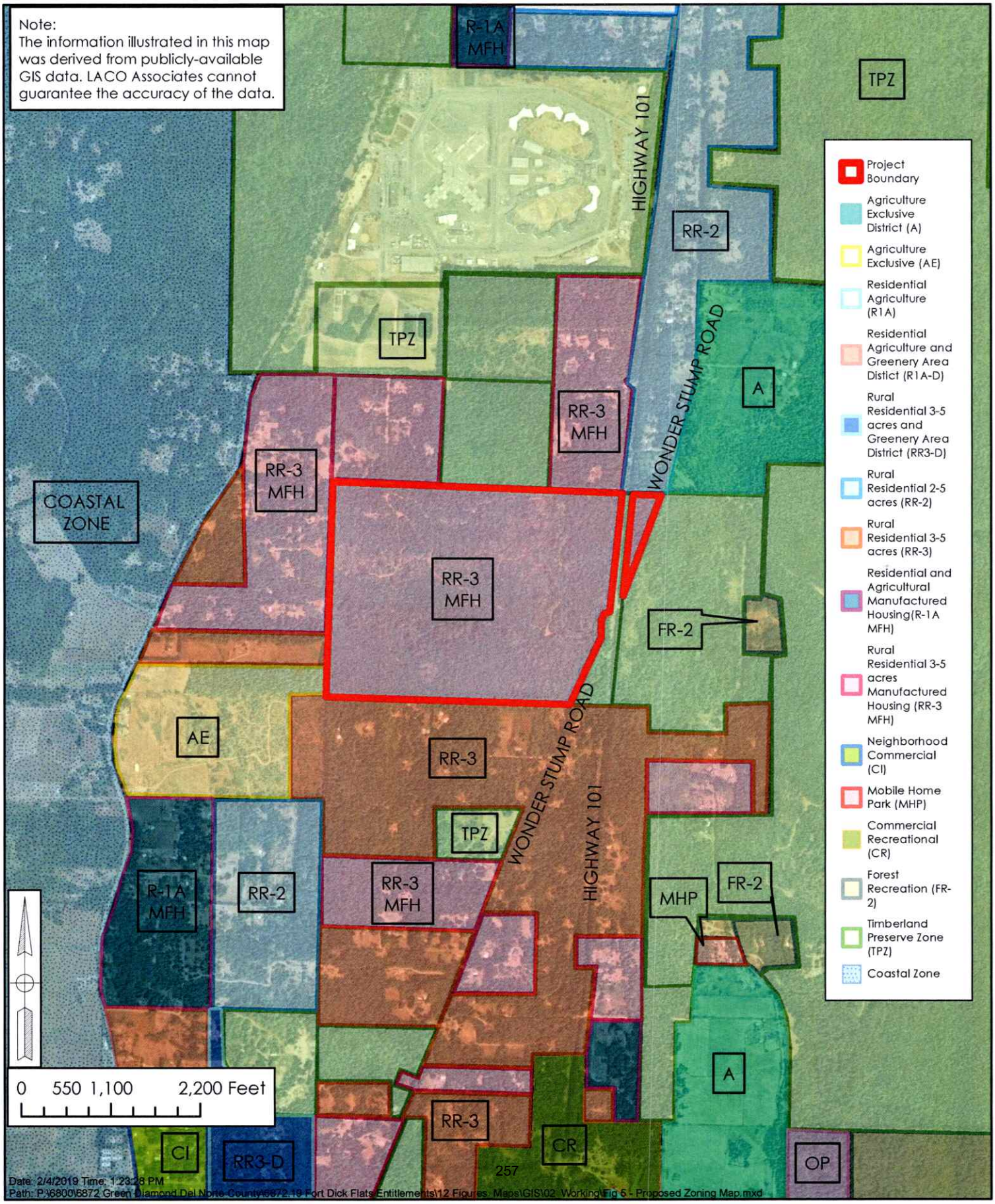
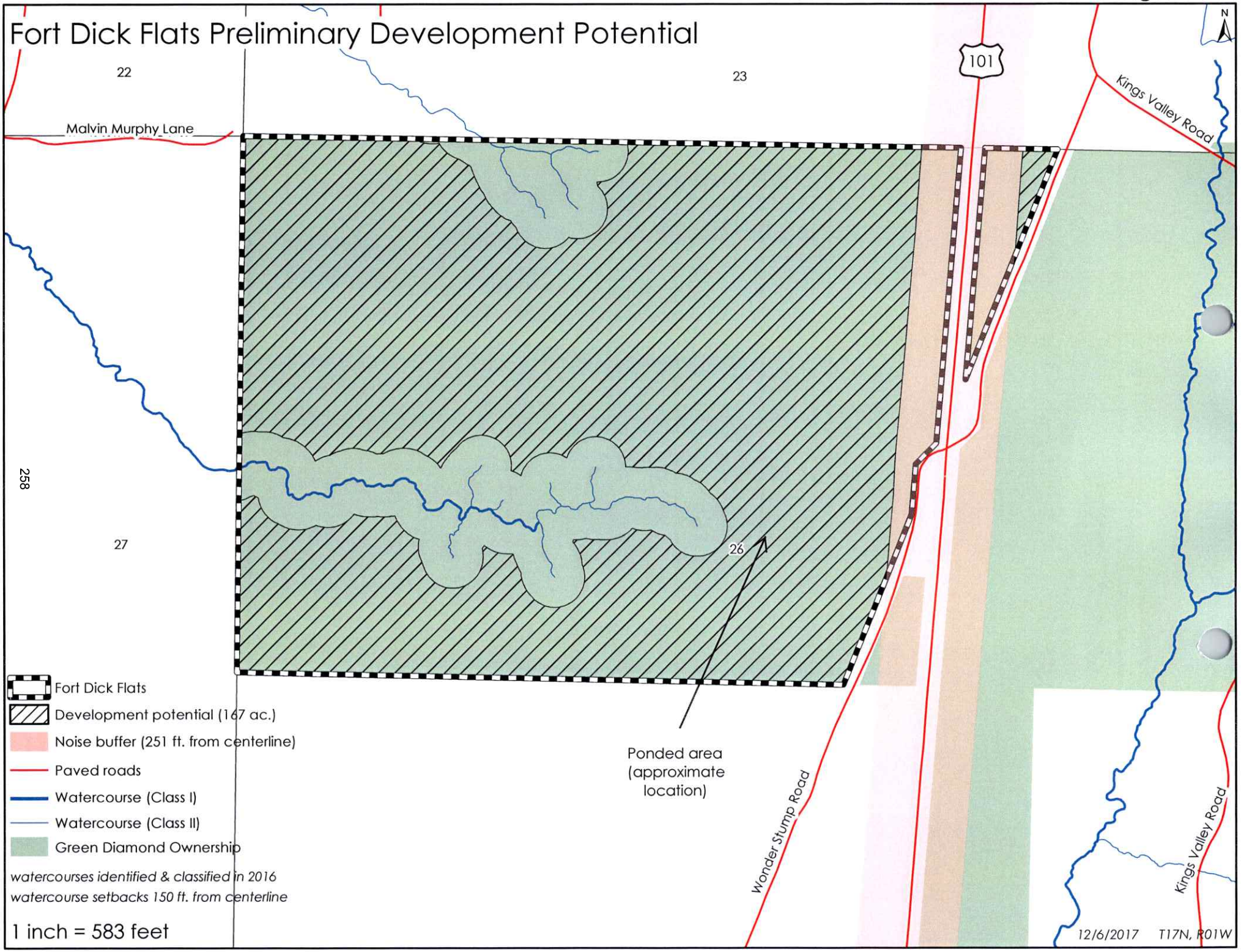


Date: 2/4/2019 Time: 1:23:28 PM
Path: P:\6800\6872 Green Diamond Del Norte County\6872.19 Fort Dick Flats Entitlements\12 Figures, Maps\GIS\02_Working\Fig 5 - Proposed Zoning Map.mxd


Fort Dick Flats Preliminary Development Potential
22
23
Malvin Murphy Lane
101
Kings Valley Road
258
27
26
Fort Dick Flats
Development potential (167 ac.)
Noise buffer (251 ft. from centerline)
Paved roads
Watercourse (Class I)
Watercourse (Class II)
Green Diamond Ownership
watercourses identified & classified in 2016
watercourse setbacks 150 ft. from centerline
1 inch = 583 feet
Ponded area
(approximate
location)
Wonder Stump Road
Kings Valley Road
12/6/2017
T17N, R01W

APPENDIX A

Mitigation and Monitoring Reporting Program (MMRP)

MITIGATION AND MONITORING PROGRAM

AESTHETICS

AES-1: In order to maintain existing forested views, minimize potential visual impacts, and provide visual screening of the Site and anticipated future residential development, the project developer and contractor shall retain existing trees along the Site's boundaries to the maximum extent feasible.

AES-2: The County shall require future development on-site to use materials and building techniques to minimize impacts from street and building lighting on day and nighttime views, including the use of: hooded flood lights to prevent off-site light pollution; low reflectivity building materials, treated windows, and muted colors to limit daytime glare; and exterior landscaping to shade buildings and decrease reflectivity to neighboring developments and Highway 101.

AIR QUALITY

AIR-1: At all times, the project shall be constructed and operated in compliance with Rule 104, Subsection D (Fugitive Dust Emissions) of the NCUAQMD's *Rules and Regulations* to reduce the amount of fugitive dust generated by construction and operation of the project. The project contractor and operator shall be required to do the following:

- Spray exposed soils with water during grading on a daily basis.
- Suspend earthmoving and trenching activities when winds exceed 20 mph.
- Cover haul-truck loads.
- Remove tracked dirt from the paved roads adjacent to the construction zone and provide a tire wash station at the Site's entrances to reduce the amount of tracked dirt leaving the Site.
- Immediately after grading, plant ground cover in disturbed areas or otherwise cover exposed disturbed areas in a manner preventing windblown dust from leaving the project Site.

AIR-2: At all times, construction equipment utilized on-site shall be maintained in good condition to minimize excessive exhaust emissions.

BIOLOGICAL RESOURCES

Refer to Mitigation Measure AES-1 in Section I, Aesthetics, above.

BIO-1: A botanical survey and wetland delineation shall occur prior to applicable subdivision approval(s) to determine the extent of riparian vegetation and top of bank and to determine necessary setback distances from the on-site Class I and II watercourses so that these resources are adequately protected. If Class I or II watercourses do not exist on a proposed project site, the necessity of an official botanical survey and wetland delineation will be required on an as-needed basis to be determined by Community Development Department staff.

BIO-2: Prior to a subdivision approval of lands encompassing any ponded areas on the existing timber access road system, potentially affected ponded areas shall be surveyed and mapped in early spring to confirm biological function and value. If necessary, mitigation shall be proposed to locate, develop, and monitor successful pond development on-site. The location of the proposed mitigation area shall be an addition to the proposed Class I stream setback and shall be sized at a 1:1 replacement.

BIO-3: Due to the potential for several special status bird species, including bird species protected under the Migratory Bird Treaty Act (MBTA) to be present within the project boundaries, any proposed tree

removal or site clearing shall be conducted outside of the bird nesting season, which occurs between March 1st and August 1st each year. If tree removal and/or site clearing is proposed during the bird nesting season, then a qualified biologist shall determine the presence of vulnerable nests, within 100 feet for passerines and 300 feet for raptors, of the proposed tree removal area and/or area to be cleared. Any active nests within the abovementioned distances shall be allowed to complete their nesting or until the qualified biologist determines they are no long active before removal may occur.

CULTURAL RESOURCES

CULT-1: Prior to a subdivision approval on lands encompassing or with the potential to affect the following resources, a professional archaeologist shall assess the two recorded archaeological resources (P-08-000364 and P-08-000365) and provide project-specific recommendations. In addition, at the time future anticipated residential development is proposed, further archival and field study for the area proposed for development shall occur and be required as part of the entitlements application submittal. Field study may include, but is not limited to, pedestrian survey, hand auger sampling, shovel test units, or geoarchaeological analyses as well as other common methods used to identify the presence of archaeological resources.

CULT-2: If archaeological resources are encountered during construction, work shall be temporarily halted in the vicinity of the discovered materials and a qualified archaeologist and the local tribes (Elk Valley Rancheria and Tolowa Dee-ni' Nation) shall be immediately contacted. Workers shall avoid altering the materials and their context until a qualified professional archaeologist, in collaboration with the local tribes, has evaluated the situation and provided appropriate recommendations. Project personnel shall not collect cultural resources. [Native American resources include chert or obsidian flakes, projectile points, mortars, and pestles; and dark friable soil containing shell and bone dietary debris, heat-affected rock, or human burials. Historic-period resources include stone or adobe foundations or walls; structures and remains with square nails; and refuse deposits or bottle dumps, often located in old wells or privies.]

CULT-3: Any identified cultural resources shall be recorded on DPR 523 historic resource recordation forms, available online from the Office of Historic Preservation's website: http://ohp.parks.ca.gov/default.asp?page_id=1069.

CULT-4: If human remains are encountered on-site, all work must stop in the immediate vicinity of the discovered remains and the County Coroner and a qualified archaeologist must be notified immediately so that an evaluation can be performed. If the remains are deemed to be Native American and prehistoric, the Native American Heritage Commission (NAHC) must be contacted by the Coroner so that a "Most Likely Descendant" can be designated and further recommendations regarding treatment of the remains is provided.

GEOLOGY AND SOILS

GEO-1: In the event that fossils or fossil-bearing deposits are discovered during anticipated future residential construction on-site, the contractor shall notify a qualified paleontologist to examine the discovery and excavations within 50 feet of the find shall be temporarily halted or diverted. The area of discovery shall be protected to ensure that fossils are not removed, handled, altered, or damaged until the Site is properly evaluated and further action is determined. The paleontologist shall document the discovery as needed, in accordance with Society of Vertebrate Paleontology standards (Society of Vertebrate Paleontology 1995), evaluate the potential resource, and assess the significance of the finding under the criteria set forth in CEQA Guidelines Section 15064.5. The paleontologist shall notify the appropriate agencies to determine

procedures that would be followed before construction is allowed to resume at the location of the find. If the project proponent determines that avoidance is not feasible, the paleontologist shall prepare an excavation plan for mitigating the effect of the project based on the qualities that make the resource important. The plan shall be submitted to the County of Del Norte for review and approval prior to implementation.

GREENHOUSE GAS EMISSIONS

See Mitigations Measures AIR-1 and AIR-2

NOISE

NOISE-1: Future development on-site shall observe a minimum setback of 251 feet from the centerline of Highway 101.

NOISE-2: All future residential uses proposed on-site shall be designed to ensure that indoor noise levels do not exceed 45 CNEL/L_{dn}.

NOISE-3: Neighboring landowners shall be notified of the consideration of subdivision applications creating lots allowing for the future ability to generate significant construction-related noise.

NOISE-4: All equipment driven by internal combustion engines shall be equipped with mufflers, which are in good condition and appropriate for the equipment. The construction contractor shall utilize "quiet" models of air compressors and other stationary noise sources where technology exists. At all times during project construction, stationary noise-generating equipment shall be located as far as practicable from sensitive receptors and placed so that emitted noise is directed away from residences. Unnecessary idling of internal combustion engines shall be prohibited. Construction staging areas shall be established at locations that would create the greatest distance between the construction-related noise sources and noise-sensitive receptors nearest the project Site during all project construction activities, to the extent feasible. The construction contractor shall designate a "noise disturbance coordinator" who shall be responsible for responding to any local complaints about construction noise. The disturbance coordinator shall be responsible for determining the cause of the noise complaint (e.g., starting too early, poor muffler, etc.) and instituting reasonable measures as warranted to correct the problem. A telephone number for the disturbance coordinator shall be conspicuously posted at the construction site. Operation of equipment or outside construction shall not occur between the nighttime hours of 11:00 p.m. and 7:00 a.m.

MITIGATION MEASURES

TRANS-1: Due to the length of time until future anticipated residential development may occur on-site and the potential amount of development which may be developed on the Site, a formal traffic study shall be required at the time a subdivision is proposed for the Site and included as part of the entitlement application submitted to the County of Del Norte Community Development Department. Subsequent subdivision applications may trigger the need for further formal traffic studies based on future need.

TRANS-2: At the time the Notice of Determination is posted, the applicant shall record a Notice of Requirement for SB 743 Implementation that must be recorded against the properties associated with this general plan and zoning amendment. "The total vehicle miles traveled (VMT) impacts for this project (GPA2001/R2001) were determined to be 55 single family equivalents. At the time of circulating the environmental document for this project, the Community Development Department determined that

payment in lieu of physical improvements to meet SB 743 mitigation obligations could not be accepted since the County does not have a bank of credits to purchase from for the purpose of VMT mitigation."

TRANS-3: Prior to the land use designation and zoning amendments taking full affect, the applicant for this project (GPA2001/R2001) shall propose mitigation consistent with the 2020 Del Norte Region SB 743 Implementation Plan and acceptable to the Community Development Director. Upon approval of the mitigation, the applicant shall submit road improvement plans to the Engineering and Surveying Division for review and acceptance. The plans shall be prepared by a California Registered Civil Engineer. The road improvement plans must include mitigation for at least the VMT impacts created by 55 single family equivalents. The resolution of the Board of Supervisors in amending the general plan and zoning of the property the shall reference the mitigation and monitoring plan, including this mitigation measure, as required by CEQA.

UTILITIES

UTIL-1: Prior to the land use designation and zoning amendments taking full affect, the applicant shall install a test well within the Battery Formation and perform an extended period pumping test, and provide the results of the extended period pumping test to the County of Del Norte for review and acceptance.

APPENDIX B

California Emissions Estimator Model (CalEEMod) Emissions Results

Fort Dick Flats General Plan Amendment and Zone Reclassification

Del Norte County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	55.00	Dwelling Unit	167.00	137,500.00	157

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	113
Climate Zone	14			**Operational Year**	2031
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Analysis assumes PG&E would be the utility company for the Site; however, Pacific Power would serve the Site (but this was not an available option to select).

Land Use - Project Site totals 211.7 acres. Developable area of Site spans approximately 167 acres. Analysis assumes each residence would be approximately 2,500 square feet in size.

Construction Phase - Default assumptions. No demolition to occur on-site (no existing development).

Off-road Equipment - Default assumptions.

Off-road Equipment - Default assumptions.

Off-road Equipment - No demolition required.

Off-road Equipment - Default assumptions.

Off-road Equipment - Default assumptions.

Off-road Equipment - Default assumptions.

Trips and VMT - No demolition required for project. Default assumptions.

On-road Fugitive Dust - No demolition required for project. Default assumptions.

Demolition - No demolition necessary.

Grading - Default assumptions.

Architectural Coating - Default assumptions.

Vehicle Trips - Default assumptions.

Vehicle Emission Factors - Default assumptions.

Vehicle Emission Factors - Default assumptions.

Vehicle Emission Factors - Default assumptions.

Road Dust - Assumes vehicles on unpaved roads would be limited to 10mph.

Woodstoves - Default assumptions.

Consumer Products - Default assumptions.

Area Coating - Default assumptions.

Landscape Equipment - Default assumptions.

Energy Use - Default assumptions.

Water And Wastewater - Default assumptions.

Solid Waste - Default assumptions.

Land Use Change - For a conservative analysis, analysis assumes that the majority of the Site's trees will be removed, with some trees to remain adjacent to Highway 101 and Wonder Stump Road to provide visual screening.

Construction Off-road Equipment Mitigation - Default assumptions. Assumes exposed areas would be watered 2x per day and that vehicle speed would be reduced to 10mph on unpaved roads.

Mobile Land Use Mitigation - N/A

Mobile Commute Mitigation - N/A

Area Mitigation - Default assumptions.

Water Mitigation - Assumes installation of low-flow fixtures and water-efficient irrigation systems and landscape.

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	10
tblConstructionPhase	NumDays	200.00	0.00
tblConstructionPhase	PhaseEndDate	1/3/2031	3/31/2030
tblConstructionPhase	PhaseEndDate	6/20/2031	9/13/2030
tblConstructionPhase	PhaseEndDate	8/27/2032	11/21/2031
tblConstructionPhase	PhaseEndDate	7/15/2044	10/9/2043
tblConstructionPhase	PhaseEndDate	5/19/2045	8/12/2044
tblConstructionPhase	PhaseEndDate	3/23/2046	6/16/2045
tblConstructionPhase	PhaseStartDate	1/4/2031	4/1/2030
tblConstructionPhase	PhaseStartDate	6/21/2031	9/16/2030
tblConstructionPhase	PhaseStartDate	8/28/2032	11/24/2031
tblConstructionPhase	PhaseStartDate	5/20/2045	8/15/2044
tblLandUse	LandUseSquareFeet	99,000.00	137,500.00
tblLandUse	LotAcreage	17.86	167.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblRoadDust	MeanVehicleSpeed	40	10
tblTripsAndVMT	WorkerTripNumber	0.00	15.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

Fort Dick Flats General Plan Amendment and Zone Reclassification - Del Norte County, Annual

Year	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
2030	0.2855	1.3613	1.9317	5.6600e-003	1.7488	0.0451	1.7939	0.7735	0.0451	0.8187	0.0000	507.6172	507.6172	0.0226	0.0000	508.1821
2031	0.4172	1.7400	2.9985	8.8400e-003	1.1441	0.0591	1.2032	0.4385	0.0591	0.4975	0.0000	822.4784	822.4784	0.0330	0.0000	823.3039
2032	0.1885	1.1016	2.2241	4.4700e-003	0.0358	0.0197	0.0554	9.6400e-003	0.0196	0.0293	0.0000	382.4541	382.4541	0.0147	0.0000	382.8208
2033	0.1856	1.0904	2.1991	4.4300e-003	0.0355	0.0195	0.0550	9.5700e-003	0.0195	0.0290	0.0000	379.0494	379.0494	0.0145	0.0000	379.4112
2034	0.1843	1.0882	2.1908	4.4200e-003	0.0355	0.0195	0.0550	9.5700e-003	0.0195	0.0290	0.0000	378.6069	378.6069	0.0144	0.0000	378.9667
2035	0.1720	0.9899	2.1887	4.4400e-003	0.0356	0.0120	0.0476	9.6100e-003	0.0120	0.0216	0.0000	379.6856	379.6856	0.0134	0.0000	380.0208
2036	0.1727	0.9936	2.1971	4.4500e-003	0.0358	0.0120	0.0478	9.6400e-003	0.0120	0.0217	0.0000	381.1404	381.1404	0.0135	0.0000	381.4768
2037	0.1720	0.9899	2.1887	4.4400e-003	0.0356	0.0120	0.0476	9.6100e-003	0.0120	0.0216	0.0000	379.6856	379.6856	0.0134	0.0000	380.0208
2038	0.1720	0.9899	2.1887	4.4400e-003	0.0356	0.0120	0.0476	9.6100e-003	0.0120	0.0216	0.0000	379.6856	379.6856	0.0134	0.0000	380.0208
2039	0.1714	0.9861	2.1803	4.4200e-003	0.0355	0.0120	0.0474	9.5700e-003	0.0119	0.0215	0.0000	378.2309	378.2309	0.0134	0.0000	378.5648
2040	0.1659	0.9492	2.1712	4.4200e-003	0.0356	9.7700e-003	0.0454	9.6100e-003	9.7600e-003	0.0194	0.0000	378.4420	378.4420	0.0128	0.0000	378.7616
2041	0.1659	0.9492	2.1712	4.4200e-003	0.0356	9.7700e-003	0.0454	9.6100e-003	9.7600e-003	0.0194	0.0000	378.4420	378.4420	0.0128	0.0000	378.7616
2042	0.1659	0.9492	2.1712	4.4200e-003	0.0356	9.7700e-003	0.0454	9.6100e-003	9.7600e-003	0.0194	0.0000	378.4420	378.4420	0.0128	0.0000	378.7616
2043	0.1284	0.7346	1.6804	3.4200e-003	0.0276	7.5600e-003	0.0351	7.4400e-003	7.5500e-003	0.0150	0.0000	292.8938	292.8938	9.8900e-003	0.0000	293.1412
2044	0.9946	0.0734	0.2536	4.6000e-004	4.1700e-003	1.5500e-003	5.7200e-003	1.1100e-003	1.5500e-003	2.6600e-003	0.0000	39.3481	39.3481	1.2900e-003	0.0000	39.3804
2045	1.1807	0.0439	0.1110	2.0000e-004	2.8600e-003	4.5000e-004	3.3100e-003	7.6000e-004	4.5000e-004	1.2100e-003	0.0000	16.9687	16.9687	5.6000e-004	0.0000	16.9826
Maximum	**1.1807**	**1.7400**	**2.9985**	**8.8400e-003**	**1.7488**	**0.0591**	**1.7939**	**0.7735**	**0.0591**	**0.8187**	**0.0000**	**822.4784**	**822.4784**	**0.0330**	**0.0000**	**823.3039**

2.1 Overall Construction

Mitigated Construction

Fort Dick Flats General Plan Amendment and Zone Reclassification - Del Norte County, Annual

Year	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
2030	0.2855	1.3613	1.9317	5.6600e-003	0.7991	0.0451	0.8442	0.3513	0.0451	0.3964	0.0000	507.6166	507.6166	0.0226	0.0000	508.1815
2031	0.4172	1.7400	2.9985	8.8400e-003	0.5322	0.0591	0.5913	0.2019	0.0591	0.2610	0.0000	822.4775	822.4775	0.0330	0.0000	823.3030
2032	0.1885	1.1016	2.2241	4.4700e-003	0.0358	0.0197	0.0554	9.6400e-003	0.0196	0.0293	0.0000	382.4537	382.4537	0.0147	0.0000	382.8204
2033	0.1856	1.0904	2.1991	4.4300e-003	0.0355	0.0195	0.0550	9.5700e-003	0.0195	0.0290	0.0000	379.0489	379.0489	0.0145	0.0000	379.4108
2034	0.1843	1.0882	2.1908	4.4200e-003	0.0355	0.0195	0.0550	9.5700e-003	0.0195	0.0290	0.0000	378.6065	378.6065	0.0144	0.0000	378.9663
2035	0.1720	0.9898	2.1887	4.4400e-003	0.0356	0.0120	0.0476	9.6100e-003	0.0120	0.0216	0.0000	379.6852	379.6852	0.0134	0.0000	380.0204
2036	0.1727	0.9936	2.1971	4.4500e-003	0.0358	0.0120	0.0478	9.6400e-003	0.0120	0.0217	0.0000	381.1400	381.1400	0.0135	0.0000	381.4764
2037	0.1720	0.9898	2.1887	4.4400e-003	0.0356	0.0120	0.0476	9.6100e-003	0.0120	0.0216	0.0000	379.6852	379.6852	0.0134	0.0000	380.0204
2038	0.1720	0.9898	2.1887	4.4400e-003	0.0356	0.0120	0.0476	9.6100e-003	0.0120	0.0216	0.0000	379.6852	379.6852	0.0134	0.0000	380.0204
2039	0.1714	0.9861	2.1803	4.4200e-003	0.0355	0.0120	0.0474	9.5700e-003	0.0119	0.0215	0.0000	378.2305	378.2305	0.0134	0.0000	378.5644
2040	0.1659	0.9491	2.1712	4.4200e-003	0.0356	9.7700e-003	0.0454	9.6100e-003	9.7600e-003	0.0194	0.0000	378.4416	378.4416	0.0128	0.0000	378.7612
2041	0.1659	0.9491	2.1712	4.4200e-003	0.0356	9.7700e-003	0.0454	9.6100e-003	9.7600e-003	0.0194	0.0000	378.4416	378.4416	0.0128	0.0000	378.7612
2042	0.1659	0.9491	2.1712	4.4200e-003	0.0356	9.7700e-003	0.0454	9.6100e-003	9.7600e-003	0.0194	0.0000	378.4416	378.4416	0.0128	0.0000	378.7612
2043	0.1284	0.7346	1.6804	3.4200e-003	0.0276	7.5600e-003	0.0351	7.4400e-003	7.5500e-003	0.0150	0.0000	292.8935	292.8935	9.8900e-003	0.0000	293.1408
2044	0.9946	0.0734	0.2536	4.6000e-004	4.1700e-003	1.5500e-003	5.7200e-003	1.1100e-003	1.5500e-003	2.6600e-003	0.0000	39.3481	39.3481	1.2900e-003	0.0000	39.3803
2045	1.1807	0.0439	0.1110	2.0000e-004	2.8600e-003	4.5000e-004	3.3100e-003	7.6000e-004	4.5000e-004	1.2100e-003	0.0000	16.9687	16.9687	5.6000e-004	0.0000	16.9826
Maximum	**1.1807**	**1.7400**	**2.9985**	**8.8400e-003**	**0.7991**	**0.0591**	**0.8442**	**0.3513**	**0.0591**	**0.3964**	**0.0000**	**822.4775**	**822.4775**	**0.0330**	**0.0000**	**823.3030**

Fort Dick Flats General Plan Amendment and Zone Reclassification - Del Norte County, Annual

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	47.05	0.00	43.61	49.64	0.00	41.47	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	4-1-2030	6-30-2030	0.5295	0.5295
2	7-1-2030	9-30-2030	0.5293	0.5293
3	10-1-2030	12-31-2030	0.5711	0.5711
4	1-1-2031	3-31-2031	0.5579	0.5579
5	4-1-2031	6-30-2031	0.5626	0.5626
6	7-1-2031	9-30-2031	0.5688	0.5688
7	10-1-2031	12-31-2031	0.4569	0.4569
8	1-1-2032	3-31-2032	0.3209	0.3209
9	4-1-2032	6-30-2032	0.3195	0.3195
10	7-1-2032	9-30-2032	0.3230	0.3230
11	10-1-2032	12-31-2032	0.3245	0.3245
12	1-1-2033	3-31-2033	0.3163	0.3163
13	4-1-2033	6-30-2033	0.3185	0.3185
14	7-1-2033	9-30-2033	0.3220	0.3220
15	10-1-2033	12-31-2033	0.3233	0.3233
16	1-1-2034	3-31-2034	0.3153	0.3153
17	4-1-2034	6-30-2034	0.3177	0.3177
18	7-1-2034	9-30-2034	0.3212	0.3212
19	10-1-2034	12-31-2034	0.3223	0.3223
20	1-1-2035	3-31-2035	0.2868	0.2868
21	4-1-2035	6-30-2035	0.2889	0.2889
22	7-1-2035	9-30-2035	0.2921	0.2921
23	10-1-2035	12-31-2035	0.2932	0.2932

24	1-1-2036	3-31-2036	0.2900	0.2900
25	4-1-2036	6-30-2036	0.2889	0.2889
26	7-1-2036	9-30-2036	0.2921	0.2921
27	10-1-2036	12-31-2036	0.2932	0.2932
28	1-1-2037	3-31-2037	0.2868	0.2868
29	4-1-2037	6-30-2037	0.2889	0.2889
30	7-1-2037	9-30-2037	0.2921	0.2921
31	10-1-2037	12-31-2037	0.2932	0.2932
32	1-1-2038	3-31-2038	0.2868	0.2868
33	4-1-2038	6-30-2038	0.2889	0.2889
34	7-1-2038	9-30-2038	0.2921	0.2921
35	10-1-2038	12-31-2038	0.2932	0.2932
36	1-1-2039	3-31-2039	0.2868	0.2868
37	4-1-2039	6-30-2039	0.2889	0.2889
38	7-1-2039	9-30-2039	0.2921	0.2921
39	10-1-2039	12-31-2039	0.2932	0.2932
40	1-1-2040	3-31-2040	0.2782	0.2782
41	4-1-2040	6-30-2040	0.2774	0.2774
42	7-1-2040	9-30-2040	0.2805	0.2805
43	10-1-2040	12-31-2040	0.2812	0.2812
44	1-1-2041	3-31-2041	0.2751	0.2751
45	4-1-2041	6-30-2041	0.2774	0.2774
46	7-1-2041	9-30-2041	0.2805	0.2805
47	10-1-2041	12-31-2041	0.2812	0.2812
48	1-1-2042	3-31-2042	0.2751	0.2751
49	4-1-2042	6-30-2042	0.2774	0.2774
50	7-1-2042	9-30-2042	0.2805	0.2805

51	10-1-2042	12-31-2042	0.2812	0.2812
52	1-1-2043	3-31-2043	0.2751	0.2751
53	4-1-2043	6-30-2043	0.2774	0.2774
54	7-1-2043	9-30-2043	0.2805	0.2805
55	10-1-2043	12-31-2043	0.0275	0.0275
58	7-1-2044	9-30-2044	0.3899	0.3899
59	10-1-2044	12-31-2044	0.6708	0.6708
60	1-1-2045	3-31-2045	0.6561	0.6561
61	4-1-2045	6-30-2045	0.5612	0.5612
		Highest	0.6708	0.6708

2.2 Overall Operational

Unmitigated Operational

273

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	4.2153	0.0721	4.6672	7.7400e-003		0.5996	0.5996		0.5996	0.5996	56.8127	24.4935	81.3062	0.0531	4.4700e-003	83.9645
Energy	3.5900e-003	0.0307	0.0131	2.0000e-004		2.4800e-003	2.4800e-003		2.4800e-003	2.4800e-003	0.0000	174.3987	174.3987	6.9600e-003	1.9500e-003	175.1540
Mobile	0.1686	0.4672	2.0679	6.2300e-003	0.6923	5.0800e-003	0.6973	0.1856	4.7300e-003	0.1904	0.0000	566.1911	566.1911	0.0196	0.0000	566.6819
Waste						0.0000	0.0000		0.0000	0.0000	14.0226	0.0000	14.0226	0.8287	0.0000	34.7404
Water						0.0000	0.0000		0.0000	0.0000	1.1369	7.9411	9.0779	0.1171	2.8300e-003	12.8499
Total	**4.3875**	**0.5700**	**6.7482**	**0.0142**	**0.6923**	**0.6071**	**1.2994**	**0.1856**	**0.6068**	**0.7924**	**71.9722**	**773.0243**	**844.9965**	**1.0255**	**9.2500e-003**	**873.3907**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	4.1752	0.0721	4.6672	7.7400e-003		0.5996	0.5996		0.5996	0.5996	56.8127	24.4935	81.3062	0.0531	4.4700e-003	83.9645
Energy	3.5900e-003	0.0307	0.0131	2.0000e-004		2.4800e-003	2.4800e-003		2.4800e-003	2.4800e-003	0.0000	174.3987	174.3987	6.9600e-003	1.9500e-003	175.1540
Mobile	0.1686	0.4672	2.0679	6.2300e-003	0.6923	5.0800e-003	0.6973	0.1856	4.7300e-003	0.1904	0.0000	566.1911	566.1911	0.0196	0.0000	566.6819
Waste						0.0000	0.0000		0.0000	0.0000	14.0226	0.0000	14.0226	0.8287	0.0000	34.7404
Water						0.0000	0.0000		0.0000	0.0000	0.9095	6.6726	7.5821	0.0937	2.2700e-003	10.6009
Total	**4.3473**	**0.5700**	**6.7482**	**0.0142**	**0.6923**	**0.6071**	**1.2994**	**0.1856**	**0.6068**	**0.7924**	**71.7448**	**771.7558**	**843.5006**	**1.0021**	**8.6900e-003**	**871.1417**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.16	0.18	2.28	6.05	0.26

2.3 Vegetation

Vegetation

	CO2e
Category	MT
Vegetation Land Change	-18,315.0000
Total	-18,315.0000

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	4/1/2030	3/31/2030	5	0	
2	Site Preparation	Site Preparation	4/1/2030	9/13/2030	5	120	
3	Grading	Grading	9/16/2030	11/21/2031	5	310	
4	Building Construction	Building Construction	11/24/2031	10/9/2043	5	3100	
5	Paving	Paving	7/16/2044	8/12/2044	5	220	
6	Architectural Coating	Architectural Coating	8/15/2044	6/16/2045	5	220	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 775

Acres of Paving: 0

Residential Indoor: 278,438; Residential Outdoor: 92,813; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	158	0.38
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	15.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	20.00	6.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	4.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition - 2030

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2030

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2030

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Site Preparation - 2030

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.0840	0.0000	1.0840	0.5958	0.0000	0.5958	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1464	0.8201	0.9775	2.7900e-003		0.0262	0.0262		0.0262	0.0262	0.0000	240.0277	240.0277	0.0118	0.0000	240.3238
Total	**0.1464**	**0.8201**	**0.9775**	**2.7900e-003**	**1.0840**	**0.0262**	**1.1102**	**0.5958**	**0.0262**	**0.6220**	**0.0000**	**240.0277**	**240.0277**	**0.0118**	**0.0000**	**240.3238**

3.3 Site Preparation - 2030

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.4500e-003	4.7200e-003	0.0396	1.0000e-004	0.0129	8.0000e-005	0.0130	3.4300e-003	8.0000e-005	3.5100e-003	0.0000	9.1421	9.1421	3.3000e-004	0.0000	9.1504
Total	**7.4500e-003**	**4.7200e-003**	**0.0396**	**1.0000e-004**	**0.0129**	**8.0000e-005**	**0.0130**	**3.4300e-003**	**8.0000e-005**	**3.5100e-003**	**0.0000**	**9.1421**	**9.1421**	**3.3000e-004**	**0.0000**	**9.1504**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.4878	0.0000	0.4878	0.2681	0.0000	0.2681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1464	0.8201	0.9775	2.7900e-003		0.0262	0.0262		0.0262	0.0262	0.0000	240.0274	240.0274	0.0118	0.0000	240.3235
Total	**0.1464**	**0.8201**	**0.9775**	**2.7900e-003**	**0.4878**	**0.0262**	**0.5140**	**0.2681**	**0.0262**	**0.2943**	**0.0000**	**240.0274**	**240.0274**	**0.0118**	**0.0000**	**240.3235**

3.3 Site Preparation - 2030

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.4500e-003	4.7200e-003	0.0396	1.0000e-004	0.0129	8.0000e-005	0.0130	3.4300e-003	8.0000e-005	3.5100e-003	0.0000	9.1421	9.1421	3.3000e-004	0.0000	9.1504
Total	**7.4500e-003**	**4.7200e-003**	**0.0396**	**1.0000e-004**	**0.0129**	**8.0000e-005**	**0.0130**	**3.4300e-003**	**8.0000e-005**	**3.5100e-003**	**0.0000**	**9.1421**	**9.1421**	**3.3000e-004**	**0.0000**	**9.1504**

3.4 Grading - 2030

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.6428	0.0000	0.6428	0.1718	0.0000	0.1718	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1263	0.5331	0.8864	2.6900e-003		0.0188	0.0188		0.0188	0.0188	0.0000	251.9295	251.9295	0.0102	0.0000	252.1840
Total	**0.1263**	**0.5331**	**0.8864**	**2.6900e-003**	**0.6428**	**0.0188**	**0.6616**	**0.1718**	**0.0188**	**0.1906**	**0.0000**	**251.9295**	**251.9295**	**0.0102**	**0.0000**	**252.1840**

3.4 Grading - 2030

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.3100e-003	3.3700e-003	0.0282	7.0000e-005	9.1700e-003	6.0000e-005	9.2300e-003	2.4500e-003	5.0000e-005	2.5000e-003	0.0000	6.5180	6.5180	2.4000e-004	0.0000	6.5239
Total	**5.3100e-003**	**3.3700e-003**	**0.0282**	**7.0000e-005**	**9.1700e-003**	**6.0000e-005**	**9.2300e-003**	**2.4500e-003**	**5.0000e-005**	**2.5000e-003**	**0.0000**	**6.5180**	**6.5180**	**2.4000e-004**	**0.0000**	**6.5239**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2893	0.0000	0.2893	0.0773	0.0000	0.0773	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1263	0.5331	0.8864	2.6900e-003		0.0188	0.0188		0.0188	0.0188	0.0000	251.9292	251.9292	0.0102	0.0000	252.1837
Total	**0.1263**	**0.5331**	**0.8864**	**2.6900e-003**	**0.2893**	**0.0188**	**0.3081**	**0.0773**	**0.0188**	**0.0961**	**0.0000**	**251.9292**	**251.9292**	**0.0102**	**0.0000**	**252.1837**

3.4 Grading - 2030

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.3100e-003	3.3700e-003	0.0282	7.0000e-005	9.1700e-003	6.0000e-005	9.2300e-003	2.4500e-003	5.0000e-005	2.5000e-003	0.0000	6.5180	6.5180	2.4000e-004	0.0000	6.5239
Total	**5.3100e-003**	**3.3700e-003**	**0.0282**	**7.0000e-005**	**9.1700e-003**	**6.0000e-005**	**9.2300e-003**	**2.4500e-003**	**5.0000e-005**	**2.5000e-003**	**0.0000**	**6.5180**	**6.5180**	**2.4000e-004**	**0.0000**	**6.5239**

3.4 Grading - 2031

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.1125	0.0000	1.1125	0.4300	0.0000	0.4300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.3822	1.6131	2.6823	8.1500e-003		0.0568	0.0568		0.0568	0.0568	0.0000	762.3320	762.3320	0.0308	0.0000	763.1022
Total	**0.3822**	**1.6131**	**2.6823**	**8.1500e-003**	**1.1125**	**0.0568**	**1.1694**	**0.4300**	**0.0568**	**0.4869**	**0.0000**	**762.3320**	**762.3320**	**0.0308**	**0.0000**	**763.1022**

3.4 Grading - 2031

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0146	8.9500e-003	0.0775	2.1000e-004	0.0278	1.6000e-004	0.0279	7.4000e-003	1.5000e-004	7.5500e-003	0.0000	19.2158	19.2158	6.3000e-004	0.0000	19.2317
Total	**0.0146**	**8.9500e-003**	**0.0775**	**2.1000e-004**	**0.0278**	**1.6000e-004**	**0.0279**	**7.4000e-003**	**1.5000e-004**	**7.5500e-003**	**0.0000**	**19.2158**	**19.2158**	**6.3000e-004**	**0.0000**	**19.2317**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.5006	0.0000	0.5006	0.1935	0.0000	0.1935	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.3822	1.6131	2.6823	8.1500e-003		0.0568	0.0568		0.0568	0.0568	0.0000	762.3311	762.3311	0.0308	0.0000	763.1013
Total	**0.3822**	**1.6131**	**2.6823**	**8.1500e-003**	**0.5006**	**0.0568**	**0.5575**	**0.1935**	**0.0568**	**0.2504**	**0.0000**	**762.3311**	**762.3311**	**0.0308**	**0.0000**	**763.1013**

3.4 Grading - 2031

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0146	8.9500e-003	0.0775	2.1000e-004	0.0278	1.6000e-004	0.0279	7.4000e-003	1.5000e-004	7.5500e-003	0.0000	19.2158	19.2158	6.3000e-004	0.0000	19.2317
Total	**0.0146**	**8.9500e-003**	**0.0775**	**2.1000e-004**	**0.0278**	**1.6000e-004**	**0.0279**	**7.4000e-003**	**1.5000e-004**	**7.5500e-003**	**0.0000**	**19.2158**	**19.2158**	**6.3000e-004**	**0.0000**	**19.2317**

285

3.5 Building Construction - 2031

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0183	0.1111	0.2262	4.3000e-004		2.0700e-003	2.0700e-003		2.0700e-003	2.0700e-003	0.0000	36.8005	36.8005	1.4800e-003	0.0000	36.8375
Total	**0.0183**	**0.1111**	**0.2262**	**4.3000e-004**		**2.0700e-003**	**2.0700e-003**		**2.0700e-003**	**2.0700e-003**	**0.0000**	**36.8005**	**36.8005**	**1.4800e-003**	**0.0000**	**36.8375**

3.5 Building Construction - 2031

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.4000e-004	5.8600e-003	3.2400e-003	2.0000e-005	4.9000e-004	1.0000e-005	5.0000e-004	1.4000e-004	1.0000e-005	1.5000e-004	0.0000	1.8209	1.8209	3.0000e-005	0.0000	1.8215
Worker	1.7600e-003	1.0800e-003	9.3100e-003	3.0000e-005	3.3400e-003	2.0000e-005	3.3600e-003	8.9000e-004	2.0000e-005	9.1000e-004	0.0000	2.3092	2.3092	8.0000e-005	0.0000	2.3111
Total	**2.0000e-003**	**6.9400e-003**	**0.0126**	**5.0000e-005**	**3.8300e-003**	**3.0000e-005**	**3.8600e-003**	**1.0300e-003**	**3.0000e-005**	**1.0600e-003**	**0.0000**	**4.1301**	**4.1301**	**1.1000e-004**	**0.0000**	**4.1326**

2986

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0183	0.1111	0.2262	4.3000e-004		2.0700e-003	2.0700e-003		2.0700e-003	2.0700e-003	0.0000	36.8005	36.8005	1.4800e-003	0.0000	36.8374
Total	**0.0183**	**0.1111**	**0.2262**	**4.3000e-004**		**2.0700e-003**	**2.0700e-003**		**2.0700e-003**	**2.0700e-003**	**0.0000**	**36.8005**	**36.8005**	**1.4800e-003**	**0.0000**	**36.8374**

3.5 Building Construction - 2031

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.4000e-004	5.8600e-003	3.2400e-003	2.0000e-005	4.9000e-004	1.0000e-005	5.0000e-004	1.4000e-004	1.0000e-005	1.5000e-004	0.0000	1.8209	1.8209	3.0000e-005	0.0000	1.8215
Worker	1.7600e-003	1.0800e-003	9.3100e-003	3.0000e-005	3.3400e-003	2.0000e-005	3.3600e-003	8.9000e-004	2.0000e-005	9.1000e-004	0.0000	2.3092	2.3092	8.0000e-005	0.0000	2.3111
Total	**2.0000e-003**	**6.9400e-003**	**0.0126**	**5.0000e-005**	**3.8300e-003**	**3.0000e-005**	**3.8600e-003**	**1.0300e-003**	**3.0000e-005**	**1.0600e-003**	**0.0000**	**4.1301**	**4.1301**	**1.1000e-004**	**0.0000**	**4.1326**

3.5 Building Construction - 2032

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1715	1.0394	2.1166	4.0600e-003		0.0194	0.0194		0.0194	0.0194	0.0000	344.3479	344.3479	0.0138	0.0000	344.6933
Total	**0.1715**	**1.0394**	**2.1166**	**4.0600e-003**		**0.0194**	**0.0194**		**0.0194**	**0.0194**	**0.0000**	**344.3479**	**344.3479**	**0.0138**	**0.0000**	**344.6933**

3.5 Building Construction - 2032

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.2300e-003	0.0535	0.0291	1.8000e-004	4.5500e-003	9.0000e-005	4.6400e-003	1.3200e-003	8.0000e-005	1.4000e-003	0.0000	17.0201	17.0201	2.3000e-004	0.0000	17.0259
Worker	0.0148	8.6700e-003	0.0785	2.3000e-004	0.0312	1.7000e-004	0.0314	8.3200e-003	1.6000e-004	8.4800e-003	0.0000	21.0861	21.0861	6.2000e-004	0.0000	21.1016
Total	**0.0170**	**0.0622**	**0.1075**	**4.1000e-004**	**0.0358**	**2.6000e-004**	**0.0360**	**9.6400e-003**	**2.4000e-004**	**9.8800e-003**	**0.0000**	**38.1062**	**38.1062**	**8.5000e-004**	**0.0000**	**38.1275**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1715	1.0394	2.1166	4.0600e-003		0.0194	0.0194		0.0194	0.0194	0.0000	344.3475	344.3475	0.0138	0.0000	344.6929
Total	**0.1715**	**1.0394**	**2.1166**	**4.0600e-003**		**0.0194**	**0.0194**		**0.0194**	**0.0194**	**0.0000**	**344.3475**	**344.3475**	**0.0138**	**0.0000**	**344.6929**

3.5 Building Construction - 2032

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.2300e-003	0.0535	0.0291	1.8000e-004	4.5500e-003	9.0000e-005	4.6400e-003	1.3200e-003	8.0000e-005	1.4000e-003	0.0000	17.0201	17.0201	2.3000e-004	0.0000	17.0259
Worker	0.0148	8.6700e-003	0.0785	2.3000e-004	0.0312	1.7000e-004	0.0314	8.3200e-003	1.6000e-004	8.4800e-003	0.0000	21.0861	21.0861	6.2000e-004	0.0000	21.1016
Total	**0.0170**	**0.0622**	**0.1075**	**4.1000e-004**	**0.0358**	**2.6000e-004**	**0.0360**	**9.6400e-003**	**2.4000e-004**	**9.8800e-003**	**0.0000**	**38.1062**	**38.1062**	**8.5000e-004**	**0.0000**	**38.1275**

3.5 Building Construction - 2033

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1702	1.0315	2.1004	4.0200e-003		0.0193	0.0193		0.0193	0.0193	0.0000	341.7193	341.7193	0.0137	0.0000	342.0621
Total	**0.1702**	**1.0315**	**2.1004**	**4.0200e-003**		**0.0193**	**0.0193**		**0.0193**	**0.0193**	**0.0000**	**341.7193**	**341.7193**	**0.0137**	**0.0000**	**342.0621**

3.5 Building Construction - 2033

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1800e-003	0.0515	0.0279	1.8000e-004	4.5200e-003	7.0000e-005	4.5900e-003	1.3100e-003	7.0000e-005	1.3800e-003	0.0000	16.8669	16.8669	2.3000e-004	0.0000	16.8725
Worker	0.0132	7.4600e-003	0.0708	2.3000e-004	0.0310	1.6000e-004	0.0311	8.2600e-003	1.4000e-004	8.4000e-003	0.0000	20.4632	20.4632	5.4000e-004	0.0000	20.4767
Total	**0.0154**	**0.0589**	**0.0987**	**4.1000e-004**	**0.0355**	**2.3000e-004**	**0.0357**	**9.5700e-003**	**2.1000e-004**	**9.7800e-003**	**0.0000**	**37.3300**	**37.3300**	**7.7000e-004**	**0.0000**	**37.3492**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1702	1.0315	2.1004	4.0200e-003		0.0193	0.0193		0.0193	0.0193	0.0000	341.7189	341.7189	0.0137	0.0000	342.0617
Total	**0.1702**	**1.0315**	**2.1004**	**4.0200e-003**		**0.0193**	**0.0193**		**0.0193**	**0.0193**	**0.0000**	**341.7189**	**341.7189**	**0.0137**	**0.0000**	**342.0617**

3.5 Building Construction - 2033

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1800e-003	0.0515	0.0279	1.8000e-004	4.5200e-003	7.0000e-005	4.5900e-003	1.3100e-003	7.0000e-005	1.3800e-003	0.0000	16.8669	16.8669	2.3000e-004	0.0000	16.8725
Worker	0.0132	7.4600e-003	0.0708	2.3000e-004	0.0310	1.6000e-004	0.0311	8.2600e-003	1.4000e-004	8.4000e-003	0.0000	20.4632	20.4632	5.4000e-004	0.0000	20.4767
Total	**0.0154**	**0.0589**	**0.0987**	**4.1000e-004**	**0.0355**	**2.3000e-004**	**0.0357**	**9.5700e-003**	**2.1000e-004**	**9.7800e-003**	**0.0000**	**37.3300**	**37.3300**	**7.7000e-004**	**0.0000**	**37.3492**

3.5 Building Construction - 2034

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1702	1.0315	2.1004	4.0200e-003		0.0193	0.0193		0.0193	0.0193	0.0000	341.7193	341.7193	0.0137	0.0000	342.0621
Total	**0.1702**	**1.0315**	**2.1004**	**4.0200e-003**		**0.0193**	**0.0193**		**0.0193**	**0.0193**	**0.0000**	**341.7193**	**341.7193**	**0.0137**	**0.0000**	**342.0621**

3.5 Building Construction - 2034

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1500e-003	0.0503	0.0270	1.8000e-004	4.5200e-003	7.0000e-005	4.5800e-003	1.3100e-003	6.0000e-005	1.3800e-003	0.0000	16.8492	16.8492	2.2000e-004	0.0000	16.8548
Worker	0.0120	6.4300e-003	0.0633	2.2000e-004	0.0310	1.4000e-004	0.0311	8.2600e-003	1.3000e-004	8.3900e-003	0.0000	20.0383	20.0383	4.6000e-004	0.0000	20.0498
Total	**0.0141**	**0.0567**	**0.0904**	**4.0000e-004**	**0.0355**	**2.1000e-004**	**0.0357**	**9.5700e-003**	**1.9000e-004**	**9.7700e-003**	**0.0000**	**36.8876**	**36.8876**	**6.8000e-004**	**0.0000**	**36.9046**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1702	1.0315	2.1004	4.0200e-003		0.0193	0.0193		0.0193	0.0193	0.0000	341.7189	341.7189	0.0137	0.0000	342.0617
Total	**0.1702**	**1.0315**	**2.1004**	**4.0200e-003**		**0.0193**	**0.0193**		**0.0193**	**0.0193**	**0.0000**	**341.7189**	**341.7189**	**0.0137**	**0.0000**	**342.0617**

3.5 Building Construction - 2034

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1500e-003	0.0503	0.0270	1.8000e-004	4.5200e-003	7.0000e-005	4.5800e-003	1.3100e-003	6.0000e-005	1.3800e-003	0.0000	16.8492	16.8492	2.2000e-004	0.0000	16.8548
Worker	0.0120	6.4300e-003	0.0633	2.2000e-004	0.0310	1.4000e-004	0.0311	8.2600e-003	1.3000e-004	8.3900e-003	0.0000	20.0383	20.0383	4.6000e-004	0.0000	20.0498
Total	**0.0141**	**0.0567**	**0.0904**	**4.0000e-004**	**0.0355**	**2.1000e-004**	**0.0357**	**9.5700e-003**	**1.9000e-004**	**9.7700e-003**	**0.0000**	**36.8876**	**36.8876**	**6.8000e-004**	**0.0000**	**36.9046**

3.5 Building Construction - 2035

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1588	0.9346	2.1034	4.0400e-003		0.0118	0.0118		0.0118	0.0118	0.0000	343.0336	343.0336	0.0128	0.0000	343.3530
Total	**0.1588**	**0.9346**	**2.1034**	**4.0400e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**343.0336**	**343.0336**	**0.0128**	**0.0000**	**343.3530**

3.5 Building Construction - 2035

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1500e-003	0.0495	0.0268	1.8000e-004	4.5300e-003	6.0000e-005	4.6000e-003	1.3200e-003	6.0000e-005	1.3800e-003	0.0000	16.9011	16.9011	2.3000e-004	0.0000	16.9067
Worker	0.0111	5.8400e-003	0.0585	2.2000e-004	0.0311	1.3000e-004	0.0312	8.2900e-003	1.2000e-004	8.4100e-003	0.0000	19.7509	19.7509	4.1000e-004	0.0000	19.7611
Total	**0.0133**	**0.0553**	**0.0853**	**4.0000e-004**	**0.0356**	**1.9000e-004**	**0.0358**	**9.6100e-003**	**1.8000e-004**	**9.7900e-003**	**0.0000**	**36.6520**	**36.6520**	**6.4000e-004**	**0.0000**	**36.6678**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1588	0.9346	2.1034	4.0400e-003		0.0118	0.0118		0.0118	0.0118	0.0000	343.0332	343.0332	0.0128	0.0000	343.3526
Total	**0.1588**	**0.9346**	**2.1034**	**4.0400e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**343.0332**	**343.0332**	**0.0128**	**0.0000**	**343.3526**

3.5 Building Construction - 2035

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1500e-003	0.0495	0.0268	1.8000e-004	4.5300e-003	6.0000e-005	4.6000e-003	1.3200e-003	6.0000e-005	1.3800e-003	0.0000	16.9011	16.9011	2.3000e-004	0.0000	16.9067
Worker	0.0111	5.8400e-003	0.0585	2.2000e-004	0.0311	1.3000e-004	0.0312	8.2900e-003	1.2000e-004	8.4100e-003	0.0000	19.7509	19.7509	4.1000e-004	0.0000	19.7611
Total	**0.0133**	**0.0553**	**0.0853**	**4.0000e-004**	**0.0356**	**1.9000e-004**	**0.0358**	**9.6100e-003**	**1.8000e-004**	**9.7900e-003**	**0.0000**	**36.6520**	**36.6520**	**6.4000e-004**	**0.0000**	**36.6678**

3.5 Building Construction - 2036

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1594	0.9381	2.1114	4.0600e-003		0.0118	0.0118		0.0118	0.0118	0.0000	344.3479	344.3479	0.0128	0.0000	344.6686
Total	**0.1594**	**0.9381**	**2.1114**	**4.0600e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**344.3479**	**344.3479**	**0.0128**	**0.0000**	**344.6686**

3.5 Building Construction - 2036

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1600e-003	0.0496	0.0269	1.8000e-004	4.5500e-003	6.0000e-005	4.6200e-003	1.3200e-003	6.0000e-005	1.3800e-003	0.0000	16.9658	16.9658	2.3000e-004	0.0000	16.9715
Worker	0.0111	5.8600e-003	0.0588	2.2000e-004	0.0312	1.3000e-004	0.0314	8.3200e-003	1.2000e-004	8.4400e-003	0.0000	19.8266	19.8266	4.1000e-004	0.0000	19.8368
Total	**0.0133**	**0.0555**	**0.0856**	**4.0000e-004**	**0.0358**	**1.9000e-004**	**0.0360**	**9.6400e-003**	**1.8000e-004**	**9.8200e-003**	**0.0000**	**36.7924**	**36.7924**	**6.4000e-004**	**0.0000**	**36.8083**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1594	0.9381	2.1114	4.0600e-003		0.0118	0.0118		0.0118	0.0118	0.0000	344.3475	344.3475	0.0128	0.0000	344.6682
Total	**0.1594**	**0.9381**	**2.1114**	**4.0600e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**344.3475**	**344.3475**	**0.0128**	**0.0000**	**344.6682**

3.5 Building Construction - 2036

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1600e-003	0.0496	0.0269	1.8000e-004	4.5500e-003	6.0000e-005	4.6200e-003	1.3200e-003	6.0000e-005	1.3800e-003	0.0000	16.9658	16.9658	2.3000e-004	0.0000	16.9715
Worker	0.0111	5.8600e-003	0.0588	2.2000e-004	0.0312	1.3000e-004	0.0314	8.3200e-003	1.2000e-004	8.4400e-003	0.0000	19.8266	19.8266	4.1000e-004	0.0000	19.8368
Total	**0.0133**	**0.0555**	**0.0856**	**4.0000e-004**	**0.0358**	**1.9000e-004**	**0.0360**	**9.6400e-003**	**1.8000e-004**	**9.8200e-003**	**0.0000**	**36.7924**	**36.7924**	**6.4000e-004**	**0.0000**	**36.8083**

3.5 Building Construction - 2037

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1588	0.9346	2.1034	4.0400e-003		0.0118	0.0118		0.0118	0.0118	0.0000	343.0336	343.0336	0.0128	0.0000	343.3530
Total	**0.1588**	**0.9346**	**2.1034**	**4.0400e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**343.0336**	**343.0336**	**0.0128**	**0.0000**	**343.3530**

3.5 Building Construction - 2037

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1500e-003	0.0495	0.0268	1.8000e-004	4.5300e-003	6.0000e-005	4.6000e-003	1.3200e-003	6.0000e-005	1.3800e-003	0.0000	16.9011	16.9011	2.3000e-004	0.0000	16.9067
Worker	0.0111	5.8400e-003	0.0585	2.2000e-004	0.0311	1.3000e-004	0.0312	8.2900e-003	1.2000e-004	8.4100e-003	0.0000	19.7509	19.7509	4.1000e-004	0.0000	19.7611
Total	**0.0133**	**0.0553**	**0.0853**	**4.0000e-004**	**0.0356**	**1.9000e-004**	**0.0358**	**9.6100e-003**	**1.8000e-004**	**9.7900e-003**	**0.0000**	**36.6520**	**36.6520**	**6.4000e-004**	**0.0000**	**36.6678**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1588	0.9346	2.1034	4.0400e-003		0.0118	0.0118		0.0118	0.0118	0.0000	343.0332	343.0332	0.0128	0.0000	343.3526
Total	**0.1588**	**0.9346**	**2.1034**	**4.0400e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**343.0332**	**343.0332**	**0.0128**	**0.0000**	**343.3526**

3.5 Building Construction - 2037

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1500e-003	0.0495	0.0268	1.8000e-004	4.5300e-003	6.0000e-005	4.6000e-003	1.3200e-003	6.0000e-005	1.3800e-003	0.0000	16.9011	16.9011	2.3000e-004	0.0000	16.9067
Worker	0.0111	5.8400e-003	0.0585	2.2000e-004	0.0311	1.3000e-004	0.0312	8.2900e-003	1.2000e-004	8.4100e-003	0.0000	19.7509	19.7509	4.1000e-004	0.0000	19.7611
Total	**0.0133**	**0.0553**	**0.0853**	**4.0000e-004**	**0.0356**	**1.9000e-004**	**0.0358**	**9.6100e-003**	**1.8000e-004**	**9.7900e-003**	**0.0000**	**36.6520**	**36.6520**	**6.4000e-004**	**0.0000**	**36.6678**

3.5 Building Construction - 2038

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1588	0.9346	2.1034	4.0400e-003		0.0118	0.0118		0.0118	0.0118	0.0000	343.0336	343.0336	0.0128	0.0000	343.3530
Total	**0.1588**	**0.9346**	**2.1034**	**4.0400e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**343.0336**	**343.0336**	**0.0128**	**0.0000**	**343.3530**

3.5 Building Construction - 2038

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1500e-003	0.0495	0.0268	1.8000e-004	4.5300e-003	6.0000e-005	4.6000e-003	1.3200e-003	6.0000e-005	1.3800e-003	0.0000	16.9011	16.9011	2.3000e-004	0.0000	16.9067
Worker	0.0111	5.8400e-003	0.0585	2.2000e-004	0.0311	1.3000e-004	0.0312	8.2900e-003	1.2000e-004	8.4100e-003	0.0000	19.7509	19.7509	4.1000e-004	0.0000	19.7611
Total	**0.0133**	**0.0553**	**0.0853**	**4.0000e-004**	**0.0356**	**1.9000e-004**	**0.0358**	**9.6100e-003**	**1.8000e-004**	**9.7900e-003**	**0.0000**	**36.6520**	**36.6520**	**6.4000e-004**	**0.0000**	**36.6678**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1588	0.9346	2.1034	4.0400e-003		0.0118	0.0118		0.0118	0.0118	0.0000	343.0332	343.0332	0.0128	0.0000	343.3526
Total	**0.1588**	**0.9346**	**2.1034**	**4.0400e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**343.0332**	**343.0332**	**0.0128**	**0.0000**	**343.3526**

3.5 Building Construction - 2038

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1500e-003	0.0495	0.0268	1.8000e-004	4.5300e-003	6.0000e-005	4.6000e-003	1.3200e-003	6.0000e-005	1.3800e-003	0.0000	16.9011	16.9011	2.3000e-004	0.0000	16.9067
Worker	0.0111	5.8400e-003	0.0585	2.2000e-004	0.0311	1.3000e-004	0.0312	8.2900e-003	1.2000e-004	8.4100e-003	0.0000	19.7509	19.7509	4.1000e-004	0.0000	19.7611
Total	**0.0133**	**0.0553**	**0.0853**	**4.0000e-004**	**0.0356**	**1.9000e-004**	**0.0358**	**9.6100e-003**	**1.8000e-004**	**9.7900e-003**	**0.0000**	**36.6520**	**36.6520**	**6.4000e-004**	**0.0000**	**36.6678**

3.5 Building Construction - 2039

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1582	0.9310	2.0953	4.0200e-003		0.0118	0.0118		0.0118	0.0118	0.0000	341.7193	341.7193	0.0127	0.0000	342.0375
Total	**0.1582**	**0.9310**	**2.0953**	**4.0200e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**341.7193**	**341.7193**	**0.0127**	**0.0000**	**342.0375**

3.5 Building Construction - 2039

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1400e-003	0.0493	0.0267	1.8000e-004	4.5200e-003	6.0000e-005	4.5800e-003	1.3100e-003	6.0000e-005	1.3700e-003	0.0000	16.8363	16.8363	2.2000e-004	0.0000	16.8419
Worker	0.0111	5.8200e-003	0.0583	2.2000e-004	0.0310	1.3000e-004	0.0311	8.2600e-003	1.2000e-004	8.3800e-003	0.0000	19.6752	19.6752	4.0000e-004	0.0000	19.6854
Total	**0.0132**	**0.0551**	**0.0850**	**4.0000e-004**	**0.0355**	**1.9000e-004**	**0.0357**	**9.5700e-003**	**1.8000e-004**	**9.7500e-003**	**0.0000**	**36.5116**	**36.5116**	**6.2000e-004**	**0.0000**	**36.5273**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1582	0.9310	2.0953	4.0200e-003		0.0118	0.0118		0.0118	0.0118	0.0000	341.7189	341.7189	0.0127	0.0000	342.0371
Total	**0.1582**	**0.9310**	**2.0953**	**4.0200e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**341.7189**	**341.7189**	**0.0127**	**0.0000**	**342.0371**

3.5 Building Construction - 2039

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1400e-003	0.0493	0.0267	1.8000e-004	4.5200e-003	6.0000e-005	4.5800e-003	1.3100e-003	6.0000e-005	1.3700e-003	0.0000	16.8363	16.8363	2.2000e-004	0.0000	16.8419
Worker	0.0111	5.8200e-003	0.0583	2.2000e-004	0.0310	1.3000e-004	0.0311	8.2600e-003	1.2000e-004	8.3800e-003	0.0000	19.6752	19.6752	4.0000e-004	0.0000	19.6854
Total	**0.0132**	**0.0551**	**0.0850**	**4.0000e-004**	**0.0355**	**1.9000e-004**	**0.0357**	**9.5700e-003**	**1.8000e-004**	**9.7500e-003**	**0.0000**	**36.5116**	**36.5116**	**6.2000e-004**	**0.0000**	**36.5273**

3.5 Building Construction - 2040

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1562	0.8992	2.1035	4.0400e-003		9.6200e-003	9.6200e-003		9.6200e-003	9.6200e-003	0.0000	343.0337	343.0337	0.0123	0.0000	343.3419
Total	**0.1562**	**0.8992**	**2.1035**	**4.0400e-003**		**9.6200e-003**	**9.6200e-003**		**9.6200e-003**	**9.6200e-003**	**0.0000**	**343.0337**	**343.0337**	**0.0123**	**0.0000**	**343.3419**

3.5 Building Construction - 2040

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1200e-003	0.0462	0.0246	1.8000e-004	4.5400e-003	5.0000e-005	4.5900e-003	1.3200e-003	5.0000e-005	1.3700e-003	0.0000	16.8973	16.8973	2.2000e-004	0.0000	16.9029
Worker	7.6100e-003	3.8000e-003	0.0432	2.0000e-004	0.0311	1.0000e-004	0.0312	8.2900e-003	9.0000e-005	8.3800e-003	0.0000	18.5110	18.5110	2.4000e-004	0.0000	18.5169
Total	**9.7300e-003**	**0.0500**	**0.0678**	**3.8000e-004**	**0.0356**	**1.5000e-004**	**0.0358**	**9.6100e-003**	**1.4000e-004**	**9.7500e-003**	**0.0000**	**35.4083**	**35.4083**	**4.6000e-004**	**0.0000**	**35.4197**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1562	0.8992	2.1035	4.0400e-003		9.6200e-003	9.6200e-003		9.6200e-003	9.6200e-003	0.0000	343.0333	343.0333	0.0123	0.0000	343.3415
Total	**0.1562**	**0.8992**	**2.1035**	**4.0400e-003**		**9.6200e-003**	**9.6200e-003**		**9.6200e-003**	**9.6200e-003**	**0.0000**	**343.0333**	**343.0333**	**0.0123**	**0.0000**	**343.3415**

3.5 Building Construction - 2040

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1200e-003	0.0462	0.0246	1.8000e-004	4.5400e-003	5.0000e-005	4.5900e-003	1.3200e-003	5.0000e-005	1.3700e-003	0.0000	16.8973	16.8973	2.2000e-004	0.0000	16.9029
Worker	7.6100e-003	3.8000e-003	0.0432	2.0000e-004	0.0311	1.0000e-004	0.0312	8.2900e-003	9.0000e-005	8.3800e-003	0.0000	18.5110	18.5110	2.4000e-004	0.0000	18.5169
Total	**9.7300e-003**	**0.0500**	**0.0678**	**3.8000e-004**	**0.0356**	**1.5000e-004**	**0.0358**	**9.6100e-003**	**1.4000e-004**	**9.7500e-003**	**0.0000**	**35.4083**	**35.4083**	**4.6000e-004**	**0.0000**	**35.4197**

3.5 Building Construction - 2041

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1562	0.8992	2.1035	4.0400e-003		9.6200e-003	9.6200e-003		9.6200e-003	9.6200e-003	0.0000	343.0337	343.0337	0.0123	0.0000	343.3419
Total	**0.1562**	**0.8992**	**2.1035**	**4.0400e-003**		**9.6200e-003**	**9.6200e-003**		**9.6200e-003**	**9.6200e-003**	**0.0000**	**343.0337**	**343.0337**	**0.0123**	**0.0000**	**343.3419**

3.5 Building Construction - 2041

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1200e-003	0.0462	0.0246	1.8000e-004	4.5400e-003	5.0000e-005	4.5900e-003	1.3200e-003	5.0000e-005	1.3700e-003	0.0000	16.8973	16.8973	2.2000e-004	0.0000	16.9029
Worker	7.6100e-003	3.8000e-003	0.0432	2.0000e-004	0.0311	1.0000e-004	0.0312	8.2900e-003	9.0000e-005	8.3800e-003	0.0000	18.5110	18.5110	2.4000e-004	0.0000	18.5169
Total	**9.7300e-003**	**0.0500**	**0.0678**	**3.8000e-004**	**0.0356**	**1.5000e-004**	**0.0358**	**9.6100e-003**	**1.4000e-004**	**9.7500e-003**	**0.0000**	**35.4083**	**35.4083**	**4.6000e-004**	**0.0000**	**35.4197**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1562	0.8992	2.1035	4.0400e-003		9.6200e-003	9.6200e-003		9.6200e-003	9.6200e-003	0.0000	343.0333	343.0333	0.0123	0.0000	343.3415
Total	**0.1562**	**0.8992**	**2.1035**	**4.0400e-003**		**9.6200e-003**	**9.6200e-003**		**9.6200e-003**	**9.6200e-003**	**0.0000**	**343.0333**	**343.0333**	**0.0123**	**0.0000**	**343.3415**

3.5 Building Construction - 2041

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1200e-003	0.0462	0.0246	1.8000e-004	4.5400e-003	5.0000e-005	4.5900e-003	1.3200e-003	5.0000e-005	1.3700e-003	0.0000	16.8973	16.8973	2.2000e-004	0.0000	16.9029
Worker	7.6100e-003	3.8000e-003	0.0432	2.0000e-004	0.0311	1.0000e-004	0.0312	8.2900e-003	9.0000e-005	8.3800e-003	0.0000	18.5110	18.5110	2.4000e-004	0.0000	18.5169
Total	**9.7300e-003**	**0.0500**	**0.0678**	**3.8000e-004**	**0.0356**	**1.5000e-004**	**0.0358**	**9.6100e-003**	**1.4000e-004**	**9.7500e-003**	**0.0000**	**35.4083**	**35.4083**	**4.6000e-004**	**0.0000**	**35.4197**

3.5 Building Construction - 2042

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1562	0.8992	2.1035	4.0400e-003		9.6200e-003	9.6200e-003		9.6200e-003	9.6200e-003	0.0000	343.0337	343.0337	0.0123	0.0000	343.3419
Total	**0.1562**	**0.8992**	**2.1035**	**4.0400e-003**		**9.6200e-003**	**9.6200e-003**		**9.6200e-003**	**9.6200e-003**	**0.0000**	**343.0337**	**343.0337**	**0.0123**	**0.0000**	**343.3419**

3.5 Building Construction - 2042

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1200e-003	0.0462	0.0246	1.8000e-004	4.5400e-003	5.0000e-005	4.5900e-003	1.3200e-003	5.0000e-005	1.3700e-003	0.0000	16.8973	16.8973	2.2000e-004	0.0000	16.9029
Worker	7.6100e-003	3.8000e-003	0.0432	2.0000e-004	0.0311	1.0000e-004	0.0312	8.2900e-003	9.0000e-005	8.3800e-003	0.0000	18.5110	18.5110	2.4000e-004	0.0000	18.5169
Total	**9.7300e-003**	**0.0500**	**0.0678**	**3.8000e-004**	**0.0356**	**1.5000e-004**	**0.0358**	**9.6100e-003**	**1.4000e-004**	**9.7500e-003**	**0.0000**	**35.4083**	**35.4083**	**4.6000e-004**	**0.0000**	**35.4197**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1562	0.8992	2.1035	4.0400e-003		9.6200e-003	9.6200e-003		9.6200e-003	9.6200e-003	0.0000	343.0333	343.0333	0.0123	0.0000	343.3415
Total	**0.1562**	**0.8992**	**2.1035**	**4.0400e-003**		**9.6200e-003**	**9.6200e-003**		**9.6200e-003**	**9.6200e-003**	**0.0000**	**343.0333**	**343.0333**	**0.0123**	**0.0000**	**343.3415**

3.5 Building Construction - 2042

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.1200e-003	0.0462	0.0246	1.8000e-004	4.5400e-003	5.0000e-005	4.5900e-003	1.3200e-003	5.0000e-005	1.3700e-003	0.0000	16.8973	16.8973	2.2000e-004	0.0000	16.9029
Worker	7.6100e-003	3.8000e-003	0.0432	2.0000e-004	0.0311	1.0000e-004	0.0312	8.2900e-003	9.0000e-005	8.3800e-003	0.0000	18.5110	18.5110	2.4000e-004	0.0000	18.5169
Total	**9.7300e-003**	**0.0500**	**0.0678**	**3.8000e-004**	**0.0356**	**1.5000e-004**	**0.0358**	**9.6100e-003**	**1.4000e-004**	**9.7500e-003**	**0.0000**	**35.4083**	**35.4083**	**4.6000e-004**	**0.0000**	**35.4197**

3.5 Building Construction - 2043

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1209	0.6959	1.6280	3.1300e-003		7.4500e-003	7.4500e-003		7.4500e-003	7.4500e-003	0.0000	265.4897	265.4897	9.5400e-003	0.0000	265.7282
Total	**0.1209**	**0.6959**	**1.6280**	**3.1300e-003**		**7.4500e-003**	**7.4500e-003**		**7.4500e-003**	**7.4500e-003**	**0.0000**	**265.4897**	**265.4897**	**9.5400e-003**	**0.0000**	**265.7282**

3.5 Building Construction - 2043

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.6400e-003	0.0357	0.0191	1.4000e-004	3.5100e-003	4.0000e-005	3.5500e-003	1.0200e-003	4.0000e-005	1.0600e-003	0.0000	13.0776	13.0776	1.7000e-004	0.0000	13.0819
Worker	5.8900e-003	2.9400e-003	0.0334	1.6000e-004	0.0241	7.0000e-005	0.0241	6.4200e-003	7.0000e-005	6.4800e-003	0.0000	14.3265	14.3265	1.8000e-004	0.0000	14.3311
Total	**7.5300e-003**	**0.0387**	**0.0524**	**3.0000e-004**	**0.0276**	**1.1000e-004**	**0.0277**	**7.4400e-003**	**1.1000e-004**	**7.5400e-003**	**0.0000**	**27.4041**	**27.4041**	**3.5000e-004**	**0.0000**	**27.4130**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1209	0.6959	1.6280	3.1300e-003		7.4500e-003	7.4500e-003		7.4500e-003	7.4500e-003	0.0000	265.4894	265.4894	9.5400e-003	0.0000	265.7279
Total	**0.1209**	**0.6959**	**1.6280**	**3.1300e-003**		**7.4500e-003**	**7.4500e-003**		**7.4500e-003**	**7.4500e-003**	**0.0000**	**265.4894**	**265.4894**	**9.5400e-003**	**0.0000**	**265.7279**

3.5 Building Construction - 2043

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.6400e-003	0.0357	0.0191	1.4000e-004	3.5100e-003	4.0000e-005	3.5500e-003	1.0200e-003	4.0000e-005	1.0600e-003	0.0000	13.0776	13.0776	1.7000e-004	0.0000	13.0819
Worker	5.8900e-003	2.9400e-003	0.0334	1.6000e-004	0.0241	7.0000e-005	0.0241	6.4200e-003	7.0000e-005	6.4800e-003	0.0000	14.3265	14.3265	1.8000e-004	0.0000	14.3311
Total	**7.5300e-003**	**0.0387**	**0.0524**	**3.0000e-004**	**0.0276**	**1.1000e-004**	**0.0277**	**7.4400e-003**	**1.1000e-004**	**7.5400e-003**	**0.0000**	**27.4041**	**27.4041**	**3.5000e-004**	**0.0000**	**27.4130**

3.6 Paving - 2044

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0101	0.0366	0.1582	2.8000e-004		1.1600e-003	1.1600e-003		1.1600e-003	1.1600e-003	0.0000	24.0995	24.0995	8.1000e-004	0.0000	24.1198
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0101**	**0.0366**	**0.1582**	**2.8000e-004**		**1.1600e-003**	**1.1600e-003**		**1.1600e-003**	**1.1600e-003**	**0.0000**	**24.0995**	**24.0995**	**8.1000e-004**	**0.0000**	**24.1198**

3.6 Paving - 2044

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.4000e-004	2.2000e-004	2.4800e-003	1.0000e-005	1.7900e-003	1.0000e-005	1.7900e-003	4.8000e-004	1.0000e-005	4.8000e-004	0.0000	1.0639	1.0639	1.0000e-005	0.0000	1.0642
Total	**4.4000e-004**	**2.2000e-004**	**2.4800e-003**	**1.0000e-005**	**1.7900e-003**	**1.0000e-005**	**1.7900e-003**	**4.8000e-004**	**1.0000e-005**	**4.8000e-004**	**0.0000**	**1.0639**	**1.0639**	**1.0000e-005**	**0.0000**	**1.0642**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0101	0.0366	0.1582	2.8000e-004		1.1600e-003	1.1600e-003		1.1600e-003	1.1600e-003	0.0000	24.0995	24.0995	8.1000e-004	0.0000	24.1197
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0101**	**0.0366**	**0.1582**	**2.8000e-004**		**1.1600e-003**	**1.1600e-003**		**1.1600e-003**	**1.1600e-003**	**0.0000**	**24.0995**	**24.0995**	**8.1000e-004**	**0.0000**	**24.1197**

3.6 Paving - 2044

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.4000e-004	2.2000e-004	2.4800e-003	1.0000e-005	1.7900e-003	1.0000e-005	1.7900e-003	4.8000e-004	1.0000e-005	4.8000e-004	0.0000	1.0639	1.0639	1.0000e-005	0.0000	1.0642
Total	**4.4000e-004**	**2.2000e-004**	**2.4800e-003**	**1.0000e-005**	**1.7900e-003**	**1.0000e-005**	**1.7900e-003**	**4.8000e-004**	**1.0000e-005**	**4.8000e-004**	**0.0000**	**1.0639**	**1.0639**	**1.0000e-005**	**0.0000**	**1.0642**

3.7 Architectural Coating - 2044

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.9777					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.7400e-003	0.0364	0.0896	1.5000e-004		3.7000e-004	3.7000e-004		3.7000e-004	3.7000e-004	0.0000	12.7663	12.7663	4.5000e-004	0.0000	12.7775
Total	**0.9834**	**0.0364**	**0.0896**	**1.5000e-004**		**3.7000e-004**	**3.7000e-004**		**3.7000e-004**	**3.7000e-004**	**0.0000**	**12.7663**	**12.7663**	**4.5000e-004**	**0.0000**	**12.7775**

3.7 Architectural Coating - 2044

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.8000e-004	2.9000e-004	3.3100e-003	2.0000e-005	2.3800e-003	1.0000e-005	2.3900e-003	6.4000e-004	1.0000e-005	6.4000e-004	0.0000	1.4185	1.4185	2.0000e-005	0.0000	1.4189
Total	**5.8000e-004**	**2.9000e-004**	**3.3100e-003**	**2.0000e-005**	**2.3800e-003**	**1.0000e-005**	**2.3900e-003**	**6.4000e-004**	**1.0000e-005**	**6.4000e-004**	**0.0000**	**1.4185**	**1.4185**	**2.0000e-005**	**0.0000**	**1.4189**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.9777					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.7400e-003	0.0364	0.0896	1.5000e-004		3.7000e-004	3.7000e-004		3.7000e-004	3.7000e-004	0.0000	12.7663	12.7663	4.5000e-004	0.0000	12.7775
Total	**0.9834**	**0.0364**	**0.0896**	**1.5000e-004**		**3.7000e-004**	**3.7000e-004**		**3.7000e-004**	**3.7000e-004**	**0.0000**	**12.7663**	**12.7663**	**4.5000e-004**	**0.0000**	**12.7775**

3.7 Architectural Coating - 2044

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.8000e-004	2.9000e-004	3.3100e-003	2.0000e-005	2.3800e-003	1.0000e-005	2.3900e-003	6.4000e-004	1.0000e-005	6.4000e-004	0.0000	1.4185	1.4185	2.0000e-005	0.0000	1.4189
Total	**5.8000e-004**	**2.9000e-004**	**3.3100e-003**	**2.0000e-005**	**2.3800e-003**	**1.0000e-005**	**2.3900e-003**	**6.4000e-004**	**1.0000e-005**	**6.4000e-004**	**0.0000**	**1.4185**	**1.4185**	**2.0000e-005**	**0.0000**	**1.4189**

3.7 Architectural Coating - 2045

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.1732					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.8900e-003	0.0436	0.1075	1.8000e-004		4.5000e-004	4.5000e-004		4.5000e-004	4.5000e-004	0.0000	15.3195	15.3195	5.4000e-004	0.0000	15.3330
Total	**1.1801**	**0.0436**	**0.1075**	**1.8000e-004**		**4.5000e-004**	**4.5000e-004**		**4.5000e-004**	**4.5000e-004**	**0.0000**	**15.3195**	**15.3195**	**5.4000e-004**	**0.0000**	**15.3330**

3.7 Architectural Coating - 2045

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.5000e-004	2.9000e-004	3.4500e-003	2.0000e-005	2.8600e-003	1.0000e-005	2.8700e-003	7.6000e-004	1.0000e-005	7.7000e-004	0.0000	1.6492	1.6492	2.0000e-005	0.0000	1.6496
Total	**5.5000e-004**	**2.9000e-004**	**3.4500e-003**	**2.0000e-005**	**2.8600e-003**	**1.0000e-005**	**2.8700e-003**	**7.6000e-004**	**1.0000e-005**	**7.7000e-004**	**0.0000**	**1.6492**	**1.6492**	**2.0000e-005**	**0.0000**	**1.6496**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.1732					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.8900e-003	0.0436	0.1075	1.8000e-004		4.5000e-004	4.5000e-004		4.5000e-004	4.5000e-004	0.0000	15.3195	15.3195	5.4000e-004	0.0000	15.3330
Total	**1.1801**	**0.0436**	**0.1075**	**1.8000e-004**		**4.5000e-004**	**4.5000e-004**		**4.5000e-004**	**4.5000e-004**	**0.0000**	**15.3195**	**15.3195**	**5.4000e-004**	**0.0000**	**15.3330**

3.7 Architectural Coating - 2045

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.5000e-004	2.9000e-004	3.4500e-003	2.0000e-005	2.8600e-003	1.0000e-005	2.8700e-003	7.6000e-004	1.0000e-005	7.7000e-004	0.0000	1.6492	1.6492	2.0000e-005	0.0000	1.6496
Total	**5.5000e-004**	**2.9000e-004**	**3.4500e-003**	**2.0000e-005**	**2.8600e-003**	**1.0000e-005**	**2.8700e-003**	**7.6000e-004**	**1.0000e-005**	**7.7000e-004**	**0.0000**	**1.6492**	**1.6492**	**2.0000e-005**	**0.0000**	**1.6496**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1686	0.4672	2.0679	6.2300e-003	0.6923	5.0800e-003	0.6973	0.1856	4.7300e-003	0.1904	0.0000	566.1911	566.1911	0.0196	0.0000	566.6819
Unmitigated	0.1686	0.4672	2.0679	6.2300e-003	0.6923	5.0800e-003	0.6973	0.1856	4.7300e-003	0.1904	0.0000	566.1911	566.1911	0.0196	0.0000	566.6819

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4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	523.60	545.05	474.10	1,932,220	1,932,220
Total	523.60	545.05	474.10	1,932,220	1,932,220

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	16.80	7.10	7.90	42.30	19.60	38.10	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Single Family Housing	0.582300	0.030810	0.216836	0.122889	0.017697	0.003502	0.006347	0.006888	0.005368	0.001219	0.004361	0.001179	0.000603

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	138.8367	138.8367	6.2800e-003	1.3000e-003	139.3807
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	138.8367	138.8367	6.2800e-003	1.3000e-003	139.3807
NaturalGas Mitigated	3.5900e-003	0.0307	0.0131	2.0000e-004		2.4800e-003	2.4800e-003		2.4800e-003	2.4800e-003	0.0000	35.5620	35.5620	6.8000e-004	6.5000e-004	35.7734
NaturalGas Unmitigated	3.5900e-003	0.0307	0.0131	2.0000e-004		2.4800e-003	2.4800e-003		2.4800e-003	2.4800e-003	0.0000	35.5620	35.5620	6.8000e-004	6.5000e-004	35.7734

5.2 Energy by Land Use - NaturalGas

Unmitigated

Land Use	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	666408	3.5900e-003	0.0307	0.0131	2.0000e-004		2.4800e-003	2.4800e-003		2.4800e-003	2.4800e-003	0.0000	35.5620	35.5620	6.8000e-004	6.5000e-004	35.7734
Total		**3.5900e-003**	**0.0307**	**0.0131**	**2.0000e-004**		**2.4800e-003**	**2.4800e-003**		**2.4800e-003**	**2.4800e-003**	**0.0000**	**35.5620**	**35.5620**	**6.8000e-004**	**6.5000e-004**	**35.7734**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	666408	3.5900e-003	0.0307	0.0131	2.0000e-004		2.4800e-003	2.4800e-003		2.4800e-003	2.4800e-003	0.0000	35.5620	35.5620	6.8000e-004	6.5000e-004	35.7734
Total		**3.5900e-003**	**0.0307**	**0.0131**	**2.0000e-004**		**2.4800e-003**	**2.4800e-003**		**2.4800e-003**	**2.4800e-003**	**0.0000**	**35.5620**	**35.5620**	**6.8000e-004**	**6.5000e-004**	**35.7734**

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5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	477247	138.8367	6.2800e-003	1.3000e-003	139.3807
Total		**138.8367**	**6.2800e-003**	**1.3000e-003**	**139.3807**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	477247	138.8367	6.2800e-003	1.3000e-003	139.3807
Total		**138.8367**	**6.2800e-003**	**1.3000e-003**	**139.3807**

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6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

Use Low VOC Cleaning Supplies

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	4.1752	0.0721	4.6672	7.7400e-003		0.5996	0.5996		0.5996	0.5996	56.8127	24.4935	81.3062	0.0531	4.4700e-003	83.9645
Unmitigated	4.2153	0.0721	4.6672	7.7400e-003		0.5996	0.5996		0.5996	0.5996	56.8127	24.4935	81.3062	0.0531	4.4700e-003	83.9645

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6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.2151					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.5370					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	3.4510	0.0674	4.2599	7.7200e-003		0.5973	0.5973		0.5973	0.5973	56.8127	23.8264	80.6391	0.0524	4.4700e-003	83.2815
Landscaping	0.0122	4.7000e-003	0.4073	2.0000e-005		2.2600e-003	2.2600e-003		2.2600e-003	2.2600e-003	0.0000	0.6671	0.6671	6.4000e-004	0.0000	0.6830
Total	**4.2153**	**0.0721**	**4.6672**	**7.7400e-003**		**0.5995**	**0.5995**		**0.5995**	**0.5995**	**56.8127**	**24.4935**	**81.3062**	**0.0531**	**4.4700e-003**	**83.9645**

6.2 Area by SubCategory

Mitigated

SubCategory	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Architectural Coating	0.2151					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.4969					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	3.4510	0.0674	4.2599	7.7200e-003		0.5973	0.5973		0.5973	0.5973	56.8127	23.8264	80.6391	0.0524	4.4700e-003	83.2815
Landscaping	0.0122	4.7000e-003	0.4073	2.0000e-005		2.2600e-003	2.2600e-003		2.2600e-003	2.2600e-003	0.0000	0.6671	0.6671	6.4000e-004	0.0000	0.6830
Total	**4.1752**	**0.0721**	**4.6672**	**7.7400e-003**		**0.5995**	**0.5995**		**0.5995**	**0.5995**	**56.8127**	**24.4935**	**81.3062**	**0.0531**	**4.4700e-003**	**83.9645**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

Use Water Efficient Landscaping

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	7.5821	0.0937	2.2700e-003	10.6009
Unmitigated	9.0779	0.1171	2.8300e-003	12.8499

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	3.58347 / 2.25915	9.0779	0.1171	2.8300e-003	12.8499
Total		**9.0779**	**0.1171**	**2.8300e-003**	**12.8499**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	2.86678 / 2.12134	7.5821	0.0937	2.2700e-003	10.6009
Total		**7.5821**	**0.0937**	**2.2700e-003**	**10.6009**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	14.0226	0.8287	0.0000	34.7404
Unmitigated	14.0226	0.8287	0.0000	34.7404

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	69.08	14.0226	0.8287	0.0000	34.7404
Total		**14.0226**	**0.8287**	**0.0000**	**34.7404**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	69.08	14.0226	0.8287	0.0000	34.7404
Total		**14.0226**	**0.8287**	**0.0000**	**34.7404**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

	Total CO2	CH4	N2O	CO2e
Category	MT			
Unmitigated	-18,315.0000	0.0000	0.0000	-18,315.0000

11.1 Vegetation Land Change

328 **Vegetation Type**

	Initial/Final	Total CO2	CH4	N2O	CO2e
	Acres	MT			
Trees	167 / 2	-18,315.0000	0.0000	0.0000	-18,315.0000
Total		**-18,315.0000**	**0.0000**	**0.0000**	**-18,315.0000**

APPENDIX C

Preliminary Biological Survey

LACO

TECHNICAL MEMORANDUM

Fort Dick Flats Preliminary Biological Survey
West of the Wonder Stump Road/State Highway 101 Intersection
Near Crescent City, California
Assessor's Parcel Numbers (APNs) 106-021-074 and -076

Date: June 20, 2019
Project No.: 6872.19

Prepared For: Green Diamond Resource Company

Prepared By: Gary Lester, Senior Environmental Scientist

Reviewed By: Deirdre Clem, Senior Planner/Project Manager

Appendices:

Appendix A:	Figures
Appendix B:	Site Photos
Appendix C:	List of Rare, Threatened and Endangered Plant Species, Crescent City Quadrangle
Appendix D:	List of Plant Species Encountered
Appendix E:	Vertebrate Species Data

1.0 INTRODUCTION

Green Diamond Resource Company (GDRCo) has requested professional services from LACO Associates (LACO) related to preparation of plans and special studies to accommodate the general plan amendment and zone reclassification (GPA/ZR) application to be submitted to the Del Norte County Planning Department for an approximately 212 acre portion of the property known as Fort Dick Flats, comprising two legal parcels identified as Assessor's Parcel Numbers (APNs) 106-021-074 and 106-021-076, located west of the Wonder Stump Road and State Highway 101 intersection north of Crescent City, within unincorporated County of Del Norte (County), California (Site or Project Site) (refer to Figure 1 in Appendix A).

The Site is currently designated as "Timberland" (TBR) under the Del Norte County General Plan and is currently zoned as "Timberland Preserve Zone" (TPZ) under the Del Norte County Zoning Code. GDRCo would like to amend the existing land use and zoning designations to Rural Residential with one lot unit per three acres (RR3) and Rural Residential with three-acre minimum lot sizes and a Manufactured Housing combining district (RR-3 MFH), respectively. At this time, only a change in the Site's current land use and

zoning designations, including a ten-year TPZ rollout, is being proposed for the Site. A subdivision or associated development is not currently proposed; however, future residential development is anticipated on-site after the 10-year TPZ rollout is finalized. The MFH combining district would allow for more flexibility once future development is proposed, by allowing for either a conventional single-family residential dwelling or a manufactured home on each potential three-acre minimum lot. Based on preliminary analysis, the Site is estimated to have a development potential of approximately 167 acres, which would allow for up to 55 single family residences or manufactured homes, each on minimum 3 acre lots (see Figure 2 in Appendix A).

Currently, the Site is undeveloped and is located outside of the Coastal Zone. The Site was last logged by GDRCo in 2009, and contains former logging roads throughout the Site. The Site is forested with young conifers and alders and contains numerous stumps and thick underbrush. The topography of the Site and surrounding area is gently sloping. The Site is located at an elevation of approximately 125 feet above mean sea level and slopes to the west at an approximately 5 to 10 percent slope. Although the U.S. Fish and Wildlife Service's (USFWS) National Wetlands Inventory does not show any wetlands or riparian habitat within the boundaries of the Site, several constraint areas, including seasonal wetlands and Class I and II watercourses in the northern and southwestern portions of the Site (tributaries to Yonkers Creek and Camp Six Creek) were identified on-site during surveys completed as part of the Timber Harvest Plan (THP) prepared in 2009, for a portion of the Site and adjacent GDRCo lands. As shown in Figure 2 (see Appendix A), a Class I watercourse traverses the southwestern portion of the Site and becomes a Class II watercourse further to the east. Within the northern portion of the Site, a Class II watercourse enters the Site from the north.

The identified stream/wetland resources require a minimum building setback of a least 100 feet from the top of bank or outer edge of riparian vegetation, whichever is greater. Based on site characteristics and review of the characteristics of the surrounding Fort Dick area, a 150-foot setback from the on-site Class I and Class II watercourses would likely adequately account for a riparian area of approximately 50 feet wide on either side of the identified watercourses. Additionally, a 251-foot noise buffer, measured from the centerline of Highway 101, is required at the Site, on either side of Highway 101, pursuant to the Del Norte County General Plan (see Figure 2 in Appendix A).

Surrounding uses include rural residential development and timberland to the north, south, east, and west of the Site. Additionally, Lake Earl is located approximately 0.9 miles west of the Site, the Smith River is located approximately 1.1 miles east of the Site, and the Pacific Ocean is located approximately 3.3 miles west of the Site. Pelican Bay State Prison is located approximately one-half mile to the north.

The purpose of the Preliminary Biological Survey was to determine if the Site contains sensitive biological resources, such as sensitive or special status species or habitat areas, including riparian and wetland areas, and to recommend appropriate setbacks.

2.0 METHODS

A site visit was conducted by LACO's Senior Botanist Gary Lester at the Project Site on September 27, 2018. Mr. Lester is qualified to conduct plant surveys as he has an undergraduate degree in botany and has received training in recognition of local flora and fauna, plant identification, and survey protocols. Additionally, Mr. Lester has conducted sensitive plant surveys, biological site investigations, and wildlife surveys professionally for over 25 years.

Prior to and during the survey, a number of resources were consulted to determine potential areas of sensitive plant and wildlife species occurrence in the vicinity of the Project Site: California Department of Fish and Wildlife (CDFW) Natural Diversity Database (CNDDB) – Crescent City Quad (CDFW, 2018), USGS 7.5-minute Crescent City quadrangle topographic map, and aerial photography. Additionally, the botanical, Northern Spotted Owl, and aquatic vertebrate survey results from pre-harvest surveys for Timber Harvest Plan (THP) 1-09-009 DEL, covering the Site and adjacent GDRCo-owned properties, were reviewed and are included in the appendices (GDRCo, 2010).

Special habitat areas, such as habitat edges and wetlands, were assessed at interval cross sections to gain a representational sampling of habitat classification and structure. Plants were identified to the taxonomic level (genus or species) necessary for rare plant identification. Plant species names follow the scientific nomenclature of the Jepson Manual (Baldwin, et. al., 2012). Photos taken at the Site are included as Appendix B.

3.0 ENVIRONMENTAL SETTING

The subject Site is accessed off Wonder Stump Road and is located north of Crescent City (Appendix A), adjacent to and immediately west of U.S. Highway 101 (Township 17 North, Range 1 West, Section 26, Humboldt Base Meridian). As discussed under Section 1.0 above, the Project Site is currently designated as "Timberland" (TBR) under the Del Norte County General Plan and is currently zoned as "Timberland Preserve Zone" (TPZ) under the Del Norte County Zoning Code. GDRCo is proposing a general plan amendment and zone reclassification (GPA/ZR) to amend the Site's current land use and zoning designations to Rural Residential (RR3 and RR-3 MFH, respectively). In anticipation of THP 1-09-009 DEL, biological surveys were conducted by GDRCo biologists on 152 acres of land, which included a portion of the Site and adjacent GDRCo-owned properties. The biological surveys examined the vegetated and aquatic habitats found on-site. A list of plant species with the potential to occur on-site was generated at the time of this memorandum, and is included as Appendix C.

LACO contacted GDRCo biological staff regarding the project area to compile existing biological data regarding the presence or absence of rare or sensitive species. The THP 1-09-009 DEL biological survey results documentation on or near the project Site is included as Appendix D [included are the required pre-timber harvest botanical surveys, Northern Spotted Owl surveys, and aquatic vertebrate (fisheries and frog and salamander) surveys].

Coastal coniferous forest vegetation occurs throughout the Site, including the following: scattered mature and widespread young growth coast redwood (*Sequoia sempervirens*), Douglas-fir (*Pseudotsuga menziesii*), Sitka spruce (*Picea sitchensis*), and Monterey pine (*Pinus radicata*). A sub-canopy composition exists of red alder (*Alnus rubra*), cascara (*Frangula purshiana*), Scouler's willow (*Salix scouleriana*), California bay (*Umbellularia californica*), and red elderberry (*Sambucus racemosa*). Understory/shrub woody vegetation present at the Project site includes the following species: Himalaya blackberry (*Rubus armenicus*), thimbleberry (*Rubus parviflorus*), salmonberry (*Rubus ispectabilis*), California blackberry (*Rubus ursinus*), coyote brush (*Baccharis pilularis*), and sword fern (*Polystichum munitum*). The Class I and Class II stream courses on-site support a variety of wetland species such as skunk cabbage (*Lysichiton americanum*), water parsley (*Oenanthe sarmentosa*), slough sedge (*Carex obnupta*) and small-headed bulrush (*Scirpus microcarpus*). The Class I/II stream, located in the southwest portion of the Project Site, is approximately 0.5 miles in length, where approximately two thirds the length is Class I and a third of which is

Class II (headwaters). The Class I stream is approximately 20 feet wide with about a 20-foot-wide riparian vegetation cover on either side of the stream. The Class II stream, located within the northern portion of the Project Site, is approximately 800 feet in length. The stream is approximately 6 feet wide with approximately 6 feet of riparian vegetation on either side. Photos of the Class I and Class II stream habitats are provided in Appendix B (Photos 1 and 2). During a prior site visit in April 2008, seasonal freshwater habitats were noted along the main road system throughout the Site and one was documented with photographs taken while occupied by Pacific tree frog (*Pseudacris regilla*) larvae (see photos 3 and 4 in Appendix B and approximate photo location on Figure 2 in Appendix A).

4.0 SENSITIVE PLANT SPECIES ANALYSIS

4.1 Sensitive Plant Species Historically Reported Nearby

The California Natural Diversity Database (CNDDB, 2018) lists historical observations for 42 sensitive plant species within the USGS 7.5-minute Crescent City quadrangle. These species were summarized by GDRCo prior to the botanical surveys conducted for THP 1-09-009 DEL and the summary is provided in Appendix C. No sensitive plant species historically recorded by the CNDDB were detected during botanical surveys conducted by GDRCo in 2008 and 2010.

A complete plant species list detected during sensitive plant surveys conducted by GDRCo are provided in Appendix D. Also provided in Appendix D are botanical project summary reports including the uncommon plant species (State Rank 4, those species not usually protected but warranting further distribution data reports) species detected on the Project Site (black trailing currant [*Ribes laxiflorum*] and heart-leaved twayblade [*Listera cordata*]).

5.0 SENSITIVE ANIMAL SPECIES ANALYSIS

5.1 Potential Sensitive Animal Species Present

According to CNDDB (2018) records and the U.S. Fish and Wildlife Service (USFWS), the Crescent City Quad sensitive animal species (USFWS, 2018) potentially occurring in the project area are listed in Table 1, below. Only coastal coniferous forest, Class I and Class II stream courses, and seasonal wetland habitats were present, eliminating many of the sensitive species specific to other types of habitats. None of the animal species listed in Table 1 were located by GDRCo biologists on the Project Site.

Prior to timber operations per THP 01-09-009 DEL in 2010, GDRCo conducted Northern Spotted Owl (NSO) and aquatic vertebrate surveys. No detections of NSO were found as indicated in the field notes results provided in Appendix E. The results of the aquatic vertebrate surveys indicate that the Class I stream provides fish access to much of the drainage (map provided in Appendix E). Sensitive aquatic vertebrates, Northern Red-legged Frog (*Rana aurora*), and Southern torrent salamander (*Rhyacotriton variegatus*) were located on THP 01-09-009 DEL, but east of Highway 101 and outside of the Project Site boundaries (Appendix E, see map).

Table 1 - Sensitive Animal Species Potentially Present at the Proposed Project Site

Species	Common Name	Fed/State List	Preferred Habitat
Oncorhynchus clarkii clarkii	Coastal cutthroat trout	None	Riverine
Emys marmortatus	western pond turtle	None	Riverine/ponds
Martes pennanti	Pacific fisher	Candidate	Associated with mature forests
Pandion haliaetus	Osprey	None	Nests built in mature tree or snags
Rhyacotriton variegatus	Southern torrent salamander	None	Cold, rocky, perennial streams
Rana aurora	Northern red-legged frog	None	Perennial waters
Strix occidentalis caurina	Northern Spotted Owl	Threatened	Nests in mature forests

The following summaries provide more detail related to the sensitive animal species provided in Table 1:

Coastal cutthroat trout is a riverine fish species, potentially using the Project Site in the Class I stream. GDRCo aquatic vertebrate surveys located coastal cutthroat trout approximately ¾ mile downstream from the Site (Appendix E). Suitable riverine habitat for this species occurs on the Class I stream within the project area and trout of unknown species was seen in the Class I stream on-site (Appendix E mapping).

Western pond turtle is a riverine reptile species, potentially using the Project Site for foraging and travel. Suitable riverine habitat for this species occurs on sections of the Smith River (~1 mile east of the Project Site) and possibly nearby ponds.

Pacific fisher is known from mature forests of the North Coast. Documented mature canopy trees occur on the Project Site, but no suitable forest complexity or large size class hardwood trees were observed during the biological evaluation. Marginal habitat occurs in the Project Site vicinity due to forest fragmentation, development, and agricultural activities.

Ospreys are known from northern California waterways. Nests are recorded from mature canopy trees or snags. CDFW recognizes active Osprey nests as protected. No active Osprey nests were observed on the Project Site.

The **Southern Torrent Salamander** is widely distributed over much of northern California. Limited suitable habitat occurs near the Project Site (cold, rocky streams), yet GDRCo aquatic stream surveys did record one individual ½ mile east of the project area (Appendix E).

The **Northern Red-legged Frog** is widely distributed over much of northern California. Limited suitable habitat occurs near the Project Site, yet GDRCo aquatic stream surveys did record one individual ½ mile east of the project area (Appendix E).

Northern Spotted Owl (NSO) is known from mature forests of the North Coast. Documented mature canopy trees occur on the Project Site, but no suitable nesting cavities were observed during the biological evaluation. Marginal habitat occurs in the Project Site vicinity due to forest fragmentation, development,

and agricultural activities. GDRCo biologists conducted protocol NSO as required prior to THP 01-09-009 DEL and detected no NSO response to recorded call playback recordings (Appendix E).

6.0 RESULTS

The biological survey results provided by GDRCo, focusing on the THP 01-09-009 DEL area, and the adjacent Class I and Class II stream courses, detected no rare plant species, no Northern Spotted Owls, and limited sensitive aquatic vertebrate species presence. However, suitable habitat is present on or near the Site for several special-status species. The Fort Dick Flats Preliminary Development Potential map (Appendix A) acknowledges the occurrence of the two stream courses and illustrates a 150-foot setback from the centerline of each drainage. Per correspondence with Ms. Jennifer Olson, Environmental Scientist with CDFW, on December 5, 2017, CDFW generally recommends a minimum buffer of 100 feet from the top of bank or outer edge of riparian vegetation, whichever is greater. Based on site characteristics and review of the characteristics of the surrounding Fort Dick area, a 150-foot setback from the on-site Class I and II watercourses would likely adequately account for a riparian area approximately 50 feet wide on either side of the identified watercourses; however, this is an estimate. A more in-depth botanical survey or wetland delineation of the Site is not part of the scope of this memorandum. Future development of the Site would be required to conduct further investigation of the wetland and riparian features, which will yield a more specific setback. Additionally, portions of the existing timber access road system have evidence of ponding at road intersections or poorly drained low spots, and potential aquatic vertebrate use at these ponded areas, that has been documented at one location (see Appendix B, photos 3 and 4, and approximate location in Figure 2 in Appendix A).

7.0 RECOMMENDATIONS

As discussed above, a stream transition line and/or wetland delineation is recommended prior to any Site development to determine the extent of riparian vegetation and top of bank to determine necessary setback distances from the on-site Class I and II watercourses in order to adequately protect these resources. In addition, a sensitive plant and animal survey is recommended prior to development, which is not likely to occur sooner than 10 years, after the 10-year TPZ rollout is finalized. GDRCo's botanical surveys, although thorough, will no longer be current. Additionally, GDRCo's surveys only covered the area located within THP 01-09-009 DEL and not the Site in its entirety.

The ponded areas found on the road system appear to be wetlands, but have not been adequately documented or delineated; therefore, prior to any Site development, it is recommended that these locations be mapped in early spring to confirm biological function and value and mitigation proposed to locate, develop, and monitor successful pond development on-site. It is recommended that the location of the proposed mitigation area be an addition to the proposed Class I stream setback and be sized at a 1:1 replacement.

In addition, future anticipated development on-site may result in the clearing of approximately 167 acres of land that is currently forested. Since there is the potential (although limited) for several special status bird species, including bird species protected under the Migratory Bird Treaty Act (MBTA), to be present on the Site, it is strongly recommended that any tree removal and site clearing occur outside of the bird nesting season, which typically occurs between March 1-August 1 each year, to avoid harming such species and to avoid the expense and time consuming effort of surveying the Site for nests. Should tree removal and site clearing be necessary to occur during the bird nesting season, it is recommended that nesting surveys be completed by a qualified biologist to determine the presence of vulnerable nests (within 100 feet for

passerines, 300 feet for raptors from the area to be cleared). Any active nests within the abovementioned distances shall be allowed to complete their nesting or until the biologist determines that they are no longer active before removal.

REFERENCES

Baldwin, B. G., D. H. Goldman, D. J. Keil, R. Patterson, T. J. Rosatti and D. H. Wilken. 2012. The Jepson Manual: Vascular Plants of California. University of California Press. Berkeley CA.

California Department of Fish and Wildlife (CDFW). October 2018. California Natural Diversity Data Base (CNDDB). Crescent City Quad. Sacramento, CA.

Green Diamond Resource Company (GDRCo). 2010. THP 1-09-009 DEL, botanical and vertebrate survey results. Unpublished data.

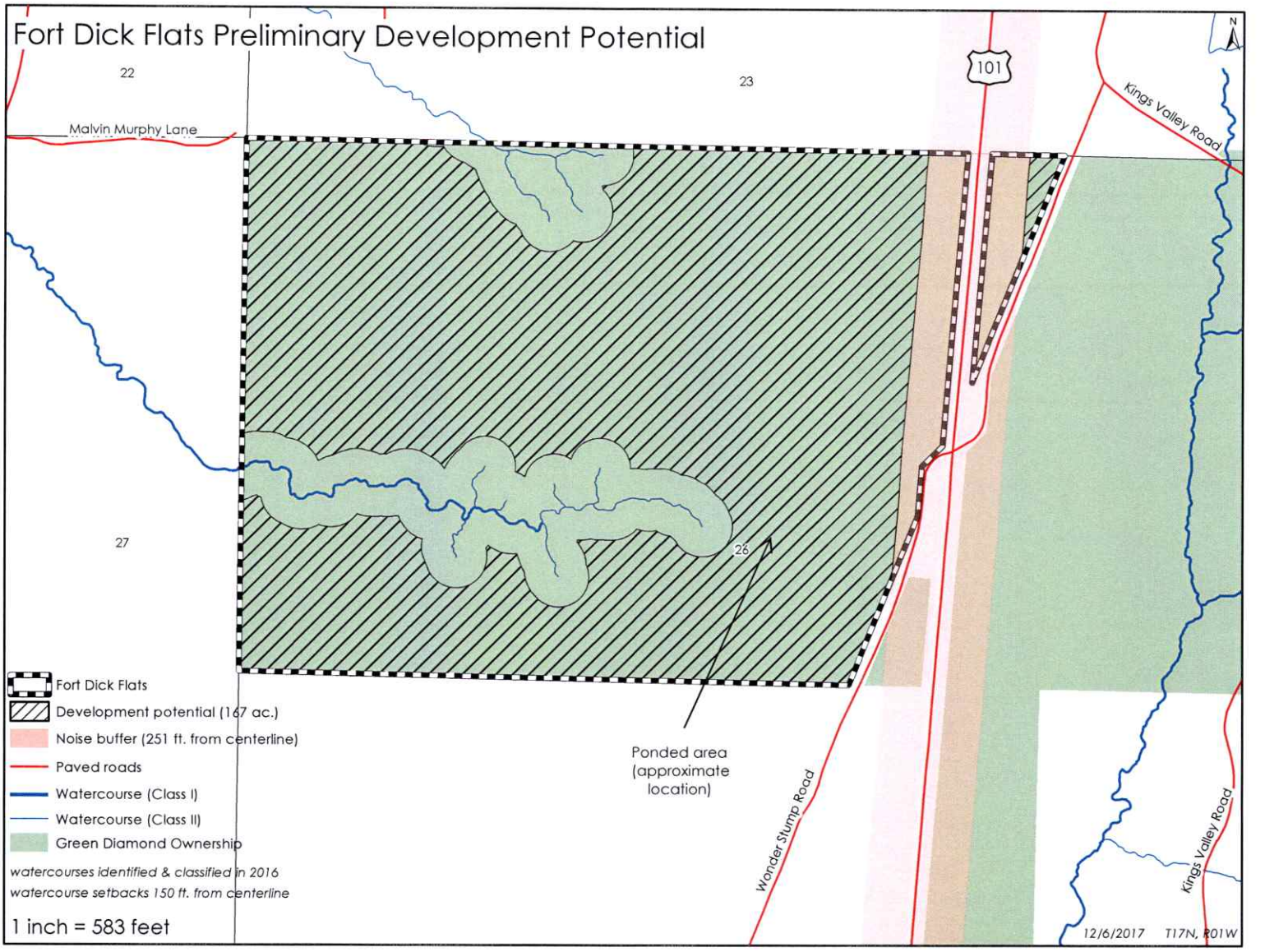
U.S. Geological Service (USGS), Crescent City (1966, photorevised 1978) 7.5 minute quadrangle map. Denver, CO.

U.S. Fish and Wildlife Service (USFWS). October 2018. Listed species found in coastal Del Norte County (informal search request). Arcata Field Station, Arcata, CA.

APPENDIX A

Figure 1: Location Map

Figure 2: Fort Dick Flats Preliminary Development Potential


Fort Dick Flats Preliminary Development Potential
22
23
27
26
Malvin Murphy Lane
101
Kings Valley Road
Wonder Stump Road
Kings Valley Road
Ponded area
(approximate
location)
N
Fort Dick Flats
Development potential (167 ac.)
Noise buffer (251 ft. from centerline)
Paved roads
Watercourse (Class I)
Watercourse (Class II)
Green Diamond Ownership
watercourses identified & classified in 2016
watercourse setbacks 150 ft. from centerline
1 inch = 583 feet
12/6/2017 T17N, R01W

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PROJECT	FORT DICK FLATS GPA & REZONE	BY ASV	FIGURE 2
CLIENT	GREEN DIAMOND RESOURCE COMPANY	DATE 2019-2-4	
LOCATION	HWY 101/WONDER STUMP RD, FORT DICK	CHECK DNC	JOB NO. 6872.19
	SITE TOPOGRAPHY	SCALE SHOWN	

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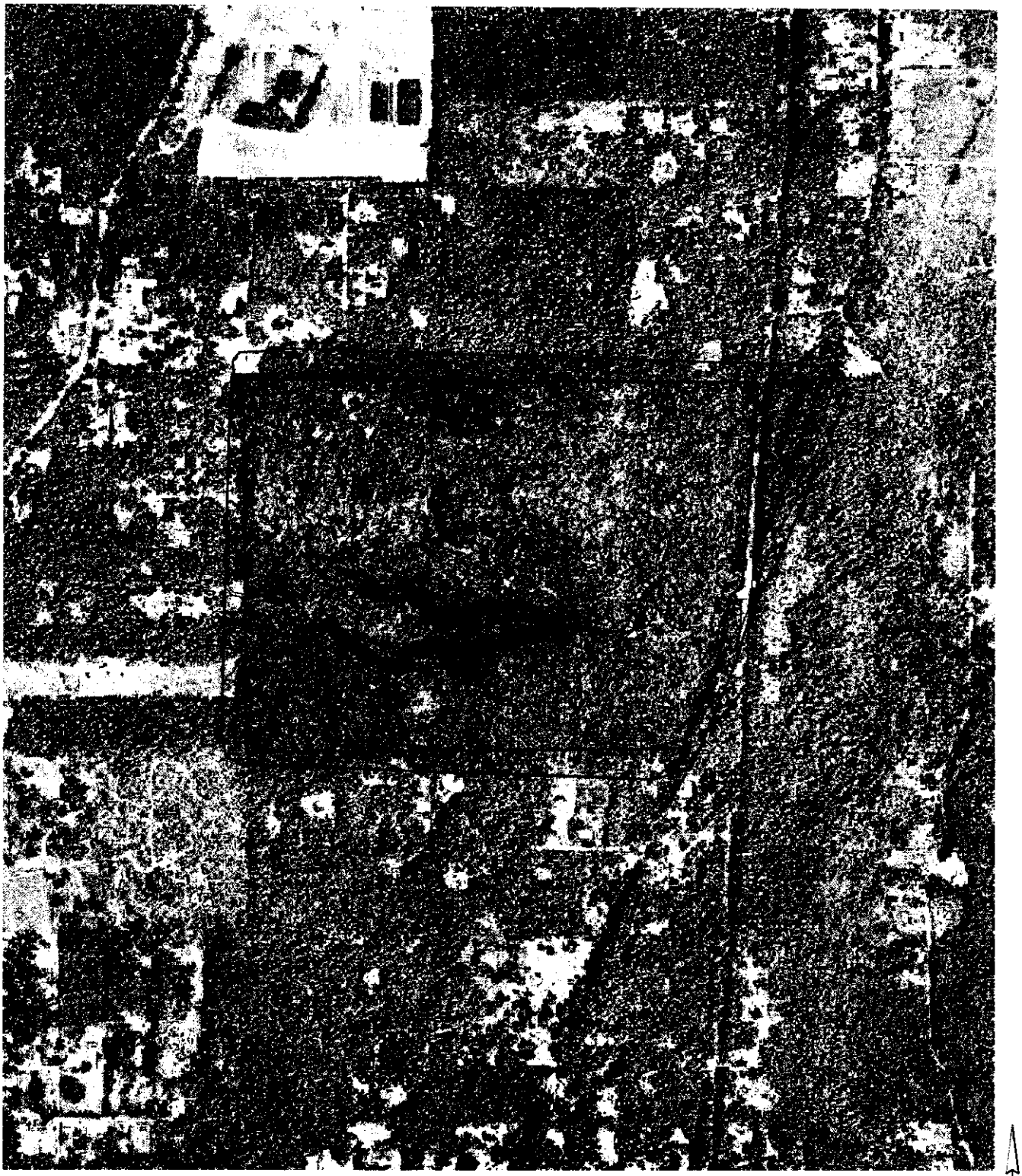

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Feb 04,2019-12:00pm T:\Cadfiles\6800\6872.19 FORT DICK ENTITLEMENTS\DWG\ Topography.dwg

APPENDIX B

Site Photos

Photo 1 – Unnamed Lake Earl tributary, Class I stream

Photo 2 – Unnamed Lake Earl tributary, Class II stream

Photo 3 – Road network intersection, standing water (April 3, 2008)

Photo 4 – Road intersection standing water, note Pacific treefrog tadpoles (April 3, 2008)

APPENDIX C

Rare, Threatened and Endangered Plant Species, Crescent City Quad (Green Diamond Resource Company data base search results for THP 1-09-009 DEL)

Survey List of Rare, Threatened, and Endangered Plant Species

Project Name: **N #563** GDRCo#: 950801

Project Quad(s): Crescent City Project Elevation Range: 80-560

Species Found: **No**

Arabis koehleri var. stipitata **Koehler's stipitate rock cress** Serpentine Association: Yes

Fed List: State List: CRPR: **1B.3** State Rank: **S1.3**

USGS 7.5' Quads (CNDDB): Broken Rib Mtn., Figurehead Mtn., Gasquet, High Plateau Mtn., Hiouchi, Hurdygurdy Butte, Kangaroo Mtn., Ship Mountain, Smoky Creek

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; Smith, Upper Klamath, SF Trinity (natureserve.org). Range is nw Klamath Ranges [n Del Norte] (Hickman, 1996). Known only from Del Norte, Siskiyou and Trinity Co., and OR (CNPS). Chaparral, or lower montane coniferous forest, serpentine (CNDDB). Dry, rocky, moderate to steep slopes, ridges or outcrops [serpentine]; often found on microsites in Jeffrey pine-dominated plant associations (Nakamura & Nelson). Elevation within 500-6,000' (CNDDB). Blooms April-July (CNPS). Perennial, caudex woody branched; stems 5-30(40) cm; lvs basal rosette with stellate hairs; petals scarlet to deep purple; fruit ascending to ± spreading, curved, glabrous (Hickman, 1996).
Project area is low elevation, mesic and very coastal.

Arabis mcdonaldiana **McDonald's rock cress** Serpentine Association: Yes

Fed List: **FE** State List: **CE** CRPR: **1B.1** State Rank: **S2.1**

USGS 7.5' Quads (CNDDB): Broken Rib Mtn., Devils Punchbowl, Gasquet, High Divide, High Plateau Mtn., Noble Butte, Polar Bear Mtn., Preston Peak, Shelly Creek Ridge

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; North Fork of Smith, South Fork Eel, Lower Klamath (natureserve.org). Known from w Klamath Ranges and Outer North Coast Ranges (Nakamura & Nelson). Known only from Del Norte, Siskiyou, Trinity, and Mendocino Co.; also in OR (CNPS). Lower or upper montane coniferous forest, on rocky outcrops, ridges, slopes, and flats on serpentine (CNDDB). Crevices, cracks, and margins of rocks on barren to shrub-covered shallow, rocky, ultramafic/serpentinite soils or rocky openings in Jeffrey pine dominated woodland on granite slopes, ridges or seepage areas (Nakamura & Nelson). Deep reddish (serpentine derived) soils (Hickman, 1996). Elevation within 400'- 5,900' (CNPS). Blooms May-July. Short-lived perennial, caudex branched; stems 10-30 cm; lvs basal rosette, glabrous and shiny; petals rose-purple, narrowly spoon-shaped (Hickman, 1996).
Project area is low elevation, mesic and very coastal.

Asplenium trichomanes ssp. trichomanes **maindenhair spleenwort** Serpentine Association: No

Fed List: State List: CRPR: **2B.3** State Rank: **S2.3**

USGS 7.5' Quads (CNDDB): Hiouchi

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; Smith (natureserve.org). Range is nw Klamath Ranges in Del Norte Co. (Hickman, 1996). Only CA occurrence is on Myrtle Creek, in the Hiouchi quad. (CNDDB). Widespread outside of CA. Lower montane coniferous forest, on rocks (CNDDB). Elevation is within 600-700' (CNPS). Plants on rock; rhizome gen short-creeping to erect; petiole narrowly winged, dark red to purple-brown, shiny; lvs 1-pinnate, many, clustered; primary leaflets 20-30(37) pairs, gen. shallowly crenate on upper, outer margins; sori linear (Hickman, 1996).
Project area is low elevation, mesic and very coastal.

Calamagrostis crassiglumis **Thurber's reed grass** Serpentine Association: No

Fed List: State List: CRPR: **2B.1** State Rank: **S1.2**

USGS 7.5' Quads (CNDDB): Crescent City, Drakes Bay, Inglenook, Sebastopol, Sister Rocks

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Maybe**

Range is North Coast. Within range of GDRCo occurs in Del Norte and Humboldt, also in Mendocino Co. (CNPS). Coastal scrub, freshwater marsh. Marshy swales surrounded by moist grasslands or coastal scrub (CNDDB). Swamps (CNPS). Wetland obligate (USDA Plants). Elevation is within 30-150' in elevation. Flowers May-July (CNPS). (One floret per spikelet, glumes greater than lemma, extended rachilla). Perennial, culms 15-40 cm tall. Panicle is narrow, dense, spikelike, 2-5 cm long, dull purple. Lemma awned from the middle. Awn is straight and about as long as the lemma. Callus hairs abundant, and about the same length as the lemma. Lf sheaths glabrous on collar (Hitchcock & Chase, 1971). See C. stricta spp. inexpansa in the Jepson Manual. Wetland obligate (USDA plants). If present wetland and riparian protections under the FPR and the AHCP will likely provide protection.
Elevation and range questionable in unit C. Species presence possible, but none was located.

Survey List of Rare, Threatened, and Endangered Plant Species

Project Name: **N #563** GDRCo#: 950801

Project Quad(s): Crescent City Project Elevation Range: 80-560

Cardamine nuttallii var. gemmata **yellow-tubered toothwort** Serpentine Association: Yes

Fed List: State List: CRPR: **3.3** State Rank: **S2.2**

USGS 7.5' Quads (CNDDB): Crescent City, Gasquet, High Divide, High Plateau Mtn., Hiouchi, Smith River
Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; Smith (natureserve.org). Range is North Coast in Del Norte Co. Also occurs in sw OR, and in WA (CNPS). Serpentinite in lower montane or North Coast coniferous forest (CNDDB). Moist sites on bare, gravelly to bouldery semistable slopes of serpentine, peridodite, or metasedimentary orgin in Jeffrey pine forests (Nakamura & Nelson). In shaded forests and riparian areas as well as more open habitat (springs, barrens, roadcuts, talus) at low elevations and on serpentine outcrops at higher elevations (natureserve.org). Redwood forest (Hickman, 1996). Elevation within 300-2,300'. Blooms Apr-May (CNPS). Herbaceous perennial, under 8" tall, glabrous throughout. Flowers pink to purple, rarely white (Nakamura & Nelson). Rhizome leaflets 3-5, subpalmately arranged, widely ovate to ± elliptic, stalked, thickish, toothed; cauline leaflets 3-5 linear (Hickman, 1996). Rarely sets fruit (naturserve.org).
Serpentine component lacking completely from the project area.

Carex arcta **northern clustered sedge** Serpentine Association: No

Fed List: State List: CRPR: **2B.2** State Rank: **S1S2**

USGS 7.5' Quads (CNDDB): Arcata North, Arcata South, Board Camp Mtn., Buckingham Mtn., Eureka, Fields Landing, Grouse Mtn., Lamont Peak, Mad River Buttes, Maple Creek, Mcwhinney Creek, Owl Creek, Redcrest
Known Occurrence in Project Vicinity: **No** Species Habitat Available? **Yes**

Occurs in these CA watersheds; Mad-Redwood, Lower Eel, South Fork Trinity, South Fork Kern, Upper Merced (natureserve.org). Range is Outer North Coast Ranges (Hickman). Within range of GDRCo occurs in Humboldt and Del Norte Co. (CNPS). Mesic North Coast coniferous forest, bogs or fens (CNDDB). Wet places, especially sphagnum bogs (Hickman, 1996). Moist meadows, swamps [Alnus-Salix, sedge] or seasonal ponds within forest (CNDDB occs.). Wetland obligate (USDA Plants). Elevation range 200-4,600'. Blooms June-Sept. (CNPS). Cespitose. Spikelets staminate at base, pistillate above. Two stigmas. Inflorescence ± dense. Spikelets 7-15, distinct (Hickman, 1996). If present, wetland and riparian protections under the FPR and the AHCP should provide protection.
Project area, especially unit B, provided habitat suitable for this plant. No populations were located.

Carex leptalea **bristle-stalked sedge** Serpentine Association: Yes

Fed List: State List: CRPR: **2B.2** State Rank: **S2**

USGS 7.5' Quads (CNDDB): Cant Hook Mtn., Crannell, Drakes Bay, Fields Landing, Trinidad, Trinity Center
Known Occurrence in Project Vicinity: **No** Species Habitat Available? **Yes**

Occurs in these CA watersheds; Smith, Mad-Redwood, Trinity, Tomales-Drake Bays (natureserve.org). Range is North Coast, Outer North Coast Ranges, Central Coast (Hickman). Within range of GDRCo occurs in Humboldt, Del Norte and Trinity Co. (CNDDB). Bogs, fens, meadows, marshes, and swamps. Mostly known from bogs, wet meadows (CNDDB) and seeps (CNPS). Along small streams, lake shores, and on low, wet ground (Hurd et. al. 1998). Seepy-watercourse in riparian-mixed conifer on serpentine (CNDDB occ.). Present in boggy ground off CR1000 with Ledum and Spirea on GDRCo. Wetland obligate (USDA plants). Elevation range is 0-2,600'. Blooms Mar-July (CNDDB). Perennial, rhizomed. Stem 10-40 cm. Spikelet 1 per inflorescence. Staminate flowers above pistillate flowers. Spike is linear-oblong (Hickman, 1996). Fairly distinctive: pale green plant with very slender leaves, filiform stems, and small, single, terminal, androgynous spikes (natureserve.org). If present, wetland and riparian protections under the FPR and the AHCP should provide protection.
Serpentine component lacking from the project area, but other specific habitat is present in the project area.

Carex praticola **meadow sedge** Serpentine Association: No

Fed List: State List: CRPR: **2B.2** State Rank: **S2S3**

USGS 7.5' Quads (CNDDB): Bark Shanty Gulch, Crescent City, Eureka, French Camp Ridge, Grouse Mtn., Holter Ridge, Homewood, Orick, Porcupine Butte, Tiltill Mtn., Tioga Pass
Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Yes**

Occurs in these CA watersheds; Smith, Mad-Redwood, Upper Klamath, Lower Klamath, Trinity, Lower Pit, Upper Tuolumne, Mono Lake (natureserve.org). Range is North Coast, c&s High Sierra Nevada (Hickman). Within range of GDRCo occurs in Humboldt, Del Norte and Siskiyou Co. (CNPS). Moist to wet meadows (CNDDB). Prairies (GDRC occ.). Seeps (CNPS). Along streambanks, and in moist, open woods (Hurd et. al. 1998). Elevation within 0-10,500'. Blooms May-July (CNPS). Cespitose. Inflorescence open, often nodding, 15-50 mm; lowest internode generally > 5 mm, second lowest 2.5-10 mm. Spikelets 2-7, distinct, base often long-tapered (Hickman, 1996).
Project area provided specific habitat for this plant, but none were located.

Survey List of Rare, Threatened, and Endangered Plant Species

Project Name: **N #563** GDRCo#: 950801

Project Quad(s): Crescent City Project Elevation Range: 80-560

Carex serpenticola **serpentine sedge** Serpentine Association: Yes

Fed List: State List: CRPR: **2B.3** State Rank: **S2.3**

USGS 7.5' Quads (CNDDB): Broken Rib Mtn., Gasquet, High Divide, High Plateau Mtn., Hiouchi, Polar Bear Mtn., Shelly Creek Ridge, Smith River

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Maybe**

Occurs in these CA watersheds; Smith (natureserve.org). Species range is ultramafic deposits in the Klamath Mts. of nw CA (Zika et al. 1998). Within range of GDRCo occurs in Del Norte Co; also in OR (Flora of NA). Mesic, serpentine sites in meadows and seeps (CNDDB). On serpentine soils. Moist to wet meadows, riparian woodlands, savannahs, successional scrublands, and the margins of wetlands (Flora of NA). Elevation within 200-4,000' (CNDDB). Blooms Mar-May (CNPS). Not in Jepson. Rhizomatous perennial capable of forming mats 2 meters in diameter. Culms 8-38 cm tall, bearing 2-5 highly reduced green or purple-margined leaves. Usually either pistillate or staminate, but some bisexual. See species description for details. Appears most similar to C. globosa except with unisexual culms and dark purple pistillate scales (Zika, Madrono).

No ultramafic deposits, no serpentine soils, but other specific habitat traits are present and available in this plan.

Carex viridula var. viridula **green sedge** Serpentine Association: No

Fed List: State List: CRPR: **2B.3** State Rank: **S1.3**

USGS 7.5' Quads (CNDDB): Crescent City, Gasquet, Inglenook, Lake Eleanor, Rodgers Peak, Sister Rocks, Smith River, Trinidad

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Yes**

Range is North Coast, n High Sierra Nevada (Hickman). Within range of GDRCo occurs in Humboldt and Del Norte Co; also in Mendocino (CNPS). Bogs and fens, marshes and swamps (freshwater), North Coast coniferous forest (mesic) (CNDDB). Also sphagnum bogs (Hickman, 1996). On sphagnum or sandy or saline soils on wet, low ground, sea level to moderate elevations (Hurd et. al. 1998). Also wet meadows, dune slacks and lake-shores at low to middle elevations (Pojar & MacKinnon, 1994). Present at Dry Lagoon and in a wet roadside ditch (CNDDB occs.). Wetland obligate (USDA plants). Elevation within 0-5,250'. Blooms (Jun)Jul-Sep(Nov) (CNPS). See species description. If present, wetland and riparian protections under the FPR and the AHCP will likely provide protection.

No dunes or lakeshores, but swamp-like habitat and north coast coniferous forest present.

Castilleja miniata ssp. elata **Siskiyou Indian paintbrush** Serpentine Association: Yes

Fed List: State List: CRPR: **2B.2** State Rank: **S2.2**

USGS 7.5' Quads (CNDDB): Chimney Rock, Devils Punchbowl, Gasquet, High Divide, High Plateau Mtn., Hiouchi, Hurdygurdy Butte, Mccloud, Polar Bear Mtn., Preston Peak, Shelly Creek Ridge

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; Smith, Lower Klamath, McCloud, Sacramento headwaters (natureserve.org). Range is nw Klamath Ranges. Known only from Del Norte and Siskiyou Co., and sw OR (Hickman). Bogs and fens. Lower montane coniferous forest, seeps. Often serpentinite (CNPS). Also associated with stream benches, and dry gullies (CNDDB). Moist places, often on serpentine below 5200' in Mixed Evergreen forest and Yellow Pine forest communities (Munz & Keck, 1970). Sometimes on flats or vertical rock walls (CNDDB occ.). Occurs within 0-5,800' in elevation. Blooms May-Aug. (CNPS). Perennial, hemiparasitic herb; inflorescence pinkish to yellow-orange (Hickman, 1996).

Forest type wrong, no serpentinite

Survey List of Rare, Threatened, and Endangered Plant Species

Project Name: **N #563** GDRCo#: 950801

Project Quad(s): Crescent City Project Elevation Range: 80-560

Coptis laciniata **Oregon goldthread** Serpentine Association: No

Fed List: State List: CRPR: **4.2** State Rank: **S3.2**

USGS 7.5' Quads (CNDDB): Bald Hills, Blake Mountain, Blue Creek Mtn., Blue Lake, Cant Hook Mtn., Cold Spring, Comptche, Deadman Point, Dinsmore, Dutchmans Knoll, Elk, Eureka Hill, Fish Lake, French Camp Ridge, Happy Camp, Hiouchi, Holter Ridge, Hoopa, Korbel, Leggett, Lord-Ellis Summit, Maple Creek, Mathison Peak, Mendocino, Northspur, Noyo Hill, Owl Creek, Point Arena, Polar Bear Mtn., Preston Peak, Sherwood Peak, Showers Mtn., Weitchpec, Willow Creek

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Yes**

Occurs in these CA watersheds; Smith, Mad-Redwood, Lower Eel, Big-Navarro-Garcia, Lower Klamath, Trinity (natureserve.org). Range is North Coast and w Klamath Ranges (Hickman). Known only from Humboldt, Del Norte and Siskiyou Co.; also in Mendocino, OR, and WA (CNPS). North Coast coniferous forest, broadleaved upland forest, meadows and seeps, mesic sites such as moist streambanks. Wet cliffs in coastal mountains (Flora of NA). Occurs on road cutbanks, rock outcrops, and forested slopes above creeks on GDRCo. Elevation range 0-6,560'. Blooms Mar-Apr. (CNPS) Perennial from slender, yellow rhizome or stolon, gen. glabrous. Lvs 3-8, gen 1-ternate; leaflets ovate to triangular, terminal stalked or not, lobes gen 3, very deep, irregularly toothed to cut. Fruit: follicles 6-12; walls are papery and slightly translucent (Hickman, 1996).

Eriogonum pendulum **Waldo buckwheat** Serpentine Association: Yes

Fed List: State List: CRPR: **2B.2** State Rank: **S2.2**

USGS 7.5' Quads (CNDDB): Gasquet, High Divide, High Plateau Mtn.

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; Smith (natureserve.org). Range is nw Klamath Ranges (Hickman). Known only from Del Norte Co. and sw OR (CNPS). Serpentine soils in lower and upper montane coniferous forest (CNPS). On dry, rocky ultramafic soils or open, somewhat grassy areas within pine forest (CNDDB). Elevation range 700-3,300' (CNDDB). Blooms Aug-Sep. (CNPS). Perennial, sub-shrub to shrub, 20-50 cm; lvs cauline, ± clustered near stem tips; inflorescence cyme-like, open, branches few; perianth white, wooly (Hickman, 1996). See description in Jepson.

Habitat and elevation are not suitable for this plant.

Erythronium hendersonii **Henderson's fawn lily** Serpentine Association: No

Fed List: State List: CRPR: **2B.3** State Rank: **S1.3**

USGS 7.5' Quads (CNDDB): Cecilville, Cottonwood Peak, Grasshopper Ridge, Greenview, Hiouchi, Hornbrook, Mt. Ashland, Siskiyou Pass

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; Smith, Upper Klamath, Scott, Salmon (natureserve.org). Range is Klamath Ranges to sw OR (Hickman). Known only from Del Norte and Siskiyou Co., also in OR. Four occurrences in CNDDB, only one in Del Norte; Hiouchi quad, T17N, R1E, S18; last seen in 1962. Most of this section is on GDRCo (CNDDB). Lower montane coniferous forest (CNDDB). Open woods and meadows (natureserve.org). Dry woodlands and openings (Hickman, 1996). Wooded slopes in the Yellow Pine Forest plant community (Munz & Keck, 1970). Semi-shaded oak woods (Niehaus 1976). Elevation within 975-5,250'. Blooms Apr-July (CNPS). Perennial from slender bulb; lvs mottled white or brown; stalk reddish; flwrs 1-4; perianth segments wide lanceolate, violet to pink (darker toward tip) with dark purple base, inner w/sac-like folds at base; filaments slender < .8mm, purple; anthers light brown-purple, style violet; stigma entire or with lobes < 1mm (Hickman, 1996).

Habitat and elevation are not suitable for this plant.

Survey List of Rare, Threatened, and Endangered Plant Species

Project Name: **N #563** GDRCo#: 950801

Project Quad(s): Crescent City Project Elevation Range: 80-560

Erythronium howellii **Howell's fawn lily** Serpentine Association: Yes

Fed List: State List: CRPR: **1B.3** State Rank: **S2.3**

USGS 7.5' Quads (CNDDB): Broken Rib Mtn., Gasquet, High Divide, High Plateau Mtn., Hiouchi, Hurdygurdy Butte, Polar Bear Mtn., Shelly Creek Ridge, Takilma

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Maybe**

Occurs in these CA watersheds; Smith, Lower Klamath (natureserve.org). Known only from Del Norte and Siskiyou Co.; also in s OR (CNPS, CNDDB). North Coast or lower montane coniferous forest with or without serpentine (CNPS). Woods, yellow pine forest (Munz & Keck, 1970). Open woods, transition zone (Abrams, 1923). Evergreen coniferous forest, redwood stand, very gravelly colluvial soil (CNDDB occs.). Elevation within 650-3,750'. (Jepson and Flora of NA include in E. citrinum.) Perennial, slender bulb; lvs 9-15cm, mottled with white or brown; tepals white, often pinkish with age, usually pale yellow at base; lacks (auricles) sac-like folds on inner perianth; stamens 11-17 mm, filaments linear, slender, white or pinkish [purple pers. comm. T. Engstrom]; anthers white, cream, pink, reddish or brownish red; style straight, white or pink; stigma unlobed or with lobes < 1mm (Flora of NA description for E. citrinum with exception of lack of auricles). Some specific habitats are present and suitable, but some habitat features don't match and the elevation of the plan area is too low.

Erythronium oregonum **Oregon fawn lily** Serpentine Association: Yes

Fed List: State List: CRPR: **2B.2** State Rank: **S2.2**

USGS 7.5' Quads (CNDDB): Bell Springs, Gasquet, Grouse Mtn., Hoopa, Iaqua Buttes, Lord-Ellis Summit, Maple Creek, Myers Flat, Scotia, Sims Mountain, Somes Bar, Taylor Peak, Willow Creek

Known Occurrence in Project Vicinity: **No** Species Habitat Available? **No**

Known only from Del Norte, Humboldt, Siskiyou, Mendocino and Trinity Co.; also in OR and WA (CNDDB). Cismontane woodland, meadows and seeps. Openings. Sometimes on serpentine. Rocky sites (CNDDB). Oak woodland or mixed evergreen forest (CNDDB occ.). Lower montane coniferous forest (GDRCo occ. info). Elevation range is 320'- 3,550' (CNPS, GDRCo occ. info). Blooms Mar-May (CNPS). Perennial from bulb. Lvs mottled brown or white. Scape ± reddish, 15-40 cm; tepals white to creamy with yellow base at anthesis, sometimes pinkish in age, sometimes with red lines or bands, inner with sac-like folds at base. Stamen 12-25 mm; anthers cream to yellow, [10-12 mm before dehiscence (Hitchcock and Cronquist)]; filaments white, flattened, 2-3 mm wide. Style white with slender recurved lobes (Flora of NA).

Erythronium revolutum **coast fawn lily** Serpentine Association: No

Fed List: State List: CRPR: **2B.2** State Rank: **S2.2**

USGS 7.5' Quads (CNDDB): Bald Hills, Blue Creek Mtn., Blue Lake, Board Camp Mtn., Bridgeville, Bull Creek, Comptche, Eureka, French Camp Ridge, Garberville, Gasquet, Grouse Mtn., Hennessy Peak, Holter Ridge, Hupa Mountain, Iaqua Buttes, Johnsons, Korbel, Leggett, Lord-Ellis Summit, Mad River Buttes, Maple Creek, Miranda, Myers Flat, Navarro, Owl Creek, Philo, Piercy, Pony Buck Peak, Salyer, Scotia, Sherwood Peak, Showers Mtn., Taylor Peak, Weed, Weitchpec, Wildwood, Willow Creek, Yager Junction

Known Occurrence in Project Vicinity: **No** Species Habitat Available? **Yes**

Occurs in these CA watersheds; Smith, Mad-Redwood, Lower Eel, South Fork Eel, Mattole, Big-Navarro-Garcia, Shasta, Lower Klamath, Trinity, SF Trinity, Cottonwood headwaters (natureserve.org). Range is North Coast, outer North Coast Ranges (Hickman). Known only from Del Norte, Humboldt, Trinity, Siskiyou, Mendocino, Sonoma and Tehama Co.; also OR and WA (CNPS). Mesic areas and streambanks in North Coast coniferous and broadleaved upland forest, bogs and fens (CNDDB, CNPS). Wet places in woodlands (Hickman, 1996). River terraces (Flora of NA). Mossy rock outcrops and rocky, north facing slopes (GDRCo and CNDDB occs.). Occurs at 0-4550' in elevation (CNPS, GDRCo occ.). Generally within 100 km (62 miles) of Pacific Coast. Blooms Mar-June (GDRCo occs.). Perennial from bulb. Lvs mottled brown or white. Scape 15-40 cm; tepals uniformly clear violet-pink at anthesis with yellow bands at base, inner w/small sac-like folds at base. Stamen 12-22 mm; anthers bright yellow, [7-8 mm long before dehiscence (Hitchcock and Cronquist)]; filaments white to pink, 2-3 mm wide and flattened. Style white to pink, stigma with slender recurved lobes (Flora of NA). Habitat did not at all seem ideal for this plant, but it could not be ruled out.

Survey List of Rare, Threatened, and Endangered Plant Species

Project Name: **N #563** GDRCo#: 950801

Project Quad(s): Crescent City Project Elevation Range: 80-560

Gentiana setigera **Mendocino gentian** Serpentine Association: Yes

Fed List: State List: CRPR: **1B.2** State Rank: **S1.2**

USGS 7.5' Quads (CNDDB): Gasquet, High Divide, High Plateau Mtn., Noble Butte

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; Smith, South Fork Eel. Siskiyou Mts. of OR and CA (natureserve.org). Range is outer North Coast Ranges. Wet mountain meadows (Hickman). Lower montane coniferous forest. Meadows, seeps, and bogs. Usually or always on serpentine (CNDDB). Also seeps (CNPS). Serpentine bogs and wet meadows, in open to semi-shaded areas (natureserve.org). Known only from Del Norte and Mendocino Co. at Red Mtn.; also occurs in OR. Elevation within 1,600-3,500'. Wetland obligate (USDA Plants). Perennial, stems arising laterally from caudex below basal rosette of lvs; decumbent, 1-few, 20-45 cm; lvs of middle to upper stem < internodes; corolla uniformly blue, fls 1-4, sinus appendages divided into 2-3 thread-like, entire segments (Hickman, 1996). If present, wetland and riparian protections under the FPR and the AHCP will likely provide protection.

Gilia capitata ssp. pacifica **Pacific gilia** Serpentine Association: No

Fed List: State List: CRPR: **1B.2** State Rank: **S2.2?**

USGS 7.5' Quads (CNDDB): Albion, Bear Harbor, Briceland, Bridgeville, Buckeye Mtn., Bull Creek, Cape Mendocino, Childs Hill, Crannell, Crescent City, Elk, Eureka, Fort Bragg, Fortuna, Gasquet, Hiouchi, Hydesville, Iaqua Buttes, Lord-Ellis Summit, Mendocino, Point Arena, Saunders Reef, Scotia, Sister Rocks, Smith River, Taylor Peak, Trinidad, Weott, Willits

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; Smith, Mad-Redwood, Upper Eel, Lower Eel, Mattole, Big-Navarro-Garcia (natureserve.org). n&c North coast (Hickman). Coastal bluff scrub, coastal prairie, valley and foothill grassland (CNDDB). Chaparral, openings (CNPS). Meadows in or near Douglas-fir forests (CNDDB occ.). Known only from Del Norte, Humboldt, and Mendocino Co. Also occurs in OR. Elevation within 15-2,900' (CNPS). Stem 25-50 cm; lf 2-pinnate; axis and lobes ± 1mm wide; lf lobes linear; flwrs in spheric heads; inflorescence 12-40 mm wide; calyx glabrous to slightly hairy or glandular, ribs green, membrane blue-violet, corolla pale to bright blue violet (Hickman, 1996).

No coastal bluff scrub, coastal prairies or valley/foothill grassland.

Glyceria grandis **American mannagrass** Serpentine Association: No

Fed List: State List: CRPR: **2B.3** State Rank: **S1.3?**

USGS 7.5' Quads (CNDDB): Big Alkali, Bridgeport, Coleville, Eureka Hill, Luckett Mtn., Maple Creek, Miramonte, Patterson Mtn., Point Arena, Sacate Ridge, Tahoe City, Tucker Mtn., Verplank Ridge

Known Occurrence in Project Vicinity: **No** Species Habitat Available? **Yes**

Occurs in these CA watersheds; Mad-Redwood, Big-Navarro-Garcia, Mill, Upper King (natureserve.org). Range is North Coast, North Coast Ranges. Wet places, meadows, lake and stream margins (Hickman). Bogs, fens, meadows, seeps, marshes, swamps, streambanks and lake margins (CNPS). Also, ditches and ponds in valleys and lower elevations in the mountains (CNDDB). Within range of GDRCo occurs in Humboldt Co.; also in Mendocino Co. Only Humboldt record is Tracy collection from 1936 at Lake Prairie, Bald Mt. Elevation 50-6,500'. Blooms June-Aug. (CNPS). Wetland obligate. Genus traits: perennial from rhizome; lf sheath closed to near top; inflorescence is panicle-like; glumes < lowest floret; veins on lemma are parallel (Hickman, 1996). (G. elata is common on GDRCo property). Traits of G. grandis: spikelet ovoid; inflorescence open; branches spreading. Palea tip jagged or widely V notched; lemma widest at middle or below. [Torreyochloa pallida var. pauciflora looks very similar to G. grandis, palea tip is also jagged or widely V notched; but leaf sheaths are open ± to the base (Hickman, 1996). Traits of lf sheaths best determined when grass is fresh] If present, wetland and riparian protections under the FPR and the AHCP will likely provide protection.

Glyceria elata was noted in the area.

Survey List of Rare, Threatened, and Endangered Plant Species

Project Name: **N #563** GDRCo#: 950801

Project Quad(s): Crescent City Project Elevation Range: 80-560

Hierochloe odorata **vanilla-grass** Serpentine Association: No

Fed List: State List: CRPR: **2B.3** State Rank: **S1.3?**

USGS 7.5' Quads (CNDDB): Crescent City, Lassen Peak, Panther Rock, Seven Lakes Basin, Thousand Lakes Valley

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Range is n High Cascade Range (Hickman). Meadows and seeps; wet sites (CNDDB). Also bogs (Hitchcock & Chase, 1971). Blooms Apr-July. Elevation range 4,900-6,200' (CNPS). Only five occurrences in CNDDB. Within range of GDRCo occurs in Siskiyou and Del Norte Co.; also OR. The only Del Norte Co. occ. is an outlier located at 10' at the Crescent City Marsh. Two species in genus and H. occidentalis is very common. Both are perennial with rhizomes, have fragrant lvs, panicle-like open infl., and stalked spikelets with three florets. The lower two florets are staminate with three stamens, the upper floret is bisexual with two stamens. HIOD is 3-5 dm tall. (HIOC is 3-10 dm tall.) HIOD leaf blade is <5 mm wide, upper blade is ± appressed, lemmas acute. HIOC lf blade > 5mm wide, upper blade spreading, lemmas rounded at slightly lobed tip (Hickman, 1996).

Iliamna latibracteata **California globe mallow** Serpentine Association: No

Fed List: State List: CRPR: **1B.2** State Rank: **S2.2**

USGS 7.5' Quads (CNDDB): Blue Lake, Board Camp Mtn., Fern Canyon, French Camp Ridge, Grouse Mtn., Hopkins Butte, Korbel, Lord-Ellis Summit, Maple Creek, Orick, Polar Bear Mtn., Sims Mountain, Sportshaven, Takilma, Tish Tang Point, Willow Creek

Known Occurrence in Project Vicinity: **No** Species Habitat Available? **Yes**

Occurs in these CA watersheds; Mad-Redwood, Shasta, Lower Klamath, Trinity, SF Trinity (natureserve.org). Range is nw Klamath ranges (Hickman). Moist often shaded places such as streamsides in conifer forests (natureserve.org). North Coast coniferous forest; seepage areas in silty clay loam (CNDDB). Montane chaparral, lower montane coniferous forest, riparian scrub and streambanks, often in burned areas. Blooms June-Aug. Type locality is along Prairie Creek at low elevation, but mostly found in lower montane forest. Elevation within 200-6,600' (mostly 3,000-5,000). Known only from Humboldt, Trinity, Siskiyou and Del Norte Co., also in OR (CNPS). One plant found on GDRCo near Hwy 299, east of Lord Ellis Summit (GDRCo). Possibly threatened by fire suppression (CNPS, 2006). Perennial from woody caudex, stem finely stellate-hairy, erect, branched, 10-20 dm; lf blade 8-20 cm, deeply palmate, 5-7 lobed, upper surface glabrous, lower surface canescent, base truncate to cordate; infl. sometimes appearing as a crowded raceme, bractlets 10-14 mm, petals rose purple (Hickman).

Kopsiopsis (Boschniakia) hookeri **small groundcone** Serpentine Association: No

Fed List: State List: CRPR: **2B.3** State Rank: **S1S2**

USGS 7.5' Quads (CNDDB): Blake Mountain, Elk, Fish Lake, High Divide, Holter Ridge, Hopland, Hyampom, Johnsons, Miranda, Purdys Gardens, Salyer, San Rafael, Weitchpec

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; Smith, Big-Navarro-Garcia, Russian, Lower Klamath, Trinity, San Pablo Bay, Tomales-Drake Bays (natureserve.org). Range is Outer North Coast Ranges, San Francisco Bay Area at Mount Tamalpais, Marin Co. (Hickman, 1996). Within range of GDRCo occurs in Humboldt, Del Norte and Trinity Co.; also in Mendocino Co. and PNW (CNPS). North Coast coniferous forest, open woods, shrubby places (CNDDB). Forest openings and/or areas of dense shrub with a well-developed litter layer (CNDDB occs). Species of Gaultheria, Arctostaphylos, Arbutus or Vaccinium are potential hosts for this parasitic plant (WA DNR, 2003). Elevation is within 300-2900' (CNPS). Small, lemon yellow, ground cones found up to 4,700' on GDRCo and plants are found inland in xeric forests. Blooms Apr-Aug. (CNPS). Perennial. Plant height is 7-12 cm. Infl. 3-6 cm, < 3 cm diameter, purplish, pink to pale yellow (Hickman, 1996). Project area is very coastal. Species presence possible, but extremely unlikely.

Survey List of Rare, Threatened, and Endangered Plant Species

Project Name: **N #563** GDRCo#: 950801

Project Quad(s): Crescent City Project Elevation Range: 80-560

Lathyrus palustris **marsh pea** Serpentine Association: No

Fed List: State List: CRPR: **2B.2** State Rank: **S2S3**

USGS 7.5' Quads (CNDDB): Crescent City, Eureka, Eureka Hill, Fields Landing, Gualala, Shelter Cove, Sister Rocks, Trinidad

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Yes**

Occurs in these CA watersheds; Smith, Mad-Redwood, Mattole (natureserve.org). Range is n North Coast (Hickman). Bogs and fens. Lower montane and North Coast coniferous forest. Marshes and swamps. Coastal prairie, coastal scrub. Moist coastal areas (CNDDB). Seasonal seep/meadow surrounded by NCCF at 450' (CNDDB occ.). Elevation within 0-450' (CNPS, CNDDB). Known only from Humboldt, Del Norte, and Mendocino Co.; OR, WA, and elsewhere. Blooms Mar-Aug (CNPS). Wetland obligate (USDA plants). Perennial herb; stem angled, flanged, or narrowly winged; lf: stipules lanceolate; leaflets 6, sometimes 4 or 8, opposite, 2.5-5.5 cm long; tendril branched, coiled; infl. 3-6 flowers, corolla pink-purple or purple, rarely white (Hickman, 1996). If present, wetland and riparian protections under the FPR and the AHCP will likely provide protection.

Lewisia oppositifolia **opposite-leaved lewisia** Serpentine Association: Yes

Fed List: State List: CRPR: **2B.2** State Rank: **S2.2**

USGS 7.5' Quads (CNDDB): Gasquet, High Divide, High Plateau Mtn., Hiouchi, Hurdygurdy Butte, Shelly Creek Ridge

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in this CA watershed; Smith (natureserve.org). Range is nw Klamath ranges; Moist places in open pine forests (Hickman). Lower montane coniferous forest. In open, rocky, shallow soils; sometimes on serpentine. Mesic sites (CNDDB). Barren to slightly shrubby, rocky serpentine openings in Jeffrey pine stands (Nakamura & Nelson). Known only from Del Norte Co., and OR. Blooms March-June (Nakamura & Nelson). Elevation within 950'-4,000' (CNPS). Low growing perennial herb, 2 ½ to 5 ½" tall, growing in small tufts. Lower lvs succulent, oblanceolate, in basal rosette. Lvs on lower portion of flower stem in 1 or 2 pairs. Sepals 2, not glandular, with coarsely dentate margins. Petals white to pinkish with blunt or jagged tips, flwrs 2-5 (usually 3) arise from one stem (Nakamura & Nelson).

Lilium occidentale **western lily** Serpentine Association: No

Fed List: **FE** State List: **CE** CRPR: **1B.1** State Rank: **S1.2**

USGS 7.5' Quads (CNDDB): Arcata South, Cannibal Island, Crescent City, Fields Landing, Sister Rocks

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Yes**

Occurs in these CA watersheds; Smith, Mad-Redwood, Lower Eel (natureserve.org). Known from a narrow strip along coast in n CA and s OR (natureserve.org). Coastal scrub, freshwater marsh, bogs and fens, coastal bluff scrub, coastal prairie, North Coast coniferous forest. Well-drained, old beach washes overlain w/wind blown alluvium and organic topsoil; usually near margins of Sitka spruce (CNDDB). Also swamps (freshwater) and forest openings (CNPS). Within 4 mi of the coast; gaps in coniferous forest, generally early seral stage; old, shallow, organic moist soils with seasonally perched water table (Nakamura & Nelson). Sandy loam or peat soils in thickets and among ferns in the North Coastal Scrub (Munz & Keck, 1970). Known from only Del Norte, Humboldt Co., and OR. Blooms June-July. Elevation within 0-650'. CA and federally endangered (CNPS). Perennial from bulb; lvs in 1-9 whorls (rarely scattered); flwrs 1-35 strongly recurved, corolla two-toned, inner surface red to maroon (rarely orange) on distal 50-60%, base yellow to green, sometimes with intervening band of orange or yellow; strongly green on outside towards base, stamens > > perianth, filaments parallel; anthers dull red or magenta, stamens closely surrounding the pistil, pollen gen red-brown (Hickman, 1996).

Minuartia howellii **Howell's sandwort** Serpentine Association: Yes

Fed List: State List: CRPR: **1B.3** State Rank: **S3.2**

USGS 7.5' Quads (CNDDB): Broken Rib Mtn., Gasquet, High Divide, High Plateau Mtn., Hiouchi, Indian Creek Baldy, Shelly Creek Ridge, Smith River

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; Smith, Scott (natureserve.org). Range is Klamath Ranges (Hickman). Lower montane coniferous forest, chaparral. Dry open places, often on serpentine hillsides and ridges, near Jeffrey Pines (CNDDB). Oak woodland on serpentine (Hickman, 1996) and in dry open places in Mixed Evergreen Forest (Munz & Keck, 1970). Dry rocky or sandy soils (Abrams 1944). Within range of GDRCo occurs in Del Norte and Siskiyou Co.; and OR. Blooms Apr-July. Elevation range is 1,800'-3,300' (CNPS). Annual with taproot; stem erect to spreading, simple or often branched from base, 12-30cm, green, becoming purple; finely glandular hairy; lf blade linear-lanceolate, recurved, rigid, stipitate glandular; flwrs five-parted, disc-shaped hypanthium (Hickman, 1996).

Survey List of Rare, Threatened, and Endangered Plant Species

Project Name: **N #563** GDRCo#: 950801

Project Quad(s): Crescent City Project Elevation Range: 80-560

Monotropa uniflora **Indian-pipe** Serpentine Association: No

Fed List: State List: CRPR: **2B.2** State Rank: **S2S3**

USGS 7.5' Quads (CNDDB): Arcata South, Blue Creek Mtn., Childs Hill, Crescent City, Eureka, Fern Canyon, High Divide, Hiouchi, Holter Ridge, Klamath Glen, Orick, Requa, Smith River

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Yes**

Occurs in these CA watersheds; Smith, Mad-Redwood, Lower Klamath (natureserve.org). Range is North Coast, Klamath Ranges (Hickman). Broadleaved upland, North Coast coniferous forest. Often under redwoods or western hemlock (CNDDB). Known from GDRCo in forests dominated by Douglas-fir, western hemlock, or redwoods, but always with some Douglas-fir in general vicinity. One GDRCo site found in Monterey pine dominated stand, with very little Douglas-fir present. M. uniflora is a myco-heterotroph dependent on a fungal associate and a host tree species from which it obtains nutrients. In CA this relationship is thought to be formed with Russula brevipes and Douglas-fir. On GDRCo species is generally known from areas with a relatively open understory, closed canopy and well developed litter layer. Can occur under dense fern cover. Within range of GDRCo occurs in Humboldt and Del Norte Co., also in OR. Elevation range 30-2,800' (CNDDB occs.). Blooms late June to July (GDRCo). Perennial. Solitary white flowers, nodding when emerging from the soil, erect in flower, turning into brown "woody" stalks with capsules when in fruit (GDRCo).

Known populations very nearby. Douglas fir present as host species for this plant in the plan area.

Oenothera wolfii **Wolf's evening primrose** Serpentine Association: No

Fed List: State List: CRPR: **1B.1** State Rank: **S1.1**

USGS 7.5' Quads (CNDDB): Cape Mendocino, Capetown, Crannell, Crescent City, Eureka, Inglenook, Orick, Orleans, Requa, Sister Rocks, Smith River

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; Smith, Mad-Redwood, Mattole, Lower Klamath (natureserve.org). Range is Klamath Ranges and n North Coast (Hickman). Coastal bluff scrub, coastal dunes, coastal prairie, lower montane coniferous forest. Sandy substrates. Usually mesic site (CNPS). Also roadcuts and roadsides near the coast and, possibly, moist sandy riparian areas (natureserve.org). Known only from Humboldt, Trinity, Del Norte, Mendocino Co. and OR. Blooms May-Oct. Elevation range 10-2,650' (CNPS). Known in cultivated fields in Trinity River Valley near Willow Creek, gravel bank near Douglas City, and on vertical cutbank adjacent to asphalt and in grassy median w of Hwy 101 s bound near Klamath River exit (CNDDB occ.). Biennial herb, rosetted; stem erect 5-10 dm, densely minutely strigose, many hairs also with red, blister-like bases, some glandular. Leaves cauline 5-18 cm, narrowly lanceolate to elliptic, wavy-dentate, upper dentate. Inflorescence a spike of yellow flowers, fading reddish orange (Hickman, 1996).

Coastal bluff scrub, coastal dunes, coastal prairie and lower montane coniferous forest is not present.

Packera bolanderi var. bolanderi **seacoast ragwort** Serpentine Association: No

Fed List: State List: CRPR: **2B.2** State Rank: **S1.2**

USGS 7.5' Quads (CNDDB): Cant Hook Mtn., Crannell, Crescent City, Fort Bragg, Gasquet, High Divide, Hiouchi, Hydesville, Mad River Buttes, Mathison Peak, Mendocino, Myers Flat, Noyo Hill, Owl Creek, Panther Creek, Redcrest, Scotia, Sister Rocks, Taylor Peak

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Maybe**

Occurs in these CA watersheds; Smith, Lower Eel, Big-Navarro-Garcia (natureserve.org) also Mad River and Little River (CNDDB). Range is North Coast (Hickman). Coastal scrub, North Coast Coniferous Forest, bluffs (CNDDB), sometimes roadsides (CNPS). Open areas in coastal forests, wet rocky cliffs (Flora of NA). Cutbanks or streambanks with loose, rocky or sandy soil (GDRCo). Known only from Humboldt, n Del Norte, and Mendocino Co.; also OR and WA. Elevation range 100- 2,150'. Blooms May-July (CNPS). Perennial from rhizome, 1-5 dm; unevenly jointed-hairy on phyllaries and lf lower surfaces. Lvs thin to fleshy; lower petioled, often 3-7 lobed, main lobe ± cordate, deeply crenate; cauline more lobed. Infl: heads radiate, yellow (Hickman, 1996). Lvs can be purple on backsides (GDRCo). Basal lvs ± thick and turgid (Flora of NA) *In Jepson as Senecio

Soils not rocky/sandy. Roadsides/streamsides are present.

Survey List of Rare, Threatened, and Endangered Plant Species

Project Name: **N #563** GDRCo#: 950801

Project Quad(s): Crescent City Project Elevation Range: 80-560

Pinguicula macroceras **horned butterwort** Serpentine Association: Yes

Fed List: State List: CRPR: **2B.2** State Rank: **S3.2**

USGS 7.5' Quads (CNDDB): Broken Rib Mtn., Cant Hook Mtn., Crescent City, Devils Punchbowl, Gasquet, High Divide, High Plateau Mtn., Hiouchi, Hurdygurdy Butte, Polar Bear Mtn., Preston Peak, Seven Lakes Basin, Smith River

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Yes**

Occurs in these CA watersheds; Smith, Lower Klamath, Trinity, Sacramento headwaters (natureserve.org). Range is n Klamath Ranges. Moist slopes, banks, serpentine cliffs (Hickman, 2nd edition). Bogs, fens, meadows, meadow edges, seeps, seepage areas, serpentine soil (CNDDB). Within range of GDRCo occurs in n Del Norte, e Trinity and w Siskiyou Co., also in OR (natureserve.org). Blooms Apr-June. Elevation range 50'-6,300' (CNDDB, CNPS). Perennial herb; infl: 1-5 per rosette, 1-2 dm; lvs in basal rosette, elliptic to ovate; fl: corolla incl spur 13-21 mm, blue-violet (rarely white). Usually grows in sites low in available nitrogen. Diet supplemented by entrapping insects (Pojar & Mackinnon).
Bog/seep habitat abundant. Elevation and range are both okay.

Piperia candida **white-flowered piperia** Serpentine Association: Yes

Fed List: State List: CRPR: **1B.2** State Rank: **S3.2**

USGS 7.5' Quads (CNDDB): Annapolis, Big Basin, Broken Rib Mtn., Bull Creek, Cant Hook Mtn., Castle Rock Ridge, Cazadero, Childs Hill, Comptche, Crannell, Davenport, Felton, Fish Lake, Forest Glen, French Camp Ridge, High Plateau Mtn., Honeydew, Hoopa, Hupa Mountain, Hurdygurdy Butte, Hyampom, Laytonville, Lord-Ellis Summit, Mindego Hill, Naufus Creek, Noble Butte, Philo, Piercy, Rodgers Peak, Salyer, Sawyers Bar, Seiad Valley, Shelly Creek Ridge, Sherwood Peak, Somes Bar, Thurston Peaks, Weitchpec, Weott, Willow Creek

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Maybe**

Range is North Coast, North Coast Ranges, Klamath Ranges and San Francisco Bay Area. Open to shaded sites, generally in coniferous forest (Hickman). North Coast coniferous, lower montane coniferous and broadleafed upland forests. Coast ranges from Santa Cruz Co. north; On Serpentine. Forest duff, mossy banks, rock outcrops & muskeg (CNDDB). Sometimes serpentinite (CNPS). Within range of GDRCo occurs in Humboldt, Del Norte, and Trinity Co., also in Mendocino Co. & OR. Blooms May-Sep. (CNPS). Elevation range 0'- 4,300' (CNDDB, CNPS). Perennial, caudex tuber or bulb-like. Pl 10-55 cm; lvs basal. Infl. ± 1-sided, ± open. Flwr; upper sepal ± pointed forward, white or green with white margins, lower sepals white, mid-vein green; lateral petals ± pointed forward to slightly ascending, white, midvein green; lip narrowly triangular recurved toward spur; spur 1.5-3.5 mm, pointed down, shorter than lip (Hickman, 1996).
Area is very wet/low/boggy overall. Seems unlikely.

Polemonium carneum **royal Jacob's-ladder** Serpentine Association: No

Fed List: State List: CRPR: **2B.2** State Rank: **S1**

USGS 7.5' Quads (CNDDB): Bodega Head, Boulder Peak, Capetown, Childs Hill, Dublin, Ferndale, Fortuna, Hornbrook, Indian Creek Baldy, Montague, Montara Mountain, Niles, Point Bonita, Rodgers Peak, San Francisco North, Sister Rocks, Smith River, Taylor Peak, Trinidad, Yreka

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Range is North Coast, Klamath Ranges, North Coast Ranges, Central Coast and San Francisco Bay Area (Hickman). Coastal prairie, coastal scrub, and lower montane coniferous forest (CNDDB). Moist to dry open areas (Hickman). Moist shaded ground or open grassy hills along coast (Jepson's A Flora of CA). Within range of GDRCo occurs in Del Norte, Humboldt, Siskiyou Co., and OR. Two recent collections from Siskiyou Co., the 14 other CNDDB occs. are historical. Historic sites near GDRCo; Big Lagoon, Smith River and Gilbert Creek (Jepson). Elevation 0-6,000'. Blooms April-Sept. (CNPS). Herbaceous perennial; minutely hairy; stems decumbent to erect, few to many from densely branched root-crown, 1-4' high. Lvs: pinnately compound, alternate; basal petioled, cauline sessile and smaller upward; lflets 7-21, 2-4 cm. Infl: cluster, open, umbel-like; flwrs: 3-7, rotate to bell-shaped, throat & lobes > tube, flesh pink to purple; style > > stamens, stamens attached at same level, filaments hairy at base; calyx membranous in age but not separated into membrane and ribs, fruit 6-8 mm (Hickman, 1996).
Plan is primarily very dense brush beneath dense canopy or shrubby swamp land. Very wet overall.

Survey List of Rare, Threatened, and Endangered Plant Species

Project Name: **N #563** GDRCo#: 950801

Project Quad(s): Crescent City Project Elevation Range: 80-560

Potamogeton foliosus var. fibrillosus **fibrous pondweed** Serpentine Association: No

Fed List: State List: CRPR: **2B.3** State Rank: **S1S2**

USGS 7.5' Quads (CNDDB): Crescent City, Sister Rocks

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Yes**

Occurs in this CA watershed; Smith (natureserve.org). Range is n North Coast, w Modoc Plateau, s East of Sierra Nevada (Hickman). Marshes and swamps, shallow water, small streams (CNDDB). Blooming period unknown. Known in CA from one occurrence Crescent City, in Del Norte Co. (CNPS). Elevation range is 0-4,300' (CNPS). Wetland obligate (USDA Plants). Perennial aquatic herb from densely matted, slender rhizomes; lvs all submersed, 2-4 cm, 1-2 cm wide, base generally with two glands, tips acute; stipules < 12 cm, persistent, clearly veined, becoming fibrous; infl: head-like or short spike; interrupted; fruit 1.4-1.7 mm, pale green, back with keel (Hickman, 1996). If present, wetland and riparian protections under the FPR and the AHCP will provide protection.

Many areas of swamp with standing water pools present.

Pyrrocoma racemosa var. congesta **Del Norte pyrrocoma** Serpentine Association: Yes

Fed List: State List: CRPR: **2B.3** State Rank: **S2.3**

USGS 7.5' Quads (CNDDB): Gasquet, High Divide, High Plateau Mtn., Hiouchi, Shelly Creek Ridge

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in this CA watershed; Smith (natureserve.org). Range is nw Klamath Ranges (Hickman). Chaparral, lower montane coniferous forest. Serpentine soils, from dry roadsides to damp hills; often in forest openings (CNDDB). Also in Yellow Pine Forest and Douglas-Fir plant communities (Munz & Keck, 1970). One occ. located in a seep with Darlingtonia californica (CNDDB occ.). Known only from Del Norte Co. and OR. Blooms Aug-Sept. Elevation range is 650'-3,300' (CNPS). Perennial from woody taproot; stems 15-90 cm, gen. glabrous; basal lvs 5-36 cm, (ob)lanceolate to widely elliptic, petioles tomentose; cauline lvs clasping, reduced, gen. serrate, glabrous; infl. gen. crowded, spike-like, radiate heads 3-15; corollas yellow; phyllaries herbaceous and yellow-green throughout, tips glandular-ciliate, not recurved (Hickman, 1996).

Project elevation is too low.

Sagittaria sanfordii **Sanford's arrowhead** Serpentine Association: No

Fed List: State List: CRPR: **1B.2** State Rank: **S3.2**

USGS 7.5' Quads (CNDDB): Berry Creek, Biggs, Carmichael, Citrus Heights, Clarksville, Clovis, Crescent City, Dales, Delta Ranch, Elk Grove, Firebaugh, Florin, Folsom Se, Fresno North, Galt, Gridley, Gustine, Ingomar, Isleton, Jamesan, Lockeford, Los Banos, Matilija, Mendota Dam, Merced, Owens Reservoir, Richardson Springs Nw, Sacramento East, San Luis Ranch, Seal Beach, Sloughhouse, Stockton West, Tranquillity, Turner Ranch, Waterloo, Whiskeytown

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Yes**

Occurs in these CA watersheds; Smith and several others in the other parts of the range (natureserve.org). Range is n North Coast (Del Norte Co.), Great Central Valley (where mostly extirpated), n South Coast (Ventura Co.) (Hickman). CA endemic. Within range of GDRC occurs in Del Norte Co. Shallow, standing fresh water and sluggish waterways associated with marshes, swamps, ponds, vernal pools, lakes, reservoirs, sloughs, ditches, canals, streams, and rivers (Nakamura & Nelson). Wetland obligate (USDA Plants). Blooms May-Oct. (CNPS). Elevation range 0-2,100' (CNPS). Aquatic perennial from rhizomes and spherical tubers. Emergent lf blades 14-25 cm, linear and 3-angled to narrowly ovate. [Lvs not arrow shaped like other members of genus (Hickman, 1996)]. Flwrs in several clusters shorter than lvs, white petals. Lower flwrs pistillate w/recurved pedicels that thicken when in fruit (Nakamura & Nelson). If present, wetland and riparian protections under the FPR and the AHCP will likely provide protection.

Slow/sluggish/standing water very abundant in the plan area.

Survey List of Rare, Threatened, and Endangered Plant Species

Project Name: **N #563** GDRCo#: 950801

Project Quad(s): Crescent City Project Elevation Range: 80-560

Sanguisorba officinalis **great burnet** Serpentine Association: Yes

Fed List: State List: CRPR: **2B.2** State Rank: **S2.2**

USGS 7.5' Quads (CNDDB): Albion, Board Camp Mtn., Crescent City, Elk, Fort Bragg, Gasquet, Grouse Mtn., High Divide, High Plateau Mtn., Hurdygurdy Butte, Mad River Buttes, Maple Creek, Mendocino, Shelly Creek Ridge, Ship Mountain, Sister Rocks

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Yes**

Occurs in these CA watersheds; Smith, Mad-Redwood, Big-Navarro-Garcia (natureserve.org). Range is c North Coast, nw Klamath Ranges, n Outer North Coast Ranges (Hickman). Bogs and fens, meadows and seeps, broadleaved upland and North Coast coniferous forest, marshes, swamps, and riparian forest. Rocky serpentine seepage areas and along stream borders (CNDDB). Also Red Fir Forest plant community (Munz & Keck, 1970). Known only from Del Norte, Humboldt, and Mendocino Co.; also OR, WA, and elsewhere. Blooms Jul-Oct. Elevation 190-4,600' (CNPS). Perennial herb w/ thick, creeping rhizome. Stem erect, 50-140 cm tall. Lvs: basal present at flwr, alternate, odd-1-pinnate, largest gen 20-40 cm; leaflets 3-6 per side, largest blade 25-50 mm, ovate-oblong, teeth gen > 15, < 1/3 to midvein. Infl. is a spike, ± elliptic-ovoid, dark purplish to reddish (Hickman, 1996).

Wet area/riparian forest habitat present.

Saxifraga nuttallii **Nuttall's saxifrage** Serpentine Association: No

Fed List: State List: CRPR: **2B.1** State Rank: **S1.1**

USGS 7.5' Quads (CNDDB): Hiouchi

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Maybe**

Occurs in this CA watershed; Smith (natureserve.org). Range is North Coast in Del Norte Co (Hickman). North Coast coniferous forest. Cliff walls, moss covered rocks along creeks; mesic sites (CNDDB). Wet shaded cliffs and ledges (Hickman 1996). Streams and wet banks (Hitchcock and Cronquist, 1976). Blooms in May. Known only from one site on the Smith River in CA; also known from OR and WA. Elevation is less than 2,300' (CNPS). Rhizomatous perennial herb with trailing stem, 5-25 cm. Cauline lvs 3-20 mm, obovate to elliptic, generally 3-lobed to sometimes entire at tip; lvs larger along middle of stem; infl: raceme or panicle with few flowers; Flower: sepals erect, << petals, triangular; petals 3-6 mm, elliptic; ten stamens; filaments thread-like. Seeds spiny (Hickman, 1996).

Very little rocky of any kind present.

Sidalcea malviflora ssp. patula **Siskiyou checkerbloom** Serpentine Association: No

Fed List: State List: CRPR: **1B.2** State Rank: **S1.1**

USGS 7.5' Quads (CNDDB): Albion, Arcata North, Board Camp Mtn., Bridgeville, Cape Mendocino, Capetown, Crescent City, Eureka, Fields Landing, Fortuna, Grouse Mtn., Hydesville, Korbel, Myers Flat, Orick, Owl Creek, Petrolia, Smith River

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; Smith, Mad-Redwood, Lower Eel, Mattole, Big-Navarro-Garcia, Trinity, SF Trinity (natureserve.org). Range is n North Coast (Hickman). Coastal prairie, broadleaved upland forest. Open coastal forest (CNDDB). Coastal bluff scrub. North Coast coniferous forest, often roadcuts (CNPS). Redwood forest plant community (Munz & Keck, 1970). Known only from Humboldt, Del Norte, and Mendocino Co. also sw OR. Blooms May-Aug. Elevation is within 50-2,900' (CNPS). Perennial herb with stem that is trailing and rooting, sparsely bristly and ± stellate. Lvs coarsely bristly and ± stellate, variable, gen. toothed or lobed; upper leaves gen. much reduced. Infl. dense, flowers stiffly erect: fl: calyx with fine-stellate and longer, gen. forked hairs (Hickman, 1996). Flowers rose-pink, five petaled (Nakamura & Nelson). Fruit segments gen coarse pitted and net-veined (Hickman, 1996). Flowers: Hibiscus-like with stamens combined in central column.

No wet meadow/open forest habitat present.

Survey List of Rare, Threatened, and Endangered Plant Species

Project Name: **N #563** GDRCo#: 950801

Project Quad(s): Crescent City Project Elevation Range: 80-560

Sidalcea oregana ssp. eximia **coast checkerbloom** Serpentine Association: No

Fed List: State List: CRPR: **1B.2** State Rank: **S1.2**

USGS 7.5' Quads (CNDDB): Arcata North, Board Camp Mtn., Cannibal Island, Crescent City, Eureka, Fields Landing, Grouse Mtn., Halfway Ridge, Hyampom, Iaqua Buttes, Mad River Buttes, Maple Creek, Smith River, Trinity Mtn.
Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Maybe**

Occurs in these CA watersheds; Smith, Mad-Redwood, Lower Eel, Lower Klamath, Trinity, SF Trinity (natureserve.org). Range is n North Coast, Outer North Coast Ranges (Hickman). Meadows and seeps, North Coast or lower montane coniferous forest. Near meadows, in gravelly soil (CNDDB). In the redwood forest and mixed evergreen forest plant communities (Munz & Keck, 1970). Known from roadsides (CNDDB occs.). Blooms Jun-Aug. CA endemic. Known only from Humboldt, Del Norte, Siskiyou, and Trinity Co.(CNPS). Elevation range form 0-5,910' (CNDDB). Perennial herb from woody taproot. Stem 9-12 dm, lower stem densely bristly, hairs simple; lvs ± basal; lower blades crenate to deeply lobed; upper blades ± compound, segments entire to deeply lobed. Infl. ± spike-like, very dense; flower calyx bristly (sometimes also sparsely fine-stellate), petals rose-pink. Intergrades with subspp. oregana and spicata (Hickman, 1996).
No meadow/open forest habitat present. The soil was not gravelly.

Silene serpentinicola **Serpentine catchfly** Serpentine Association: Yes

Fed List: State List: CRPR: **1B.2** State Rank: **S2.2**

USGS 7.5' Quads (CNDDB): Gasquet, High Divide, High Plateau Mtn., Hiouchi, Klamath Glen
Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; Smith, Lower Klamath (natureserve.org). Range is nw corner of CA, Del Norte Co, maybe sw OR (natureserve.org). CA serpentine endemic. Known only from Del Norte Co. Chaparral, lower montane coniferous forest. Serpentine openings, gravelly or rocky soils (CNDDB). Blooms May-July. Elevation ranges from 450-5,450' (CNPS). Perennial herb, rhizomatous, taproot stout. Flowering shoots 4-10(15) cm, softly pubescent. Lvs: gradually reduced upward, cauline in 4-8 pairs, crowded, oblanceolate to obovate, sparsely pubescent on both surfaces. Infl: terminal, 1-3(4)-flowered cymes, densely glandular-pubescent, bracts leaflike. Flowers: calyx purple tinged, corolla scarlet (Flora of NA). Not in Jepson. Has been confused with S. californica and S. hookeri ssp. pulverulenta. Species differ in following ways S. serpentinicola produces Carmine-red flwrs, while S. californica has Red-scarlet flwrs and S. hookeri ssp. pulverulenta has Pink-white flwrs. Pubescence and flwr morphology are different for each species (Nelson & Nelson 2004).
No serpentine present in the plan area.

Streptanthus howellii **Howell's jewel-flower** Serpentine Association: Yes

Fed List: State List: CRPR: **1B.2** State Rank: **S1.2**

USGS 7.5' Quads (CNDDB): Fourth Of July Creek, High Divide, High Plateau Mtn., Mt. Emily, Smith River
Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; Smith, Lower Klamath (natureserve.org). Range is n Klamath Ranges (Hickman). Lower montane coniferous forest. Dry serpentine slopes, in open pine woods or in brushy areas; on rocky soil (CNDDB). Dry serpentine slopes in Mixed Evergreen Forest plant community (Munz & Keck, 1970). Serpentine chapparal. From low elevation, rocky flats to montane ridges and summits. Always in open, exposed, serpentine clay, but will persist in brushy woodlands and brushfields for years. Found on roadsides (natureserve.org). May occupy disturbed areas within these habitat types (Nakamura & Nelson). Known only from Del Norte Co. and OR. Blooms Jul-Aug. Elevation range is 950-4,900' (CNPS). Perennial herb 3-7 dm; stems 1-few, basal lvs 2-10 cm, obovate, entire to coarsely dentate, fleshy, petioled; cauline lvs petioled to ± sessile, lower narrowly obovate, upper narrower. Petals 8-10 mm, purple at tip, yellow below, no lf bracts subtending flwrs, flwr bud and sepals glabrous (Hickman, 1996).
No serpentine, not rocky and not dry.

Survey List of Rare, Threatened, and Endangered Plant Species

Project Name: **N #563** GDRCo#: 950801

Project Quad(s): Crescent City Project Elevation Range: 80-560

Vaccinium scoparium **little-leaved huckleberry** Serpentine Association: No

Fed List: State List: CRPR: **2B.2** State Rank: **S2.2?**

USGS 7.5' Quads (CNDDB): Caribou Lake, Eaton Peak, English Peak, Gasquet, High Divide, Marble Mountain, Seven Lakes Basin, Thompson Peak, Ukonom Lake

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **No**

Occurs in these CA watersheds; Smith, Scott, Lower Klamath, Salmon, Sacramento headwaters (natureserve.org). Range is Klamath Ranges (Hickman). Subalpine coniferous forest. Rocky, subalpine woods. One site near Gasquet in boggy creek with Darlingtonia, Pinguicula and Port Orford cedar. Also known from meadows (CNDDB occs). Known only from Del Norte, Siskiyou, and Trinity Co., also known from OR, WA, and elsewhere. Blooms June-Aug (CNPS). Elevation range 400'-2,200' in Del Norte and 6,000'-7,800' in Siskiyou Co. (CNDDB). Shrub, "shrubby," rather than erect, rhizomed; stem gen erect, less than 5 dm, rooting; twigs strongly angled, green; lvs deciduous, serrate, lower surface glabrous; flowers: solitary in axils of lowest leaves of youngest shoots, corollas pink, fruits red (Hickman, 1996).

Elevation and range for Del Norte are suitable, but habitat requirements are otherwise lacking.

Viola primulifolia ssp. occidentalis **Western bog violet** Serpentine Association: Yes

Fed List: State List: CRPR: **1B.2** State Rank: **S2.2**

USGS 7.5' Quads (CNDDB): Gasquet, High Divide, High Plateau Mtn., Shelly Creek Ridge, Ship Mountain

Known Occurrence in Project Vicinity: **Yes** Species Habitat Available? **Maybe**

Occurs in this CA watershed; Smith (natureserve.org). Range is nw Klamath Ranges near Gasquet in Del Norte Co., also in sw OR (Hickman). Bogs and fens, marshes and swamps. Streamside flats and bogs; serpentine soils (CNDDB). Darlingtonia marshes and bogs (Hickman, 1996). Marshes or bogs in Mixed Evergreen Forest plant community (Munz & Keck, 1970). Swamps (Abrams 1951). Within range of GDRC occurs in Del Norte and Humboldt Co., also Mendocino Co. and OR. Elevation within 300'-3,250'. Blooms Apr-Sept. (CNPS). Wetland obligate (USDA Plants). Perennial herb from spreading or erect rhizomes, producing thin late-season stolons; stem 0; lvs basal, simple, petiole 30-110 mm, blade elliptic to widely ovate, crenate, base tapered, tip acute or rounded. Infl: peduncle 40-165 mm; white petals, lower three petals with purple veins, lateral two heavily bearded (Hickman, 1996). If present, wetland and riparian protections under the FPR and the AHCP will likely provide protection.

No serpentine in the plan area. Otherwise, suitable habitat seems abundant.

APPENDIX D

List of Plant Species Encountered (Green Diamond Resource Company Botanical Survey results for THP 1-09-009 DEL, survey dates August 12, 2008, July 1, 2010, including survey route mapping)

Vascular Plant Species List

Survey Date(s): 8/12/2008 7/1/2010 **Project: N #563**

Scientific Name	Common Name
Trees	
Abies grandis	grand fir
Alnus rubra	red alder
Frangula purshiana	cascara
Notholithocarpus densiflorus var. densiflorus	tanoak
Picea sitchensis	Sitka spruce
Pseudotsuga menziesii var. menziesii	Douglas-fir
Sequoia sempervirens	coast redwood
Thuja plicata	western red cedar
Tsuga heterophylla	western hemlock
Umbellularia californica	California-bay
Shrubs	
Acer circinatum	vine maple
Baccharis pilularis	coyote brush
Berberis nervosa	dwarf Oregon-grape
Ceanothus thyrsiflorus	blue blossom
Cornus sp.	dogwood
Cytisus scoparius	Scotch broom
Gaultheria shallon	salal
Morella californica	wax myrtle
Rhododendron occidentale	western azalea
Ribes bracteosum	stink currant
Ribes laxiflorum	trailing black currant
Ribes menziesii	canyon gooseberry
Rubus leucodermis	white-stemmed raspberry
Rubus parviflorus	thimbleberry
Rubus spectabilis	salmonberry
Rubus ursinus	Pacific bramble; California blackberry
Sambucus racemosa var. racemosa	red elderberry
Vaccinium ovatum	evergreen huckleberry
Vaccinium parvifolium	red huckleberry
Herbaceous	
Actaea rubra	baneberry
Adiantum aleuticum	five-fingered fern
Agrostis sp.	bent grass
Aira sp.	Hairgrass
Anaphalis margaritacea	pearly everlasting
Anthoxanthum odoratum	sweet vernal grass
Asarum caudatum	wild ginger
Athyrium filix-femina var. cyclosorum	lady fern
Bellis perennis	English daisy
Blechnum spicant	deer fern

Scientific Name	Common Name
Herbaceous (cont.)	
Boykinia occidentalis	coast boykinia
Cardamine oligosperma	western bittercress
Carex deweyana ssp. leptopoda	short-scaled sedge
Carex hendersonii	Henderson's sedge
Carex obnupta	slough sedge
Carex sp. (not a rare)	sedge
Chrysosplenium glechomifolium	golden saxifrage
Cirsium arvense	Canada thistle
Cirsium vulgare	bull thistle
Claytonia sibirica	candy flower
Cortaderia jubata	weedy pampas grass
Cynosurus sp.	dogtail grass
Disporum smithii (new Prosartes smithii)	Smith's fairy bells
Disporum sp.	fairy bells
Dryopteris expansa	wood fern
Equisetum arvense	common horsetail
Erechtites sp.	fireweed
Festuca sp.	fescue
Fragaria vesca	wood strawberry
Galium sp.	bedstraw
Hedera helix	English ivy
Holcus lanatus	common velvet grass
Juncus bolanderi	Bolander's rush
Juncus effusus	common rush
Juncus sp.	rush
Lolium sp	ryegrass
Lysichiton americanum	skunk cabbage
Madia madioides	woodland madia
Madia sp.	tarweed
Maianthemum dilatatum	false lily-of-the-valley
Marah sp.	wild cucumber
Mentha pulegium	pennyroyal
Mimulus dentatus	toothed monkey flower
Mimulus guttatus	seep-spring monkey flower
Oenanthe sarmentosa	Pacific water-parsley
Oxalis oregana	redwood sorrel
Oxalis sp.	sorrel
Parentucellia viscosa	yellow parentucellia
Phacelia bolanderi	Bolander's phacelia
Phacelia californica	California phacelia
Plantago lanceolata	English plantain
Poa annua	annual bluegrass
Polypodium sp.	polypody

Scientific Name	Common Name
Herbaceous (cont.)	
Polystichum munitum	sword fern
Potentilla sp.	cinquefoil
Prunella vulgaris	self-heal
Ranunculus repens	creeping buttercup
Ranunculus sp.	buttercup
Rumex crispus	curly dock
Sanicula crassicaulis	Pacific snakeroot
Sanicula sp.	sanicle
Stachys sp.	hedge nettle
Taraxacum officinale	dandelion
Tolmiea diplomenziesii	youth-on-age; pig-a-back plant
Trillium ovatum	western trillium
Urtica dioica ssp. holosericea	stinging nettle
Veronica americana	American brooklime
Viola sempervirens	evergreen violet
Whipplea modesta	yerba de selva

Green Diamond Resource Company
Botanical Project Summary Report

Report Date: 10/18/2010

Project: N #563

Roads ☑ (see attached location/survey route map)

CDF THP#: **1-09-009D**

GDRC THP: **950801**

RPF: C. Keller

USGS 7.5' Quadrangle(s): **Crescent City**

Watershed: Smith River

Drainage: Upper Jordon

Legal Description: **T.17N R.1W Sec. 25,26 HB&M**

Elevation Range (ft): 80-560 **Aspect** E,W **% Slope** 10-90 **# of Units:** 3

Soils/Geology: Melbourne

Botanical Mgmt Area(s): **CN**

Surveyors: '08: BH, NK, MA, MS; '10: BH, RC, JM, GO, LP

Survey Date(s): 8/12/2008 7/1/2010 Total Field Hours: 37 Acres Surveyed: 152

Habitat Assessment ☐ **Seasonally Appropriate Survey** ☑ **Rare Plant Habitat** ☑

Forest Openings/ Roadsides	Mature Forest w/ open understory	Wetlands/Creeks	Grasslands/Dry meadows	Serpentine
☑	☐	☑	☐	☐

CNPS 1 or 2 Rare Plants Found ☐ *(mitigated)*

CNPS 3 or 4 Uncommon Plants Found ☑ *(not usually mitigated)*

CNPS 3 or 4 OR Misc Plant Notes:

Ribes laxiflorum was found in Unit A (BotID#29673), Unit B (BotID#29914) and Unit C (BotID#29915). It is likely that the population in unit A will be impacted by timber harvest activities. The populations in Units B and C will be less impacted due to their locations in riparian management zones. CNDDB forms will be submitted and kept on file at GDRCo.

Listera cordata was located in Unit B (BotID#29916). It is likely that this population will be impacted by timber harvest activities. A CNDDB form will be submitted and kept on file at GDRCo.

Botany ID#: **29673** **RILA - 1** # Individuals: **1** % Leaf: **100** % Mature: **100**

Mitigation: **None** Overall Site Quality: **Poor** % Flower: **0** % Immature: **0**

Area Occupied (sq. ft): **15** % Fruiting: **0** % Seedlings: **0**

Habitat Description: forest

Data reflects status of plant on 8/12/08. The plant appeared to be healthy. It had lots of leaves. Site quality rated poor as the plant will not be protected and is in a forest that will be clear cut.

The plant was growing in a North Coast coniferous forest. It was found in a moist depression near the boundary of the unit, in an area that was receiving plenty of light. Slope ranged from 0-5%.

Botany ID#: **29914** **RILA - 2** # Individuals: **1** % Leaf: **100** % Mature: **100**

Mitigation: **None** Overall Site Quality: **Fair** % Flower: **0** % Immature: **0**

Area Occupied (sq. ft): **3** % Fruiting: **0** % Seedlings: **0**

Habitat Description: Bottom, Streamside coastal wet areas

Data reflects status of plants on 7/1/2010.
Population consists of only a single individual. It is on top of a downed log with a thick duff layer. The plant looks healthy.

The plant is located about 200 feet west of the class I creek and about 200 feet north of the southern unit boundary. The density of the brush recedes in this area and there are Carex obnupta and Lysichiton americanum plants and a few large, downed logs.

Green Diamond Resource Company
Botanical Project Summary Report

Report Date: 10/18/2010

Project: N #563

Roads ☑ (see attached location/survey route map)

CDF THP#: **1-09-009D**

GDRC THP: **950801**

RPF: C. Keller

Botany ID#: **29915**	**RILA - 3**	# Individuals: **6**	% Leaf:	**100**	% Mature:	**100**
Mitigation: **None**		Overall Site Quality: **Fair**	% Flower:	**0**	% Immature:	**0**
		Area Occupied (sq. ft):	% Fruiting:	**0**	% Seedlings:	**0**

Habitat Description: Streamside, Roadside forest

Data reflects status of plants on 7/1/2010.
Plant information represents the combined average of three different groups that are located along the Class I creek of the eastern unit boundary. The groups range in size from 1 individual to 4 individuals.
All plants appear healthy , are approximately 3 feet tall, and are not flowering or fruiting.

Plants are growing in moist soil beside the road and above the creek among other shrubs. One group is growing in a vine-like habit over large woody debris.

Botany ID#: **29916**	**LICO - 1**	# Individuals: **14**	% Leaf:	**50**	% Mature:	**100**
Mitigation: **None**		Overall Site Quality: **Poor**	% Flower:	**50**	% Immature:	**0**
		Area Occupied (sq. ft):	% Fruiting:	**0**	% Seedlings:	**0**

Habitat Description: Bottom forest

Data reflects status of plants on 7/1/2010.
Plant information reflects the combined average of two different groups. Group one has a single individual and the second group consists of 13 individuals.
The first group appears to be in healthy condition. The second group shows signs of herbivory, possibly from slugs. Although 5 out of 13 are flowering, some of the others look as though they were flowering and were eaten.

The first group is growing on the forest floor in thick redwood leaf litter. The forest is more or less a pure stand of redwood. The canopy cover is very dense and the plant is shaded. The second group is growing in the same conditions and is located approximately 100 feet from the first group.

Vegetation/Habitat Description

*Units A and C were surveyed on 8/12/08 and 15 field hours were spent surveying.
**Unit B was surveyed and portions of units A and C were resurveyed on 7/1/2010 and 22 field hours were spent surveying.

Most of this THP is in the Northern California Coast ecological section and the Crescent City Plain subsection. This subsection is on a coastal plain between mountains of the northern California Coast Ranges and the Pacific Ocean. The mouth of the Smith River, which drains from the Klamath Mountains, is on this coastal plain. It has a temperate, humid climate with much summer fog. The predominant natural plant communities on the plain are Sitka spruce series on the outer edge and Redwood series inland. Red alder series is common in riparian areas. The dunes support a succession of plant communities, from bare dune through Native dunegrass series, Sand - verbena - beach bursage series, and Beach pine series to Sitka spruce series. Pickleweed series predominates in saltmarsh. Most of unit C is in the Northern Franciscan subsection, also within the Northern California Coast ecological section. This subsection is in a steep mountainous area of the northern California Coast Ranges with substantial oceanic influence on climate, including summer fog. It is bounded by the South Fork Mountain Thrust fault and a branch of it on the east, by the Pacific Ocean on the west, and by the Grogan fault on the southwest. The climate is temperate and humid. The predominant natural plant community is Redwood series. Douglas-fir - tanoak series occurs on upper slopes and ridges.

Sitka spruce occurs along the coast. There are patches of Black oak series, Oregon white oak series, and Pacific reedgrass series on south-facing slopes and ridges. Red alder series is common in riparian areas (USDA, Forest Service).

Unit A:
Unit A was a second growth forest of small to medium sized, moderately spaced trees. Dominant overstory trees were: Sequoia sempervirens at 50%, Picea sitchensis and Alnus rubra at 20% each, and Pseudotsuga menziesii var. menziesii and Tsuga heterophylla at approximately 5% each. The dominant understory trees were: Sequoia sempervirens and Rhamnus purshiana with some Alnus rubra and Picea sitchensis. Shrub cover ranged from 30-50%. Dominant shrubs were: Rubus ursinus at 40%, Rubus spectabilis at 30%, Vaccinium ovatum at 15%, and Gaultheria shallon at 10%. Overall herbaceous cover averaged 30-50%. Dominant herbaceous species were: Polystichum munitum and Oxalis oregana at 30% each, Blechnum spicant at 20%, and Dryopteris expansa and Galium sp. at 10% each. The slope of the unit ranged from 0-5%. Soil was generally rocky, loam with duff. Large woody debris was abundant on the forest floor. The unit was surrounded by clear cuts and the unit edges were thick with brush.

The existing seasonal roads around Unit A were not rocked, but drivable. Water bars were not present. The overstory canopy was very open because the unit was surrounded by clear cuts. Overstory canopy ranged from 0-15% and averaged 10%. Dominant overstory trees were: Sequoia sempervirens at 40%, Alnus rubra at 30%, Picea sitchensis at 20%, and Pseudotsuga menziesii var. menziesii at 10%. Roadside shrub density ranged from moderate to dense. Dominant roadside shrubs were: Rubus ursinus, Rubus parviflorus, Rubus spectabilis, Cortaderia jubata, and Vaccinium ovatum. Roadside herb coverage averaged 40%. Dominant roadside herbaceous species were: mixed grasses, Hypochaeris radicata, Anaphalis margaritacea, and Prunella sp. Road surface plant cover averaged 25%. Dominant road surface plants were: mixed grasses, Rubus parviflorus, Rubus ursinus, and Cortaderia jubata. Soil was generally loam.
The oversized landing appeared to be a 10x25 foot wet area. The standing water was 2-4 inches deep. The water and surrounding terrain was muddy. Dry, muddy soil/silt extended about 20 feet around the wet area. The surrounding roads had forest canopy with a high abundance of shrub cover at the margins, but the wet area was otherwise entirely open with scattered Juncus sp. cover. Canopy cover was very open. Sequoia sempervirens was the most dominant tree of the overstory with a moderate amount of Alnus rubra as well. Sequoia sempervirens and Alnus rubra were the most dominant trees of the understory with a modest amount of Rhamnus purshiana as well. Shrub cover was very modest. Rubus leucodermis and Cytisus scoparius were the most dominant shrubs of the area with a very small amount of Baccharis pilularis also. Overall herbaceous cover was modest. Juncus sp. and Juncus bolanderi were the most dominant herbaceous plants with very small amounts of Holcus lanatus, Dryopteris expansa, Leucanthemum vulgare and Trifolium dubium. Juncus bolanderi, Juncus sp., Holcus lanatus, Leucanthemum vulgare and Trifolium dubium were flowering at the time of the survey. Surface substrate was primarily composed of soil, but modest amounts of vegetation/stems, gravel/stone and water, and minimal amounts of large woody debris and duff/litter were also components. Slope was flat and had all aspects. Topography for the area was valley/bottom. Soil

types were silt, loam and clay.

There was a wetland area that had a fairly open canopy. Dense shrub cover characterized the area. Shallow, muddy water was present with a high cover of Juncus, Carex and Blechnum spicant. The surrounding forest was Sequoia sempervirens dominated with dense shrub cover at the forest margins. Canopy cover was moderate. Sequoia sempervirens was the most dominant tree of the overstory with a modest amount of Alnus rubra. Rhamnus purshiana and Alnus rubra were the most dominant trees of the understory with a small amount of Sequoia sempervirens and a trace of Salix sitchensis. Shrub cover was modest. Gaultheria shallon was the most dominant shrub with a modest amount of Rubus spectabilis and trace amounts of Vaccinium ovatum and Baccharis pilularis. Overall herbaceous cover was moderate. Juncus sp., Dryopteris expansa and Blechnum spicant, and Carex obnupta were the most dominant herbaceous plants, but minimal amounts of Rubus ursinus and Holcus lanatus were also present. Surface substrate was primarily composed of vegetation/stems, duff/litter and water, but small amounts of soil and large woody debris were also present. Slope ranged from flat to gently sloped with western, northwestern and southwestern aspects. Topography for the area was valley/bottom. Soil types were silt, loam, clay and rocky soil.

There was a temporary road running in a north-south direction through the southern unit region. Clear cut areas with high shrub cover surrounded the road. There was a high large woody debris component. Muddy roadside drainages and puddles were present. Disturbed roadside habitat with weedy species was common. Canopy cover was extremely minimal. Alnus rubra was the most dominant tree of the overstory with a modest amount of Sequoia sempervirens as well. Sequoia sempervirens was the most dominant tree of the understory with small amounts of Rhamnus purshiana and Alnus rubra. Shrub cover was very modest. Cytisus scoparius and Rubus leucodermis were the most dominant shrubs with minimal amounts of Baccharis pilularis and Vaccinium ovatum. Overall herbaceous cover was modest. Holcus lanatus, Rubus ursinus and Trifolium dubium were the most abundant herbaceous species with small amounts of Dryopteris expansa and Leucanthemum vulgare. Leucanthemum vulgare, Rubus ursinus, Holcus lanatus and Trifolium dubium were flowering at the time of the survey. Surface substrate was primarily composed of duff/litter, vegetation/stems and soil with a small amount of large woody debris and a trace amount of gravel/stone. Slope ranged from flat to gently sloped with southern, western and southwestern aspects. Topography included slope and valley/bottom. Soil types were silt, sand, clay and rocky soil.

Unit B:
The forest interior of unit B was flat and had an undulating forest floor with muddy, barren areas indicative of consistent winter standing water. The forest interior had heterogeneous habitat in which the vegetative/herbaceous cover was organized into micro-areas of differing herbaceous and shrub diversity. Canopy cover ranged from 30-70% and averaged 55%. The trees were moderately spaced and even-aged. Dominant trees of the overstory included: Sequoia sempervirens at 70%, Picea sitchensis at 25% and Tsuga heterophylla at 5%. Dominant understory trees included: Myrica californica at 40%, Rhamnus purshiana at 40%, Alnus rubra at 15% and Umbellularia californica at 5%. Shrub cover was 45% and the shrubs were moderately spaced. Dominant shrubs included:

Vaccinium ovatum at 40%, Gaultheria shallon at 35%, Rubus ursinus and Rubus parviflorus together at 20% and Vaccinium parvifolium at 5%. Overall herbaceous cover was 35%. Dominant herbaceous species included: Blechnum spicant at 30%, Carex obnupta at 30%, Dryopteris expansa at 3%, Polystichum munitum at 30% and Lysichiton americanum at 7%. Carex obnupta and Lysichiton americanum were flowering at the time of the survey. Surface substrate included: vegetation/stems at 50%, soil at 3%, duff/litter at 35%, large woody debris at 8% and water at 4%. Slope ranged from flat to gently sloped and had all aspects. Topography included slope and valley/bottom. Soil types were silt, sand, loam and clay.

There was a very large wetland area with patchy, heterogeneous habitat. Some areas contained standing water and mud with Lysichiton americanum and Carex obnupta that was very dense. Other areas had small patches of Sequoia sempervirens and Picea sitchensis with a duff layer. Some areas contained almost no canopy trees, but very thick shrub and understory tree thickets that were impassible. Canopy cover was very low. Sequoia sempervirens and Picea sitchensis were the most dominant trees of the overstory with a very small amount of Tsuga heterophylla. Rhamnus purshiana, Myrica californica, Alnus rubra, Physocarpus capitatus and Cornus sp. were the most dominant trees of the understory with a small amount of Picea sitchensis and Sequoia sempervirens. Shrub cover was abundant. Gaultheria shallon, Rubus spectabilis and Rhododendron occidentale were the most dominant shrubs with small amounts of Vaccinium parvifolium and Corylus cornuta var. californica as well. Overall herbaceous cover ranged from minimal to extremely abundant. Carex obnupta and Blechnum spicant were the most abundant herbaceous species with a small amount of Lysichiton americanum and trace amounts of Athyrium filix-femina var. cyclosorum, Polystichum munitum, Maianthemum dilatatum and Equisetum telmateia ssp. braunii. Carex obnupta was flowering and Lysichiton americanum and Maianthemum dilatatum were in fruit at the time of the survey. Surface substrate was primarily composed of vegetation/stems and soil, but small amounts of duff/litter, large woody debris and water were also components. Slope ranged from flat to gently sloped and had all aspects. Topography included slope and valley/bottom. Soil type was silt and sand.

There was an attempt to locate the class I creek flowing through the central region of the unit. It appeared that the creek was integrated into the wetland area, and no specific channel or differentiated wet area was observed. Attempts to locate the creek were made from several different angles and approaches.

Unit C:
Tree density in Unit C was open. Overstory canopy ranged from 0-55% and averaged 20%. Dominant overstory trees were: Sequoia sempervirens at 80%, Alnus rubra at 10%, Pseudotsuga menziesii var. menziesii at 5%, and Abies grandis at less than 5%. Sequoia sempervirens was the dominant understory tree, with Rhamnus purshiana, and some Picea sitchensis and Pseudotsuga menziesii var. menziesii. Shrub cover averaged 55%. Dominant shrubs were: Rubus spectabilis at 70%, Rubus parviflorus and Gaultheria shallon at 10% each, and Berberis nervosa and Vaccinium ovatum at 5% each. Overall herbaceous cover averaged 20%. Dominant herbaceous species were: Polystichum munitum at50%, Oxalis oregana at 20%, Asarum caudatum at 10%, and Trientalis latifolia and Trillium ovatum at 5%

each. The slope of the unit ranged from 5-45%. Aspects were southwest and east. Soil was generally mesic clay with duff. Some large woody debris was present. The creek did not have distinctive riparian vegetation.

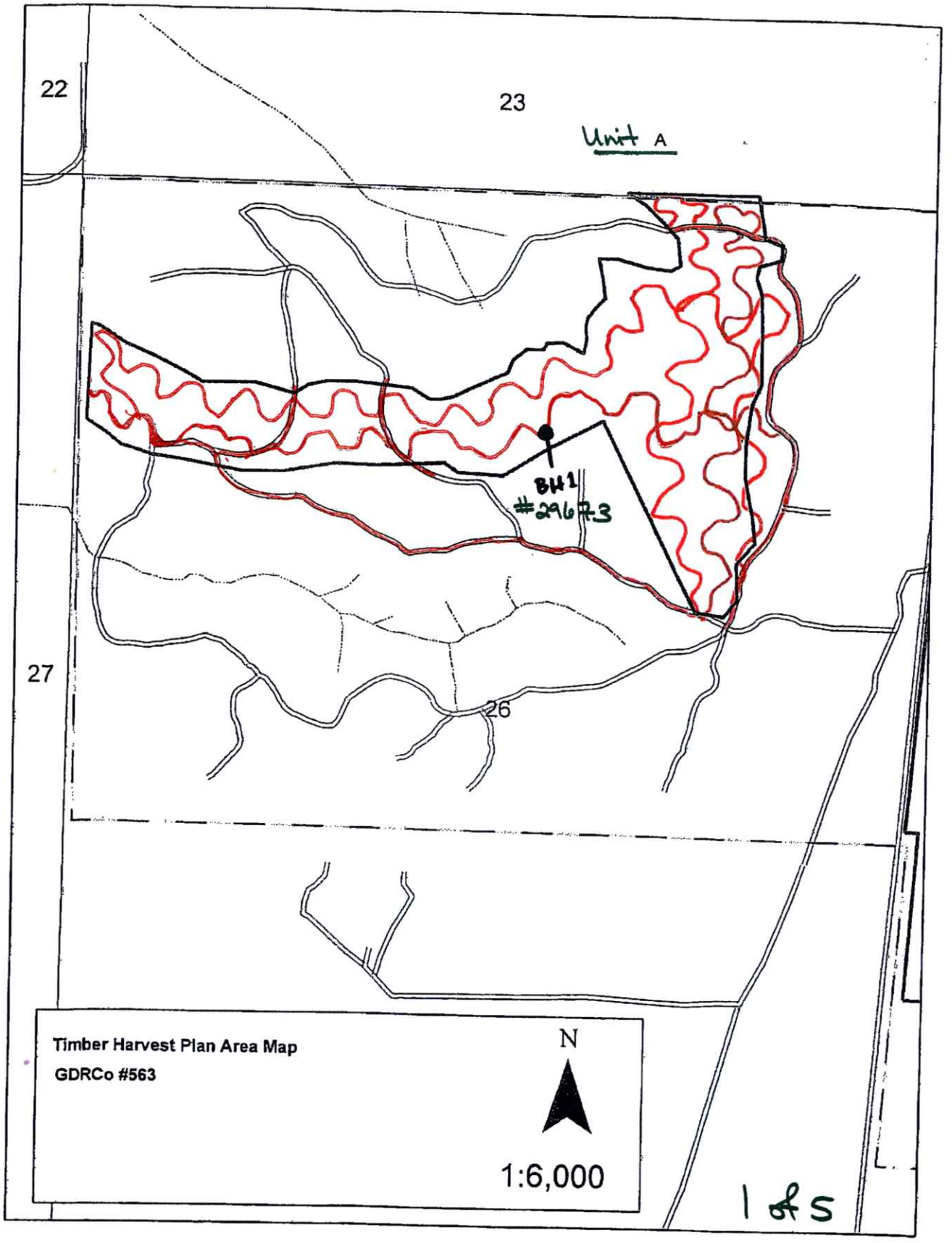
Some sections of the existing seasonal road were drivable. The road had not been recently rocked, but may have been rocked in the past. Some water bars were present. Overstory canopy ranged from 0-20% and averaged 10%. Dominant overstory trees were: Alnus rubra at 70%, Sequoia sempervirens at 20%, and Rhamnus purshiana at 10%. Roadside shrub density was dense. Dominant roadside shrubs were: Rubus parviflorus at 30%, Rubus spectabilis, Sambucus racemosa var. racemosa, and Rubus ursinus at 20% each, and Rubus leucodermis at 10%. Roadside herbaceous cover averaged 20%. Dominant roadside herbs were: Blechnum spicant at 40%, Ranunculus repens at 20%, and Tolmiea menziesii and Adiantum aleuticum at 10% each. Road surface plant cover averaged 25%. Dominant road surface plants were: Alnus rubra at 20%, Ranunculus repens at 10%, Prunella sp. at 5%, and Holcus lanatus at 5%. The soil was generally clay with rock.

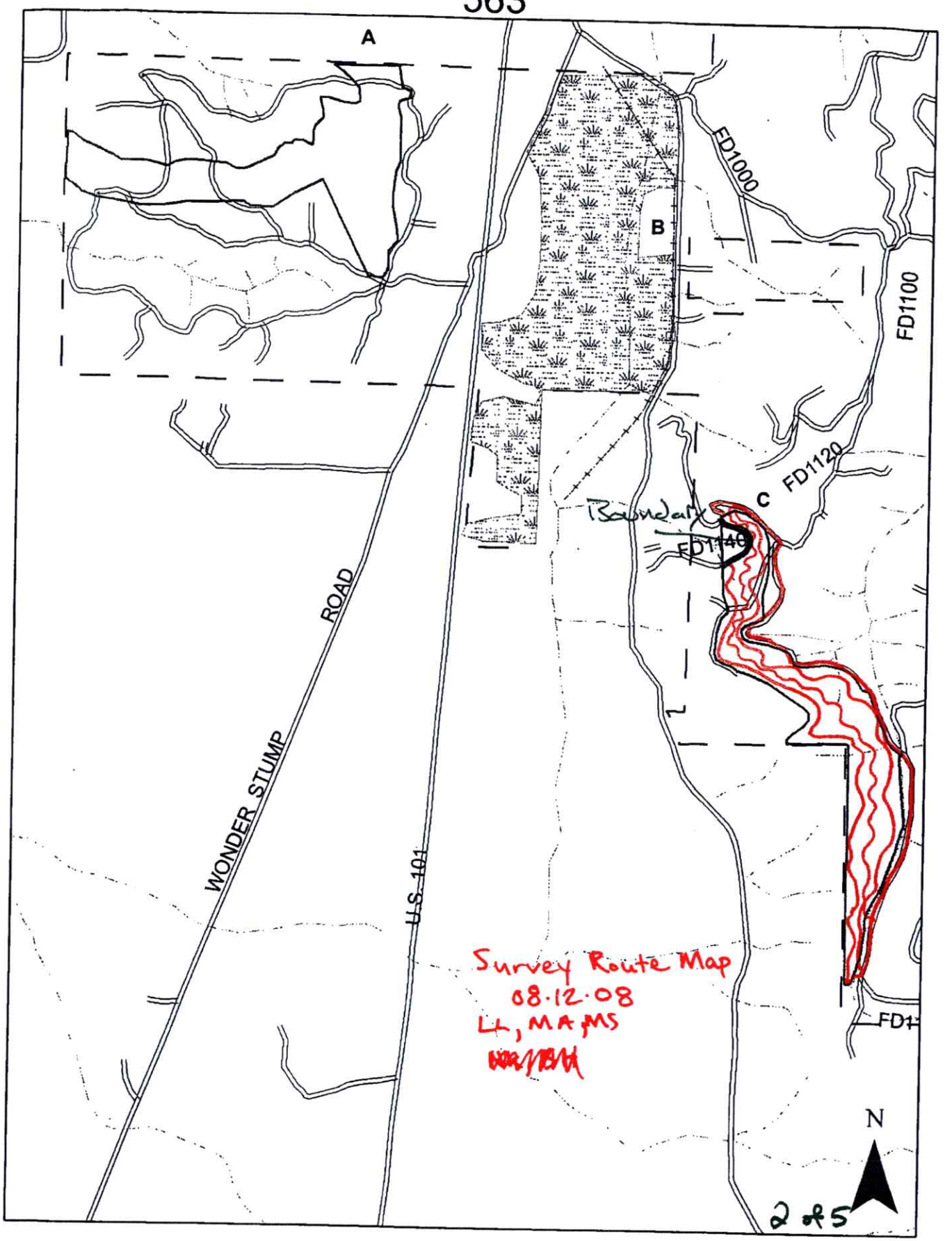
The class I creek in unit C had a 2 foot channel and a muddy bottom. The creek flowed in a wide, (60-100 foot) flat, valley. Heavy Rubus spectabilis covered the creek channel and Sambucus racemosa var. racemosa dominated the banks. The areas with shrub covered creek margins had very low herbaceous cover. The soil in the flat, valley bottom area was saturated to inundated approximately 10 to 30 feet from the creek channel. Canopy cover was modest. Alnus rubra was the most dominant tree of the overstory with a moderate amount of Sequoia sempervirens as well. Rhamnus purshiana, Alnus rubra and Sequoia sempervirens were all dominant species of the understory. Shrub cover was dense. Ribes bracteosum, Sambucus racemosa var. racemosa and Rubus spectabilis were the most dominant shrubs. Herbaceous cover was dominated by Oenanthe sarmentosa, Athyrium filix-femina var. cyclosorum, Tolmiea menziesii, Chrysosplenium glechomifolium and Lysichiton americanum. Surface substrate was primarily composed of vegetation/stems, but small amounts of soil, gravel/stone, duff/litter, large woody debris and water were also components. Slope ranged from flat to moderately steep and had eastern and northern aspects. Topography included slope and valley/bottom. Soil types were silt, sand and loam.

Road Survey Notes:

The proposed roads and landing were surveyed by botanical field technicians.

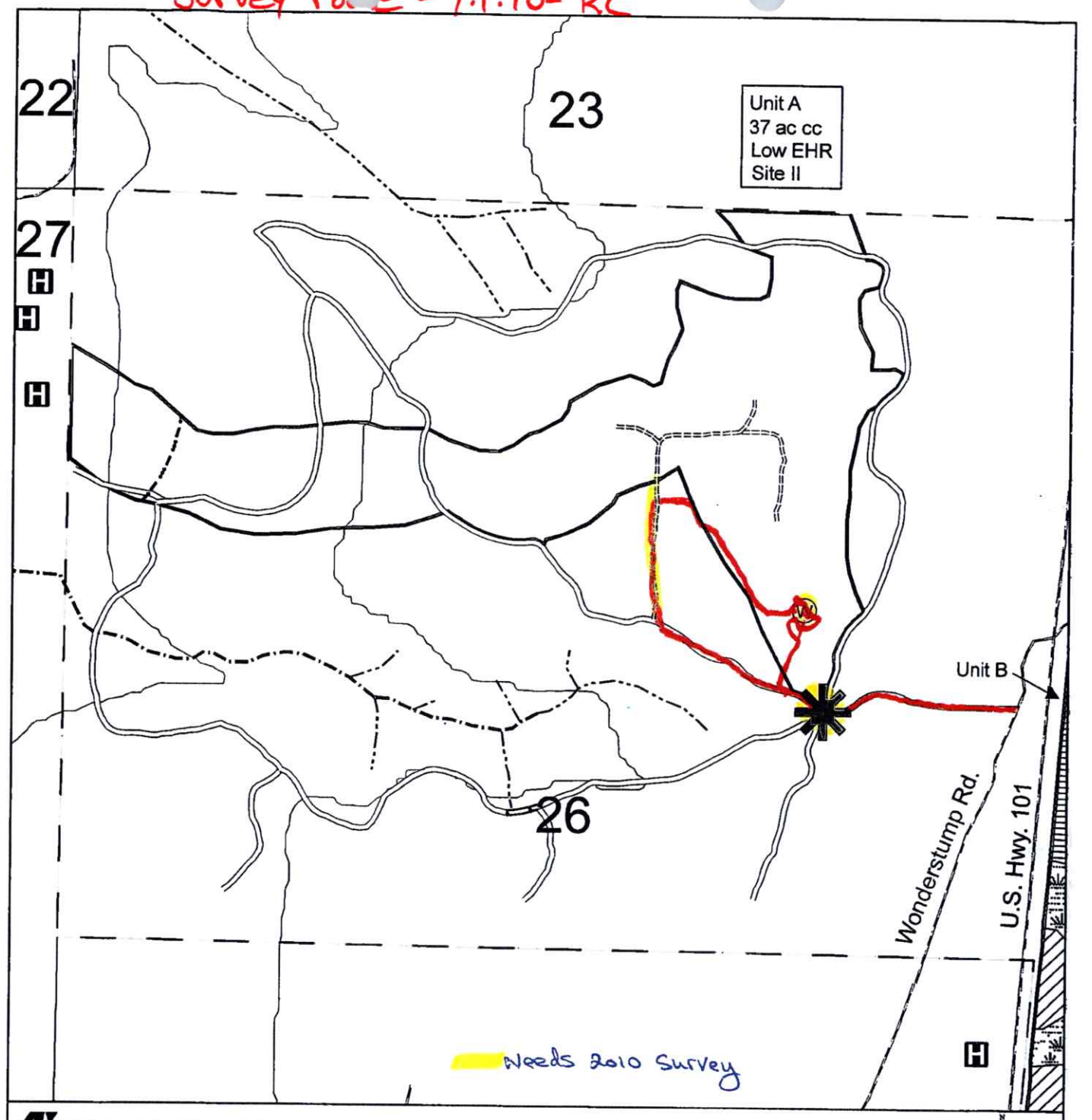
BH, NK 8.12.08 ● = RILA




A
B
C
FD1000
FD1100
FD1120
FD1140
Boundary
WONDER STUMP ROAD
U.S. 101
Survey Route Map
08.12.08
LL, MA, MS
N
2 of 5

1:12,000

Survey route - 7.1.10- RC



GREEN DIAMOND RESOURCE COMPANY

GDRCo # 563
Unit A THP Map

T17N, R1W, HBM

9/10/08

Contour interval = 40 ft.

Scale:
1 inch = 500 feet

Ground-based Yarding - Clearcut

GDRCo Ownership

Ridge

500' Residential Buffer
-No Operations prior to 8 AM

House

Wet Area

Oversized landing construction
-Helicopter service landing
-not to exceed 1 ac

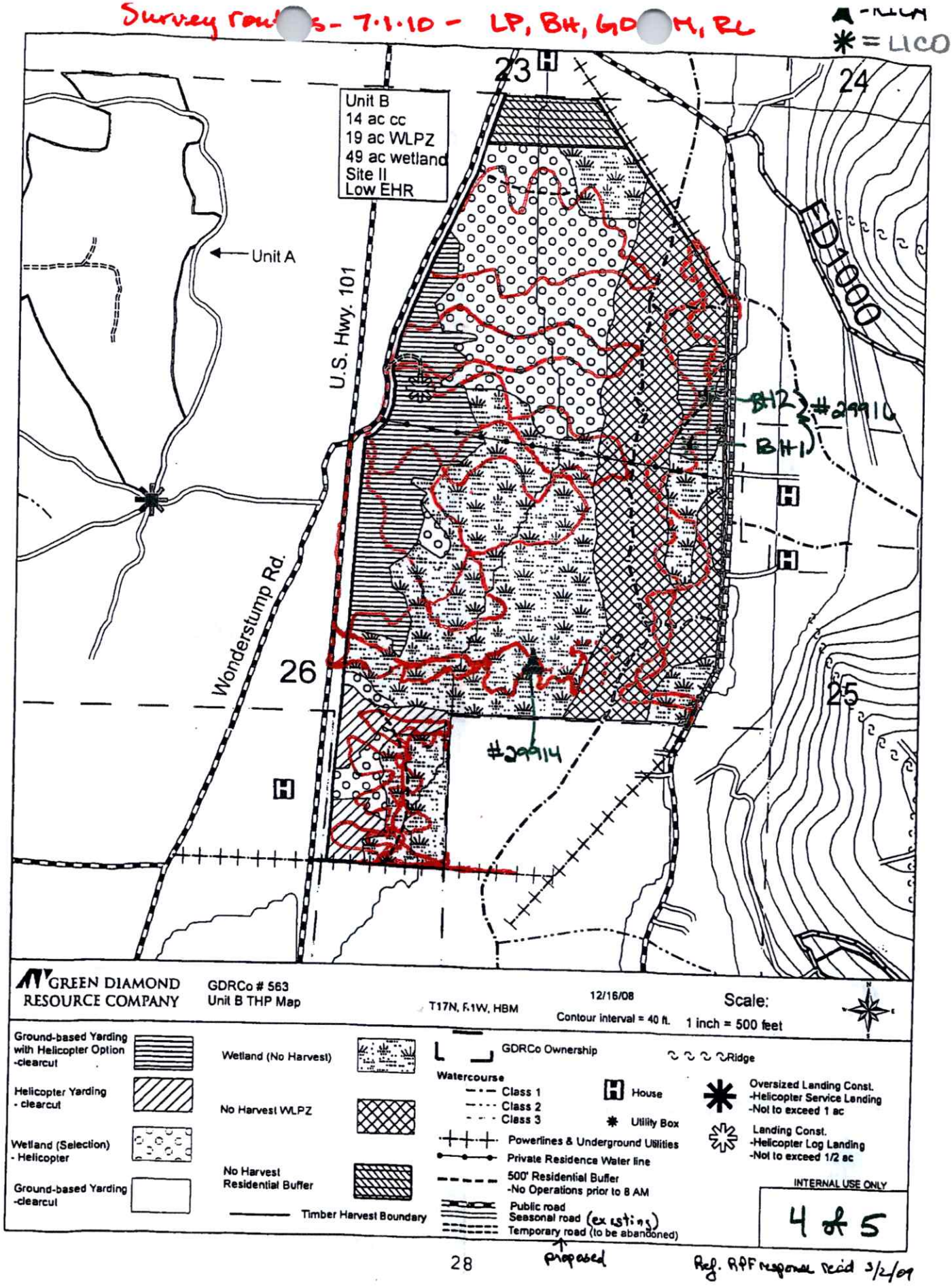
Watercourse
Class 1
Class 2
Class 3

Timber Harvest Boundary

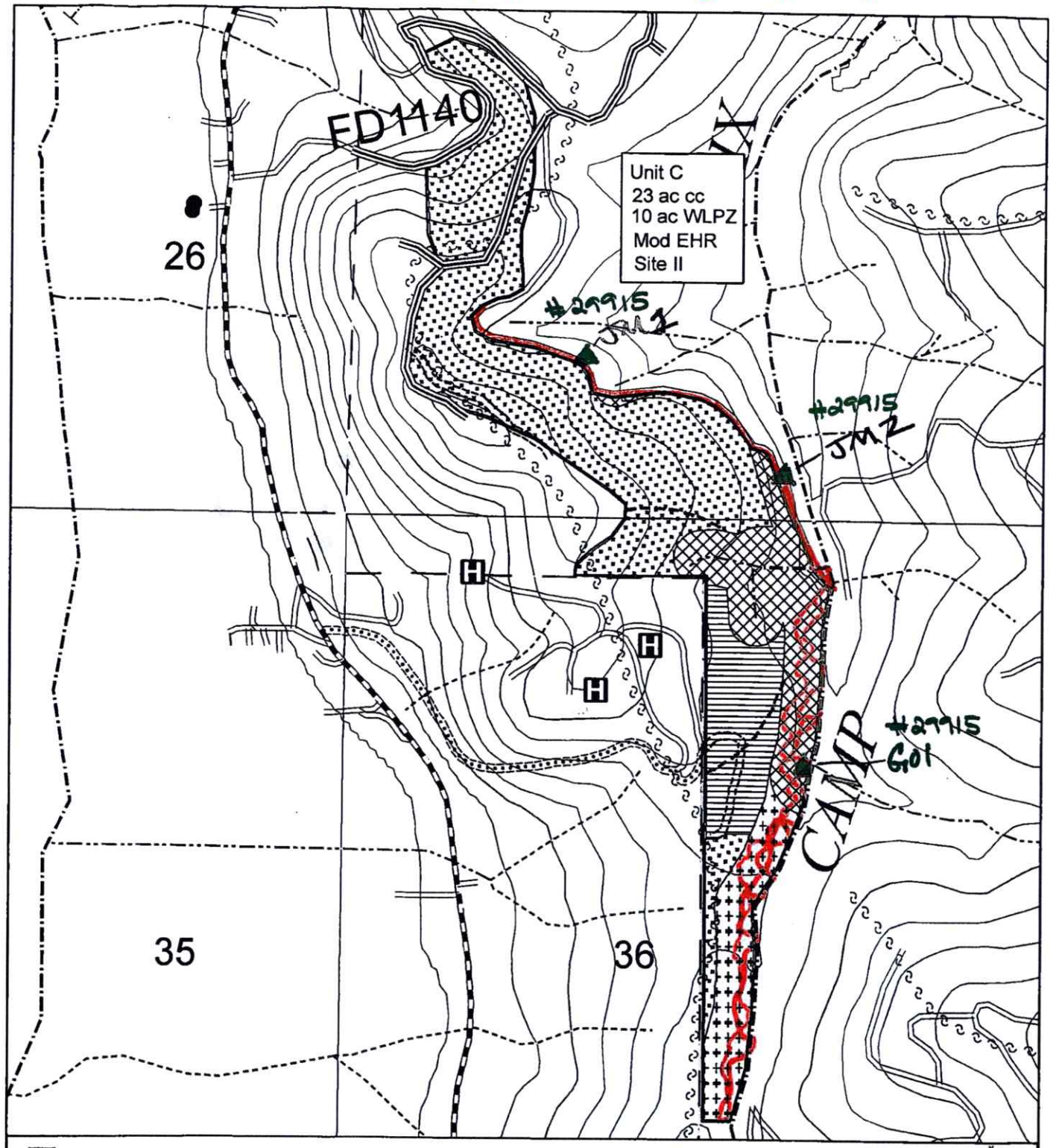
Public road
Seasonal road
Temporary road (to be abandoned)

INTERNAL USE ONLY

3 & 5


Survey roads - 7.1.10 - LP, BH, GO, M, RL
* = LICO
Unit B
14 ac cc
19 ac WLPZ
49 ac wetland
Site II
Low EHR
Unit A
U.S. Hwy. 101
Wonderstump Rd.
FD1000
23
24
25
26
BH2
#29910
BH1
#29914
H
GREEN DIAMOND RESOURCE COMPANY
GDRCo # 563
Unit B THP Map
T17N, R1W, HBM
12/16/08
Contour interval = 40 ft.
Scale:
1 inch = 500 feet
Ground-based Yarding with Helicopter Option -clearcut
Helicopter Yarding - clearcut
Wetland (Selection) - Helicopter
Ground-based Yarding -clearcut
Wetland (No Harvest)
No Harvest WLPZ
No Harvest Residential Buffer
Timber Harvest Boundary
GDRCo Ownership
Ridge
Watercourse
Class 1
Class 2
Class 3
House
Utility Box
Powerlines & Underground Utilities
Private Residence Water line
500' Residential Buffer
-No Operations prior to 8 AM
Public road
Seasonal road (existing)
Temporary road (to be abandoned)
Oversized Landing Const.
-Helicopter Service Landing
-Not to exceed 1 ac
Landing Const.
-Helicopter Log Landing
-Not to exceed 1/2 ac
INTERNAL USE ONLY
4 of 5
28
proposed
Rcd. RPF response rcvd 3/2/09

Survey route map 7/1/2010 (J[redacted], GO) ▲ = RILA



APPENDIX E

Green Diamond Resource Company vertebrate survey results for THP 1-09-009 DEL, (Northern Spotted Owl surveys, fish and sensitive amphibian occurrences)

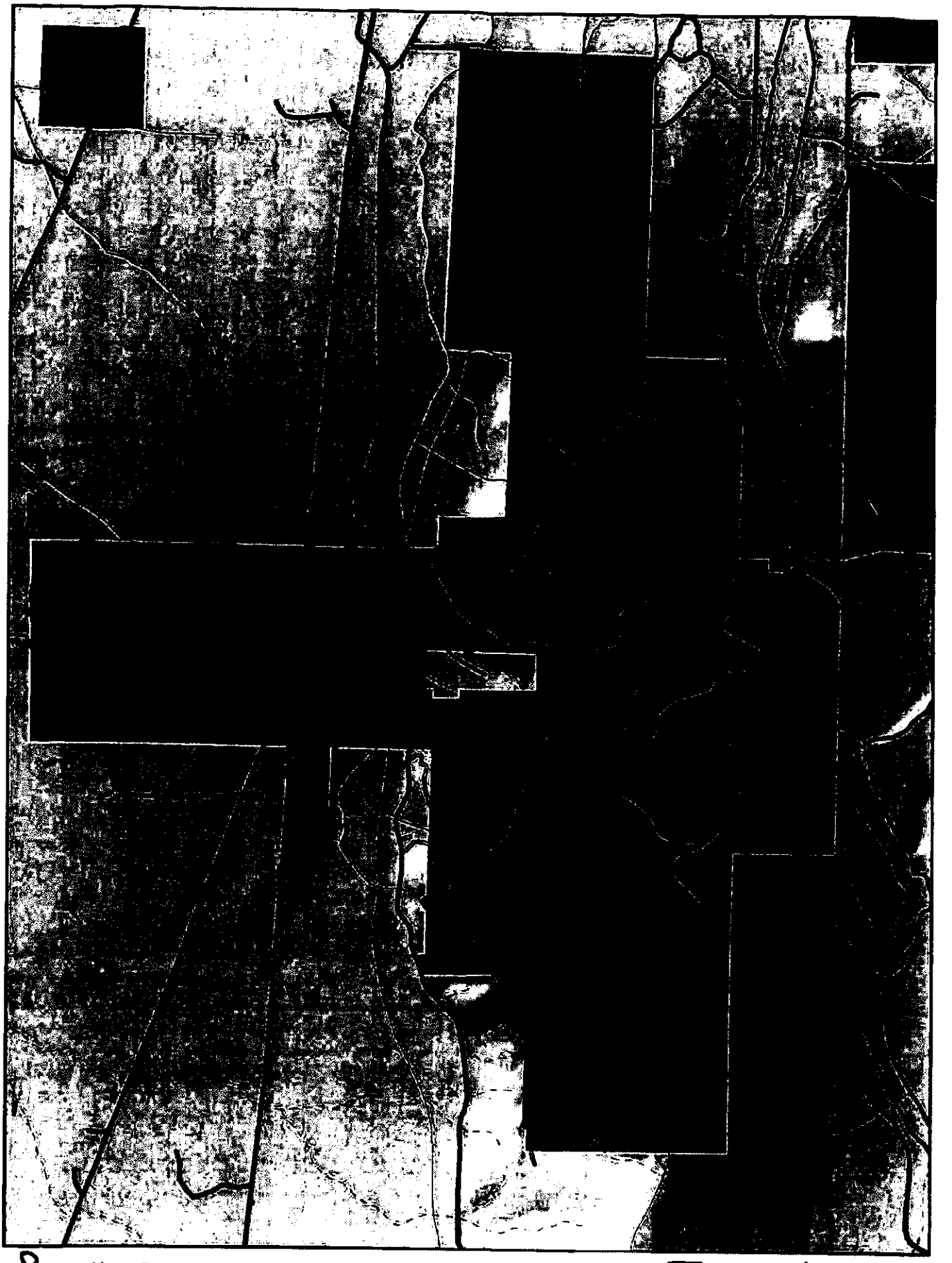


PHOTO # 7-4

TAPE # 563

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 4 / 29 / 2008
GDRCO THP#: 563
THP Name: FORT OZUK CLEANUP
Begin Survey Time: 19 : 40
End Survey Time: 21 : 34
Calling Method(s): (Voice) Recorded Hoot-Flute

Surveyor(s): C. HOWARD
Air Photo: 7-4
Weather- Temp (F°): OVERCAST 47°F
%Cloud Cover: 100%
Wind Code: (0) 1 2 3 4 5 6
Precipitation: (N) L M F S

St#	Approximate Location:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
1	FO ROAD 10 FORT	19:40	19:50	Ø				
2	FO ROAD 10 FORT	20:11	20:21	Ø				
3	FO ROAD 10	20:40	20:50	Ø				
4	FO FORT	21:05	21:15	Ø				
5	FO FORT	21:24	21:34	Ø				

Comments:

Species Codes:
SPOW: Northern Spotted Owl
GHOW: Great Horned Owl
BAOW: Barred Owl
COBO: Common Barn Owl
NSWO: Northern Saw-whet Owl
WESO: Western Screech Owl
NOPO: Northern Pygmy Owl
FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call
3: 3-Note Call
A: Agitated Contact
B: Bark
S: Series Contact
C: Contact

Weather Codes:
*Wind :*0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 5 / 30 / 2008

GDRCO THP#: 563

THP Name: Forty Deck

Begin Survey Time: 20 : 06

End Survey Time: 21 : 46

Calling Method(s): (Voice) Recorded Hoot-Flute

Surveyor(s): C. Howard

Air Photo: —

Weather- Temp (F°): 58°F

%Cloud Cover: Ø

Wind Code: (0) 1 2 3 4 5 6

Precipitation: (N) L M F S

St#	Approximate Location:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
1	FD FLAT	20:06	20:16	Ø				
2	FD FLAT	20:25	20:35	Ø				
3	FD 10	20:51	21:01	Ø				
4	FD 10	21:15	21:25	Ø				
5	FD 10	21:36	21:46	Ø				

Comments:

Species Codes:

SPOW: Northern Spotted Owl
GHOW: Great Horned Owl
BAOW: Barred Owl
COBO: Common Barn Owl
NSWO: Northern Saw-whet Owl
WESO: Western Screech Owl
NOPO: Northern Pygmy Owl
FLOW: Flammulated Owl

Call Type Codes:

4: 4-Note Call
3: 3-Note Call
A: Agitated Contact
B: Bark
S: Series Contact
C: Contact

Weather Codes:

Wind: 0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)

Precip: None, Light, Mod, Heavy, Fog, Snow

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 6 / 10 / 2008

GDRCO THP#: 563

THP Name: Fort Dick

Begin Survey Time: 20 : 16

End Survey Time: 22 : 02

Calling Method(s): (Voice) Recorded Hoot-Flute

Surveyor(s): C. Howard

Air Photo: —

Weather- Temp (F°): 59°F

%Cloud Cover: Ø

Wind Code: (0) 1 2 3 4 5 6

Precipitation: (N) L M F S

St#	Approximate Location:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
1	FD Flat	20:16	20:26	Ø				
2	FD Flat	20:42	20:52	Ø				
3	FD10	21:15	21:25	Ø				
4	FD10	21:39	21:47	Ø				
5	FD10	21:52	22:02	Ø				

Comments:

Species Codes:

SPOW: Northern Spotted Owl
GHOW: Great Horned Owl
BAOW: Barred Owl
COBO: Common Barn Owl
NSWO: Northern Saw-whet Owl
WESO: Western Screech Owl
NOPO: Northern Pygmy Owl
FLOW: Flammulated Owl

Call Type Codes:

4: 4-Note Call
3: 3-Note Call
A: Agitated Contact
B: Bark
S: Series Contact
C: Contact

Weather Codes:

Wind: 0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)

Precip:
None, Light, Med, Heavy, Fog, Snow

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 6 / 26 / 08
GDRCO THP#: 563
THP Name:
Begin Survey Time: 20 : 45
End Survey Time: 22 : 06
Calling Method(s): (Voice) Recorded Hoot-Flute

Surveyor(s): SSS
Air Photo: 8-5, 7-4
Weather- Temp (F°): 65
%Cloud Cover: 0
Wind Code: 0 (1) 2 3 4 5 6
Precipitation: (N) L M F S

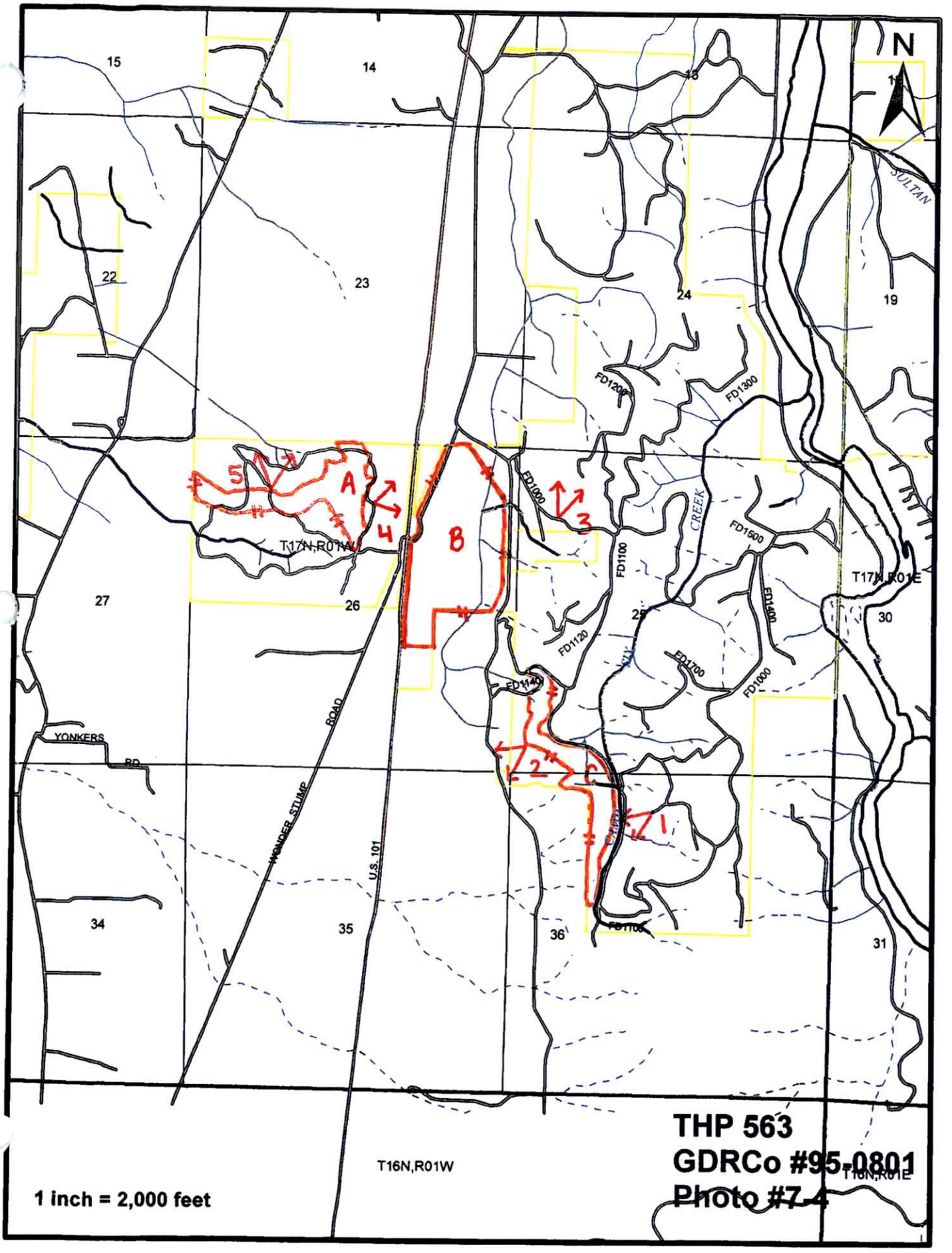
St#	Approximate Location:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
5	See Map	2045	2055	NR				
4	↓	2058	2108	NR				
3		2121	2131	NR				
2		2136	2146	NR				
1		2156	2206	NR				

Comments:

Species Codes:
SPOW: Northern Spotted Owl
GHOW: Great Horned Owl
BAOW: Barred Owl
COBO: Common Barn Owl
NSWO: Northern Saw-whet Owl
WESO: Western Screech Owl
NOPO: Northern Pygmy Owl
FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call
3: 3-Note Call
A: Agitated Contact
B: Bark
S: Series Contact
C: Contact

Weather Codes:
Wind: 0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow


N
15
14
13
22
23
24
19
SULTAN
FD1200
FD1300
FD1000
FD1100
CREEK
FD1500
FD1400
FD1120
FD1700
FD1140
FD1000
T17N,R01W
T17N,R01E
27
26
25
30
A
B
C
1
2
3
4
5
YONKERS
RD
WONDER STUMP
ROAD
U.S. 101
34
35
36
31
T16N,R01W
T16N,R01E
THP 563
GDRCo #95-0801
Photo #7-4
1 inch = 2,000 feet

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 4 / 15 / 2010 **Surveyor(s):** DAE

GDRCO THP#: 95-0801 **Air Photo:**

THP Name: 563 **Weather- Temp (F°):** 40

Begin Survey Time: 19 : 35 **%Cloud Cover:** 10

End Survey Time: 21 : 22 (Recorder batteria died so used hoot flute too)

Calling Method(s): Voice (Recorded) (Hoot-Flute) **Wind Code:** 0 1 (2) 3 4 5 6

Precipitation: (N) L M F S

St#	Approximate Location:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
1	FD 1000 Spur	2019	2029	Ø				
2	FD 1100 spur	2050	2100	Ø				
3	FD 1000	2112	2122	Ø				
4	FD Unit A	1948	1958	Ø				
5	FD Unit A	1935	1945	Ø				

Comments:

Species Codes:
SPOW: Northern Spotted Owl NSWO: Northern Saw-whet Owl
GHOW: Great Horned Owl WESO: Western Screech Owl
BAOW: Barred Owl NOPO: Northern Pygmy Owl
COBO: Common Barn Owl FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call 3: 3-Note Call A: Agitated Contact
B: Bark S: Series Contact C: Contact

Weather Codes:
*Wind :*0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 5 / 18 / 10 **Surveyor(s):** JAS

GDRCO THP#: 95-0801 **Air Photo:**

THP Name: 563 **Weather- Temp (F°):** 50

Begin Survey Time: 20 : 05 **%Cloud Cover:** 100

End Survey Time: 22 : 04 **Wind Code:** 0 (1) 2 3 4 5 6

Calling Method(s): Voice (Recorded) Hoot-Flute **Precipitation:** (N) L M F S

St#	Approximate Location:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
5		2005	2015	Ø				
4		2022	2032	Ø				
1		2104	2114	Ø				
2		2133	2143	Ø				
3		2154	2204	Ø				

Comments:

Species Codes:
SPOW: Northern Spotted Owl NSWO: Northern Saw-whet Owl
GHOW: Great Horned Owl WESO: Western Screech Owl
BAOW: Barred Owl NOPO: Northern Pygmy Owl
COBO: Common Barn Owl FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call 3: 3-Note Call A: Agitated Contact
B: Bark S: Series Contact C: Contact

Weather Codes:
*Wind :*0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 6 / 7 / 10
GDRCO THP#: 95-0801
THP Name: 563
Begin Survey Time: 20 : 21
End Survey Time: 22 : 22
Calling Method(s): Voice (Recorded) Hoot-Flute

Surveyor(s): JAJ
Air Photo:
Weather- Temp (F°): 55
%Cloud Cover: Ø
Wind Code: 0 (1) 2 3 4 5 6
Precipitation: (N) L M F S

St#	Approximate Location:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
5		2021	2031	Ø				
4		2039	2049	Ø				
1		2120	2130	Ø				
2		2152	2202	Ø				
3		2212	2222	Ø				

Comments:

Species Codes:
SPOW: Northern Spotted Owl NSWO: Northern Saw-whet Owl
GHOW: Great Horned Owl WESO: Western Screech Owl
BAOW: Barred Owl NOPO: Northern Pygmy Owl
COBO: Common Barn Owl FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call 3: 3-Note Call A: Agitated Contact
B: Bark S: Series Contact C: Contact

Weather Codes:
Wind: 0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 6 / 14 / 10
GDRCO THP#: 95-0801
THP Name: 563
Begin Survey Time: 20:34
End Survey Time: 22:35
Calling Method(s): Voice (Recorded) Hoot-Flute

Surveyor(s): JAJ
Air Photo:
Weather- Temp (F°): 53
%Cloud Cover: Ø
Wind Code: (0) 1 2 3 4 5 6
Precipitation: (N) L M F S

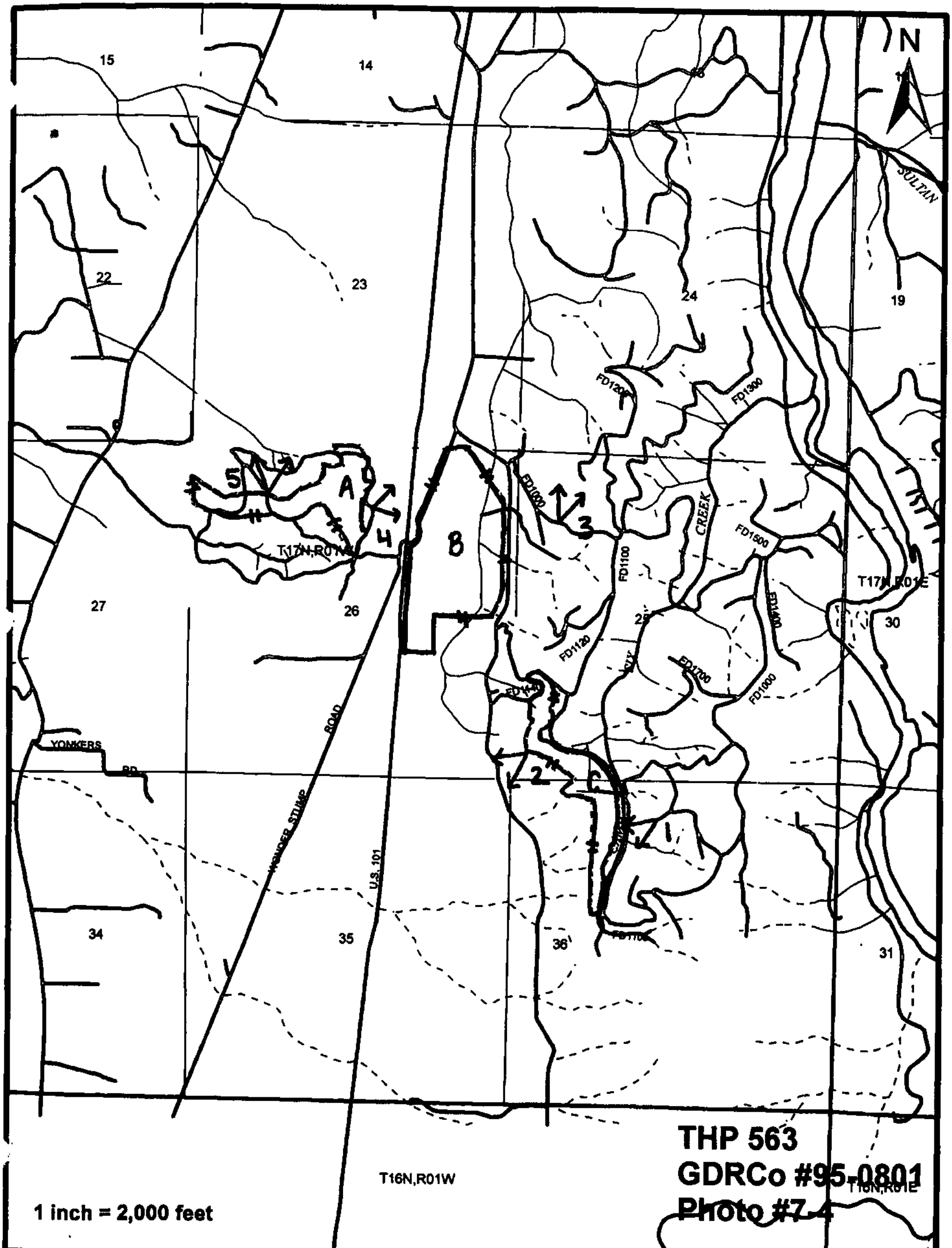
St#	Approximate Location:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
5		2034	2044	Ø				
4		2051	2101	Ø				
1		2133	2143	Ø				
2		2204	2214	Ø				
3		2225	2235	Ø				

Comments:

Species Codes:
SPOW: Northern Spotted Owl NSWO: Northern Saw-whet Owl
GHOW: Great Horned Owl WESO: Western Screech Owl
BAOW: Barred Owl NOPO: Northern Pygmy Owl
COBO: Common Barn Owl FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call 3: 3-Note Call A: Agitated Contact
B: Bark S: Series Contact C: Contact

Weather Codes:
*Wind :*0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow



N
15
14
23
22
24
19
SULTAN
FD1200
FD1300
FD1000
FD1100
CREEK
FD1500
FD1400
FD1120
FD1700
FD1000
T17N,R01W
T17N,R01E
27
26
25
30
YONKERS
RD
WONDER STUMP ROAD
U.S. 101
34
35
36
31
T16N,R01W
1 inch = 2,000 feet
THP 563
GDRCo #95-0801
Photo #7-4

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GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 3 / 8 / 2011 **Surveyor(s):** CIG

GDRCO THP#: 95-0801 **Air Photo:** 7-4

THP Name: THP 563 **Weather- Temp (F°):** 48°

Begin Survey Time: 19 : 24 **%Cloud Cover:** 100%

End Survey Time: 20 : 40 **Wind Code:** 0 (1) 2 3 4 5 6

Calling Method(s): Voice (Recorded) Hoot-Flute **Precipitation:** N (L) M F S

St#	THP Unit	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
2	C	19:24	19:34	∅				
1	C	19:57	20:07	∅				
3	B	20:22	20:41	∅	*treated	2S	2 PW*	

Comments:

Species Codes:
SPOW: Northern Spotted Owl NSWO: Northern Saw-whet Owl
GHOW: Great Horned Owl WESO: Western Screech Owl
BAOW: Barred Owl NOPO: Northern Pygmy Owl
COBO: Common Barn Owl FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call 3: 3-Note Call A: Agitated Contact
B: Bark S: Series Contact C: Contact

Weather Codes:
Wind: 0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow

Herid DATE

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 3 / 3 / 2011
GDRCO THP#: 95-0801
THP Name: THP 563
Begin Survey Time: 18 : 05
End Survey Time: 19 : 27
Calling Method(s): Voice (Recorded) Hoot-Flute

Surveyor(s): CIG
Air Photo: 7-4
Weather- Temp (F°): 45°
%Cloud Cover: 100%
Wind Code: 0 (1) 2 3 4 5 6
Precipitation: (N) L M F S

St#	THP Unit:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
1	C	18:05	18:16	Ø				
2	C	18:49	18:59	Ø				
3	B	19:09	19:27	Ø				

Comments: * pt. 3 treated as a PW

Species Codes:
SPOW: Northern Spotted Owl
GHOW: Great Horned Owl
BAOW: Barred Owl
COBO: Common Barn Owl
NSWO: Northern Saw-whet Owl
WESO: Western Screech Owl
NOPO: Northern Pygmy Owl
FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call
3: 3-Note Call
A: Agitated Contact
B: Bark
S: Series Contact
C: Contact

Weather Codes:
Wind: 0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow

Entered DAE

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 4 / 4 / 2011
GDRCO THP#: 95-0801
THP Name: THP 563
Begin Survey Time: 20 : 03
End Survey Time: 21 : 24
Calling Method(s): Voice (Recorded) Hoot-Flute

Surveyor(s): CIG
Air Photo: 7-4
Weather- Temp (F°): 40°
%Cloud Cover: 100%
Wind Code: 0 (1) 2 3 4 5 6
Precipitation: (N) (L) M F S

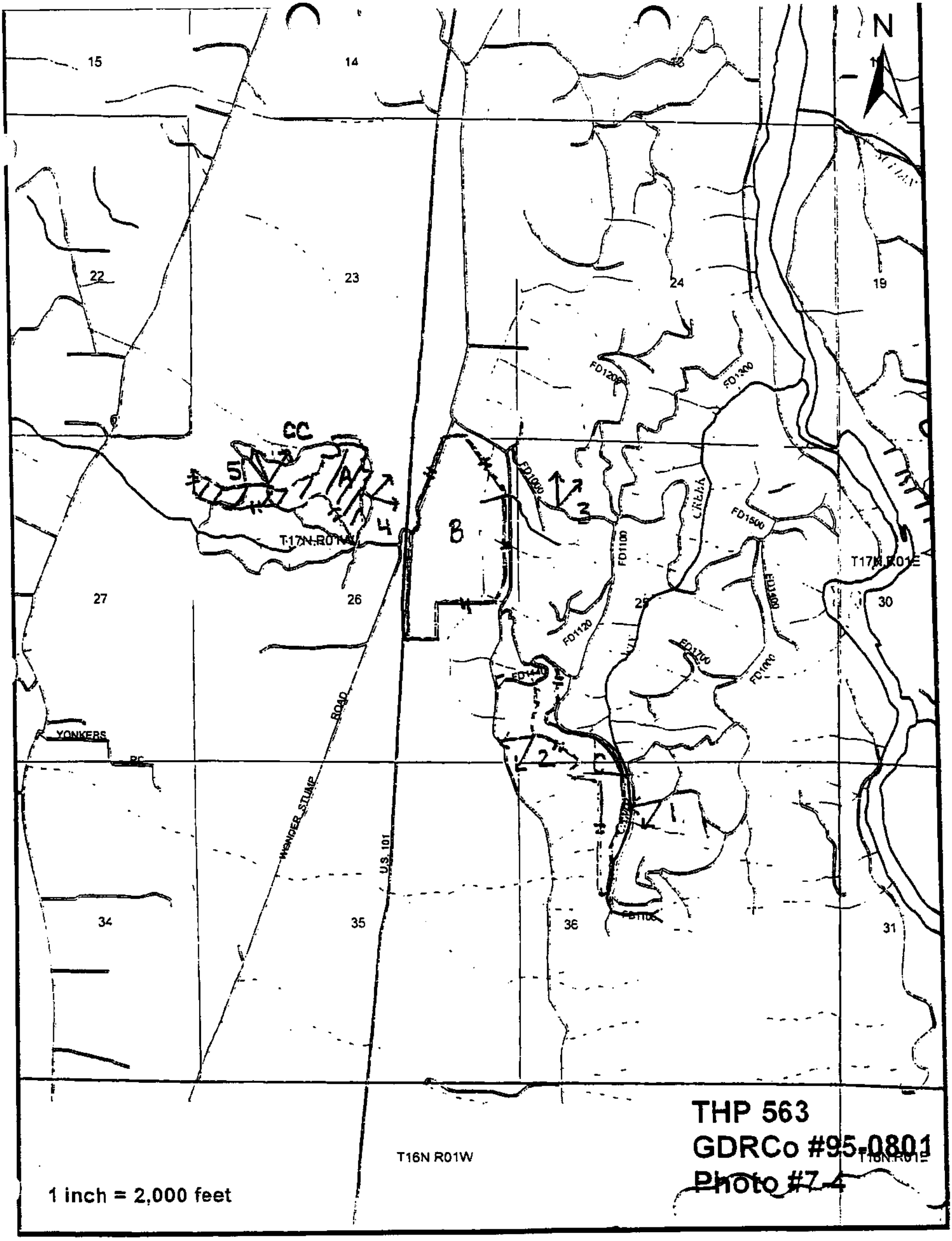
St#	THP Unit	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
3	B	20:03	20:21	Ø				
1	C	20:41	20:51	Ø				
2	C	21:14	21:24	Ø				

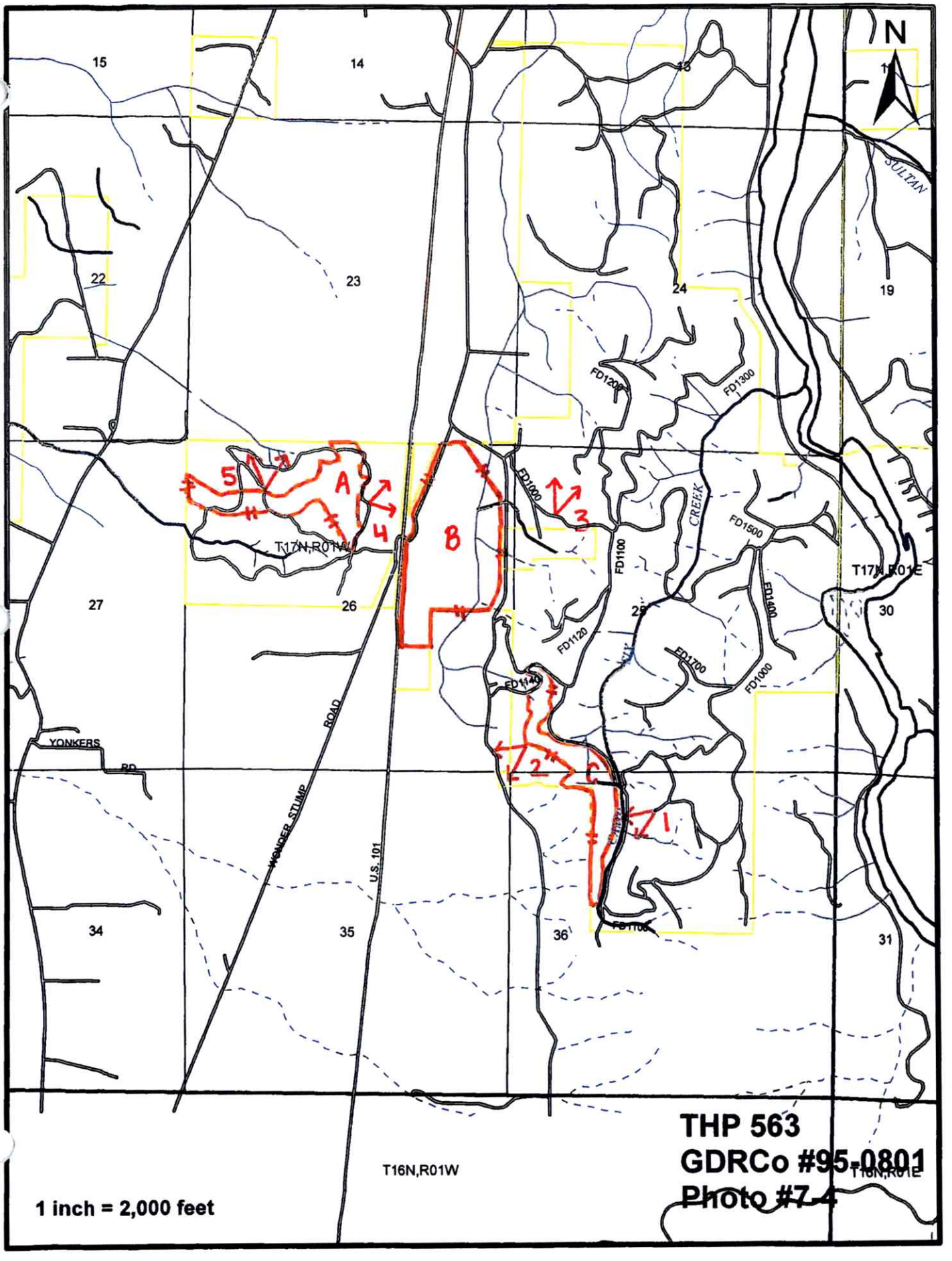
Comments: #3 called as a PW

Species Codes:
SPOW: Northern Spotted Owl
GHOW: Great Horned Owl
BAOW: Barred Owl
COBO: Common Barn Owl
NSWO: Northern Saw-whet Owl
WESO: Western Screech Owl
NOPO: Northern Pygmy Owl
FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call
3: 3-Note Call
A: Agitated Contact
B: Bark
S: Series Contact
C: Contact

Weather Codes:
Wind: 0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow


N
15
14
22
23
24
19
27
26
30
34
35
36
31
T17N.R01W
T17N.R01E
T16N R01W
FD1200
FD1300
FD1000
FD1500
FD1100
FD1120
FD1700
FD1400
YONKERS
RD
WONDER STUMP
ROAD
U.S. 101
CC
5
4
3
8
2
1
THP 563
GDRCo #95-0801
Photo #7-4
1 inch = 2,000 feet


N
15
14
13
22
23
24
19
27
26
25
30
31
34
35
36
T17N,R01W
T17N,R01E
T16N,R01W
T16N,R01E
SULTAN
CREEK
FD1200
FD1300
FD1000
FD1100
FD1500
FD1400
FD1120
FD1700
FD1140
FD1000
FD1100
YONKERS
RD
WONDER STUMP
ROAD
U.S. 101
A
B
C
1
2
3
4
5
1 inch = 2,000 feet
THP 563
GDRCo #95-0801
Photo #7-4

GREEN DIAMOND RESOURCE COMPANY

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cen gea

HCP Spotted Owl Protocol Survey Form

Date: 04 / 17 / 2013 **Surveyor(s):** CRK

GDRCO THP#: 95-0801 **Air Photo:** #7-4

THP Name: THP 563 **Weather- Temp (F°):** 48°F

Begin Survey Time: 19 : 42 **%Cloud Cover:** 0

End Survey Time: 20 : 44 **Wind Code:** (0) 1 2 3 4 5 6

Calling Method(s): Voice (Recorded) Hoot-Flute **Precipitation:** (N) L M H F S

St#	THP Unit:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
1	C	19:42	19:52	–	–	–	–	–
2	C	20:16	20:26	–	–	–	–	–
3	B	20:34	20:44	–	–	–	–	–

Comments: Called pt 1 a little early because I had to walk to it

Species Codes:
SPOW: Northern Spotted Owl NSWO: Northern Saw-whet Owl
GHOW: Great Horned Owl WESO: Western Screech Owl
BAOW: Barred Owl NOPO: Northern Pygmy Owl
COBO: Common Barn Owl FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call 3: 3-Note Call A: Agitated Contact
B: Bark S: Series Contact C: Contact

Weather Codes:
Wind : **0**- No wind/calm (0 mph) **1**-Smoke drifts slightly(1-3) **2**-Leaves rustle (4-7) **3**-Leaves small twigs in constant motion (8-12) **4**-Dust raised, small branches in motion (13-18) **5**-Small trees sway (19-24) **6**-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow

55✓
Cengea

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 04 / 26 / 2013 **Surveyor(s):** CRK

GDRCO THP#: 95-0801 **Air Photo:** # 7-4

THP Name: THP 563 **Weather- Temp (F°):** 45

Begin Survey Time: 20 : 10 **%Cloud Cover:** 100

End Survey Time: 20 : 56 **Wind Code:** (0) 1 2 3 4 5 6

Calling Method(s): Voice (Recorded) Hoot-Flute **Precipitation:** (N) L M H F S

St#	THP Unit:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
1	C	20:10	20:20	NSWO	5:43min	unk	unk	340°
2	C	20:27	20:37	NSWO	3:30 min	unk	unk	304°
3	B	20:46	20:56	NSWO	2:05min	unk	unk	132°

Comments:

Species Codes:
SPOW: Northern Spotted Owl NSWO: Northern Saw-whet Owl
GHOW: Great Horned Owl WESO: Western Screech Owl
BAOW: Barred Owl NOPO: Northern Pygmy Owl
COBO: Common Barn Owl FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call 3: 3-Note Call A: Agitated Contact
B: Bark S: Series Contact C: Contact

Weather Codes:
*Wind :***0**- No wind/calm (0 mph) **1**-Smoke drifts slightly(1-3) **2**-Leaves rustle (4-7) **3**-Leaves small twigs in constant motion (8-12) **4**-Dust raised, small branches in motion (13-18) **5**-Small trees sway (19-24) **6**-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

45 J
cengpq

Date: 05 / 01 / 2013 **Surveyor(s):** PJT

GDRCO THP#: 95-0801 **Air Photo:** 7-4

THP Name: THP 563 **Weather- Temp (F°):** 57

Begin Survey Time: 20 : 13 **%Cloud Cover:** 0

End Survey Time: 21 : 03 **Wind Code:** 0 (1) 2 3 4 5 6

Calling Method(s): Voice ~~Recorded~~ Hoot-Flute **Precipitation:** (N) L M H F S

St#	THP Unit:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
1	C	2013	2023	—	—	—	—	—
2	C/B	2039	2049	—	—	—	—	—
3	B	2053	2103	—	—	—	—	—

Comments:

Species Codes:

SPOW: Northern Spotted Owl NSWO: Northern Saw-whet Owl
GHOW: Great Horned Owl WESO: Western Screech Owl
BAOW: Barred Owl NOPO: Northern Pygmy Owl
COBO: Common Barn Owl FLOW: Flammulated Owl

Call Type Codes:

4: 4-Note Call 3: 3-Note Call A: Agitated Contact
B: Bark S: Series Contact C: Contact

Weather Codes:

Wind : **0**- No wind/calm (0 mph) **1**-Smoke drifts slightly(1-3) **2**-Leaves rustle (4-7) **3**-Leaves small twigs in constant motion (8-12) **4**-Dust raised, small branches in motion (13-18) **5**-Small trees sway (19-24) **6**-Large branches trees sway (25-30+)

Precip:

None, Light, Mod, Heavy, Fog, Snow

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Conyea

Date: 05 / 09 / 2013 **Surveyor(s):** CRK

GDRCO THP#: 95-0801 **Air Photo:** #7-4

THP Name: THP 563 **Weather- Temp (F°):** 50

Begin Survey Time: 20 : 23 **%Cloud Cover:** 100

End Survey Time: 21 : 28 **Wind Code:** 0 (1) 2 3 4 5 6

Calling Method(s): Voice (Recorded) Hoot-Flute **Precipitation:** (N) L M H F S

St#	THP Unit:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
1	C	20:23	20:33	—	—	-	—	—
2	S, B	20:49	20:59	NOPO	4:30 min	unk	unk	188
3	B	21:08	21:28	—	—	—	—	—

Comments:

Species Codes:
SPOW: Northern Spotted Owl NSWO: Northern Saw-whet Owl
GHOW: Great Horned Owl WESO: Western Screech Owl
BAOW: Barred Owl NOPO: Northern Pygmy Owl
COBO: Common Barn Owl FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call 3: 3-Note Call A: Agitated Contact
B: Bark S: Series Contact C: Contact

Weather Codes:
*Wind :***0**- No wind/calm (0 mph) **1**-Smoke drifts slightly(1-3) **2**-Leaves rustle (4-7) **3**-Leaves small twigs in constant motion (8-12) **4**-Dust raised, small branches in motion (13-18) **5**-Small trees sway (19-24) **6**-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow

SS ✓

cergea

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 05 / 15 / 2013 **Surveyor(s):** CRK

GDRCO THP#: 95-0801 **Air Photo:** #7-4

THP Name: THP 563 **Weather- Temp (F°):** 50

Begin Survey Time: 22 : 21 **%Cloud Cover:** 100

End Survey Time: 23 : 14 **Wind Code:** (0) 1 2 3 4 5 6

Calling Method(s): Voice (Recorded) Hoot-Flute **Precipitation:** (N) L M H F S

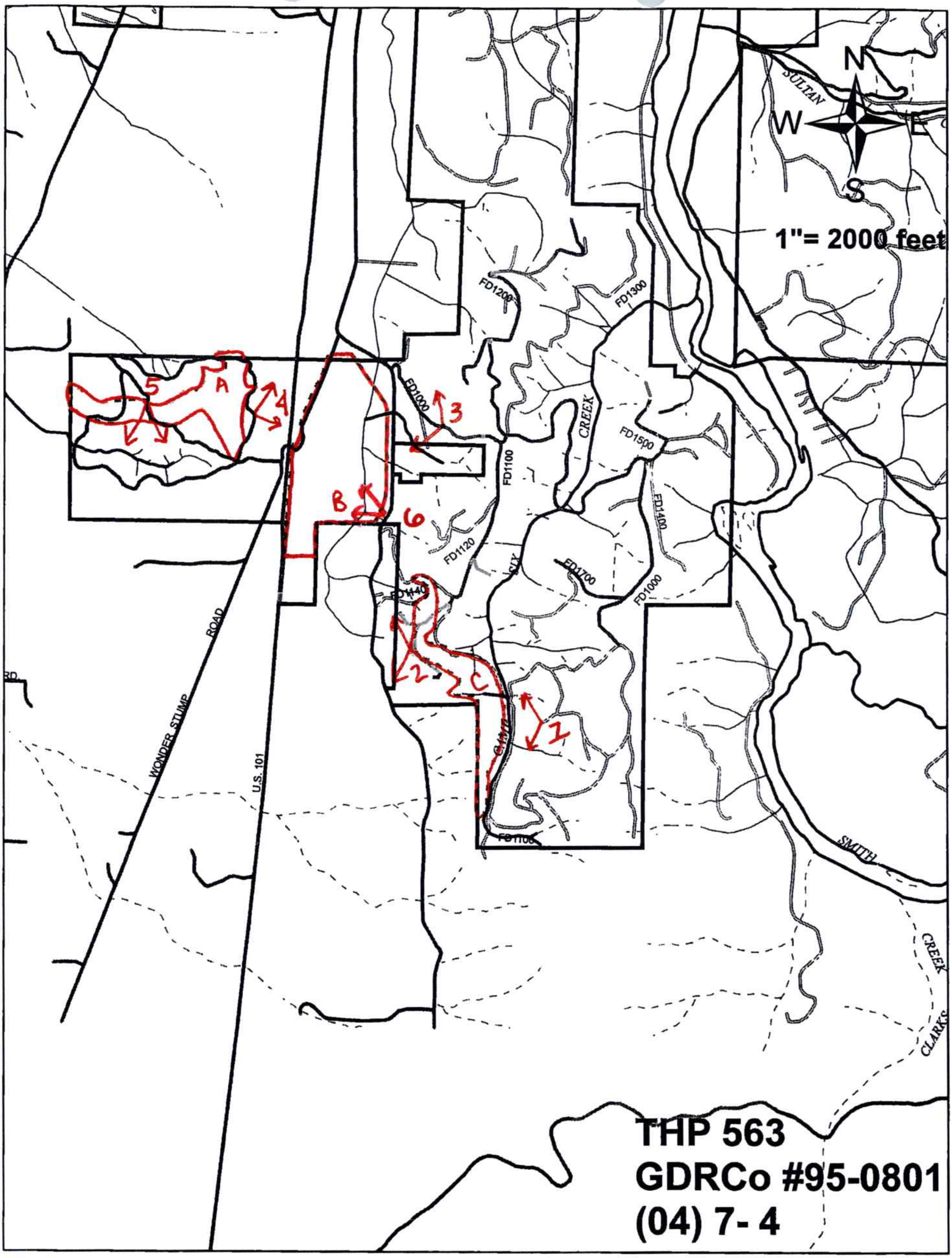
St#	THP Unit:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
1	C	22:21	22:31	NSWO	0min	unk	unk	311
2	C, B	22:46	22:56	—	—	—	—	—
3	B	23:04	23:14	—	—	—	—	—

Comments:

Species Codes:
SPOW: Northern Spotted Owl NSWO: Northern Saw-whet Owl
GHOW: Great Horned Owl WESO: Western Screech Owl
BAOW: Barred Owl NOPO: Northern Pygmy Owl
COBO: Common Barn Owl FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call 3: 3-Note Call A: Agitated Contact
B: Bark S: Series Contact C: Contact

Weather Codes:
*Wind :*0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow



N
W
E
S
SULTAN
1"= 2000 feet
FD1200
FD1300
FD1000
FD1500
FD1100
FD1400
FD1120
FD1700
FD1000
FD1140
FD1100
CREEK
SMITH
CREEK
CLARKS
WONDER STUMP
ROAD
U.S. 101
RD.
A
B
C
1
2
3
4
5
6
THP 563
GDRCo #95-0801
(04) 7- 4

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 03 / 04 / 2014
GDRCO THP#: [redacted] 95-0801
THP Name: THP 563
Begin Survey Time: 17 : 08
End Survey Time: 17 : 41
Calling Method(s): Voice (Recorded) Hoot-Flute

Surveyor(s): MRH
Air Photo:
Weather- Temp (F°): 53
%Cloud Cover: 75%
Wind Code: 0 (1) 2 3 4 5 6
Precipitation: (N) L M H F S

St#	THP Unit:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
—	B	17:08	17:18	—	—	—	—	—
—	C	17:31	17:41	—	—	—	—	—

Comments: Both surveys conducted were spot calls.
Unit B surveyed from 10T 0405793, 4632745.
Unit C surveyed from 10T 0405715, 4631588.
No NSPO or other species heard during either survey.

Species Codes:
SPOW: Northern Spotted Owl
NSWO: Northern Saw-whet Owl
GHOW: Great Horned Owl
WESO: Western Screech Owl
BAOW: Barred Owl
NOPO: Northern Pygmy Owl
COBO: Common Barn Owl
FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call
3: 3-Note Call
A: Agitated Contact
B: Bark
S: Series Contact
C: Contact

Weather Codes:
Wind: **0**- No wind/calm (0 mph) **1**-Smoke drifts slightly(1-3) **2**-Leaves rustle (4-7) **3**-Leaves small twigs in constant motion (8-12) **4**-Dust raised, small branches in motion (13-18) **5**-Small trees sway (19-24) **6**-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

C / 55!

Date: 3 / 11 / 2014
GDRCO THP#: 95-08801
THP Name: 563
Begin Survey Time: 20 : 29
End Survey Time: 21 : 40
Calling Method(s): Voice (Recorded) Hoot-Flute

Surveyor(s): TLB
Air Photo:
Weather- Temp (F°): 45
%Cloud Cover: 0
Wind Code: 0 (1) 2 3 4 5 6
Precipitation: (N) L M H F S

St#	THP Unit:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
2	C	20:29	20:39	—	—	—	—	—
3	B	20:53	21:03	—	—	—	—	—
6	B	21:11	21:21	—	—	—	—	—
4	B	21:30	21:40	—	—	—	—	—

Comments:

Species Codes:
SPOW: Northern Spotted Owl NSWO: Northern Saw-whet Owl
GHOW: Great Horned Owl WESO: Western Screech Owl
BAOW: Barred Owl NOPO: Northern Pygmy Owl
COBO: Common Barn Owl FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call 3: 3-Note Call A: Agitated Contact
B: Bark S: Series Contact C: Contact

Weather Codes:
*Wind :*0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

SSV CV

Date: 03 / 18 / 2014 **Surveyor(s):** N. Soderlelt

GDRCO THP#: 95-0801 **Air Photo:**

THP Name: 563 **Weather- Temp (F°):** 54

Begin Survey Time: ~~21~~:20 **%Cloud Cover:** 0-10

End Survey Time: 22:44 **Wind Code:** (0) 1 2 3 4 5 6

Calling Method(s): Voice (Recorded) Hoot-Flute **Precipitation:** (N) L M H F S

St#	THP Unit:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
4	95 ~~A~~	2120	2130					
3	B	2150	2200					
6	B	2209	2219					
2	C	2234	2244					

Comments: SPOT call of "C"
survey also counted as spot call of "B"

Species Codes:
SPOW: Northern Spotted Owl NSWO: Northern Saw-whet Owl
GHOW: Great Horned Owl WESO: Western Screech Owl
BAOW: Barred Owl NOPO: Northern Pygmy Owl
COBO: Common Barn Owl FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call 3: 3-Note Call A: Agitated Contact
B: Bark S: Series Contact C: Contact

Weather Codes:
Wind : **0**- No wind/calm (0 mph) **1**-Smoke drifts slightly(1-3) **2**-Leaves rustle (4-7) **3**-Leaves small twigs in constant motion (8-12) **4**-Dust raised, small branches in motion (13-18) **5**-Small trees sway (19-24) **6**-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow

55 CV

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 3 / 26 / 2014
GDRCO THP#: 95-0801
THP Name: THP 563
Begin Survey Time: 21 : 47
End Survey Time: 22 : 51
Calling Method(s): Voice (Recorded) Hoot-Flute

Surveyor(s): TLB
Air Photo:
Weather- Temp (F°): 45
%Cloud Cover: 90
Wind Code: 0 1 (2) 3 4 5 6
Precipitation: N L M H (F) S

St#	THP Unit:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
5	A, B	21:47	21:57	—	—	—	—	—
6 (S.C.)	B	22:07	22:17	—	—	—	—	—
2 (S.C.)	C	22:28	22:38	—	—	—	—	—
3	B	22:41	22:51	—	—	—	—	—

Comments: S.C. = Spot Call

Species Codes:
SPOW: Northern Spotted Owl
GHOW: Great Horned Owl
BAOW: Barred Owl
COBO: Common Barn Owl
NSWO: Northern Saw-whet Owl
WESO: Western Screech Owl
NOPO: Northern Pygmy Owl
FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call
3: 3-Note Call
A: Agitated Contact
B: Bark
S: Series Contact
C: Contact

Weather Codes:
Wind : 0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow

SS ✓
CV

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 4 / 2 / 2014
GDRCO THP#: 95-0801
THP Name: 563
Begin Survey Time: 22 : 11
End Survey Time: 23 : 25
Calling Method(s): Voice (Recorded) Hoot-Flute

Surveyor(s): CRK
Air Photo: 7-4
Weather- Temp (F°): 40
%Cloud Cover: 20
Wind Code: 0 1 (2) 3 4 5 6
Precipitation: (N) L M H F S

St#	THP Unit:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
3	B	22:11	22:21	—	—			—
2	C	22:27	22:37	—	—			—
6	B	22:53	23:03	—	—			—
4	B	23:15	23:25	—	—			—

Comments: Spot call of "C"
Survey also counted as spot call of "B"

Species Codes:
SPOW: Northern Spotted Owl
GHOW: Great Horned Owl
BAOW: Barred Owl
COBO: Common Barn Owl
NSWO: Northern Saw-whet Owl
WESO: Western Screech Owl
NOPO: Northern Pygmy Owl
FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call
3: 3-Note Call
A: Agitated Contact
B: Bark
S: Series Contact
C: Contact

Weather Codes:
Wind : **0**- No wind/calm (0 mph) **1**-Smoke drifts slightly(1-3) **2**-Leaves rustle (4-7) **3**-Leaves small twigs in constant motion (8-12) **4**-Dust raised, small branches in motion (13-18) **5**-Small trees sway (19-24) **6**-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

C ✓ SS ✓

Date: 05 / 01 / 14
GDRCO THP#: 95-0801
THP Name: THP 563
Begin Survey Time: 20:20
End Survey Time: :
Calling Method(s): Voice (Recorded) Hoot-Flute

Surveyor(s): S Hunt von Ab
Air Photo:
Weather- Temp (F°):
%Cloud Cover: 100
Wind Code: (0) 1 2 3 4 5 6
Precipitation: (N) L M H (F) S

St#	THP Unit:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
2		2020	2030	—				
3		2039	2049	—				
6		2059	2109	—				
4		2120	2130	—				

Comments: Hwy noise throughout survey. Light fog - no drip

Species Codes:
SPOW: Northern Spotted Owl
GHOW: Great Horned Owl
BAOW: Barred Owl
COBO: Common Barn Owl
NSWO: Northern Saw-whet Owl
WESO: Western Screech Owl
NOPO: Northern Pygmy Owl
FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call
3: 3-Note Call
A: Agitated Contact
B: Bark
S: Series Contact
C: Contact

Weather Codes:
Wind: 0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)
Precip:
None, Light, Mod, Heavy, Fog, Snow

GREEN DIAMOND RESOURCE COMPANY

HCP Spotted Owl Protocol Survey Form

Date: 05 / 06 / 2014 **Surveyor(s):** N. Soderlet

GDRCO THP#: 95-09001 **Air Photo:**

THP Name: THP 563 **Weather- Temp (F°):** 54

Begin Survey Time: 21 : 35 **%Cloud Cover:** 10

End Survey Time: 22 : 47 **Wind Code:** (0) 1 2 3 4 5 6

Calling Method(s): Voice (Recorded) Hoot-Flute **Precipitation:** (N) L M H F S

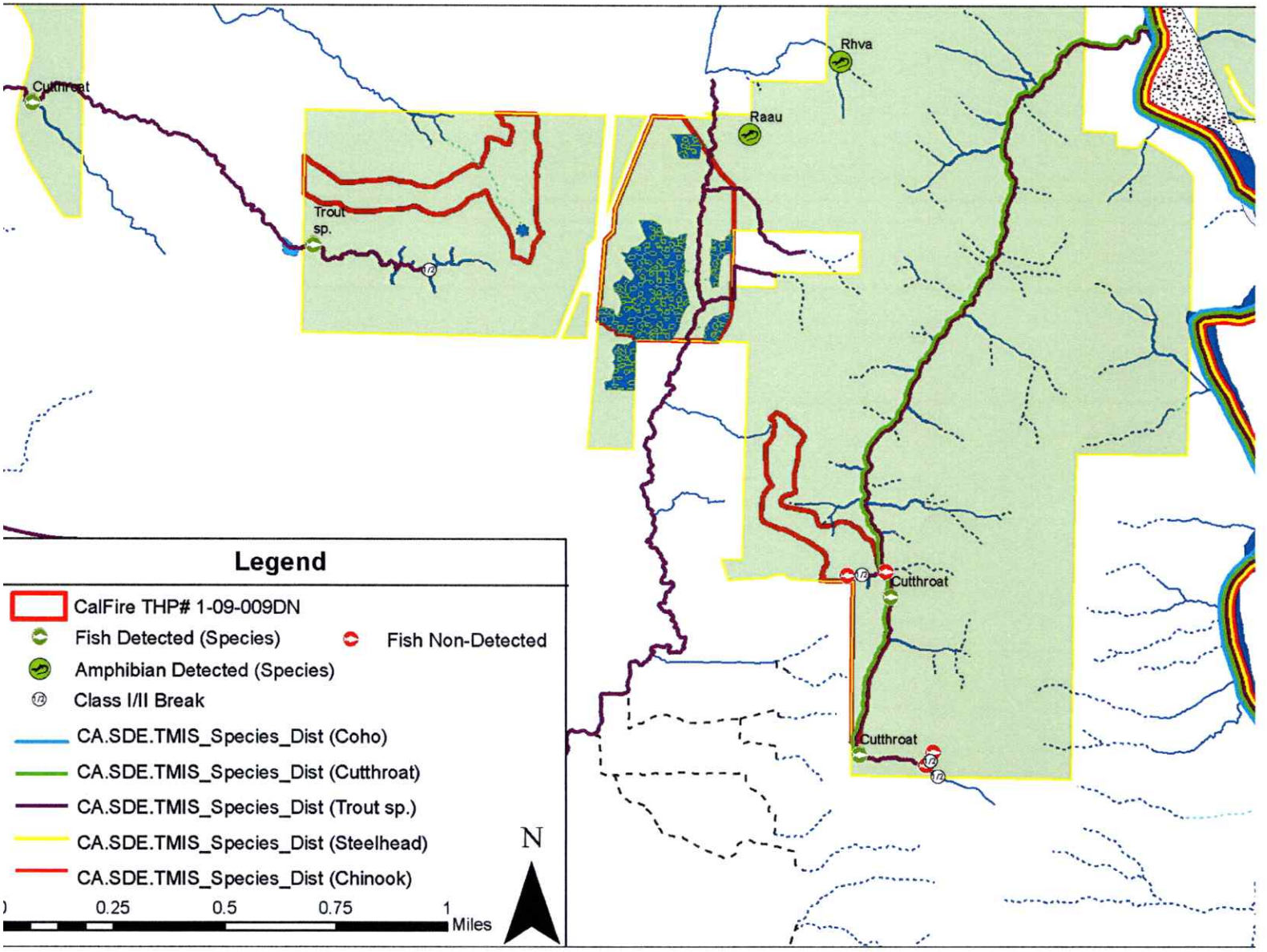
St#	THP Unit:	Start Time:	End Time:	Species:	Response Time:	Sex:	Call Type:	Azimuth:
4	A	2135	2145	\				
6	B	2156	2206	\				
2	B	2218	2228	\				
3	B			\				

Comments:

Species Codes:
SPOW: Northern Spotted Owl NSWO: Northern Saw-whet Owl
GHOW: Great Horned Owl WESO: Western Screech Owl
BAOW: Barred Owl NOPO: Northern Pygmy Owl
COBO: Common Barn Owl FLOW: Flammulated Owl

Call Type Codes:
4: 4-Note Call 3: 3-Note Call A: Agitated Contact
B: Bark S: Series Contact C: Contact

Weather Codes:
Wind: 0- No wind/calm (0 mph) 1-Smoke drifts slightly(1-3) 2-Leaves rustle (4-7) 3-Leaves small twigs in constant motion (8-12) 4-Dust raised, small branches in motion (13-18) 5-Small trees sway (19-24) 6-Large branches trees sway (25-30+)
Precip:
None, Light, Mod. Heavy, Fog. Snow


Cutthroat
Trout sp.
Rhva
Raau
Cutthroat
Cutthroat
Legend
CalFire THP# 1-09-009DN
Fish Detected (Species)
Fish Non-Detected
Amphibian Detected (Species)
Class I/II Break
CA.SDE.TMIS_Species_Dist (Coho)
CA.SDE.TMIS_Species_Dist (Cutthroat)
CA.SDE.TMIS_Species_Dist (Trout sp.)
CA.SDE.TMIS_Species_Dist (Steelhead)
CA.SDE.TMIS_Species_Dist (Chinook)
0
0.25
0.5
0.75
1
Miles
N

APPENDIX D

Cultural Resources Correspondance

LACO

October 1, 2018

6872.19

Northwest Information Center
Sonoma State University
150 Professional Center Drive, Suite E
Rohnert Park, California 94928

Attention: Bryan Much, Coordinator

Subject: Request for Records Search for Portion of One (1) Assessor's Parcel Number (APN) in the Unincorporated Community of Fort Dick in Del Norte County, California – APN 106-021-010

Dear Mr. Much:

On behalf of our client, Green Diamond Resource Company (GDRCo), LACO Associates (LACO) would like to make a request to the Northwest Information Center (NWIC) for a Cultural and Historic Resources Records Search for a portion of the property identified as Assessor's Parcel Number (APN) 106-021-010, generally located east of Lake Earl Drive and west of Wonder Stump Road and Highway 101 in the unincorporated community of Fort Dick, in Del Norte County, California. Although APN 106-021-010 totals approximately 308 acres in size, the project site (Site) is comprised of an approximately 212 acre portion of the property. This project is currently in the preliminary planning stage and we are looking for early input. The County of Del Norte will be the lead agency for this project and will not be sending you a separate request. Three maps are enclosed for your reference, including an Area of Potential Effect (APE) map, a Certificates of Compliance (CoC) map, and a Preliminary Development Potential map.

GDRCo is seeking approval of a general plan amendment and a ten-year Timberland Preserve Zone (TPZ) reclassification. The Site is currently designated as "Timberland" (TBR) under the Del Norte County General Plan, and is currently zoned as "Timberland Preserve Zone" (TPZ) under the Del Norte County Zoning Code. GDRCo would like to amend the existing land use and zoning designations to Rural Residential with one lot unit per three acres (RR3) and Rural Residential with three- to five-acre lot sizes (RR-3), respectively. At this time, only a change in the Site's current land use and zoning designations, including a ten-year TPZ rollout, is being proposed for the Site. A subdivision or any associated development is not currently proposed; however, future residential development is anticipated on-site.

The Site contains several constraint areas, including Class I and II watercourses in the northern and southwestern portions of the Site (tributaries to Yonkers Creek and Camp Six Creek), which require a minimum building setback of a least 100 feet from the top of bank or outer edge of riparian vegetation, whichever is greater. Based on Site characteristics, identified resources, and required buffers, including a 251 foot noise buffer on either side of Highway 101, as measured from the centerline of Highway 101, the Site is estimated to have a development potential of 167 acres. In the future, if a residential subdivision of the Site is proposed, the Site would allow for up to a maximum of 55 residential lots, assuming the requested land use and zoning designations of RR3 and RR-3, respectively, are approved for the Site.

The current and proposed parcel access to the site is via Wonder Stump Road, located adjacent to and east of the Site. The Site is currently undeveloped and forested and contains various unmaintained dirt roads and skid trails scattered throughout the Site.

Surrounding uses include rural residential development and timberland to the north, south, east, and west of the Site. Additionally, Lake Earl is located approximately 0.9 miles west of the Site, and Smith River is located approximately one mile east of the Site. Pelican Bay State Prison is located approximately a half a mile to the north.

We are respectfully requesting a Records Search to be conducted for the Site. We authorize up to four (4) hours of work to be performed. Please contact us if the search will require additional effort. Please indicate LACO Project Number 6872.19 on the invoice.

I look forward to your response. If you have any question, please do not hesitate to contact me. I can be reached at marruffom@lacoassociates.com or (707) 443-5054.

Sincerely,
LACO Associates

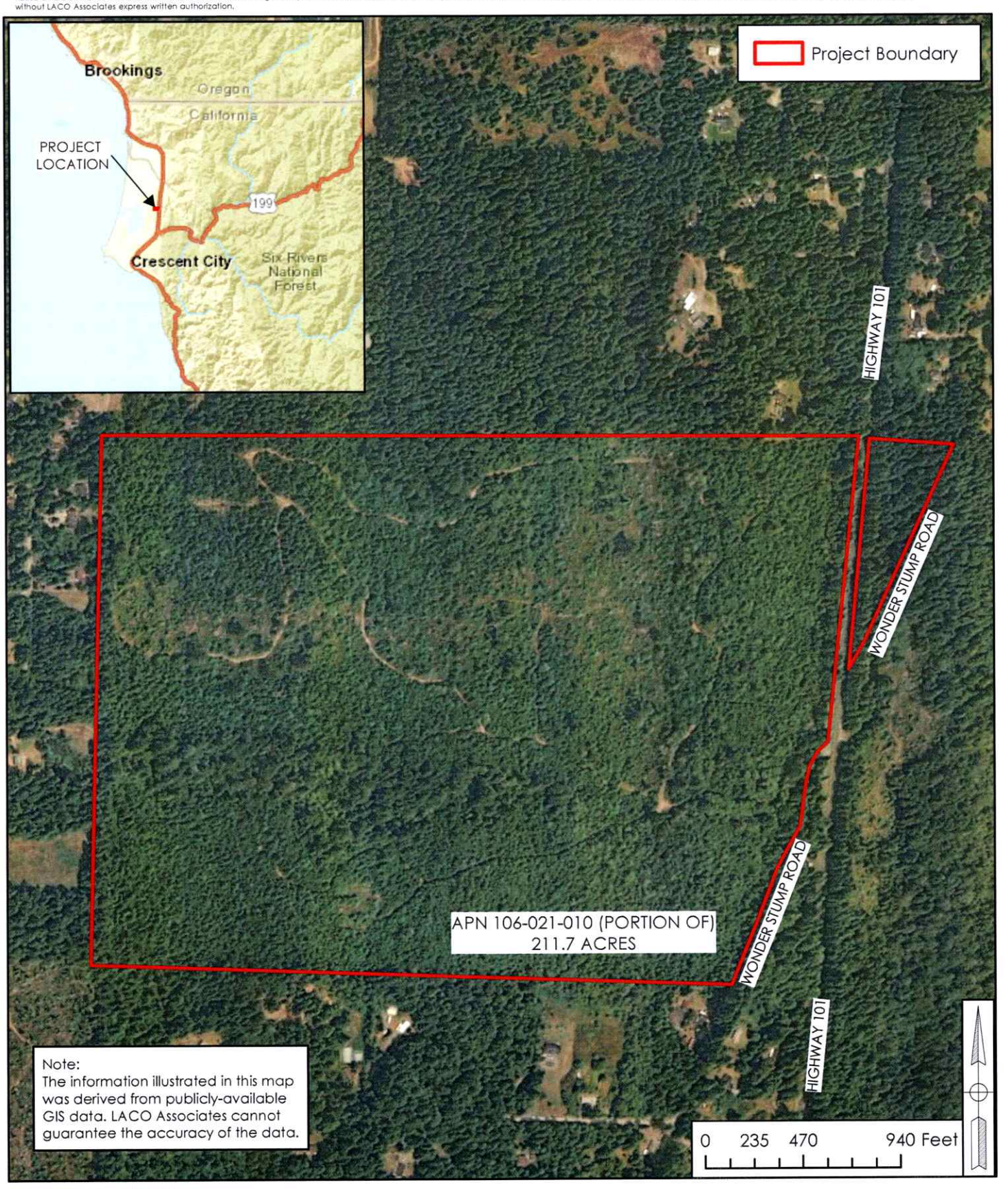
Megan Marruffo
Associate Planner

Enclosures (APE, CoC, and Preliminary Development Potential Maps)

LACO
EUREKA • UKIAH • SANTA ROSA
1-800-515-5054 www.lacoassociates.com

PROJECT	FORT DICK FLATS ENTITLEMENTS	BY CMB	FIGURE 1
CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK MMM	
LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE 9/28/2018	JOB NO. 6872.19
	AREA OF POTENTIAL EFFECT MAP		

REUSE OF DOCUMENTS: This document and the ideas and design incorporated herein, as an instrument of professional service, is the property of LACO Associates and shall not be reused in whole or part for any other project without LACO Associates express written authorization.

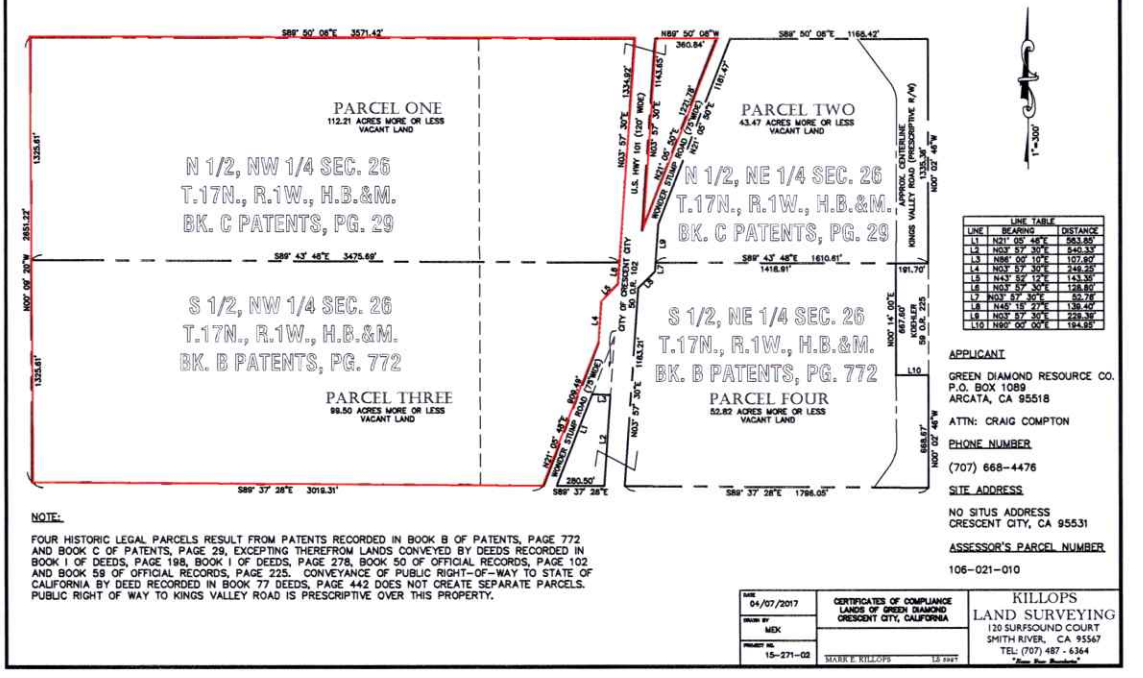


Date: 9/28/2018 Time: 11:30:44 AM
Path: P:\6800\6872 Green Diamond Del Norte County\6872.19 Fort Dick Flats Entitlements\12 Figures\Maps\GIS\6872.19 APE Map.mxd

TENTATIVE MAP

CERTIFICATES OF COMPLIANCE

COUNTY OF DEL NORTE - STATE OF CALIFORNIA



LINE TABLE		
LINE	BEARING	DISTANCE
L1	N21° 05' 48"E	563.85'
L2	N03° 57' 30"E	340.33'
L3	N86° 02' 10"E	107.90'
L4	N03° 57' 30"E	349.25'
L5	N43° 52' 12"E	143.30'
L6	N03° 57' 30"E	28.80'
L7	N03° 57' 30"E	52.78'
L8	N45° 15' 27"E	139.40'
L9	N03° 57' 30"E	238.76'
L10	N90° 00' 00"E	194.85'

NOTE:

FOUR HISTORIC LEGAL PARCELS RESULT FROM PATENTS RECORDED IN BOOK B OF PATENTS, PAGE 772 AND BOOK C OF PATENTS, PAGE 29, EXCEPTING THEREFROM LANDS CONVEYED BY DEEDS RECORDED IN BOOK I OF DEEDS, PAGE 198, BOOK I OF DEEDS, PAGE 278, BOOK 50 OF OFFICIAL RECORDS, PAGE 102 AND BOOK 59 OF OFFICIAL RECORDS, PAGE 225. CONVEYANCE OF PUBLIC RIGHT-OF-WAY TO STATE OF CALIFORNIA BY DEED RECORDED IN BOOK 77 DEEDS, PAGE 442 DOES NOT CREATE SEPARATE PARCELS. PUBLIC RIGHT OF WAY TO KINGS VALLEY ROAD IS PRESCRIPTIVE OVER THIS PROPERTY.

APPLICANT

GREEN DIAMOND RESOURCE CO.
P.O. BOX 1089
ARCATA, CA 95518

ATTN: CRAIG COMPTON

PHONE NUMBER

(707) 668-4476

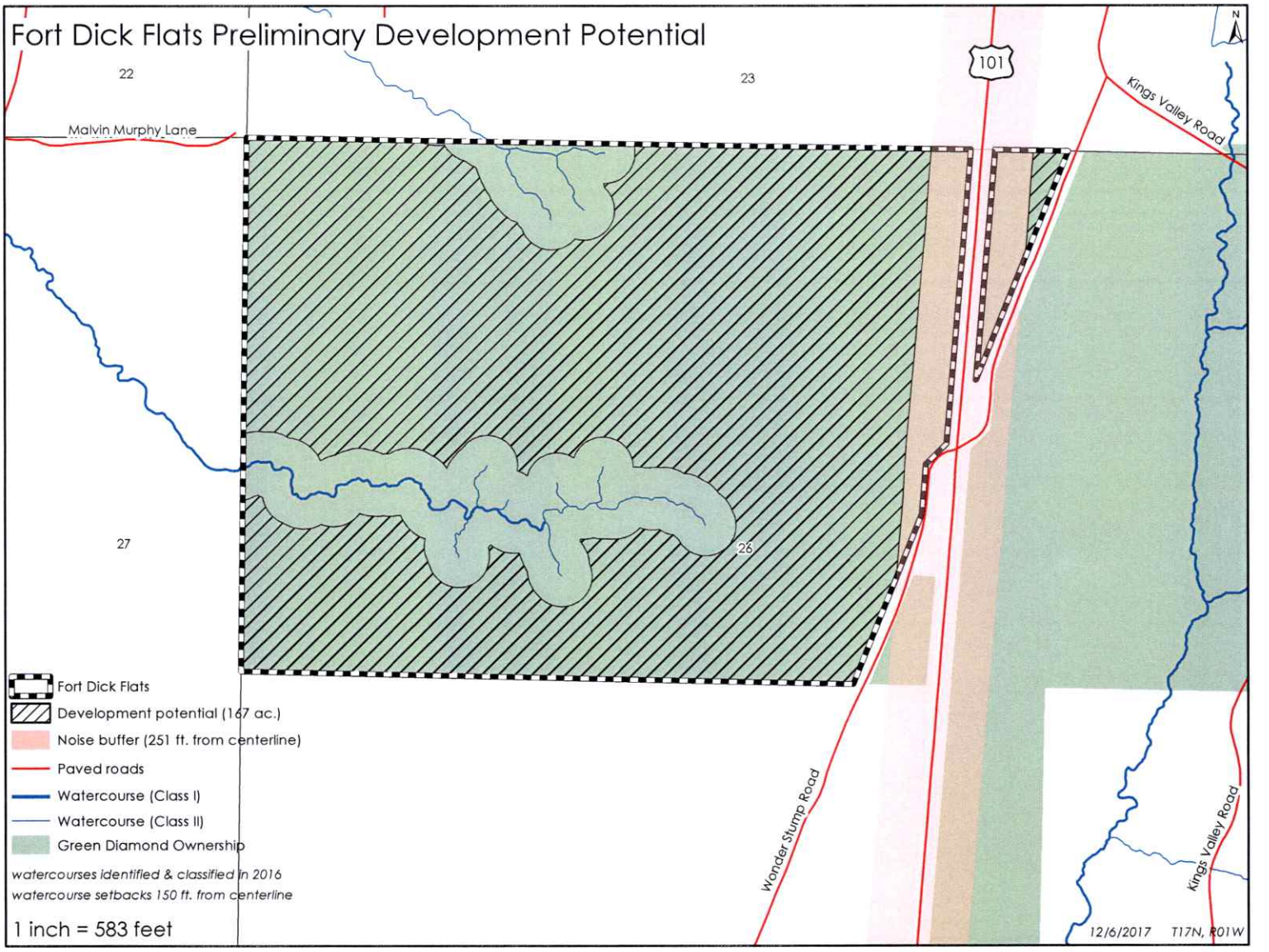
SITE ADDRESS

NO SITUS ADDRESS
CRESCENT CITY, CA 95531

ASSESSOR'S PARCEL NUMBER

106-021-010

DATE 04/07/2017	CERTIFICATES OF COMPLIANCE LANDS OF GREEN DIAMOND CRESCENT CITY, CALIFORNIA	KILLOPS LAND SURVEYING
DRAWN BY MEK		120 SURFSOUND COURT SMITH RIVER, CA 95567 TEL: (707) 487 - 6364
PROJECT NO. 15-271-02	MARK E. KILLOPS LS 5967	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LACO

October 1, 2018

6872.19

☐ Pyuwa Bommelyn, THPO
cc: Karin Levy, Cultural Resource Specialist
Tolowa Dee-ni' Nation
140 Rowdy Creek Road
Smith River, California 95567

☒ Crista Stewart, THPO
Elk Valley Rancheria
2332 Howland Hill Road
Crescent City, California 95531

Subject: Proposed General Plan Amendment and Zone Reclassification
Green Diamond Resource Company
Portion of Assessor's Parcel Number 106-021-010
Highway 101 and Wonder Stump Road, Fort Dick, Del Norte County, California

Dear Tribal Representative:

Green Diamond Resource Company (GRDCo) has retained LACO Associates to assist with permitting and entitlements, including an Initial Study as required under CEQA, for a general plan amendment and zone reclassification of a portion of the property identified as Assessor's Parcel Number (APN) 106-021-010 (known as Fort Dick Flats), generally located east of Lake Earl Drive and west of Wonder Stump Road and Highway 101 in the unincorporated community of Fort Dick, in Del Norte County, California. Although APN 106-021-010 totals approximately 308 acres in size, the project site (Site) is comprised of an approximately 212 acre portion of the property. This project is currently in the preliminary planning stage and we are looking for early input. The County of Del Norte will be the Lead Agency under CEQA for the proposed project. Three maps are enclosed for your reference, including an Area of Potential Effect (APE) map, a Certificates of Compliance (CoC) map, and a Preliminary Development Potential map.

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I look forward to your response. If you have any questions or would like any additional information on the project, please do not hesitate to contact me. I can be reached at marruffom@lacoassociates.com or (707) 443-5054.

Sincerely,
LACO Associates

Megan Marruffo
Associate Planner

Enclosures

LACO
EUREKA • UKIAH • SANTA ROSA
1-800-515-5054 www.lacoassociates.com

PROJECT	FORT DICK FLATS ENTITLEMENTS	BY CMB	FIGURE 1
CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK MMM	
LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE 9/28/2018	JOB NO. 6872.19
	AREA OF POTENTIAL EFFECT MAP		

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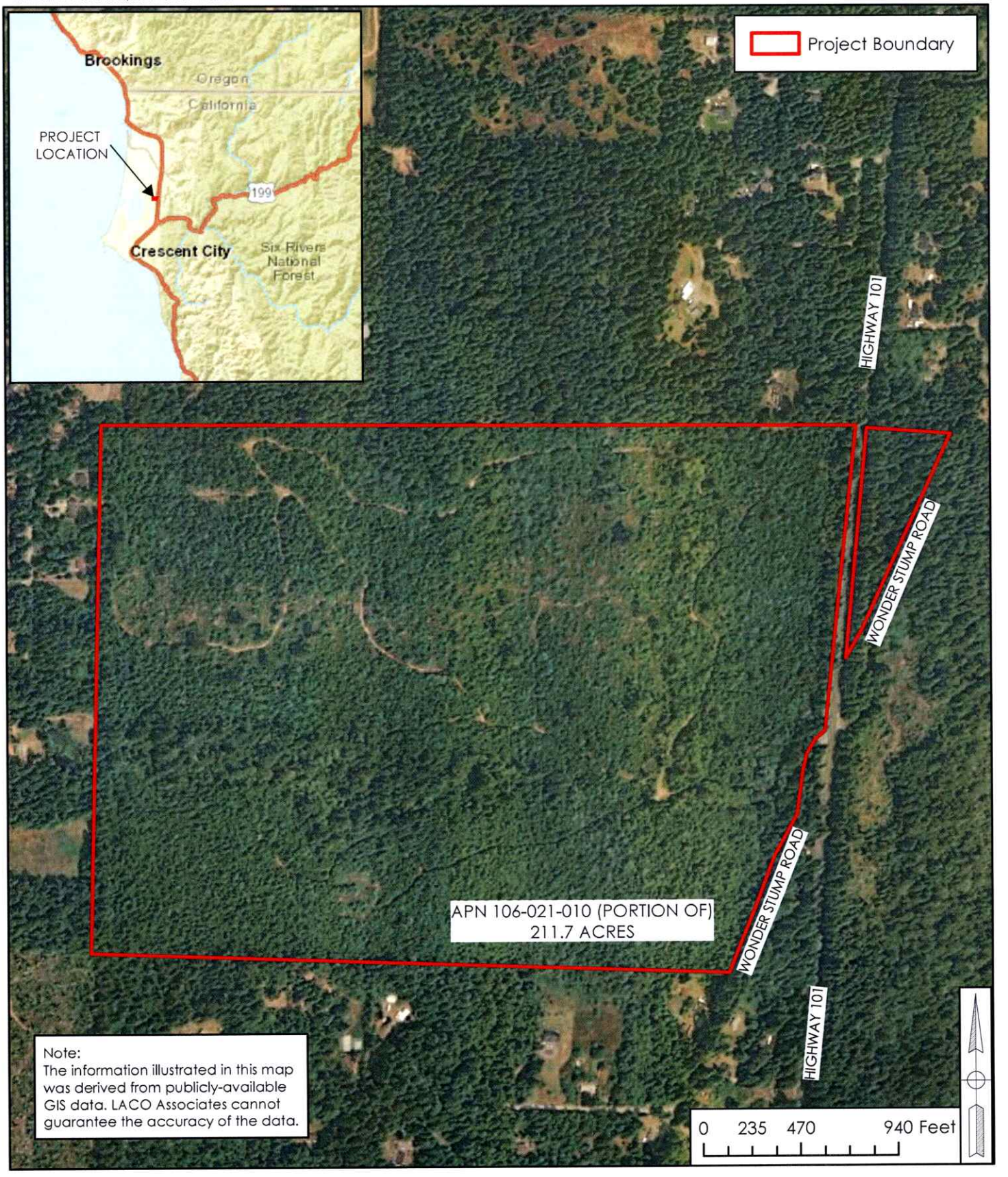

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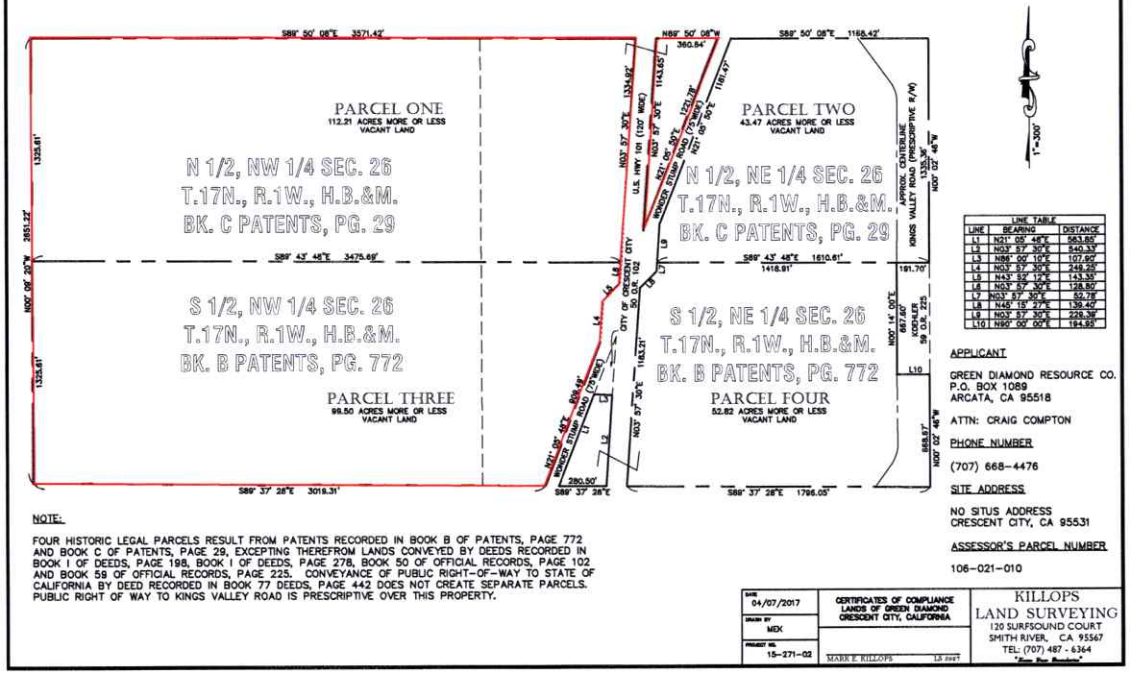
TENTATIVE MAP

CERTIFICATES OF COMPLIANCE

COUNTY OF DEL NORTE - STATE OF CALIFORNIA



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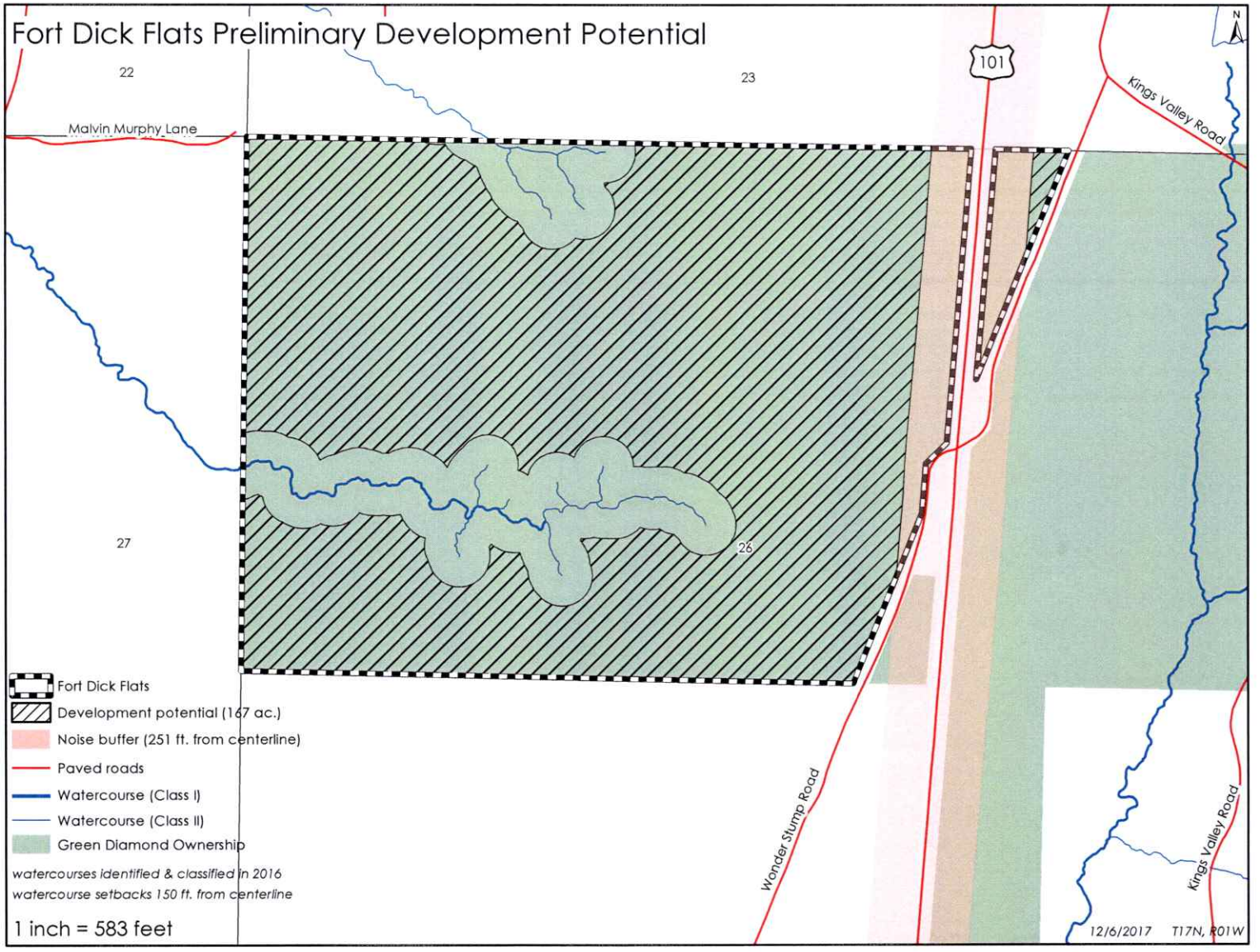
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	CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK	MMM	1
	LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE	9/28/2018	JOB NO.
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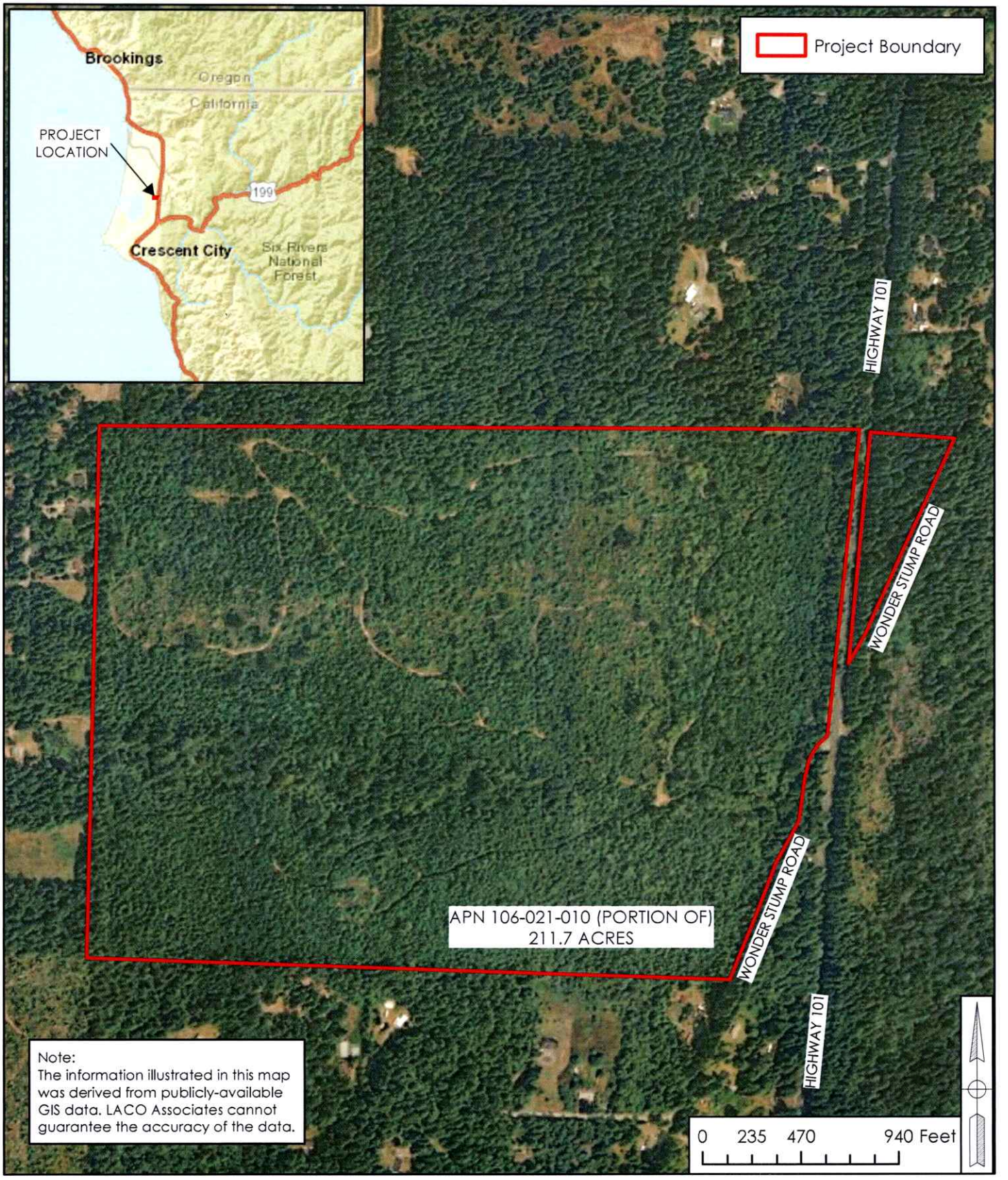

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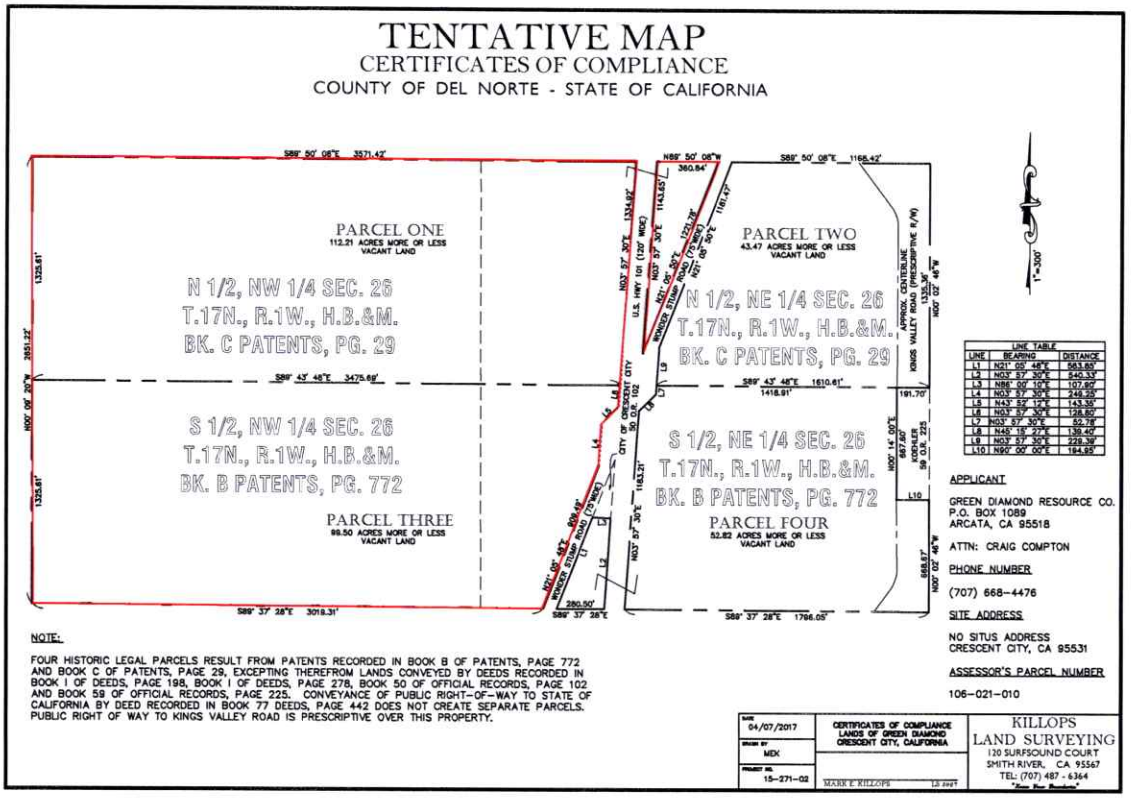

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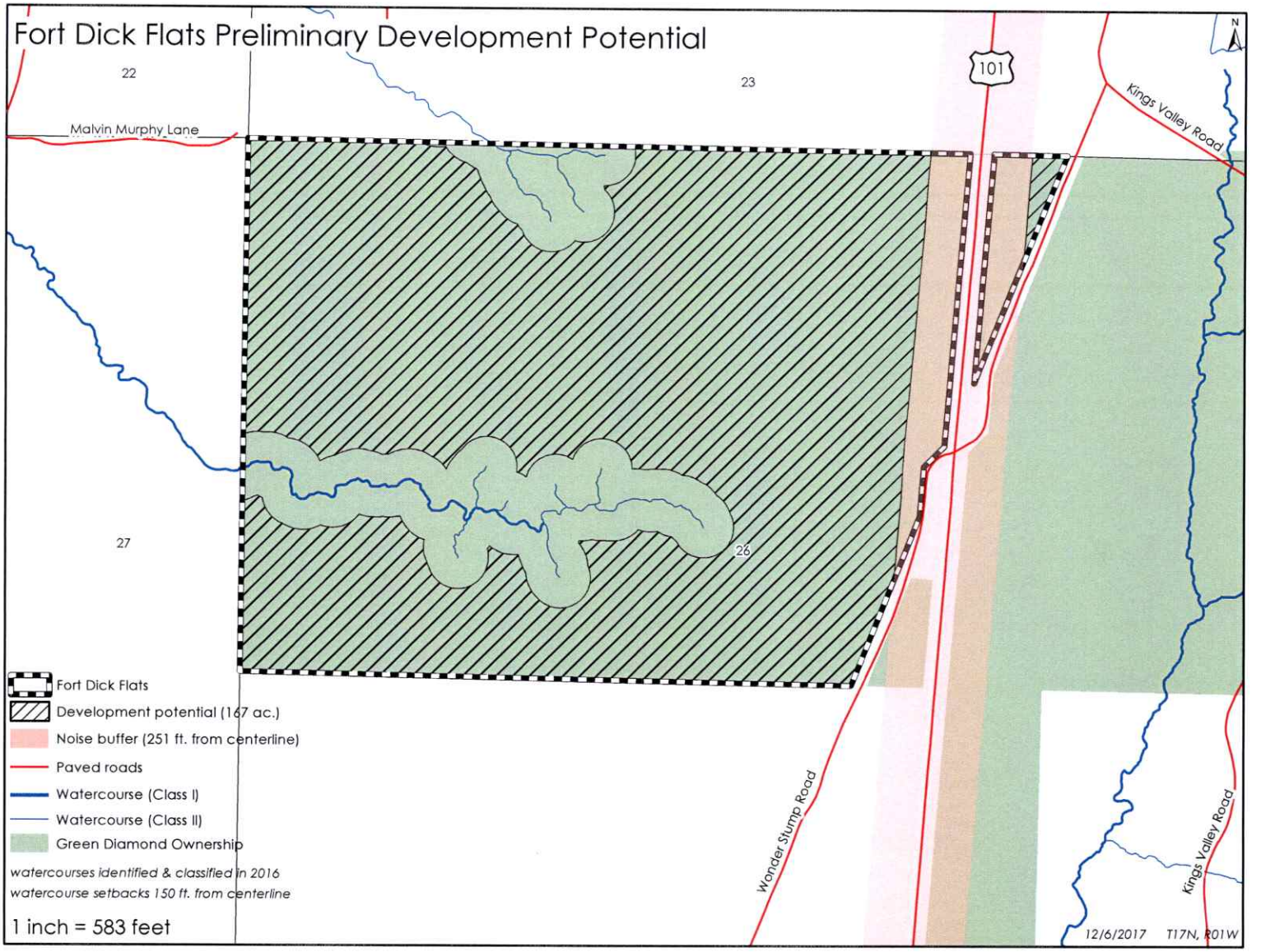
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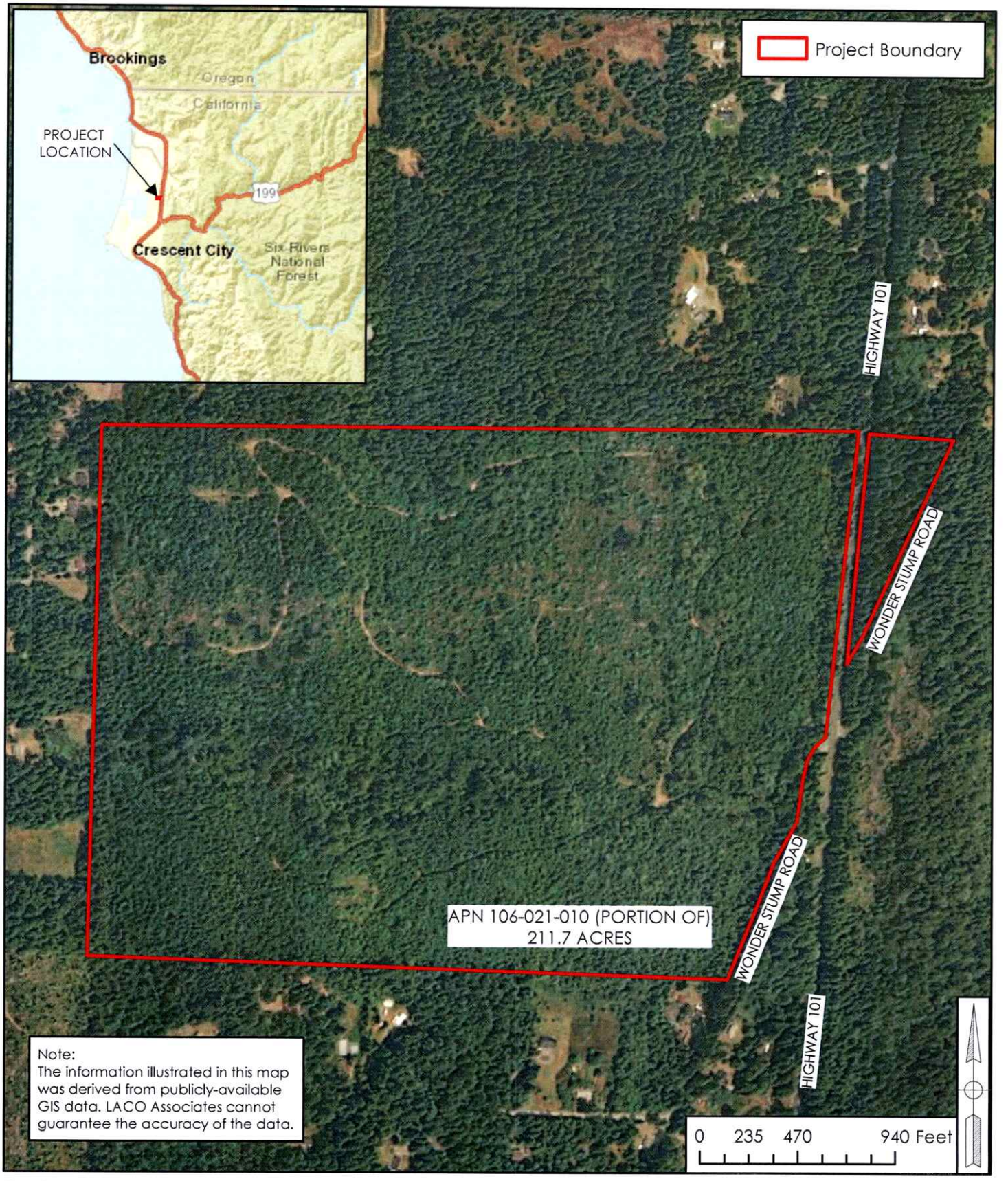

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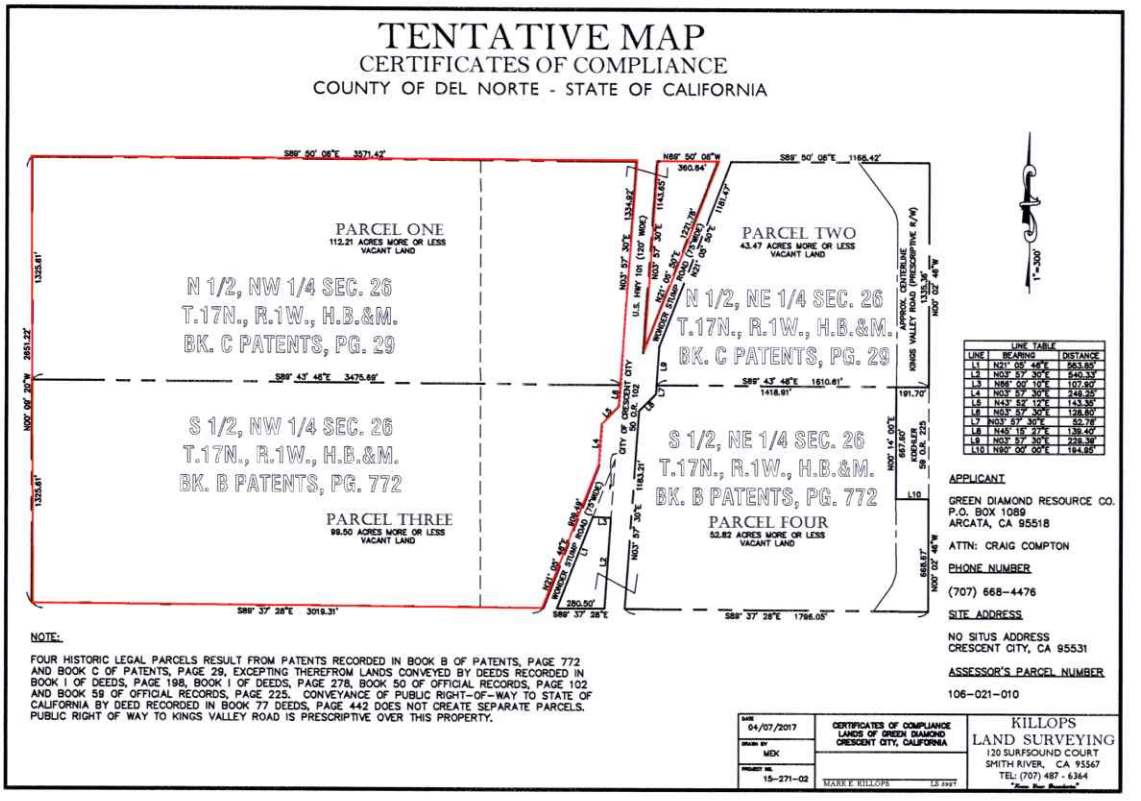

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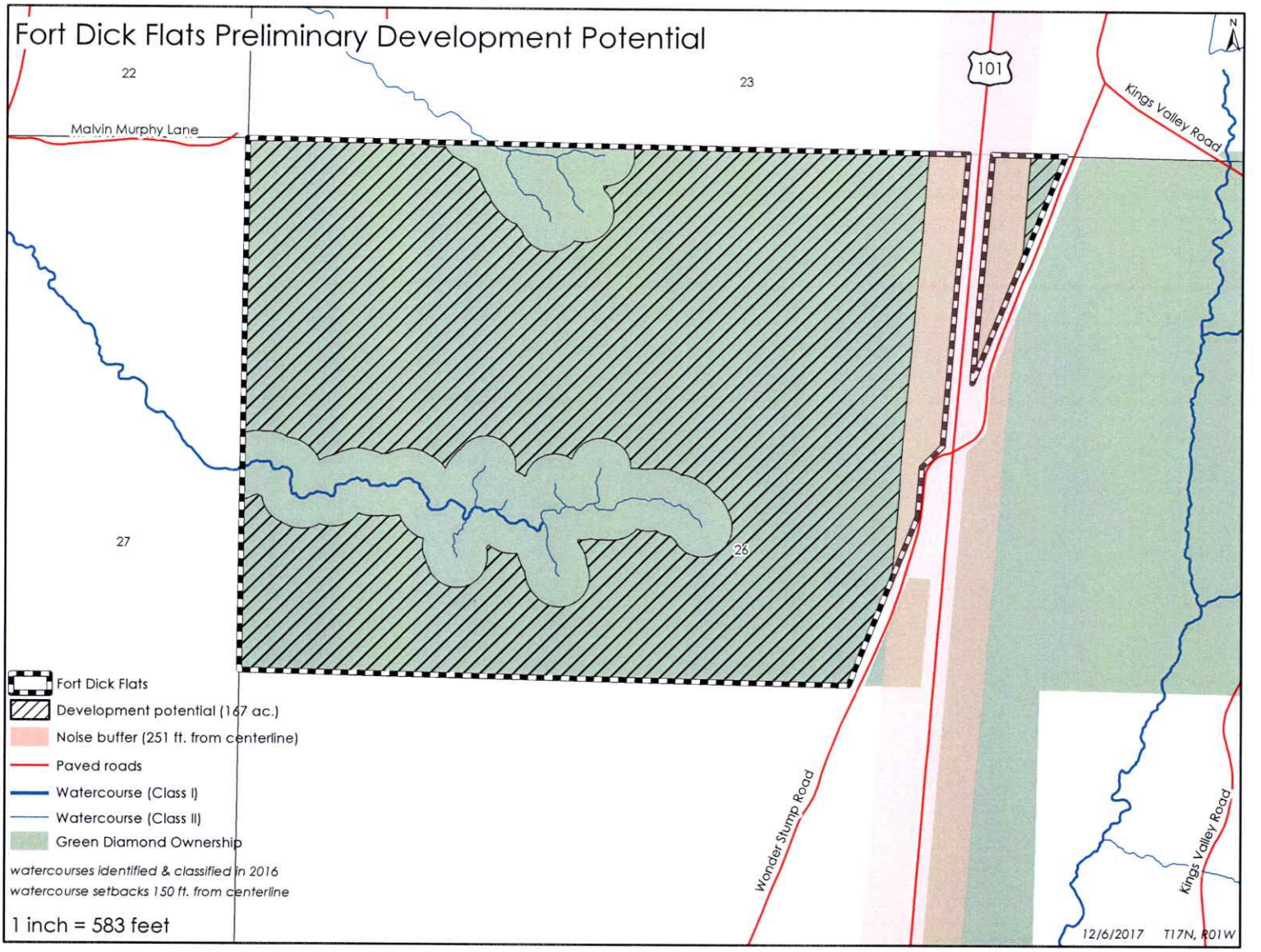
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Northwest Information Center
Sonoma State University
150 Professional Center Drive, Suite E
Rohnert Park, California 94928-3609
Tel: 707.588.8455
nwic@sonoma.edu
http://www.sonoma.edu/nwic

October 17, 2018

NWIC File No.: 18-0652

Megan Marruffo
LACO Associates
21 W Fourth St.
Eureka, CA 95501

Re: Record search results for the proposed Wonder Stump Road Project.

Dear Megan Marruffo:

Per your request received by our office on 10/1/18, a records search was conducted for the above referenced project by reviewing pertinent Northwest Information Center (NWIC) base maps that reference cultural resources records and reports, historic-period maps, and literature for Del Norte County. Please note that use of the term cultural resources includes both archaeological resources and historical buildings and/or structures.

Review of this information indicates that there have been two archaeological/cultural resource studies that cover approximately 90% of the Wonder Stump Road project area: S-015153 (Peak & Associates, Inc. 1993) and S-011902 (Roscoe 1989). This project area contains two recorded Native American archaeological resources (P-08-000364, Projectile Point #1; and P-08-000365, Projectile Point #2) and one recorded historic-period cultural resource (P-08-000363, 467 Plank Road). The State Office of Historic Preservation Historic Property Directory (OHP HPD) (which includes listings of the California Register of Historical Resources, California State Historical Landmarks, California State Points of Historical Interest, and the National Register of Historic Places) lists no recorded buildings or structures within or adjacent to the proposed project area. In addition to these inventories, the NWIC base maps show no recorded buildings or structures within the proposed project area.

At the time of Euroamerican contact the Native Americans that lived in the area were speakers of the Tolowa language, part of the Athapaskan language family (Gould 1978: 128). There are no Native American resources in or adjacent to the proposed project area referenced in the ethnographic literature [Drucker 1937; Kroeber 1925; Gould 1978].

Based on an evaluation of the environmental setting and features associated with known sites, Native American resources in this part of Del Norte County have been found in terraces near ridgelines, near intermittent or perennial watercourses, and in particular concentration near lake or coastal shorelines. The Wonder Stump Road project area contains a gently sloped wooded area approximately one mile east of Lake Earl, with at least one watercourse within the project area. Given these environmental factors, there is a moderate potential for further unrecorded Native American resources in the proposed Wonder Stump Road project area.

Review of historical literature and maps indicated mid-19th century historic-period activity within the proposed Wonder Stump Road project area. The General Land Office Survey Plat for Township 17 North/Range 1 West (1856) depicts a "wagon road" within the proposed project area; this road may be associated with P-08-000363 (467 Plank Road). Although the presence of a historic-period road does not necessarily indicate additional historic-period activity, the accessibility of the proposed project area does contribute to its potential archaeological sensitivity. With this in mind, there is a moderate potential for unrecorded historic-period archaeological resources in the proposed Wonder Stump Road project area.

The 1952 USGS Crescent City 15-minute topographic quadrangle fails to depict any buildings or structures within the Wonder Stump Road project area. Therefore, there is a low possibility of identifying any buildings or structures 45 years or older within the project area.

RECOMMENDATIONS:

1) There are two recorded archaeological resources (P-08-000364; P-08-000365) in the proposed project area and one recorded historic-period cultural resource (P-08-000363) within the proposed project area. It is recommended that a professional archaeologist assess the resource(s) and provide project-specific recommendations. Please refer to the list of consultants who meet the Secretary of Interior's Standards at http://www.chrisinfo.org.

2) There is a moderate potential of identifying Native American archaeological resources and a moderate potential of identifying historic-period archaeological resources

in the project area. Due to the passage of time since the previous survey (S-015153, Peak & Associates, Inc. 1993) and the changes in archaeological theory and method since that time, we recommend a qualified archaeologist conduct further archival and field study for the entire project area to identify archaeological resources. Field study may include, but is not limited to, pedestrian survey, hand auger sampling, shovel test units, or geoarchaeological analyses as well as other common methods used to identify the presence of archaeological resources. Please refer to the list of consultants who meet the Secretary of Interior's Standards at http://www.chrisinfo.org.

3) We recommend the lead agency contact the local Native American tribe(s) regarding traditional, cultural, and religious heritage values. For a complete listing of tribes in the vicinity of the project, please contact the Native American Heritage Commission at 916/373-3710.

4) If the proposed project area contains buildings or structures that meet the minimum age requirement, prior to commencement of project activities, it is recommended that this resource be assessed by a professional familiar with the architecture and history of Del Norte County. Please refer to the list of consultants who meet the Secretary of Interior's Standards at http://www.chrisinfo.org.

5) Review for possible historic-period buildings or structures has included only those sources listed in the attached bibliography and should not be considered comprehensive.

6) If archaeological resources are encountered **during construction,** work should be temporarily halted in the vicinity of the discovered materials and workers should avoid altering the materials and their context until a qualified professional archaeologist has evaluated the situation and provided appropriate recommendations. Project personnel should not collect cultural resources. Native American resources include chert or obsidian flakes, projectile points, mortars, and pestles; and dark friable soil containing shell and bone dietary debris, heat-affected rock, or human burials. Historic-period resources include stone or adobe foundations or walls; structures and remains with square nails; and refuse deposits or bottle dumps, often located in old wells or privies.

7) It is recommended that any identified cultural resources be recorded on DPR 523 historic resource recordation forms, available online from the Office of Historic Preservation's website: http://ohp.parks.ca.gov/default.asp?page_id=1069

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the California Historical Resources Information System (CHRIS) Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

The California Office of Historic Preservation (OHP) contracts with the California Historical Resources Information System's (CHRIS) regional Information Centers (ICs) to maintain information in the CHRIS inventory and make it available to local, state, and federal agencies, cultural resource professionals, Native American tribes, researchers, and the public. Recommendations made by IC coordinators or their staff regarding the interpretation and application of this information are advisory only. Such recommendations do not necessarily represent the evaluation or opinion of the State Historic Preservation Officer in carrying out the OHP's regulatory authority under federal and state law.

Thank you for using our services. Please contact this office if you have any questions, (707) 588-8455.

Sincerely,

Cameron Felt
Researcher

LITERATURE REVIEWED

In addition to archaeological maps and site records on file at the Northwest Information Center of the Historical Resources Information System, the following literature was reviewed:

Baumhoff, Martin A.

1958 *California Athabascan Groups*. University of California Publications, Anthropological Records 16(5):157-237. Berkeley and Los Angeles. (Reprint by Kraus Reprint Corporation, New York, 1976).

Conners, Pamela A.

1998 *A History of the Six Rivers National Forest...Commemorating the First 50 Years.* USDA Forest Service, Pacific Southwest Region, Six Rivers National Forest, Eureka, CA.

Cook, S.F.

1956 *The Aboriginal Population of the North Coast of California*. University of California Anthropological Records 16(3):81-130. Berkeley and Los Angeles.

Drucker, Philip

1937 *The Tolowa and their Southerwest Oregon Kin*. University of California Publications in American Archaeology and Ethnology 36(4):221-300. Berkeley.

Fickewirth, Alvin A.

1992 *California Railroads*. Golden West Books, San Marino, CA.

General Land Office

1856 Survey Plat for Township 17 North/Range 1 West.

Gould, Richard A.

1978 Tolowa. In *California*, edited by Robert F. Heizer, pp. 128-136. Handbook of North American Indians, vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Gudde, Erwin G.

1969 *California Place Names: The Origin and Etymology of Current Geographical Names*. Third Edition. University of California Press, Berkeley and Los Angeles.

Hart, James D.

1987 *A Companion to California*. University of California Press, Berkeley and Los Angeles.

Hoover, Mildred Brooke, Hero Eugene Rensch, and Ethel Rensch, revised by William N. Abeloe

1966 *Historic Spots in California*. Third Edition. Stanford University Press, Stanford, CA.

Hoover, Mildred Brooke, Hero Eugene Rensch, and Ethel Rensch, William N. Abeloe, revised by Douglas E. Kyle

1990 *Historic Spots in California*. Fourth Edition. Stanford University Press, Stanford, CA.

Hope, Andrew

2005 *Caltrans Statewide Historic Bridge Inventory Update*. Caltrans, Division of Environmental Analysis, Sacramento, CA.

Kroeber, A.L.

1925 *Handbook of the Indians of California*. Bureau of American Ethnology, Bulletin 78, Smithsonian Institution, Washington, D.C. (Reprint by Dover Publications, Inc., New York, 1976)

Moratto, Michael J.

1973 *An Archaeological Overview of Redwood National Park.* Publications in Anthropology, Number 8. Cultural Resources Management Division, Western Archaeological Center, National Park Sevice, Tucson, AZ.

Roberts, George, and Jan Roberts

1988 *Discover Historic California*. Gem Guides Book Co., Pico Rivera, CA.

State of California Department of Parks and Recreation

1976 *California Inventory of Historic Resources*. State of California Department of Parks and Recreation, Sacramento.

State of California Department of Parks and Recreation and Office of Historic Preservation

1988 *Five Views: An Ethnic Sites Survey for California*. State of California Department of Parks and Recreation and Office of Historic Preservation, Sacramento.

State of California Office of Historic Preservation **

2012 *Historic Properties Directory*. Listing by City (through April 2012). State of California Office of Historic Preservation, Sacramento.

Thornton, Mark V.

1993 An Inventory and Historical Significance Evaluation of CDF Fire Lookout Stations. CDF Archaeological Reports No. 12.

Williams, James C.

1997 *Energy and the Making of Modern California*. The University of Akron Press, Akron, OH.

Woodbridge, Sally B.

1988 *California Architecture: Historic American Buildings Survey*. Chronicle Books, San Francisco.

Works Progress Administration

1984 *The WPA Guide to California*. Reprint by Pantheon Books, New York. (Originally published as California: A Guide to the Golden State in 1939 by Books, Inc., distributed by Hastings House Publishers, New York.)

**Note that the Office of Historic Preservation's *Historic Properties Directory* includes National Register, State Registered Landmarks, California Points of Historical Interest, and the California Register of Historical Resources as well as Certified Local Government surveys that have undergone Section 106 review.

Megan Marruffo

From: Crista Stewart <cstewart@elk-valley.com>
Sent: Monday, October 22, 2018 2:57 PM
To: Megan Marruffo
Subject: RE: GDRCo's Fort Dick Flats Project - Highway 101/Wonder Stump Road, Fort Dick

Hi Megan:

We have reviewed the information regarding the Fort Dick Flats Project. The Tribe understands that this area may contain additional archaeological materials related to the isolates found but are not aware of specific sites that are of concern. If you locate archaeological materials during the course of work, the Tribe would like to be immediately notified.

We greatly appreciate your consultation efforts Megan.

Please feel free to contact me at 707-465-2620 or via email at cstewart@elk-valley.com.
Crista

Crista D. Stewart
Director of Grants/Tribal Historic Preservation Officer
Elk Valley Rancheria, California
2332 Howland Hill Road
Crescent City, CA 95531
707-465-2620 Office
707-951-4836 Cell
Email: cstewart@elk-valley.com
Website: www.elk-valley.com

From: Megan Marruffo [mailto:marruffom@lacoassociates.com]
Sent: Friday, October 19, 2018 12:49 PM
To: Crista Stewart <cstewart@elk-valley.com>
Subject: GDRCo's Fort Dick Flats Project - Highway 101/Wonder Stump Road, Fort Dick

Good afternoon, Ms. Stewart

I am writing in regards to the Fort Dick Flats project, proposed by our client, Green Diamond Resource Company (GDRCo). GDRCo has retained LACO Associates to assist with permitting and entitlements, including an Initial Study as required under CEQA, for a general plan amendment and zone reclassification for a 211.7 acre site identified as Assessor's Parcel Numbers (APNs) 106-021-074 and -076 (formerly APN 106-021-010), generally located east of Lake Earl Drive and west of Wonder Stump Road and Highway 101 in the unincorporated community of Fort Dick, in Del Norte County, California. This project is currently in the preliminary planning stage and we are looking for early input. The County of Del Norte will be the Lead Agency under CEQA for the proposed project.

We sent you a letter on October 1st regarding the proposed project. Since the date of our original letter, we have been informed of new APNs for the Site and have received a letter from the Northwest Information Center, which includes the results of their record search conducted for the Site. A letter with project details, maps, and the NWIC letter is attached for your reference. A hard copy of the letter has also been mailed to you.

We are respectfully seeking your input regarding any specific areas within the Area of Potential Effect which may be likely to harbor culturally valuable resources and may therefore merit additional protection or require a cultural monitor to be on-site during anticipated future development. Any input you can provide would be most appreciated. Please let me know if you have any questions or require additional information. Thank you for your assistance.

Thank you,

LACO
Megan Marruffo
Associate Planner
LACO Associates
Eureka | Ukiah | Santa Rosa
Advancing the quality of life for generations to come
707 443 5054
http://www.lacoassociates.com

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Megan Marruffo

From: Amanda O'Connell <amanda.oconnell@tolowa.com>
Sent: Friday, October 26, 2018 4:45 PM
To: Megan Marruffo
Cc: Karin Levy; Briannon Fraley; Chairman Padgette
Subject: Initiation of CEQA Consultation
Attachments: Signed Response to Fort Dick Flats consultation request.pdf

Dv-laa-ha~ Megan,

Please find attached our response to your request to initiate CEQA consultation. We look forward to working with you.

Shu' shaa nin-la,

Amanda O'Connell
Tribal Historic Preservation Officer
Tolowa Dee-ni' Nation
140 Rowdy Creek Rd.
Smith River, CA 95567
(707) 487-9255 x1174

"Xwii-day shu' waa-sinlh-'a~'vt xwii-day shvm naa waa-tr'vslh-'aa~-le'"
(When you live correct everything shall be blessed)

*****Tolowa Dee-ni' Nation Confidentiality Notice***** This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed.

Tolowa Dee-ni' Nation

140 Rowdy Creek Rd, Smith River, CA 95567-9525
Ph: (707) 487-9255 Fax: (707) 487-0930

Denise Richards-Padgette
Chairperson

Jeri Lynn Thompson
Vice Chairperson

Leann McCallum
Council Secretary

Dr. Joseph Giovannetti
Treasurer

Marvin Richards Sr.
Council Member

Kara Brundin-Miller
Council Member

Cari Nelson
Council Member

October 26, 2018

LACO Associates
Megan Marruffo
21 W. Fourth Street
Eureka, CA 95501

RE: Initiation of CEQA consultation for Proposed General Plan Amendment and Zone Reclassification

Dv-laa-ha~ Ms. Marruffo,

Tolowa Dee-ni' Nation ("Nation") recently received a request from you to review your client's (Green Diamond Resource Company "GDRCo") Proposed General Plan Amendment and Zone Reclassification for potential impacts to significant cultural resources. The Nation understands that due to your requirements to comply with California law, LACO (in care of GDRCo) must initiate consultation through the California Environmental Quality Act ("CEQA").

As the Tribal Historic Preservation Officer, I will serve as the Nation's staff liaison to facilitate regular communications between LACO and the Tribal Council of the Nation. Any and all official consultation will be done with the Tribal Council directly or delegated upon their approval. With that said, the Nation does have concerns about cultural resources within the Area of Potential Effect (APE), and we would like to request a site visit to the project location.

The Nation is grateful for your compliance with California law and looks forward to working with you on the protection of cultural resources located within our aboriginal territory. To continue communications please contact me by phone at (707) 487-3237 or by email at amanda.oconnell@tolowa.com.

Shu' shaa nin-la,

Amanda O'Connell
Tribal Historic Preservation Officer

CC: Tribal Council of Tolowa Dee-ni' Nation

Waa-saa-ghitlh-'a~ Wee-ni Naa-ch'aa-ghitlh-ni
Our Heritage Is Why We Are Strong

APPENDIX E

Preliminary Traffic Memorandum

LACO

TECHNICAL MEMORANDUM

Preliminary Traffic Analysis
Fort Dick Flats Entitlements
Assessor's Parcel Numbers: 106-021-074 and 106-021-076

Date: Revised August 27, 2019
Project No.: 6872.19

Prepared For: Green Diamond Resource Company

Reviewed By: Scott Kelly
PE; EXP 09/30/20

Attachments:
Figures
Figure 1 - Study Area and Zoning
Figure 2 - Study Intersection
Appendix 1: Caltrans Growth Factors
Appendix 2: Traffic Analysis Tabular Results

1.0 INTRODUCTION

This technical memorandum presents the results of a preliminary traffic analysis based on the maximum density allowed for future development under the proposed Fort Dick Flats project, which includes a 10-year Timberland Production Zone (TPZ) Reclassification and General Plan Amendment (Project). The Project does not propose development of the parcel at this time, but the zone reclassification and General Plan amendment plans for residential development. To provide a conservative analysis, the potential traffic impacts of the maximum potential future development will be analyzed.

The Site to be re-zoned under the current project and anticipated for future residential development is 211.71 acres of the Fort Dick Flats property (identified as Assessor's Parcel Numbers (APNs) 106-021-074 and 106-021-076), located within Del Norte County, California (see Figure 1). The Site spans across Highway 101 (HWY 101), with approximately 206.98 acres to the west of 101 and 4.73 acres to the east of 101. The Site would continue to be accessed via Wonder Stump Road at two locations. While Access Point #1 would be the main access for the anticipated future subdivision, Access Point #2 would be a driveway for access to the small triangular portion of the Site located east of HWY 101.

Based on the acreage of the Fort Dick Flats property (211.7 acres) and the requested land use and zoning designations for the Site, up to a maximum of 70 individual lots and dwelling units could potentially be created and developed on-site in the future. However, because this calculation does not account for

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932 B W. Eighth Avenue, Chico, CA 95926, 530 801-6170 – Fax 707 462-0223
Toll Free 800 515-5054 lacoassociates.com

identified protected resources on-site and required buffer zones from each area, the Site's potential developable area and amount of development anticipated on-site in the future would be reduced. We estimate that these constraints would limit development to approximately 55 individual residential lots. Nonetheless, in order to provide a conservative analysis of the Site's potential future traffic impacts, the maximum of 70 lots and dwelling units is utilized. Additionally, while second units are permitted within the land use and zoning designations requested for the Site, each parcel containing a second unit must be a minimum of twice the minimum parcel size required by the General Plan and Zoning Code and must be situated on the parcel so that the parcel could be subdivided without resulting in two dwellings on one parcel. A maximum of 35 lots and 70 dwelling units or 70 lots and 70 dwelling units could occur on-site.

The traffic is analyzed for a residential neighborhood with the assumption that it would be fully developed in roughly 15 years (2033); giving time for completion of the 10-year Zone Reclassification and General Plan Amendment and following development of the Site. Estimates of the traffic generated from full build-out of the potential residential development are included. The objective of this traffic analysis is to provide County staff with information to support informed decisions regarding potential traffic impacts resulting from traffic generated by future residential development.

2.0 PROJECT BACKGROUND

The Project location is currently designated as "Timberland" (TBR) under the Del Norte County General Plan and is zoned as "Timberland Preserve Zone" (TPZ) under the Del Norte County Zoning Code. Green Diamond Resource Company (GDRCo) proposes to amend the existing land use designation and zoning to Rural Residential with one lot per three acres (RR3) and Rural Residential with three- to five-acre lot sizes (RR-3), respectively.

With a 211.7-acre Site and a maximum density of one dwelling unit per three acres, the maximum development potential of the Site is 70 dwelling units, although, as noted above, the amount of development anticipated for the Site in the future is less due to identified resources on-site and required buffers. However, the maximum development potential of 70 lots and units is utilized in order to provide a conservative analysis and present the maximum traffic impacts that may result under future development of the Site. It is unknown at this stage of the project what the exact buffers and other restrictions to development may be. Proposed access points for the development would likely be along Wonder Stump Road, with at least one main accessway to the area west of HWY 101, and a driveway to provide access to the small 4.73-acre triangular area east of HWY 101 (see Figure 1). The intersection expected to be most impacted by the development is Wonder Stump Road and HWY 101 (see Figure 2).

3.0 METHODOLOGY

The scope of the traffic study includes estimates of total capacity of adjacent streets and estimates of the peak-hour vehicle trips generated upon build-out of a residential development. The traffic circulation of the Existing, Future, and Future plus Project conditions are evaluated using the level of service and control delay, resulting from analysis in HCS7 (release 7.6) software. The ITE Trip Generation Manual was used to determine the base traffic on Wonder Stump Road for the Existing conditions and the number of project-generated trips during peak hours for the Future plus Project conditions.

Traffic circulation can be evaluated by the level of service of the roadway and the control delay at the traffic control. Level of service (LOS) is commonly used by state, county, and city regulatory agencies to represent the quality of traffic operations on various types of roads or intersections based on traffic volumes

and roadway capacity, using a series of letter designations ranging from A to F, as established in the Highway Capacity Manual (HCM) (TRB, 2010). Generally, LOS A represents free-flow conditions and LOS F represents restricted-flow or breakdown conditions. Level of service is determined by estimating the average intersection delay in seconds per vehicle (see Table 1). The through-movements on an uncontrolled main street are assumed to operate at free-flow (LOS A).

Table 1. Level of Service and Corresponding Control Delay for a Two-Way Stop-Controlled Intersection (from the HCM2010 manual, TRB 2010).

LOS	Control Delay (seconds/vehicle)
A	0-10
B	>10-15
C	>15-25
D	>25-35
E	>35-50
F	>50

HCS7 (Release 7.6) software is used to analyze the capacity, LOS, and control delay of the study intersection. The study intersection is designated as a Two-Way Stop-Controlled (TWSC) intersection. The required input data for a TWSC intersection in the HCS7 software is: (1) number and configuration of lanes for each approach; (2) percentage of heavy vehicles; (3) demand flow rate for each entering vehicle movement during the peak hour and a peak hour factor; (4) geometric factors, such as unique channelization, two-way left-turn lane or median storage, approach grades, flared approaches on the minor street, and upstream signals; (5) pedestrian information; and (6) length of analysis period (generally a peak 15-minute period within the peak hour.

The ITE Trip Generation Manual, 9th Edition, was used to estimate the existing vehicle trips on Wonder Stump Road and the project-generated vehicle trips. The ITE Trip Generation Manual provides trips generated per unit for various land uses. In the case of the current and proposed residential developments along Wonder Stump Road, the land use is most like Single-family Detached Housing (Land Use Code 210). Trip generation rates specific to ITE Land Use Code 210 are given for A.M. and P.M. peak hours, and the associated trip distribution for the peak hours (see Table 2).

Table 2. Trip Generation Rates for Single-Family Detached Housing for AM and PM Peak Hours (ITE, 2012).

Trip Generation Rates (ITE Trip Generation Manual, 9th edition, 2012)									
				AM Peak Hour			**PM Peak Hour**		
Land Use	**ITE Code**	**Intensity**	**Average Weekday Trips per Unit**	**% In**	**% Out**	**Trips per Unit**	**% In**	**% Out**	**Trips per Unit**
Single-family Detached Housing	210	per 1 du[1]	9.52	25%	75%	0.75	63%	37%	1.0

[1] *du - dwelling unit*

4.0 EXISTING CONDITIONS

The streets adjacent to or near the Site are Wonder Stump Road, HWY 101, Elk Valley Cross Road, and Kings Valley Road. Intersections of interest include Wonder Stump Road and (1) Elk Valley Cross Road, (2) HWY 101, and (3) Kings Valley Road.

The existing access road to the Site is located along Wonder Stump Road, approximately 300 feet west of the intersection Wonder Stump Road and HWY 101. It is assumed that one access point for the Site on the west side of HWY 101 will take access from this existing roadway.

There is also the potential of the proposed development to obtain alternative access points or emergency access points from the western side of the property, which would require an agreement with the existing residences. However, there is no known or recorded access right or easement across the adjacent private properties, so this may be infeasible. Western access points, for normal traffic or emergencies, would provide traffic to reach Lake Earl Drive. Knotty Pine Lane, which is a residential road that branches off Maeghan Way and meets the northwest corner of the Site, is currently the most accessible and developed road on the western side. The access points are not finalized at this point, so the feasibility of these alternative access points is not yet proven.

Crescent City, approximately 3 miles south of the Site, is the most significant traffic generator in the area. It is assumed that the predominant source and destination of traffic to and from the Site will be to the south.

From the south, Wonder Stump Road begins at Elk Valley Cross Road and runs northeast as a two-lane road for approximately 1.1 miles to Donna Declue Road, at which point it becomes a single-lane, un-striped road. The roughly 1-mile segment of Wonder Stump Road from Donna Declue Road to HWY 101 is a single-lane road lined by trees and residential property driveways, with a minimum paved width of 19.5 feet. The road is narrow and would likely deter residents from turning south onto Wonder Stump Road from the Site, especially with HWY 101 easily accessible. The narrow section of Wonder Stump Road is divided at three locations by vegetated medians, which slows traffic.

To the northeast, after crossing HWY 101, Wonder Stump Road continues until it ends at a T-intersection with Kings Valley Road.

With Wonder Stump Road being a single-lane, un-striped road to the south of the Site, the intersection of Wonder Stump Road and Elk Valley Cross Road will likely experience an insignificant impact from the Project.

The intersection of Wonder Stump Road and Kings Valley Road is not likely to be affected by the Project because of the negligible amount of traffic that the maximum one dwelling unit (in the portion of the property east of HWY 101) would create.

The intersection of Wonder Stump Road and HWY 101 will be the primary route for vehicles traveling to and from the Site and is therefore analyzed further as the study intersection. The study intersection is a two-way stop controlled (TWSC) intersection, with HWY 101 being the un-controlled (or major) road. Both roads are two lanes at the intersection, with no designated left or right turn lanes. There is a flared approach to the stop controls on Wonder Stump Road. HWY 101 widens as northbound and southbound traffic approaches the intersection, leaving sufficient room for passenger vehicles turning right onto Wonder Stump Road to

move out of the through lane to decelerate before turning. Vehicles turning left onto Wonder Stump Road from northbound or southbound HWY 101 must slow or stop in the through lane to yield to oncoming traffic before turning. There is no lighting installed at this intersection, making it particularly hazardous.

Existing traffic volumes for the intersection of Wonder Stump Road and HWY 101 (HWY 101 northbound and southbound through-traffic only) were estimated using 2016 Caltrans traffic counts and a Caltrans growth factor. The nearest intersection to the Site where Caltrans traffic counts were performed is HWY 101 at Elk Valley Cross Road (Postmile 31.188), approximately 2.2 miles south of the Wonder Stump Road/HWY 101 intersection (see Table 3). The "Ahead Peak Hour" represents the traffic north of the Elk Valley Cross Road/HWY 101, which would be expected to travel north past the study intersection (Wonder Stump Road/HWY 101).

Table 3. Existing Traffic Volumes using a Caltrans Growth Factor over Two Years (2018) and 2016 Caltrans Traffic Counts (Caltrans, 2016).

Year	Route	Location (Postmile)	Ahead Peak Hour Trips	Ahead Annual Average Daily Traffic (AADT)
)2018	101	Wonder Stump Road [Derived from data for Elk Valley Cross Road/HWY 101 (31.188)]	**808**	7,878

The existing traffic from residential lots on Wonder Stump Road was estimated using the trip generation rates for Single-family Detached Housing (ITE Land Use Code 210, 2012) in Table 2 and the estimated number of residential houses that currently use the Wonder Stump Road and HWY 101 intersection, estimated to be 32 existing residences. The cutoff for residences choosing to drive north on Wonder Stump Road to HWY 101 was estimated to be any residences north of Coulson Lane. The cutoff boundary assumes that residents south of Coulson Lane would avoid the greater length of single-lane road to drive north. The resulting trip generation, for the A.M. and P.M. peak hours, are divided into trips into and out of the area (see Table 4).

Table 4. Estimated Trip Generation for the Existing Residences that are Likely to Use the Wonder Stump Road and HWY 101 Intersection.

Existing Residences Trip Generation Summary									
				AM Peak Hour			PM Peak Hour		
Description	ITE Code	Quantity [dwelling units]	Average Weekday Trips	In	Out	Total	In	Out	Total
Existing residential	210	32	305	6	18	24	20	12	32

A majority of the urban development in the area is to the south of the Site, apart from Pelican Bay State Prison, so it is assumed more traffic would go in the southbound direction. The distribution of traffic movements from Wonder Stump Road onto HWY 101 were assumed to be 75 percent to HWY 101 southbound and 25 percent to HWY 101 northbound (see Table 5).

Table 5. Assumed Existing Distribution of Traffic from Wonder Stump Road to HWY 101.

		Assumed Distribution (%)	
From	**On to**	**Right**	**Left**
Wonder Stump Road EB	HWY 101	75	25
Wonder Stump Road WB	HWY 101	25	75

The estimated vehicle trips at the Wonder Stump Road and HWY 101 intersection was determined by combining the assumed distributions with the Caltrans 2016 traffic counts and the ITE Trip Generation for single-family detached housing (see Table 6). The estimated vehicle counts were input into the HCS7 software for analysis on the control delay and level of service (LOS) and are summarized in the conclusion. The Peak Hour Trips from Table 3 are divided in half to estimate the northbound-through and southbound-through volumes in Table 6.

Table 6. Estimated Vehicle Trips for the AM and PM Peak Hours at the Study Intersection.

Existing Conditions - Wonder Stump Road and HWY 101 Intersection												
Time	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**
AM Peak Hour (vehicles)	5	0	14	0	0	0	5	404	0	0	404	2
PM Peak Hour (vehicles)	3	0	9	0	0	0	15	404	0	0	404	5

Note: See Figure 2 for abbreviations

The AADT volume on Wonder Stump Road to the north of Star Trek Drive was 440 vehicles in the most recent traffic count (2013-2015) and is predicted to be 550 in the year 2036 (DNLTC, 2016). The level of service on Wonder Stump Road to the south of the Site, at Star Trek Drive, is predicted to remain at A (see Table 7). The junction of Route 197 and HWY 101 is predicted to be impaired, at a LOS of D, but the intersection is 2.9 miles to the north of the study intersection and would have little impact on our study intersection.

Table 7. Annual Average Daily Traffic (AADT) Volumes and LOS for Roadways Around the Site (DNLTC, 2016).

		AADT Volumes		LOS	
Road	**Location on Road**	**2013-2015**	**2036**	**2014**	**2036**
Wonder Stump Rd	N of Star Trek Drive	440	550	A	A
HWY 101	Elk Valley Cross Road	6,367	7,508	B	A

Note: Source of all data presented in table- DNLTC, 2016

5.0 FUTURE TRAFFIC

The future traffic is analyzed for traffic conditions in roughly 15 years (2033), which is the potential time frame of full development of the Site.

The Caltrans 20-year growth factor of 1.10 is used for the relevant section of HWY 101 (DN-101-23.85/39.98) (see Appendix 1). The growth factor was scaled linearly, to 1.085, to account for looking at a 17-year growth between 2016, the most current year for available HWY 101 traffic volumes, and 2033. The expected traffic volumes in the year 2033 were estimated using the existing traffic volumes and the scaled growth factor (see Table 8). The LOS results are shown in Section 7 (Analysis), below.

Table 8. Expected Vehicle Counts During AM and PM Peak Hours in the Future.

Future - Wonder Stump Road and HWY 101 Intersection												
Time	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**
AM Peak Hour (vehicles)	5	0	14	0	0	0	5	434	0	0	434	2
PM Peak Hour (vehicles)	3	0	9	0	0	0	15	434	0	0	434	5

6.0 FUTURE PLUS PROJECT TRAFFIC

The future traffic is analyzed for a residential development that would be fully developed in roughly 15 years (2033), allowing time for the 10-year Zone Reclassification and General Plan Amendment, and following development of the Site.

The primary access point for the potential residential development would be on Wonder Stump Road to the west of HWY 101. There would be an additional access point (a driveway) onto Wonder Stump Road solely for the small portion of the property to the east of HWY 101, but this property would not be expected to have a significant impact on traffic because it could only contain up to one dwelling unit, under the requested zoning designation of one unit per three acres (RR-3).

6.1 Project Trip Generation

Trip generation from the potential development was determined using the trip generation rates for Single-family Detached Housing (ITE Land Use Code 210) in Table 2 and the number of potential dwelling units from the development. Approximately 53 vehicle trips in the A.M. peak-hour and 70 vehicle trips in the P.M. peak hour are expected from the potential development (Table 9).

Table 9. Trip Generation from the Potential Development.

Project Trip Generation Summary									
				AM Peak Hour			PM Peak Hour		
Description	**ITE Code**	**Quantity**	**Average Weekday**	**In**	**Out**	**Total Trips Generated**	**In**	**Out**	**Total Trips Generated**
Proposed Project	210	70 du[1]	666	13	39	**53**	44	26	**70**

6.2 Project Trip Distribution

The distribution of traffic movements from Wonder Stump Road onto HWY 101 was assumed to be the same as the existing conditions, with 75 percent to HWY 101 southbound and 25 to HWY 101 northbound. It is assumed that all traffic coming from the development will go to HWY 101, instead of using the single-lane portion of Wonder Stump Road to the south (see Table 10).

Table 10. Assumed Existing Distribution of Traffic from Wonder Stump Road to HWY 101 and Access Points to Wonder Stump Road.

		Assumed Distribution (%)	
From	**On to**	**Right**	**Left**
Wonder Stump Road EB (200 veh)	HWY 101	75	25
Wonder Stump Road WB (← veh)	HWY 101	25	75
Access Point 1 [1]	Wonder Stump Road	0	100

Note: [1] to be used for the Future with Project scenario project trip generation distribution

The project-generated vehicle trips were determined using the trip generation and the assumed distribution of the turning movements from the access point of the Site to Wonder Stump Road onto HWY 101 (*Table 11*).

Table 11. Project Generated Vehicle Trips for the AM and PM Peak Hours.

Project Generated Trips - Wonder Stump Road and HWY 101 Intersection												
Time	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**
AM Peak Hour (vehicles)	10	0	30	0	0	0	10	0	0	0	0	3
PM Peak Hour (vehicles)	6	0	19	0	0	0	33	0	0	0	0	11

6.3 Future Plus Project Traffic

The expected vehicle count at the Wonder Stump and HWY 101 intersection in the future plus potential development was determined by combining the future vehicle count and the estimated trip generation from the potential development (see Table 12). The estimated vehicle counts were input into the HCS7 software for analysis on the control delay and level of service (LOS) and are summarized in the conclusion.

Table 12. Expected Vehicle Counts During AM and PM Peak Hours in the Future Plus Project.

Future plus Project - Wonder Stump Road and HWY 101 Intersection												
Time	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**
AM Peak Hour (vehicles)	14	0	43	0	0	0	14	434	0	0	434	5
PM Peak Hour (vehicles)	9	0	28	0	0	0	48	434	0	0	434	16

7.0 ANALYSIS

The estimated vehicle counts for the Existing, Future, and Future plus Project Conditions were utilized with the HCS7 software (see Appendix 2), along with the intersection geometric conditions and other factors, to analyze the traffic movements at the intersection of Wonder Stump Road and HWY 101.

The LOS at the study intersection is not predicted to change significantly from the Existing conditions to the Future or Future plus Project conditions. All traffic movements have a LOS of A at the study intersection in all three scenarios. The longest delay from the analysis run in HCS7 software is 10 seconds during the AM peak hour on Wonder Stump Road (see Table 13).

Table 13. Summary of Results for the Control Delay and LOS of the Scenarios.

Scenario		Eastbound		Westbound		Northbound		Southbound	
		Control Delay (s)	LOS	Control Delay (s)	LOS	Control Delay (s)	LOS	Control Delay (s)	LOS
Existing	AM	9.5	A	-	-	8.2	A	8.2	A
	PM	9.5	A	-	-	8.2	A	8.2	A
Future	AM	9.6	A	-	-	8.3	A	8.3	A
	PM	9.9	A	-	-	8.3	A	8.3	A
Future w/ Development	AM	10.0	A	-	-	8.3	A	8.3	A
	PM	9.9	A	-	-	8.5	A	8.3	A

8.0 CONCLUSIONS

From the analysis, it is anticipated that residential development of the Site has the potential to generate a conservative maximum of 53 A.M. peak-hour trips and 70 P.M. peak-hour trips. These estimates were based on the development of 70 residences on 70 individual lots, although, due to the identified resources and required buffers, the amount of development would likely be less. These trips were added to the current peak hour trips at the study intersection for analysis.

Utilizing HCS7 software, it was determined that the LOS at the study intersection does not change significantly from the existing conditions to the future or future with development conditions. The longest estimated vehicle delay is 10 seconds during the AM peak hour on Wonder Stump Road, which still remains within a LOS of A. The potential development is not expected to significantly impact the traffic circulation on any adjacent roads.

Our analysis predicts that the delay on northbound HWY 101 traffic will not be significant. However, there is the potential for traffic to back up on HWY 101 northbound, as vehicles wait to turn left onto Wonder Stump Road across southbound traffic. If further development is planned within the surrounding areas, then it could become necessary to create a designated left-turn lane for northbound HWY 101 traffic. The intersection geometry and the addition of deceleration and/or acceleration lanes on HWY 101 should be analyzed at the time of the future residential development.

The addition of additional access points should also be analyzed because of the size of the property to provide better emergency access.

It is our recommendation that a formal Traffic Impact study (TIS) shall be completed, prior to the approval of any residential development project. The TIS is necessary to quantify and mitigate potential impacts of a residential development.

9.0 REFERENCES

Caltrans. 2016. 2016 Traffic Volumes. <http://www.dot.ca.gov/trafficops/census/volumes2016/>. Accessed on October 22, 2018.

DNLTC (Del Norte Local Transportation Commission). 2016. 2016 Regional Transportation Plan.

ITE (Institute of Transportation Engineers). 2012. Trip Generation Manual, 9th Edition.

McTrans – University of Florida Transportation Institute. 2018. HCS7 Software.

TRB (Transportation Research Board of the National Academies). 2010. HCM 2010 – Highway Capacity Manual 2010.

FIGURES

LACO

EUREKA • UKIAH • SANTA ROSA

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PROJECT	FORT DICK FLAT ENTITLEMENTS	BY ASV	FIGURE 1
CLIENT	GREEN DIAMOND RESOURCE COMPANY	DATE 11-8-2018	
LOCATION	HWY 101/WONDER STUMP RD, FORT DICK	CHECK DNC	JOB NO. 6872.19
	STUDY AREA/ LAND USE/ ZONING	SCALE SHOWN	

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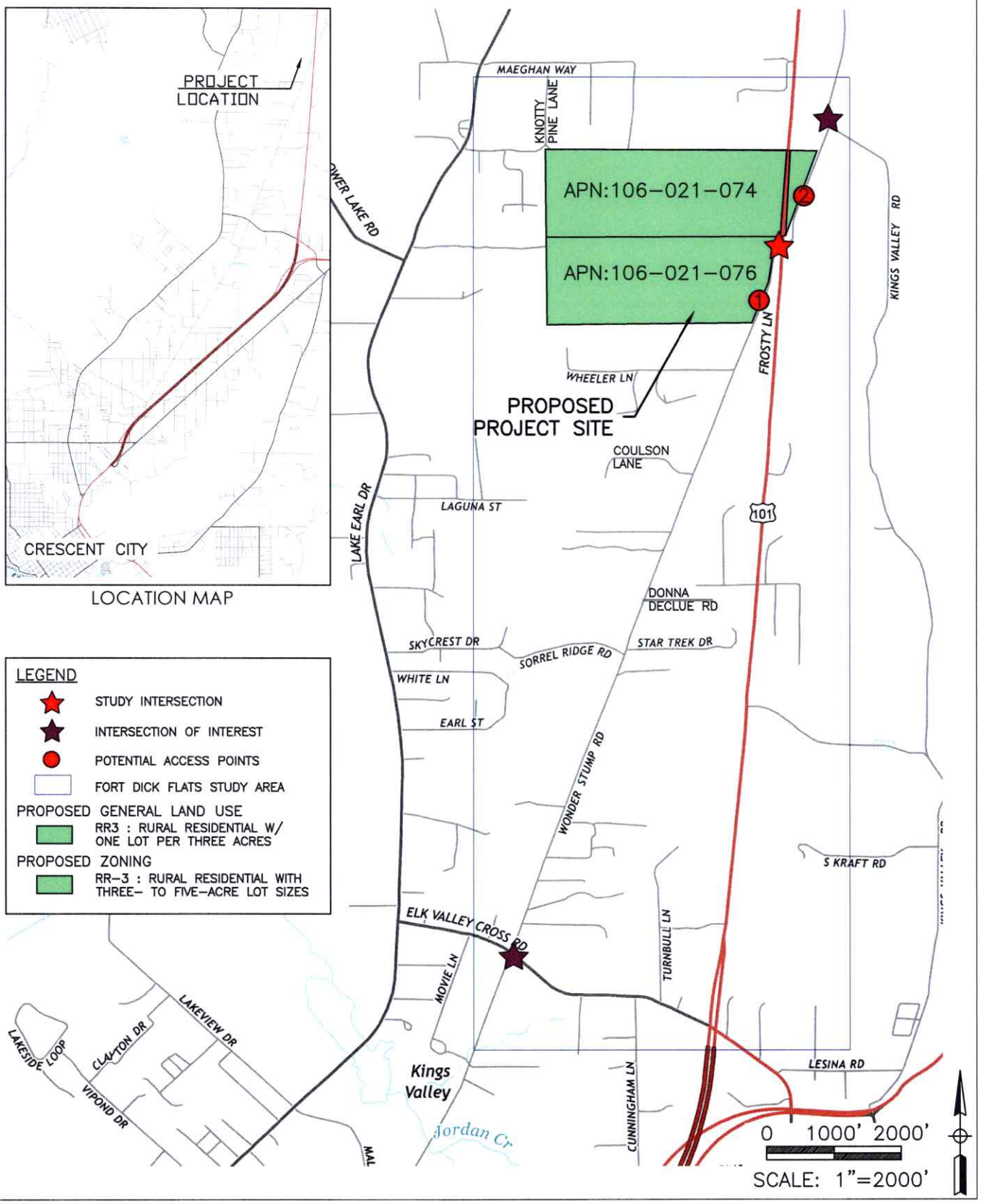
LOCATION MAP



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LACO	PROJECT	FORT DICK FLAT ENTITLEMENTS	BY	ASV	FIGURE
EUREKA • UKIAH • SANTA ROSA	CLIENT	GREEN DIAMOND RESOURCE COMPANY	DATE	11-8-2018	2
1-800-515-5054 WWW.LACOASSOCIATES.COM	LOCATION	HWY 101/WONDER STUMP RD, FORT DICK	CHECK	DNC	JOB NO. 6872.19
		STUDY INTERSECTION	SCALE	NTS	

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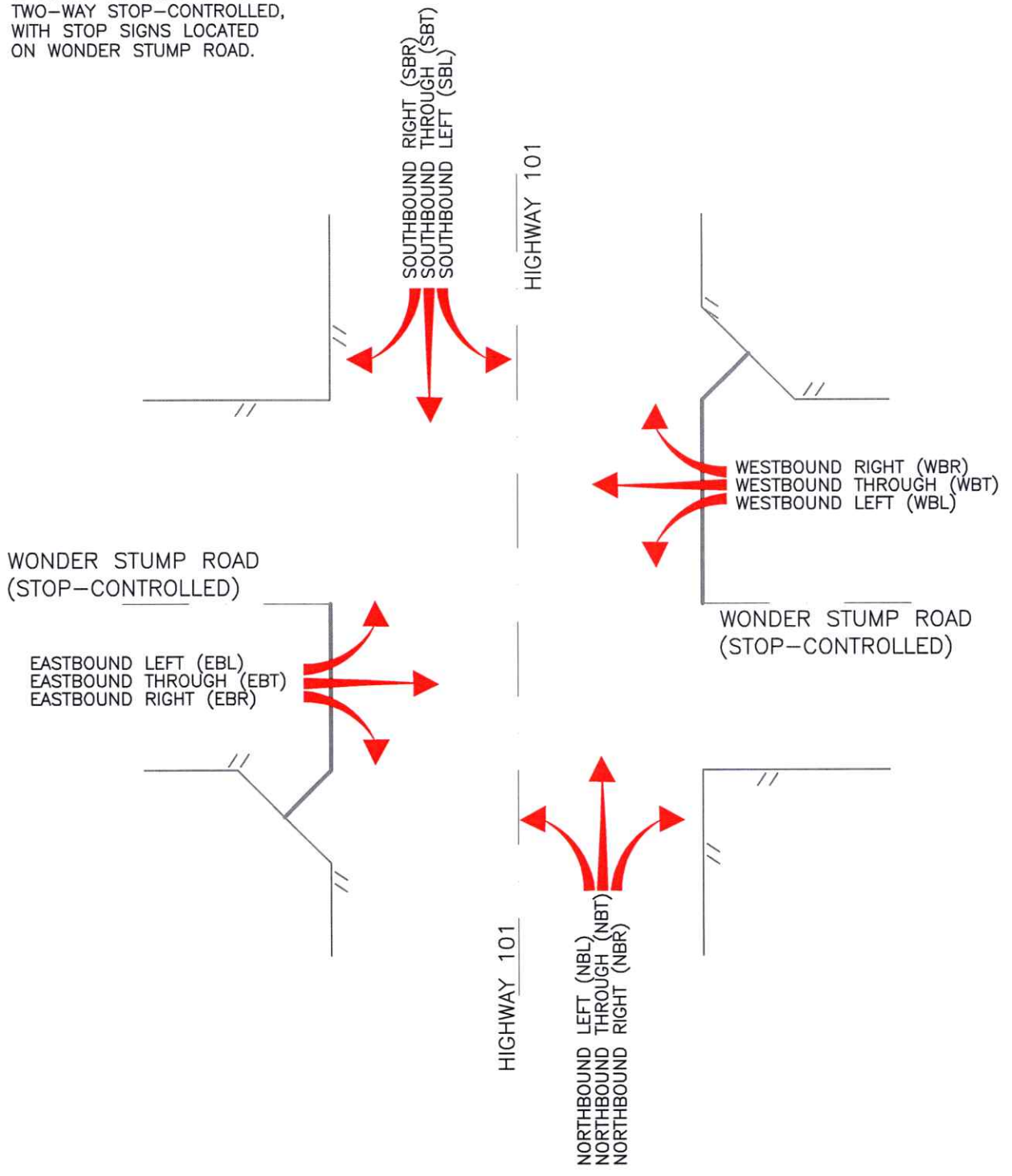
NOTES:
1. STUDY INTERSECTION IS TWO-WAY STOP-CONTROLLED, WITH STOP SIGNS LOCATED ON WONDER STUMP ROAD.



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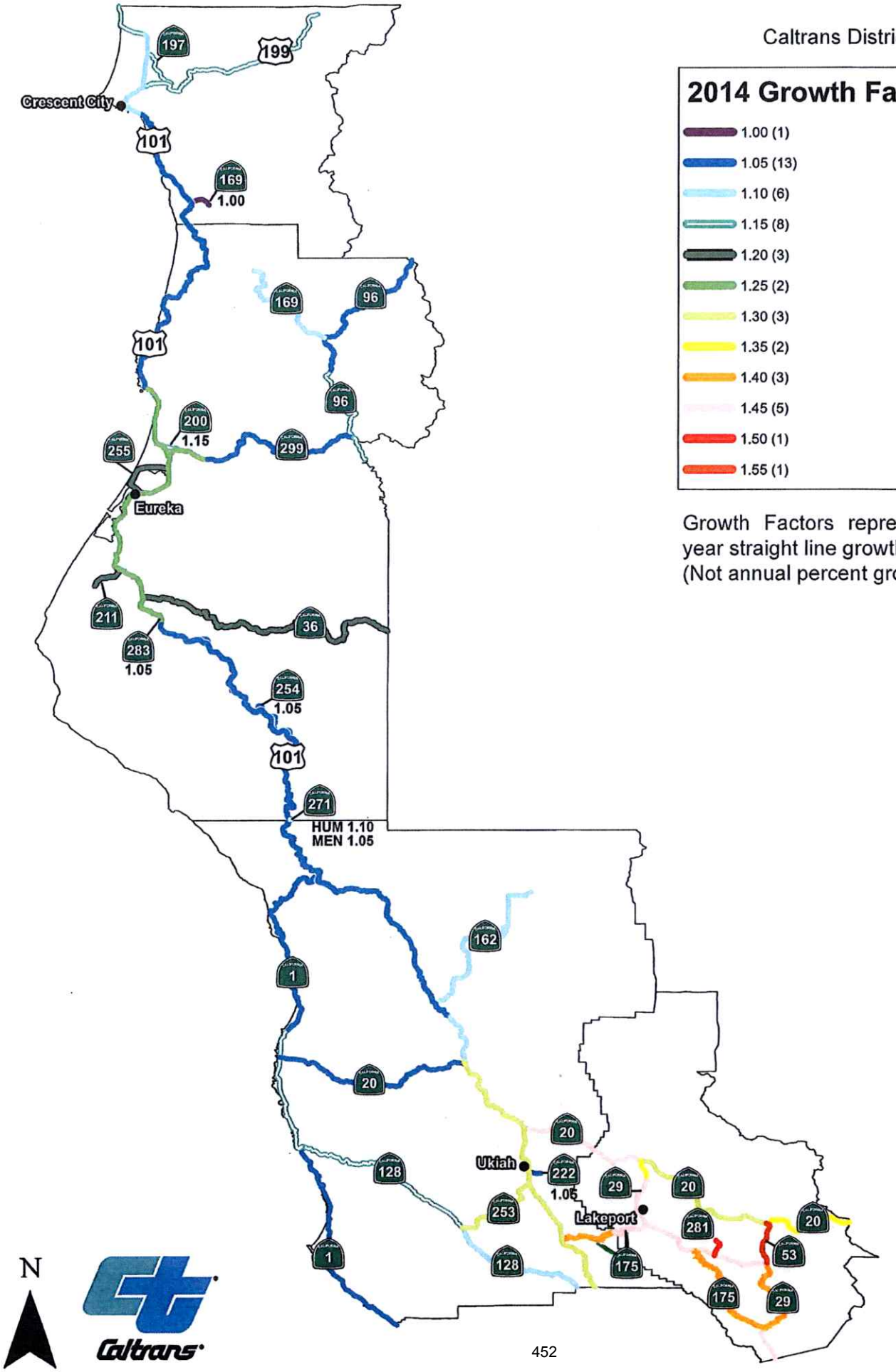
APPENDIX 1

Caltrans Growth Factors

Caltrans District 1



Growth Factors represent a 20 year straight line growth pattern. (Not annual percent growth)

Caltrans

State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Flex your power!
Be energy efficient!

To: CHARLIE FIELDER
JANA HOLLIFIELD
MATT BRADY
MARK SUCHANEK

Date: February 3, 2014

File: Growth Factors

From: BRAD METTAM
Deputy District Director,
Planning and Local Assistance

Subject: 2014 Growth Factors

Attached are the 2014 District 1 growth factor summary, the 2014 District Growth Factor Map, and a "Using D1 Growth Factors" tutorial.

Prior to 1984, Caltrans District 1 projected future traffic volumes based solely on historical growth. Future volumes were calculated using an annual percent increase that was derived from historical traffic volumes. We found that this method produced acceptable results in the short to mid-term, but due to compounding, long-range predictions (20 years or more) tended to be overestimated.

In 1984, in order to eliminate that long-range distortion noted above, we began calculating growth factors as a 20-year straight-line determinant. For example, a segment of highway with a growth factor of 1.4 is predicted to have a 40% increase in traffic over the next 20-years. Likewise, it is predicted to have a 20% increase over 10 years.

Historically, District staff has developed growth factors based on both projected travel trends and historical growth from two data sources—the "California Motor Vehicle Stock Travel and Fuel Forecast" (CMVSTAFF) and historical Average Vehicle Mile Traveled (AVMT) comparisons from "Traffic Volumes on the California State Highway System." Since CMVSTAFF was not available for the 2014 growth factor update, county growth factor targets were developed based on California Air Resources Board traffic growth projections and historic traffic growth data.

Our growth factors are applied over highway segments that were determined using observed conditions; these segments vary in length, but they are not longer than fifty miles. Traffic volumes over segments are based on a calculated weighted average of

volumes (Annual Average Daily Traffic) for the entire segment. While actual growth at the local level can vary considerably, we are looking at overall growth over the long-term. If more specific data or information are available for a particular location (actual counts, planned growth, etc.) it may be advisable to calculate a location-specific rate. However, for the purposes of facility design (20-year design-life) our generalized segment growth factors are appropriate. It should be noted that our growth factors forecast traffic growth only for the mainline (State Routes); local streets should be examined separately.

District planning staff reviews growth factors every two years, and typically revise them every two to four years. Growth factors were not updated for several years following 2006, since MVSTAFF data supported higher growth rates at a time when traffic counts were generally level or declining. The most recent MVSTAFF has been removed from the Division of Transportation Planning, Office of Transportation Forecasting and Analysis website, and they recommended using the use of the Air Resources Board EMFAC database as a substitute. Therefore, we based our 20-year District vehicle miles of travel target on ARB data. District staff would prefer to use county travel demand models to project traffic growth, or the MVSTAFF to develop growth factor targets, and we hope to do so in the future. However, neither of these data sources is currently supportable.

If you have any questions regarding the growth factors, please call Rex Jackman at (707) 445-6412 or Chris Dosch at (707) 441-4542.

Attachments:
2014 Growth Factor Summary
2014 Growth Factor Map
Using District 1 Growth Factors Tutorial

c: TROY ARSENEAU
DAVID MORGAN
JOHN CARSON
RALPH MARTINELLI
GARRY BANDUCCI
SANDRA ROSAS
STEVE HUGHES
SUSAN ZANCHI
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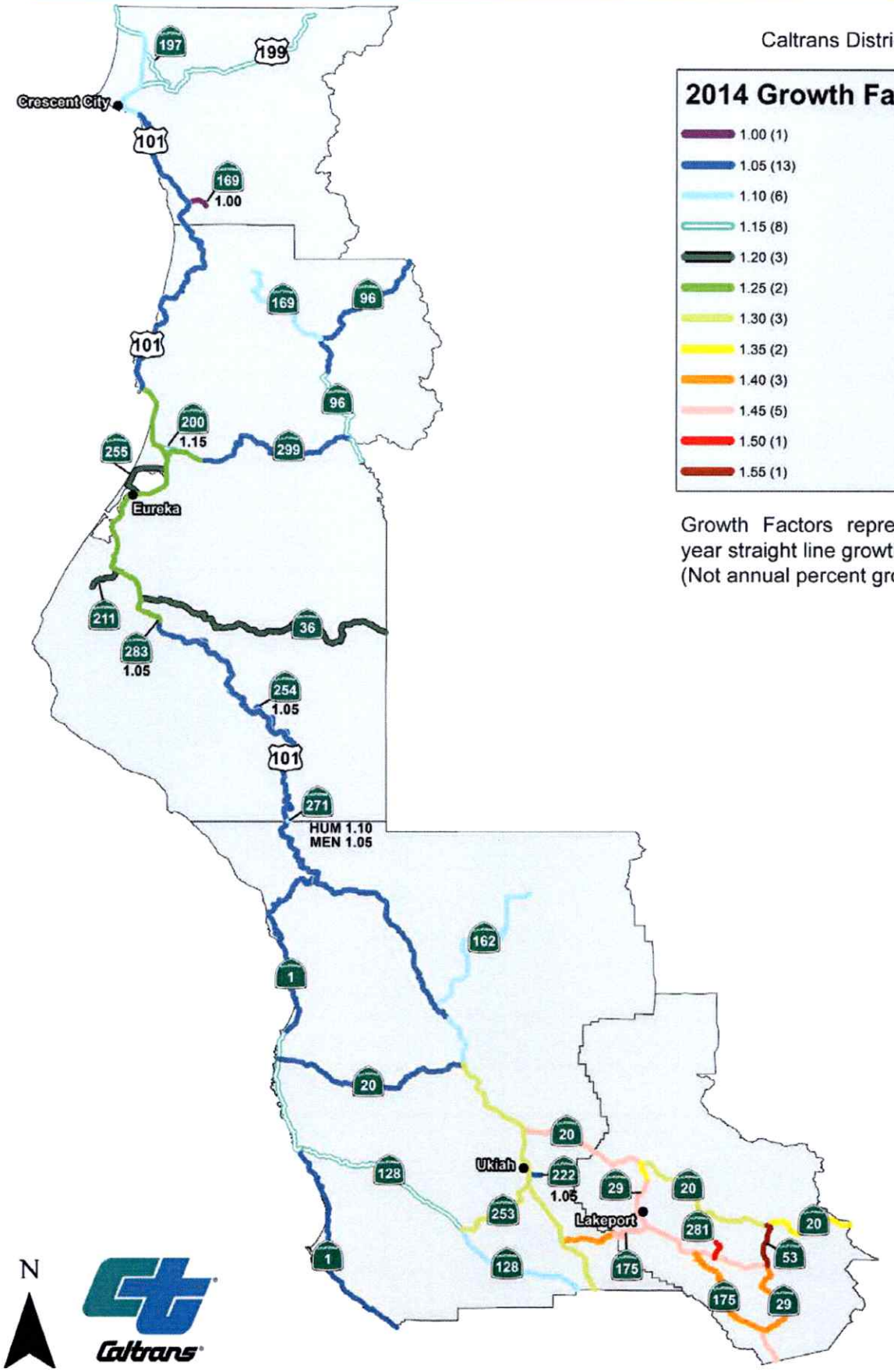
REX JACKMAN


Caltrans District 1
2014 Growth Factor Map
1.00 (1)
1.05 (13)
1.10 (6)
1.15 (8)
1.20 (3)
1.25 (2)
1.30 (3)
1.35 (2)
1.40 (3)
1.45 (5)
1.50 (1)
1.55 (1)
Growth Factors represent a 20 year straight line growth pattern. (Not annual percent growth)
Crescent City
Eureka
Ukiah
Lakeport
HUM 1.10
MEN 1.05
N
Caltrans

DISTRICT 1 - GROWTH FACTOR SUMMARY

20 YEAR GROWTH FACTORS

SEGMENT	2/2014 G.F.
MEN-1-0.00/40.27	1.05
MEN-1-40.27/64.86	1.15
MEN-1-64.86/105.57	1.05
MEN-20-0.00/33.16	1.05
MEN-20-33.22/44.11	1.45
LAK-20-0.00/8.34	1.45
LAK-20-8.34/31.62	1.30
LAK-20-31.62/46.48	1.35
LAK-29-0.00/5.81	1.45
LAK-29-5.81/20.31	1.40
LAK-29-20.31/48.40	1.45
LAK-29-48.40/52.54	1.35
HUM-36-0.00/45.68	1.20
LAK-53-0.00/7.45	1.55
HUM-96-0.00/16.00	1.15
HUM-96-16.00/44.98	1.05
MEN-101-0.10/47.27	1.30
MEN-101-47.27/55.90	1.10
MEN-101-55.90/104.15	1.05
HUM-101-0.00/51.84	1.05
HUM-101-51.84/100.71	1.25
HUM-101-100.71/137.14	1.05
DN-101-0.00/23.85	1.05
DN-101-23.85/39.98	1.10
DN-101-39.98/46.49	1.15
MEN-128-0.00/29.58	1.15
MEN-128-29.58/50.90	1.10
MEN-162-0.00/34.05	1.10
DN-169-0.0/3.52	1.00
HUM-169-13.20/33.84	1.10
MEN-175-0.00/9.85	1.40
LAK-175-0.00/8.19	1.45
LAK-175-8.25/28.04	1.40
DN-197-0.00/7.08	1.15
DN-199-0.51/36.41	1.15
HUM-200-0.00/2.68	1.15
HUM-211-73.20/79.16	1.20
MEN-222-0.00/2.15	1.05
MEN-253-0.00/17.18	1.30
HUM-254-0.00/46.53	1.05
HUM-255-0.0/8.80	1.20
MEN-271-0.0/22.72	1.05
HUM-271-0.00/0.31	1.10
LAK-281-14.00/17.00	1.50
HUM-283-0.00/0.36	1.05
HUM-299-0.00/5.93	1.25
HUM-299-5.93/38.83	1.05
HUM-299-38.83/43.04	1.15
DISTRICT GROWTH FACTOR (Weighted Average)	1.24

APPENDIX 2

Traffic Analysis Tabular Results

HCS7 Two-Way Stop-Control Report

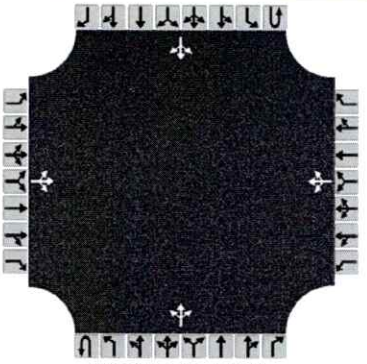
General Information

Analyst	ASV
Agency/Co.	LACO Associates
Date Performed	10/22/2018
Analysis Year	2018
Time Analyzed	
Intersection Orientation	North-South
Project Description	Fort Dick Flats - Existing AM

Site Information

Intersection	1
Jurisdiction	DN County and Caltrans
East/West Street	Wonderstump Road
North/South Street	HWY 101
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume, V (veh/h)		5	0	14		0	0	0		5	404	0		0	404	2
Percent Heavy Vehicles (%)		0	0	0		0	0	0		0				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.50	6.20		7.10	6.50	6.20		4.10				4.10		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.50	4.00	3.30		2.20				2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			20				0			5				0		
Capacity, c (veh/h)			829				0			1130				1132		
v/c Ratio			0.02							0.00				0.00		
95% Queue Length, Q_{95} (veh)			0.1							0.0				0.0		
Control Delay (s/veh)			9.5							8.2				8.2		
Level of Service, LOS			A							A				A		
Approach Delay (s/veh)		9.5								0.1				0.0		
Approach LOS		A														

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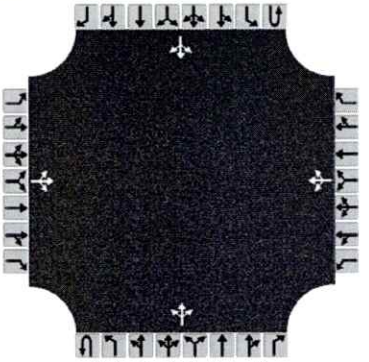
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ASV	Intersection	1
Agency/Co.	LACO Associates	Jurisdiction	DN County and Caltrans
Date Performed	10/22/2018	East/West Street	Wonderstump Road
Analysis Year	2018	North/South Street	HWY 101
Time Analyzed		Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Fort Dick Flats - Existing PM		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume, V (veh/h)		3	0	9		0	0	0		15	404	0		0	404	5
Percent Heavy Vehicles (%)		0	0	0		0	0	0		0				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			13				0			16				0		
Capacity, c (veh/h)			806				0			1127				1132		
v/c Ratio			0.02							0.01				0.00		
95% Queue Length, Q_{95} (veh)			0.0							0.0				0.0		
Control Delay (s/veh)			9.5							8.2				8.2		
Level of Service, LOS			A							A				A		
Approach Delay (s/veh)		9.5								0.4				0.0		
Approach LOS		A														

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HCS7 Two-Way Stop-Control Report

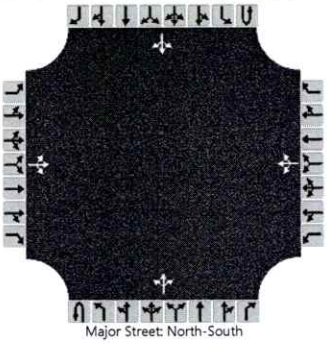
General Information

Analyst	ASV
Agency/Co.	LACO Associates
Date Performed	10/22/2018
Analysis Year	2018
Time Analyzed	
Intersection Orientation	North-South
Project Description	Fort Dick Flats - Future AM

Site Information

Intersection	1
Jurisdiction	DN County and Caltrans
East/West Street	Wonderstump Road
North/South Street	HWY 101
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		5	0	14		0	0	0		5	434	0		0	434	2
Percent Heavy Vehicles (%)		0	0	0		0	0	0		0				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.50	6.20		7.10	6.50	6.20		4.10				4.10		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.50	4.00	3.30		2.20				2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			21				0			5				0		
Capacity, c (veh/h)			808							1099				1101		
v/c Ratio			0.03							0.00				0.00		
95% Queue Length, Q_{95} (veh)			0.1							0.0				0.0		
Control Delay (s/veh)			9.6							8.3				8.3		
Level of Service (LOS)			A							A				A		
Approach Delay (s/veh)		9.6								0.1				0.0		
Approach LOS		A														

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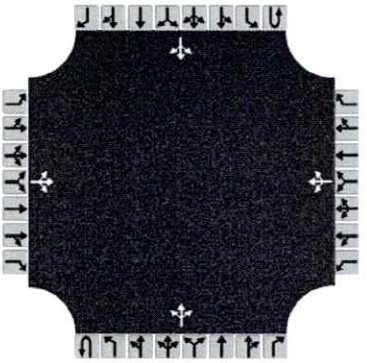
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ASV	Intersection	1
Agency/Co.	LACO Associates	Jurisdiction	DN County and Caltrans
Date Performed	10/22/2018	East/West Street	Wonderstump Road
Analysis Year	2018	North/South Street	HWY 101
Time Analyzed		Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Fort Dick Flats - Future PM		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume, V (veh/h)		3	0	9		0	0	0		15	434	0		0	434	5
Percent Heavy Vehicles (%)		0	0	0		0	0	0		0				0		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			13				0			16				0		
Capacity, c (veh/h)			773				0			1096				1101		
v/c Ratio			0.02							0.01				0.00		
95% Queue Length, Q_{95} (veh)			0.1							0.0				0.0		
Control Delay (s/veh)			9.7							8.3				8.3		
Level of Service, LOS			A							A				A		
Approach Delay (s/veh)	9.7								0.4				0.0			
Approach LOS	A															

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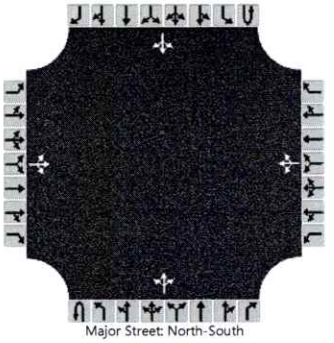
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ASV	Intersection	1
Agency/Co.	LACO Associates	Jurisdiction	DN County and Caltrans
Date Performed	10/22/2018	East/West Street	Wonderstump Road
Analysis Year	2018	North/South Street	HWY 101
Time Analyzed		Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Fort Dick Flats - Future w Project AM		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		14	0	43		0	0	0		14	434	0		0	434	5
Percent Heavy Vehicles (%)		0	0	0		0	0	0		0				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.50	6.20		7.10	6.50	6.20		4.10				4.10		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.50	4.00	3.30		2.20				2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			62				0			15				0		
Capacity, c (veh/h)			788							1096				1101		
v/c Ratio			0.08							0.01				0.00		
95% Queue Length, Q_{95} (veh)			0.3							0.0				0.0		
Control Delay (s/veh)			10.0							8.3				8.3		
Level of Service (LOS)			A							A				A		
Approach Delay (s/veh)		10.0								0.4				0.0		
Approach LOS		A														

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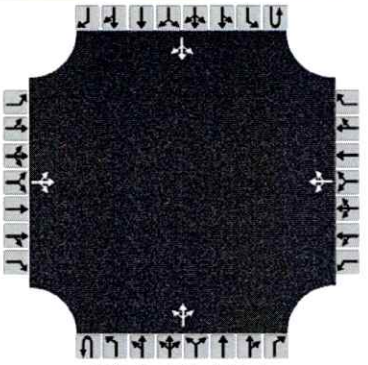
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	ASV	Intersection	1
Agency/Co.	LACO Associates	Jurisdiction	DN County and Caltrans
Date Performed	10/22/2018	East/West Street	Wonderstump Road
Analysis Year	2018	North/South Street	HWY 101
Time Analyzed		Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Fort Dick Flats - Future w Project PM		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume, V (veh/h)		9	0	28		0	0	0		48	434	0		0	434	16
Percent Heavy Vehicles (%)		0	0	0		0	0	0		0				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized		No				No				No				No		
Median Type/Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			40				0			52				0		
Capacity, c (veh/h)			781				0			1085				1101		
v/c Ratio			0.05							0.05				0.00		
95% Queue Length, Q_{95} (veh)			0.2							0.2				0.0		
Control Delay (s/veh)			9.9							8.5				8.3		
Level of Service, LOS			A							A				A		
Approach Delay (s/veh)		9.9								1.3				0.0		
Approach LOS		A														

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APPENDIX F

Preliminary Wastewater Treatment Evaluation

LACO

May 2, 2018

6872.19

Green Diamond Resource Company
Craig Compton
Post Office Box 1089
Arcata, California 95518-1089

Attention: Craig Compton

Subject: Preliminary On-Site Wastewater Treatment Evaluation Test Results
Assessor's Parcel Number 106-021-10A
Wonder Stump Road, Crescent, California

Dear Mr. Compton:

LACO Associates (LACO) was retained by Green Diamond Resource Company (Client) to determine the suitability of the subject property for private on-site wastewater treatment systems. The subject property (the "Site"), identified as Assessor's Parcel Number 106-021-10A is located in the northern portion of Section 26, Township 17 N, Range 1 W, Humboldt Baseline and Meridian, of the Crescent City 7.5-Minute Series Quadrangle (Figure 1). The Parcel is zoned as timber harvest. This evaluation is to determine the suitability of the Site to be subdivided if it is removed from timber production. Percolation tests were conducted to obtain preliminary data of the soils infiltration capacity and determine preliminary on-site wastewater treatment system designs.

LACO conducted an on-site wastewater treatment system exploration, in general accordance with the current Del Norte County Sewage Disposal Regulations, at six locations across the Site to determine the suitability of on-site wastewater treatment. During the field exploration, a backhoe was used to excavate six test pits. Percolation test pits (TPs) were located adjacent to Piezometers (PZs). Soil textures were extrapolated from piezometer boring logs installed in October 2016 (Attachment 1). Depth to a limiting condition or initial groundwater, if encountered, was recorded. Six test pits (TP) were installed to a maximum depth of 5 feet below ground surface (bgs) (Figure 2). Due to high ground water measured in PZ-1 and PZ-2, percolation testing at TP-1 and TP-2 was conducted at approximately 1 foot bgs to evaluate the upper soils ability to accept effluent. Test pits were dug at corresponding piezometer locations PZ-3, PZ4, and PZ-5. Test pits TP-3a and Tp-3b were abandoned due to emergent groundwater below 2 feet. Test pits TP-4a and TP-4b were also abandoned due to emergent water in the test pits at 3.5 feet and 4 feet bgs, respectively. Percolation testing at TP-3 and TP-4 was conducted at approximately 1 foot bgs. Percolation at TP-5 and TP-6 were conducted to approximately 5 feet bgs.

The Site is located on an uplifted marine terrace with soils composed of consolidated sandy clay loam, sandy loam, and loamy sand. The geology is mapped as the Battery Formation, Pleistocene marine terrace, and sand dune deposits comprising gravels and sands, with silty clays (CDMG, 1982). The Site is located at an elevation of approximately 125 feet above mean sea level. The Site slopes to the west at approximately 5 to 10 percent. An unnamed drainage cuts through the central western portion of the Site and is approximately 30 feet in depth, flowing to the west.

Percolation testing was conducted March 29 through 31, 2018. Percolation test data sheets are found in Attachment 2. Percolation rates from the test pits ranged from 10 minutes an inch to 30 minutes an inch. Infiltration application rates range from 0.363 gallons per day per square foot (g/d/sf) to 0.554 g/d/sf (expected Del Norte County application rates). Potential residential sites in the vicinity of PZ-5 and PZ-6 appear to be able to support conventional gravity on-site wastewater treatment systems. All other PZ locations due to high groundwater elevations (between 2 and 5 feet bgs) encountered during percolation testing will require shallow low-pressure distribution or Wisconsin mound on-site wastewater treatment systems.

LACO would like to thank you for the opportunity to be of assistance. Please do not hesitate to call us at 707-443-5054 if you have any questions or need additional information.

Sincerely,
LACO Associates

Gary L. Manhart PG 7169
Senior Engineering Geologist

GLM:jlm

FIGURES

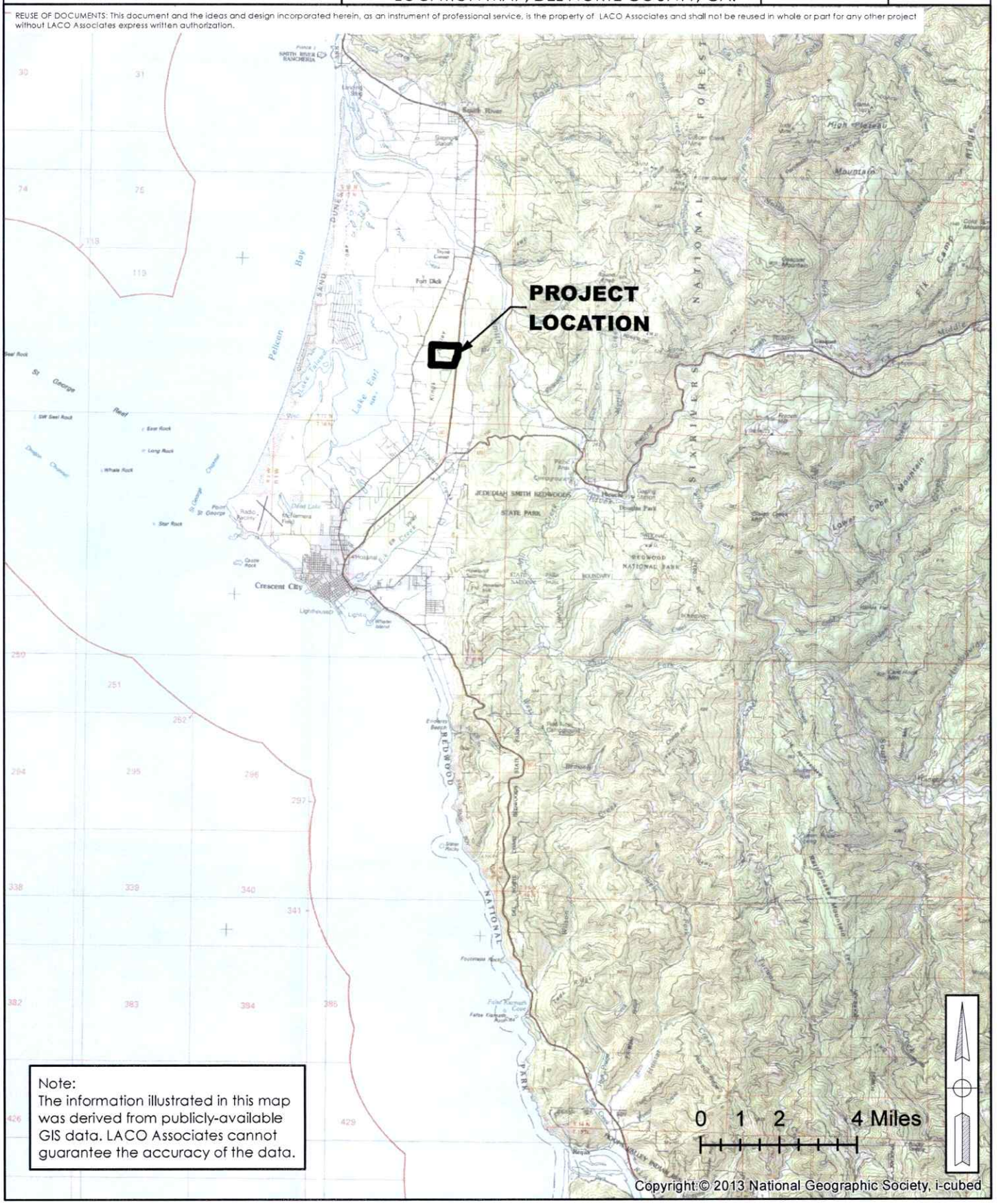
LACO

EUREKA • UKIAH • SANTA ROSA

1-800-515-5054 www.lacoassociates.com

PROJECT	FORT DICK FLATS ENTITLEMENTS	BY VSD	FIGURE 1
CLIENT	GREEN DIAMOND	CHECK GLM	
LOCATION	CRESCENT CITY	DATE 3/27/2018	JOB NO. 6872.19
	LOCATION MAP, DEL NORTE COUNTY, CA.		

REUSE OF DOCUMENTS: This document and the ideas and design incorporated herein, as an instrument of professional service, is the property of LACO Associates and shall not be reused in whole or part for any other project without LACO Associates express written authorization.



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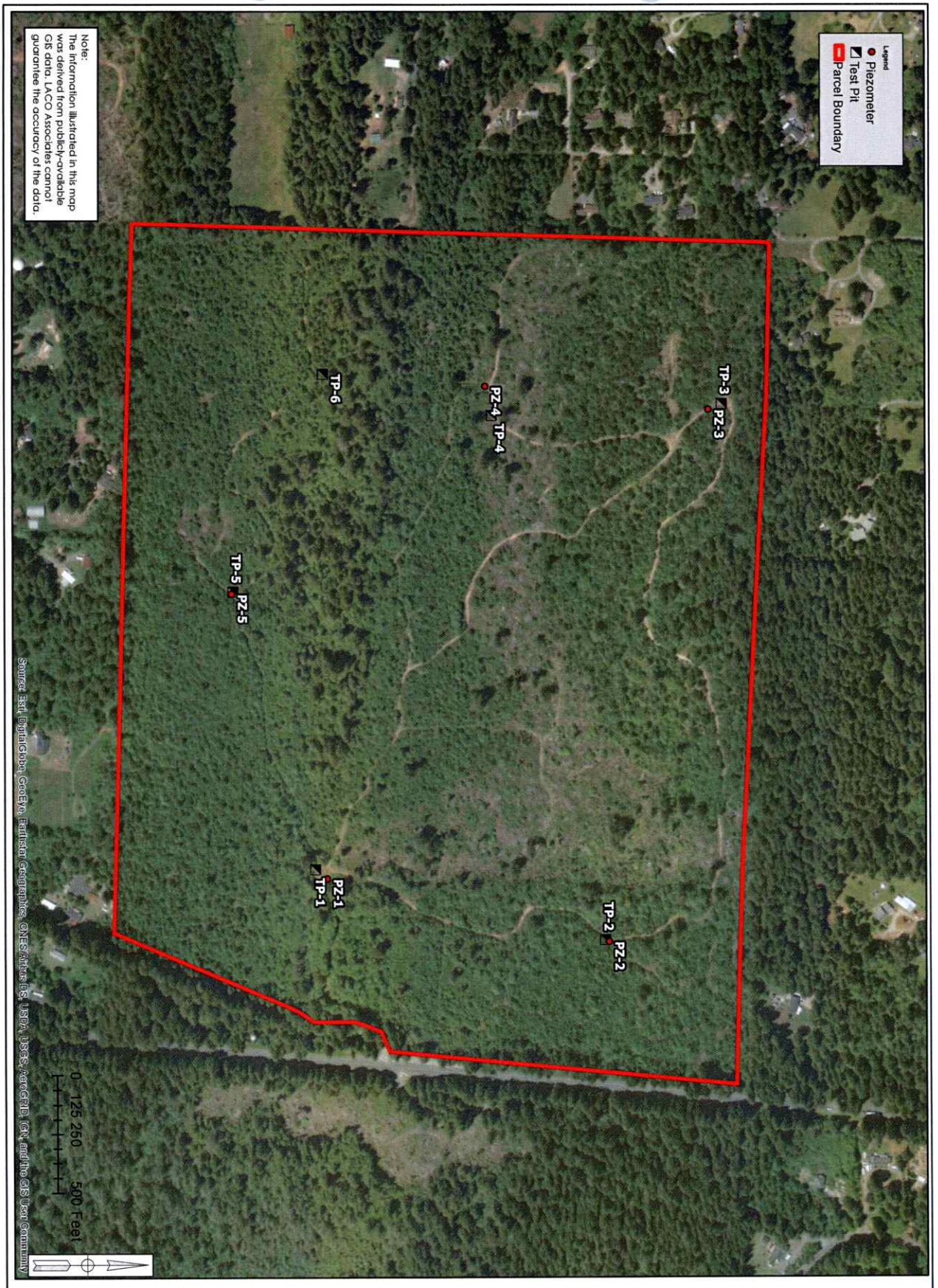

FORT DICK FLATS ENTITLEMENTS **SITE MAP** GREEN DIAMOND CRESCENT CITY, DEL NORTE COUNTY, CA.	NO.	HISTORY/REVISION	BY CHK. DATE

DRAWN VSD
CHECK GLM
APPROVED GLM
DATE 4/19/2018
JOB NO. 6872.19
FIGURE 2

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1-800-515-5054 www.lacoassociates.com

ATTACHMENT 1

Soil Logs

BORING NUMBER PZ-1

LACO
21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
311 Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 443-5054 Fax 707 443-0553
www.lacoassociates.com

CLIENT Green Diamond
PROJECT NAME Flats Entitlements
PROJECT NUMBER 6872.19
PROJECT LOCATION Fort Dick, CA
DATE STARTED 10/10/16 **COMPLETED** 10/10/16
GROUND ELEVATION 141 ft 103-141 ft. **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Fisch Drilling
GROUND WATER LEVELS:
DRILLING METHOD Box GeoProbe 6600
▽ **AT TIME OF DRILLING** 20.00 ft / Elev 121.00 ft Rained
LOGGED BY SJM **CHECKED BY** GLM
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0		SM		(SM) Silty Sand (USDA Sandy Loam), dark brown 10YR 4/6, moist, firm, non-plastic fines, sand, trace manganese, mottling	
5					136.0
		SC-SM		(SC-SM) Clayey Sand (USDA Sandy Clay Loam), dark brown and gray 2.5Y 4/3, moist, loose, low plasticity fines, sand mottling	
10					131.0
		SC-SM		(SC-SM) Clayey Sand (USDA Sandy Clay Loam), dark reddish-brown 10YR 3/3, moist, loose, low plasticity fines, sand, mottling	
15					126.0
		SM		(SM) Clayey Sand (USDA Sandy Loam), reddish-brown 5Y 4/4, wet, loose, low plasticity fines, sand	
20				▽	121.0
		SP		(SP) Poorly Graded Sand (USDA Loamy Sand), gray 2.5Y 2.5/1, wet, loose, non-platic fines, sand	
25					
30					111.0

Bottom of borehole at 30.0 feet.

GENERAL LOG - GINT STD US LAB.GDT - 4/19/18 10:40 - P:\GINT FILES\PROJECTS\6872.19 FLATS ENTITLEMENTS\6872.19 FORT DICK PIEZOMETER BORING LOGS.GPJ

BORING NUMBER PZ-2

LACO
21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
311 Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 443-5054 Fax 707 443-0553
www.lacoassociates.com

CLIENT Green Diamond
PROJECT NAME Flats Entitlements
PROJECT NUMBER 6872.19
PROJECT LOCATION Fort Dick, CA
DATE STARTED 10/11/16 **COMPLETED** 10/11/16
GROUND ELEVATION 141 ft 103-141 ft. **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Fisch Drilling
GROUND WATER LEVELS:
DRILLING METHOD Box GeoProbe 6600
▽ **AT TIME OF DRILLING** 20.00 ft / Elev 121.00 ft Rained
LOGGED BY SJM **CHECKED BY** GLM
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0					
		SM		(SM) Silty Sand (USDA Loam), reddish-brown 10YR 4/6, moist, loose, non-plastic, fines, sand, trace manganese, organic	
5					136.0
		SP-SM		(SP-SM) Poorly Graded Sand with Silt (USDA Sandy Loam), brown 10YR 4/6, moist, loose, non-plastic fines, sand	
10					131.0
		SC		(SC) Clayey Sand (USDA Sandy Clay Loam), brown 2.5Y 4/4, moist, loose, low-plasticity fines, sand	
15					126.0
		SP-SM		(SP-SM) Poorly Graded Sand with Silt (USDA Loamy Sand), rust red 10YR 3/6, wet, loose, non-plastic fines, sand, mottling	
20				▽	
25					
30					111.0

Bottom of borehole at 30.0 feet.

GENERAL LOG - GINT STD US LAB.GDT - 4/19/18 10:40 - P:\GINT FILES\PROJECTS\6872.19 FLATS ENTITLEMENTS\6872.19 FORT DICK PIEZOMETER BORING LOGS.GPJ

BORING NUMBER PZ-3

LACO
21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
311 Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 443-5054 Fax 707 443-0553
www.lacoassociates.com

CLIENT Green Diamond
PROJECT NUMBER 6872.19
DATE STARTED 10/11/16 **COMPLETED** 10/11/16
DRILLING CONTRACTOR Fisch Drilling
DRILLING METHOD Box GeoProbe 6600
LOGGED BY VSD **CHECKED BY** GLM
NOTES

PROJECT NAME Flats Entitlements
PROJECT LOCATION Fort Dick, CA
GROUND ELEVATION 108 ft 103-141 ft. **HOLE SIZE** 4 inches
GROUND WATER LEVELS:
AT TIME OF DRILLING 15.00 ft / Elev 93.00 ft Rained
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0		SC		(SC) Clayey Sand (USDA Sandy Loam), brownish-yellow, moist, firm, low plasticity fines, sand
5				5.0 — 103.0
		OH		(OH) Organic Soil (USDA Loam), very dark brown 10YR 2/2, moist, loose, non-plastic fines, soil developed within buried tree
10				10.0 — 98.0
		SP		(SP) Poorly Graded Sand (USDA Sand), dark grayish-brown 10YR 4/2, wet, loose, non-plastic fines, sand
15				▽
20				
25				25.0 — 83.0
		GP		(GP) Poorly Graded Gravel with Sand, black to pale yellow 2.5YR 2.5/1 to 2.5YR 8/2, wet, loose fines, sand, gravel
30				30.0 — 78.0

Bottom of borehole at 30.0 feet.

GENERAL LOG - GINT STD US LAB.GDT - 4/19/18 10:40 - P:\GINT FILES\PROJECTS\6872.19 FLATS ENTITLEMENTS\6872.19 FORT DICK PIEZOMETER BORING LOGS.GPJ

BORING NUMBER PZ-4

LACO
21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
311 Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 443-5054 Fax 707 443-0553
www.lacoassociates.com

CLIENT Green Diamond
PROJECT NAME Flats Entitlements
PROJECT NUMBER 6872.19
PROJECT LOCATION Fort Dick, CA
DATE STARTED 10/11/16 **COMPLETED** 10/11/16
GROUND ELEVATION 117 ft 103-141 ft. **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Fisch Drilling
GROUND WATER LEVELS:
DRILLING METHOD Box GeoProbe 6600
▽ **AT TIME OF DRILLING** 30.00 ft / Elev 87.00 ft Rained
LOGGED BY SJM **CHECKED BY** GLM
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0		ML		(ML) Silt with Sand (USDA Clay), light red-brown 10YR 5/8, moist, medium dense, firm, low-plasticity fines, sand	
5					112.0
		SP-SM		(SP-SM) Poorly Graded Sand with Silt (USDA Sandy Loam), red-brown 10YR 4/4, moist, loose, non-plastic fines, sand	
10					107.0
		SC		(SC) Clayey Sand (USDA Sandy Clay Loam), light brownish-gray 10YR 4/3, moist, loose, low plasticity fines, sand	
15					102.0
		SP		(SP) Poorly Graded Sand (USDA Sand), reddish-brown and gray 10YR 4/3, moist, loose, non-plastic fines, sand	
20					97.0
		SP		(SP) Poorly Graded Sand (USDA Sand), gray 10YR 4/3, moist, loose, non-plastic fines, sand	
25					
30					87.0

Bottom of borehole at 30.0 feet.

GENERAL LOG - GINT STD US LAB.GDT - 4/19/18 10:40 - P:\GINT FILES\PROJECTS\6872.19 FLATS ENTITLEMENTS\6872.19 FORT DICK PIEZOMETER BORING LOGS.GPJ

BORING NUMBER PZ-5

LACO
21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
311 Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 443-5054 Fax 707 443-0553
www.lacoassociates.com

CLIENT Green Diamond
PROJECT NUMBER 6872.19
DATE STARTED 10/10/16 **COMPLETED** 10/10/16
DRILLING CONTRACTOR Fisch Drilling
DRILLING METHOD Box GeoProbe 6600
LOGGED BY SJM **CHECKED BY** GLM
NOTES

PROJECT NAME Flats Entitlements
PROJECT LOCATION Fort Dick, CA
GROUND ELEVATION 138 ft 103-141 ft **HOLE SIZE** 4 inches
GROUND WATER LEVELS:
AT TIME OF DRILLING 30.00 ft / Elev 108.00 ft Rained
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0		SM		(SM) Silty Sand (USDA Sandy Loam), red-brown 10YR 4/6, moist, loose, non-plastic fines, sand
15.0				123.0
		SM		(SM) Silty Sand (USDA Sandy Loam), brown 2.5Y 3/3, moist, loose, non-plastic fines, sand; nearing groundwater
20.0				118.0
		SP		(SP) Poorly Graded Sand (USDA Sand), brown, moist, wet, loose, non-plastic fines, sand
30.0 ▽				108.0

Bottom of borehole at 30.0 feet.

GENERAL LOG - GINT STD US LAB.GDT - 4/19/18 10:40 - P:\GINT FILES\PROJECTS\6872.19 FLATS ENTITLEMENTS\6872.19 FORT DICK PIEZOMETER BORING LOGS.GPJ

ATTACHMENT 2

Percolation Test Data Sheet

SOILS PERCOLATION TEST DATA SHEET

CLIENT	Green Diamond	DATE	3/31/2018
JOB NO.	6872.19	A.P.N.	
TEST PIT NO.	TP-1	TESTED BY	VSD
DEPTH TESTED	1'	LOCATION	
DEPTH TO GW	>5'		
PRESOAK	Four complete refills: four complete refills	1 hour presoak:	10:45 AM

Reading No.	Start Time	Stop Time	Δ Time (min.)	Intial Water Level (in.)	Final Water Level (in.)	Δ Water Level (in.)	Rate (min./in.)
1	11:45 AM	12:00 PM	15	8	7 1/2	1/2	30.0
2	12:00 PM	12:15 PM	15	8	7 1/2	1/2	30.0
3	12:15 PM	12:30 PM	15	8	7 1/2	1/2	30.0
4	12:30 PM	12:45 PM	15	8	7 1/2	1/2	30.0
5	12:45 PM	1:00 PM	15	8	7 1/2	1/2	30.0
6	1:00 PM	1:15 PM	15	8	7 1/2	1/2	30.0
					STABILIZED RATE =		**30.0**

TEST PIT NO.	TP-2	DATE	43189.0
DEPTH TESTED	1'	TESTED BY	VSD
DEPTH TO GW	4'		
PRESOAK	Four complete refills: four complete refills	1 hour presoak:	10:12 AM

Reading No.	Start Time	Stop Time	Δ Time (Minutes)	Intial Water Level (in.)	Final Water Level (in.)	Δ Water Level Drop (in.)	Rate (Minutes Per Inch)
1	11:12 AM	11:27 AM	15	7	6	1	15.0
2	11:27 AM	11:42 AM	15	7	6	1	15.0
3	11:42 AM	11:57 AM	15	7	6	1	15.0
4	11:57 AM	12:12 PM	15	7	6	1	15.0
5	12:12 PM	12:27 PM	15	7	6	1	15.0
6	12:27 PM	12:42 PM	15	7	6	1	15.0
					STABILIZED RATE =		**15.0**

TEST PIT NO.	TP-3	DATE	3/31/2018
DEPTH TESTED	1'	TESTED BY	VSD
DEPTH TO GW	5'		
PRESOAK	Four complete refills:	1 hour presoak:	7:35am

No.	Time	Time	(Minutes)	Level (in.)	(in.)	Drop (in.)	(Minutes Per Inch)
1	8:35 AM	8:50 AM	15	7	6	1	15.0
2	8:50 AM	9:05 AM	15	7	6	1	15.0
3	9:05 AM	9:20 AM	15	7	6	1	15.0
4	9:20 AM	9:35 AM	15	7	6	1	15.0
5	9:35 AM	9:50 AM	15	7	6	1	15.0
6	9:50 AM	10:05 AM	15	7	6 1/2	1/2	30.0
7	10:05 AM	10:20 AM	15	7	6 1/2	1/2	30.0
					STABILIZED RATE =		**30.00**

TEST PIT NO. TP-4 DATE 3/30/2018
DEPTH TESTED 1' TESTED BY VSD
DEPTH TO GW >5'
PRESOAK Four complete refills: four complete refills 1 hour presoak: 1:48 PM

Reading No.	Start Time	Stop Time	Δ Time (Minutes)	Intial Water Level (in.)	Final Water Level (in.)	Δ Water Level Drop (in.)	Rate (Minutes Per Inch)
1	2:48 AM	3:03 AM	15	7	5 1/2	1 1/2	10.00
2	3:03 AM	3:18 AM	15	7	5 1/2	1 1/2	10.00
3	3:18 AM	3:33 AM	15	7	5 1/2	1 1/2	10.00
4	3:33 AM	3:48 AM	15	7	5 1/2	1 1/2	10.00
5	3:48 AM	4:03 AM	15	7	5 1/2	1 1/2	10.00
6	4:03 AM	4:18 AM	15	7	5 1/2	1 1/2	10.00
					STABILIZED RATE =		**10.00**

TEST PIT NO. TP-5 DATE 3/29/2018
DEPTH TESTED 5' TESTED BY VSD
DEPTH TO GW 6.5'
PRESOAK Four complete refills: four complete refills 1 hour presoak: 12:25 PM

Reading No.	Start Time	Stop Time	Δ Time (Minutes)	Intial Water Level (in.)	Final Water Level (in.)	Δ Water Level Drop (in.)	Rate (Minutes Per Inch)
1	12:25 AM	12:40 AM	15	6	4 1/2	1 1/2	10.00
2	12:40 AM	12:55 AM	15	6	4 3/4	1 1/4	12.00
3	12:55 AM	1:10 AM	15	6	5	1	15.00
4	1:10 AM	1:25 AM	15	6	5	1	15.00
5	1:25 AM	1:40 AM	15	6	5	1	15.00
6	1:40 AM	1:55 AM	15	6	5	1	15.00
					STABILIZED RATE =		**15.00**

TEST PIT NO. TP-6 DATE 3/29/2018
DEPTH TESTED 5' TESTED BY VSD
DEPTH TO GW <5'
PRESOAK Four complete refills: four complete refills 1 hour presoak: 1:01 PM

Reading No.	Start Time	Stop Time	Δ Time (Minutes)	Intial Water Level (in.)	Final Water Level (in.)	Δ Water Level Drop (in.)	Rate (Minutes Per Inch)
1	2:02 AM	2:17 AM	15	5 1/2	4 1/2	1	15.00
2	2:17 AM	2:32 AM	15	5 1/2	4 1/2	1	15.00
3	2:32 AM	2:47 AM	15	5 1/2	4 1/2	1	15.00
4	2:47 AM	3:02 AM	15	5 1/2	4 1/2	1	15.00
5	3:02 AM	3:17 AM	15	5 1/2	4 1/2	1	15.00
6	3:17 AM	3:32 AM	15	5 1/2	4 1/2	1	15.00
					STABILIZED RATE =		**15.00**

APPENDIX G

Preliminary Groundwater Supply Assessment

LACO

TECHNICAL MEMORANDUM

Preliminary Groundwater Supply Assessment
Assessor's Parcel Number 106-021-10A
Wonder Stump Road, Crescent City, California

Date: November 2, 2018
Project No.: 6872.19

Prepared For: Green Diamond Resource Company, Craig Compton

Prepared By: Gary L. Manhart
CEG No. 2651; Exp. 10/31/20

CERTIFIED ENGINEERING GEOLOGIST
GARY LEE MANHART
No. 2651
Exp. 10/31/20
STATE OF CALIFORNIA

Reviewed By: Christopher J. Watt
CEG 2415; Exp 03/31/20

CERTIFIED ENGINEERING GEOLOGIST
CHRISTOPHER JOHN WATT
No. 2415
STATE OF CALIFORNIA

Attachments:
Figure 1: Location Map
Figure 2: Site Map
Attachment 1: Piezometer Well Logs
Attachment 2: Depth to Groundwater Chart

1.0 INTRODUCTION AND PURPOSE

LACO Associates (LACO) was retained by Green Diamond Resource Company (Client) to provide a preliminary evaluation of the Site for development of groundwater resources. The subject property (the "Site"), identified as Assessor's Parcel Number 106-021-10A, is located in the northern portion of Section 26, Township 17 North, Range 1 West, Humboldt Baseline and Meridian, of the Crescent City 7.5-Minute Series Quadrangle (Figure 1). The Parcel is zoned as timber harvest. This evaluation is part of a broader scope of work to determine the suitability of the Site to be converted from timber production to low-density residential. The proposed number of lots would be between 33 (5 acre lots) or 55 (3 acre lots).

LACO conducted a preliminary exploration to assess the feasibility of developing domestic water well(s) to serve the proposed future residential subdivision. LACO formed this assessment based on the following Site conditions:

1) Locations of wells, streams, and other bodies of water on and in the immediate vicinity of the Site.
2) Geologic maps, structures and stratigraphy.
3) Aquifer description and assumed characteristics based on published information and results of continuous core drilling logs.

2.0 SITE CONDITIONS

The Site is undeveloped with former logging roads allowing access to the Site. The Site was last logged in 2009. The Site is forested with young conifers and alders with stumps and thick undergrowth. The Site is located at an elevation of approximately 125 feet above mean sea level and slopes to the west at approximately 5 to 10 percent. An unnamed drainage cuts through the central western portion of the Site, is approximately 30 feet in depth, and flows to the west (Figure 2).

3.0 SITE EXPLORATION

LACO conducted a subsurface exploration, installing piezometers and logging soils to 30 feet depth under a Del Norte County Department of Environmental Health drilling permit. Five locations were chosen across the Site to determine the seasonal fluctuation of groundwater. During the field exploration, a drill rig was used to collect soil samples and install piezometers PZ-1 through PZ-5 in October 2016. Soils were logged in general accordance with the American Society for Testing and Materials (ASTM) Test Procedure D2488 Visual-Manual Procedures. Boring logs are presented in Attachment 1. Down hole data loggers were installed to record ground water fluctuations from October 10, 2016, through March 30, 2017. Graphical groundwater elevations in each piezometer are presented in Attachment 2. Raw data is available upon request.

4.0 GEOLOGY

The Site is within the Marine terrace unit of the Smith River Plain Groundwater Basin (Buck, 1957). The Battery Formation is a thin, flat-lying, marine terrace deposit that unconformably overlies basement rock of the Franciscan Complex or the St. George Formation, depending on location. It consists of alternating sand and clay beds with interbedded continental deposits of stream gravel and sand. Well logs and seismic data indicate that the Battery Formation is 30 feet to 70 feet thick. It underlies most of the Smith River Plain south and east of Lake Earl. The Battery Formation is the principal aquifer in the southern two-thirds of the plain. The producing zones consist of lenticular beds of fine- to medium-grained, well-sorted sand. Depth to this aquifer ranges from 5 feet to 30 feet and averages about 20 feet. Groundwater in this aquifer is either perched or unconfined. The formation is moderately permeable but has limited saturated thickness. Well yields are noted as generally large enough for domestic and limited irrigation uses (DWR, 1980). The St. George Formation and basement rock of the Franciscan Complex yield very little water to wells (DWR, 2004).

At the PZ exploration locations, we encountered a sequence of silt, clayey sand, silty sand, and fine-grained sand (Attachment 1). The fine-grained soil material was generally limited to within the upper 10 feet of the ground surface. The coarse-grained material sequence was generally encountered below the topsoil and continued to a depth of 30 feet. The entire sequence of sands is interpreted to be Pleistocene marine terrace deposits of the Battery Formation.

5.0 HYDROGEOLOGY

Recharge is accomplished by direct infiltration of precipitation, subsurface inflow from surface water/precipitation infiltration in alluvial fans or dune areas, and infiltration of runoff in the lower reaches of the Smith River and other permeable stream channels. Due to the clayey nature of the upper part of the Battery Formation, recharge is slow to occur at some locations (DWR, 1987).

Review of hydrographs for long-term comparison of groundwater levels over the course of the year indicates a slight decline associated with the 1976-1977 and 1987-1994 droughts, followed by a recovery to pre-drought conditions of the early 1970s and 1980s (LACO, 2012). Generally, groundwater level data show a seasonal fluctuation of approximately 5 feet to 15 feet for normal and dry years. Overall, there do not appear to be any increasing or decreasing trends in groundwater levels.

Given that groundwater flows through unconfined shallow aquifers of the Battery Formation, the discharge of septic effluent from the proposed systems has the potential to negatively impact shallow groundwater quality within the Battery Formation. An average specific capacity (SC) of the Battery Formation in the Fort Dick area is 4.5 gallons per minute per foot of draw-down based on well tests performed during installation and reported by the well drillers (DWR, 1957) from which the following parameters can be estimated:

Transmissivity (T) = 33.6 $(SC)^{0.67}$ = 92.0 ft^2 / day

Hydraulic conductivity (K) = T / b, where b is saturated thickness (30 feet where measured in this exploration) = 3.07 ft / day

Discharge (Q) = $(K / \pi (b_2^2 - b_1^2) \times \ln (r_2/r_1)$ where b is the maximum and minimum saturated thickness and r is the radial distance from the well = $9x10^6$ gallons per day

The values for saturated thickness of the aquifer and distances from the well are assumed values based on what is known for the aquifer and size of the Site. Calculated discharge represents a maximum.

6.0 DOMESTIC WELL DEVELOPMENT FEASIBILITY

Based on existing available data published by the Department of Water Resources (1980; 1987), the preliminary findings of our drilling explorations, and results of our study of precipitation, groundwater levels and expected water usage, we evaluate the local groundwater resource as capable of supplying the minimum daily domestic water supply requirements needed to serve the maximum proposed future 55 single-family residential lots. The annual average precipitation for the Crescent City Area is 71.24 inches and the buildable portion of the Site is 165 acres equating to 975 acre-feet of water. Generally accepted storage is approximately 1/3 the precipitation making approximately 325 acre-feet of water available. The maximum projected build-out of 55 lots with an expected maximum water usage of 450 gallons per day, comes to 9,033,750 gallons per year which equals 27.7-acre feet usage for 55 lots, or 0.5 acre-feet per lot, well below the annual input due to rainfall. Based on the available data and above calculations the subdivision of the Site is feasible based on available groundwater.

At a minimum, all new domestic wells installed at the Site should be drilled to the base of the producing zone within the Battery formation (Approximately 40 feet) and sealed to a minimum of 20 feet below ground surface. Wells shall be sited a minimum horizontal distance of 100 feet from any disposal field in conformance

with current water well and NCRWQCB's North Coast Basin Plan standards. If feasible, disposal field setbacks greater than 100 feet should be maintained to reduce the potential for wastewater discharge to affect the domestic water source. All new water wells shall be constructed by a licensed well-drilling contractor in accordance with the American Water Works Association Standards and the California Department of Water Resources' Water Well Standards (DWR, 1991).

The proposed number of units (33 to 55) could cause potential impact to the water quality due to the concentration of onsite wastewater treatment systems and may require further study; however, there are several areas to the north, south, and west with similar residential densities to that which is proposed that do not appear to have groundwater impacts from onsite wastewater treatment systems.

It is recommended that for additional confidence in the development potential of the water resource at the Site, a test well should be installed within the Battery Formation and an extended period pumping test be performed at a later date, prior to development approvals. The test well would more accurately measure the saturated thickness and the aquifer parameters, transmissivity and hydraulic conductivity to determine the aquifer capacity of the Battery Formation at the Site.

7.0 REFRENCES

Back, W., 1957, Geology and Ground Water Features of Smith River Plain. USGS Water Supply Paper 1254.

DWR [Department of Water Resources], 1980, Ground Water Basins in California. California Department of Water Resources, Northern District, Bulletin 118-80.

DWR, 1987, Smith River Plain Ground Water Study, State of California, The Resources Agency, Department of Water Resources, Northern District, 129 pages.

DWR, 1991, California Well Standards, Water Wells, Monitoring Wells, Cathodic Protection Wells. California, Department of Water Resources, Bulletin 74-90.

LACO Associates, 2012, Preliminary Onsite Wastewater Disposal Field Evaluation and Domestic Well Development Feasibility Assessment, Fort Dick 4, APN 105-042-024, Fort Dick California. Unpublished client report.

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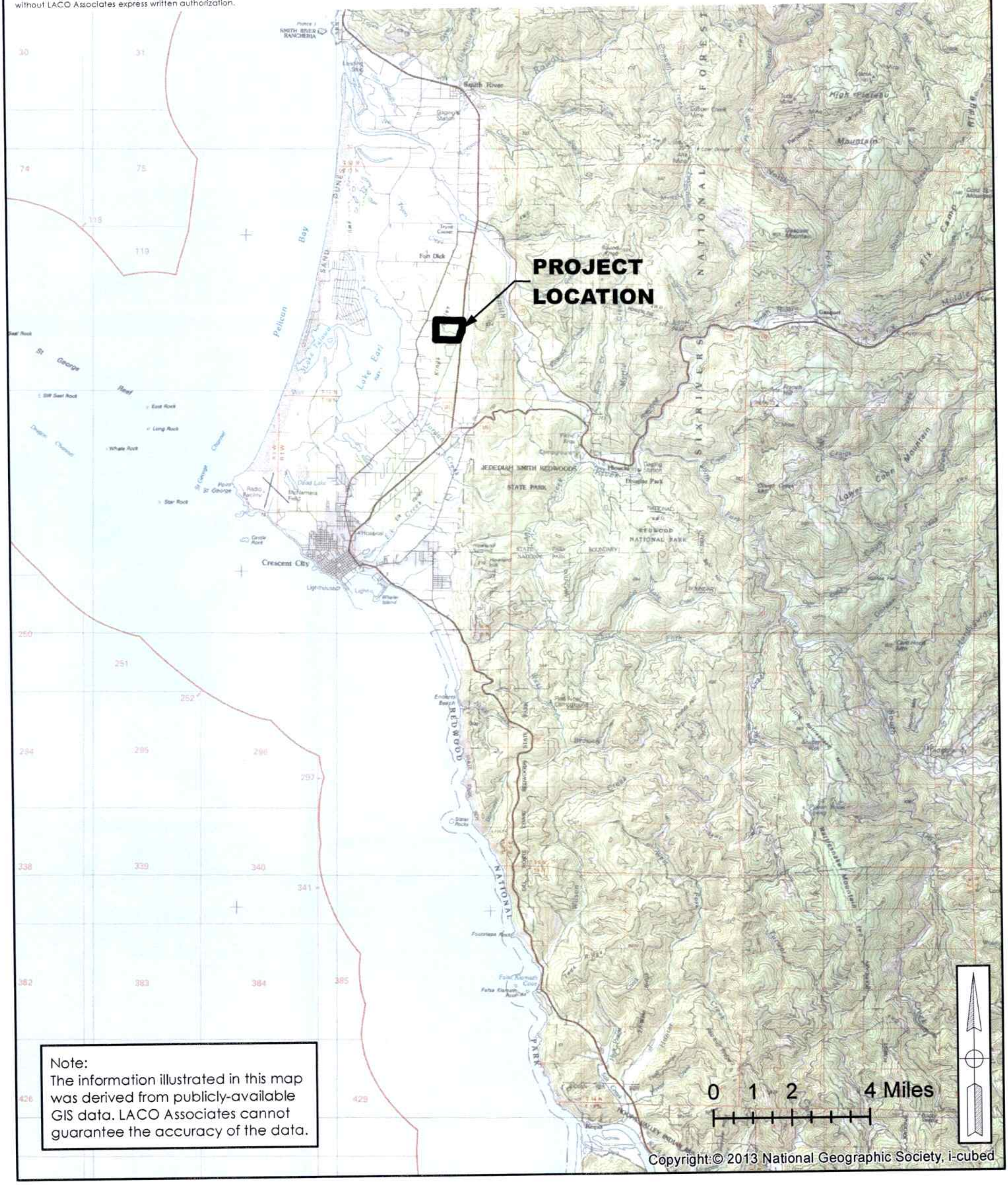
FIGURES

Figure 1: Location Map

Figure 2: Site Map

LACO	PROJECT	FORT DICK FLATS ENTITLEMENTS	BY	VSD	FIGURE
EUREKA • UKIAH • SANTA ROSA	CLIENT	GREEN DIAMOND	CHECK	GLM	1
1-800-515-5054 www.lacoassociates.com	LOCATION	CRESCENT CITY	DATE	3/27/2018	JOB NO. 6872.19
		LOCATION MAP, DEL NORTE COUNTY, CA.			

REUSE OF DOCUMENTS: This document and the ideas and design incorporated herein, as an instrument of professional service, is the property of LACO Associates and shall not be reused in whole or part for any other project without LACO Associates express written authorization.



Note:
The information illustrated in this map was derived from publicly-available GIS data. LACO Associates cannot guarantee the accuracy of the data.

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Date: 4/19/2018 Time: 1:38:24 PM
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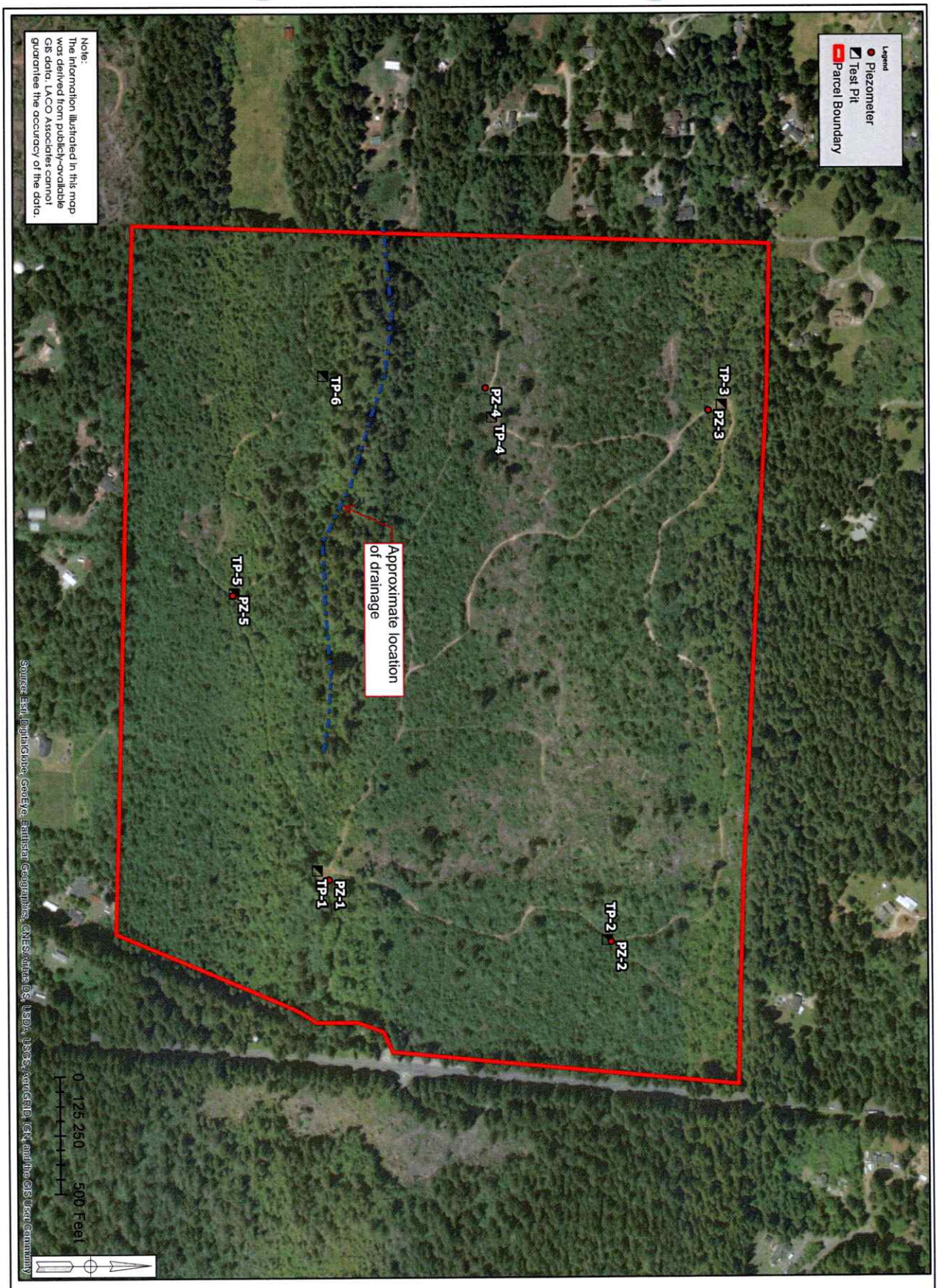


FORT DICK FLATS ENTITLEMENTS **SITE MAP** GREEN DIAMOND CRESCENT CITY, DEL NORTE COUNTY, CA.	NO.	HISTORY/REVISION	BY CHK DATE

DRAWN: VSD
CHECK: GLM
APPROVED: GLM
DATE: 4/19/2018
JOB NO.: 6872.19
FIGURE: 2

LACO
EUREKA • UKIAH • SANTA ROSA
1-800-515-5054 www.lacoassociates.com

APPENDIX 1

Piezometer Well Logs

BORING NUMBER PZ-1

LACO
21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
311 Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 443-5054 Fax 707 443-0553
www.lacoassociates.com

CLIENT Green Diamond
PROJECT NAME Flats Entitlements
PROJECT NUMBER 6872.19
PROJECT LOCATION Fort Dick, CA
DATE STARTED 10/10/16 **COMPLETED** 10/10/16
GROUND ELEVATION 141 ft 103-141 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Fisch Drilling
GROUND WATER LEVELS:
DRILLING METHOD Box GeoProbe 6600
▽ **AT TIME OF DRILLING** 20.00 ft / Elev 121.00 ft Rained
LOGGED BY SJM **CHECKED BY** GLM
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0					
		SM		(SM) Silty Sand (USDA Sandy Loam), dark brown 10YR 4/6, moist, firm, non-plastic fines, sand, trace manganese, mottling	
5				5.0	136.0
		SC-SM		(SC-SM) Clayey Sand (USDA Sandy Clay Loam), dark brown and gray 2.5Y 4/3, moist, loose, low plasticity fines, sand mottling	
10				10.0	131.0
		SC-SM		(SC-SM) Clayey Sand (USDA Sandy Clay Loam), dark reddish-brown 10YR 3/3, moist, loose, low plasticity fines, sand, mottling	
15				15.0	126.0
		SM		(SM) Clayey Sand (USDA Sandy Loam), reddish-brown 5Y 4/4, wet, loose, low plasticity fines, sand	
20				20.0 ▽	121.0
		SP		(SP) Poorly Graded Sand (USDA Loamy Sand), gray 2.5Y 2.5/1, wet, loose, non-platic fines, sand	
25					
30				30.0	111.0

Bottom of borehole at 30.0 feet.

GENERAL LOG - GINT STD US LAB.GDT - 4/19/18 10:40 - P:\GINT FILES\PROJECTS\6872.19 FLATS ENTITLEMENTS\6872.19 FORT DICK PIEZOMETER BORING LOGS.GPJ

BORING NUMBER PZ-2

LACO
21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
311 Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 443-5054 Fax 707 443-0553
www.lacoassociates.com

CLIENT Green Diamond
PROJECT NUMBER 6872.19
DATE STARTED 10/11/16 **COMPLETED** 10/11/16
DRILLING CONTRACTOR Fisch Drilling
DRILLING METHOD Box GeoProbe 6600
LOGGED BY SJM **CHECKED BY** GLM
NOTES

PROJECT NAME Flats Entitlements
PROJECT LOCATION Fort Dick, CA
GROUND ELEVATION 141 ft 103-141 ft. **HOLE SIZE** 4 inches
GROUND WATER LEVELS:
AT TIME OF DRILLING 20.00 ft / Elev 121.00 ft Rained
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0		SM		(SM) Silty Sand (USDA Loam), reddish-brown 10YR 4/6, moist, loose, non-plastic, fines, sand, trace manganese, organic
5.0				136.0
5		SP-SM		(SP-SM) Poorly Graded Sand with Silt (USDA Sandy Loam), brown 10YR 4/6, moist, loose, non-plastic fines, sand
10.0				131.0
10		SC		(SC) Clayey Sand (USDA Sandy Clay Loam), brown 2.5Y 4/4, moist, loose, low-plasticity fines, sand
15.0				126.0
15		SP-SM		(SP-SM) Poorly Graded Sand with Silt (USDA Loamy Sand), rust red 10YR 3/6, wet, loose, non-plastic fines, sand, mottling
20				▽
25				
30				30.0 111.0

Bottom of borehole at 30.0 feet.

GENERAL LOG - GINT STD US LAB.GDT - 4/19/18 10:40 - P:\GINT FILES\PROJECTS\6872.19 FLATS ENTITLEMENTS\6872.19 FORT DICK PIEZOMETER BORING LOGS.GPJ

BORING NUMBER PZ-3

LACO
21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
311 Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 443-5054 Fax 707 443-0553
www.lacoassociates.com

CLIENT Green Diamond
PROJECT NUMBER 6872.19
DATE STARTED 10/11/16 **COMPLETED** 10/11/16
DRILLING CONTRACTOR Fisch Drilling
DRILLING METHOD Box GeoProbe 6600
LOGGED BY VSD **CHECKED BY** GLM
NOTES

PROJECT NAME Flats Entitlements
PROJECT LOCATION Fort Dick, CA
GROUND ELEVATION 108 ft 103-141 ft. **HOLE SIZE** 4 inches
GROUND WATER LEVELS:
AT TIME OF DRILLING 15.00 ft / Elev 93.00 ft Rained
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0		SC		(SC) Clayey Sand (USDA Sandy Loam), brownish-yellow, moist, firm, low plasticity fines, sand
5				5.0 — 103.0
		OH		(OH) Organic Soil (USDA Loam), very dark brown 10YR 2/2, moist, loose, non-plastic fines, soil developed within buried tree
10				10.0 — 98.0
		SP		(SP) Poorly Graded Sand (USDA Sand), dark grayish-brown 10YR 4/2, wet, loose, non-plastic fines, sand
15				▽
20				
25				25.0 — 83.0
		GP		(GP) Poorly Graded Gravel with Sand, black to pale yellow 2.5YR 2.5/1 to 2.5YR 8/2, wet, loose fines, sand, gravel
30				30.0 — 78.0

Bottom of borehole at 30.0 feet.

GENERAL LOG - GINT STD US LAB.GDT - 4/19/18 10:40 - P:\GINT FILES\PROJECTS\6872.19 FLATS ENTITLEMENTS\6872.19 FORT DICK PIEZOMETER BORING LOGS.GPJ

BORING NUMBER PZ-4

LACO
21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
311 Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 443-5054 Fax 707 443-0553
www.lacoassociates.com

CLIENT Green Diamond
PROJECT NUMBER 6872.19
DATE STARTED 10/11/16 **COMPLETED** 10/11/16
DRILLING CONTRACTOR Fisch Drilling
DRILLING METHOD Box GeoProbe 6600
LOGGED BY SJM **CHECKED BY** GLM
NOTES

PROJECT NAME Flats Entitlements
PROJECT LOCATION Fort Dick, CA
GROUND ELEVATION 117 ft 103-141 ft. **HOLE SIZE** 4 inches
GROUND WATER LEVELS:
AT TIME OF DRILLING 30.00 ft / Elev 87.00 ft Rained
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0		ML		(ML) Silt with Sand (USDA Clay), light red-brown 10YR 5/8, moist, medium dense, firm, low-plasticity fines, sand
5				5.0 — 112.0
		SP-SM		(SP-SM) Poorly Graded Sand with Silt (USDA Sandy Loam), red-brown 10YR 4/4, moist, loose, non-plastic fines, sand
10				10.0 — 107.0
		SC		(SC) Clayey Sand (USDA Sandy Clay Loam), light brownish-gray 10YR 4/3, moist, loose, low plasticity fines, sand
15				15.0 — 102.0
		SP		(SP) Poorly Graded Sand (USDA Sand), reddish-brown and gray 10YR 4/3, moist, loose, non-plastic fines, sand
20				20.0 — 97.0
		SP		(SP) Poorly Graded Sand (USDA Sand), gray 10YR 4/3, moist, loose, non-plastic fines, sand
25				
30				30.0 ▽ — 87.0

Bottom of borehole at 30.0 feet.

GENERAL LOG - GINT STD US LAB.GDT - 4/19/18 10:40 - P:\GINT FILES\PROJECTS\6872.19 FLATS ENTITLEMENTS\6872.19 FORT DICK PIEZOMETER BORING LOGS.GPJ

BORING NUMBER PZ-5

LACO
21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
311 Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 443-5054 Fax 707 443-0553
www.lacoassociates.com

CLIENT Green Diamond
PROJECT NUMBER 6872.19
DATE STARTED 10/10/16 **COMPLETED** 10/10/16
DRILLING CONTRACTOR Fisch Drilling
DRILLING METHOD Box GeoProbe 6600
LOGGED BY SJM **CHECKED BY** GLM
NOTES

PROJECT NAME Flats Entitlements
PROJECT LOCATION Fort Dick, CA
GROUND ELEVATION 138 ft 103-141 ft. **HOLE SIZE** 4 inches
GROUND WATER LEVELS:
AT TIME OF DRILLING 30.00 ft / Elev 108.00 ft Rained
AT END OF DRILLING ---
AFTER DRILLING ---

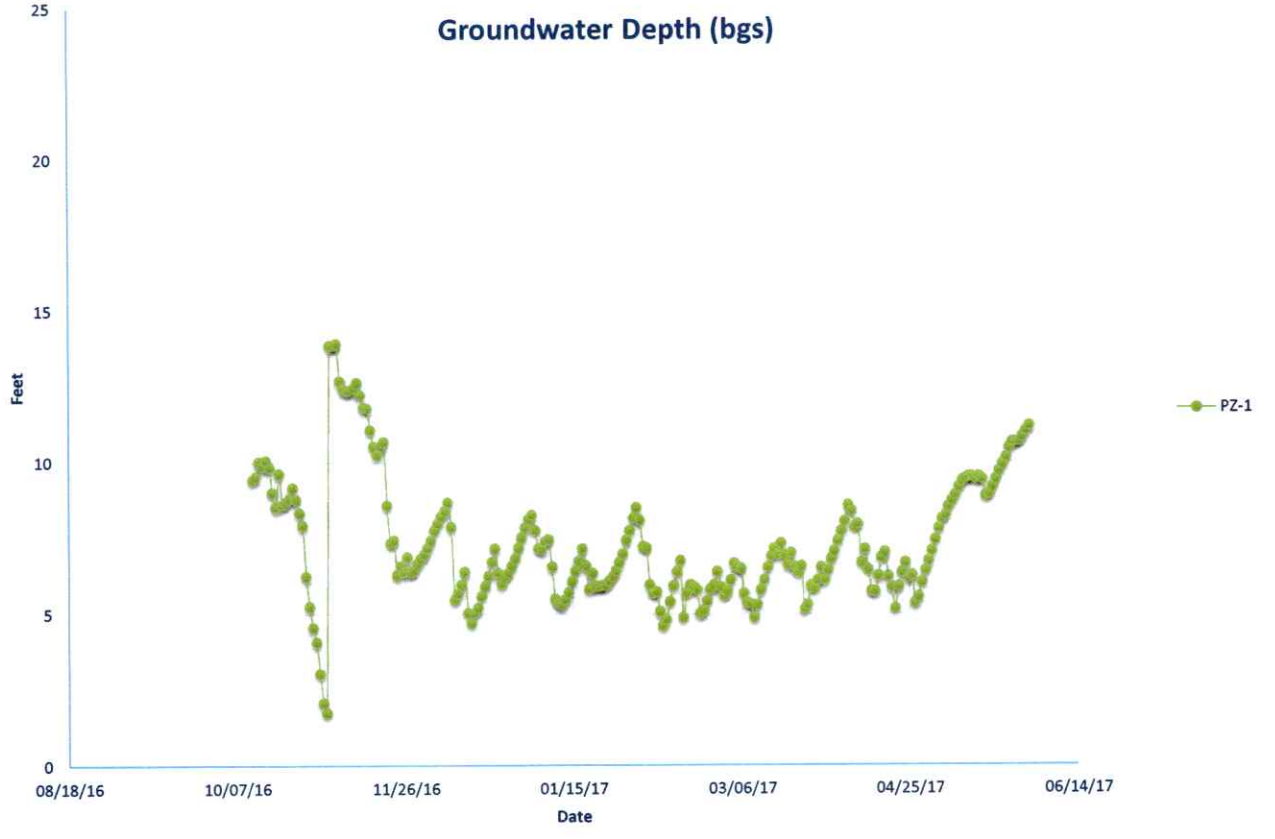
DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0		SM		(SM) Silty Sand (USDA Sandy Loam), red-brown 10YR 4/6, moist, loose, non-plastic fines, sand
15.0				123.0
		SM		(SM) Silty Sand (USDA Sandy Loam), brown 2.5Y 3/3, moist, loose, non-plastic fines, sand; nearing groundwater
20.0				118.0
		SP		(SP) Poorly Graded Sand (USDA Sand), brown, moist, wet, loose, non-plastic fines, sand
30.0 ▽				108.0

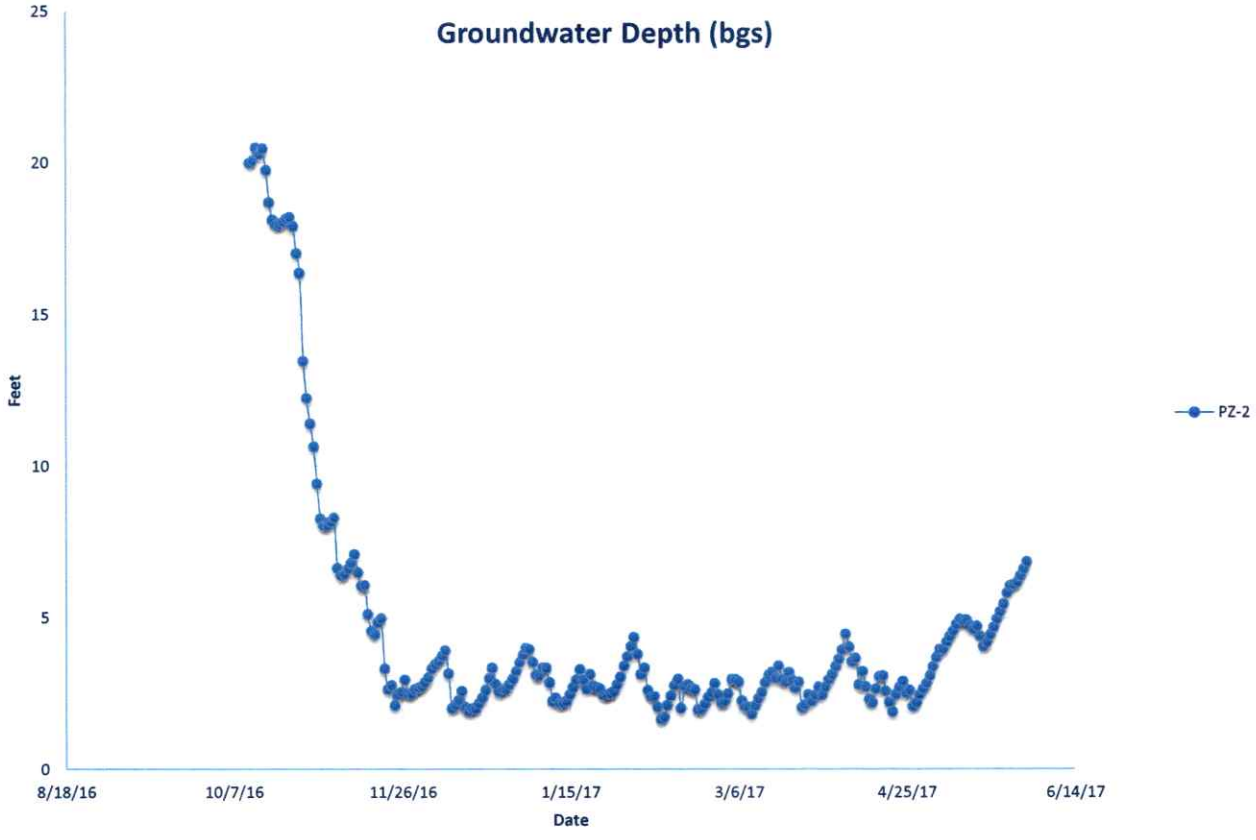
Bottom of borehole at 30.0 feet.

GENERAL LOG - GINT STD US LAB.GDT - 4/19/18 10:40 - P:\GINT FILES\PROJECTS\6872.19 FLATS ENTITLEMENTS\6872.19 FORT DICK PIEZOMETER BORING LOGS.GPJ

APPENDIX 2

Depth to Groundwater Chart


Groundwater Depth (bgs)
25
20
15
10
5
0
Feet
08/18/16
10/07/16
11/26/16
01/15/17
03/06/17
04/25/17
06/14/17
Date
PZ-1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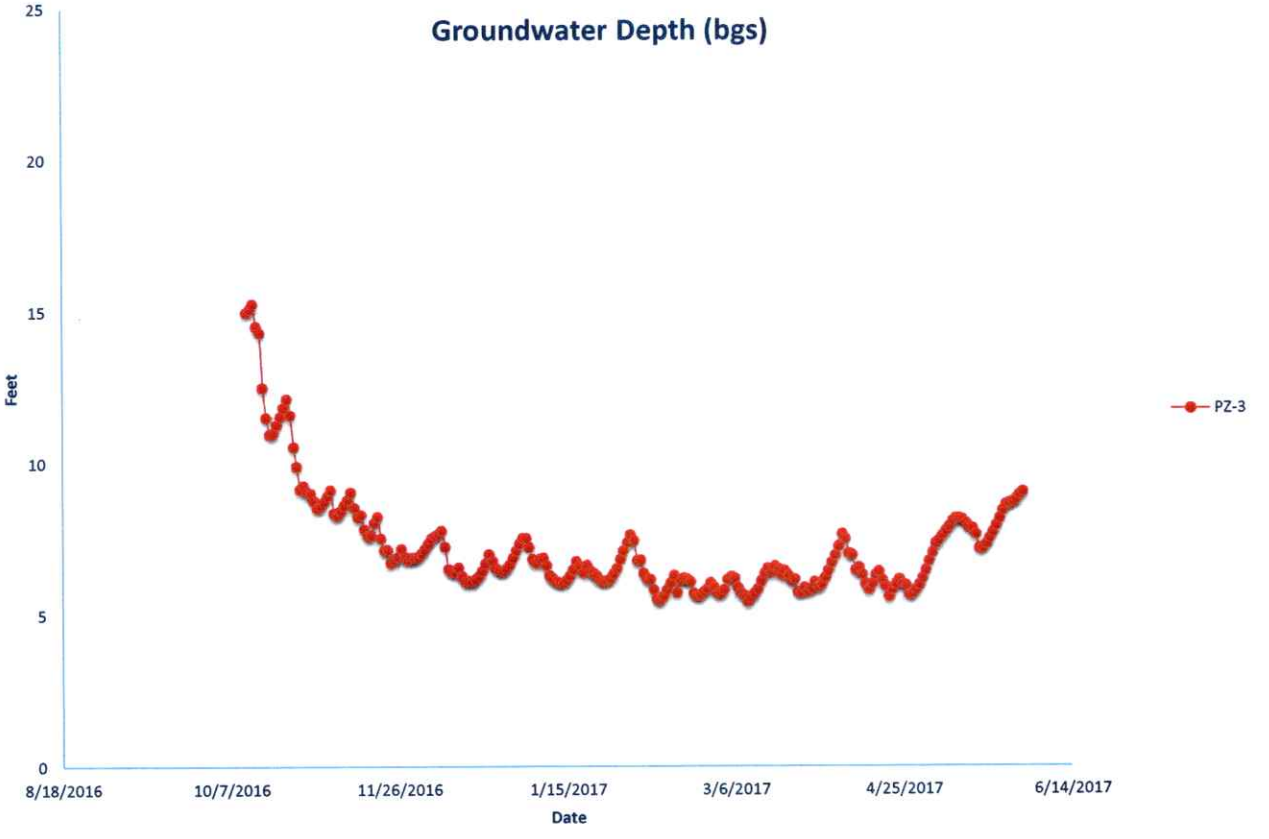
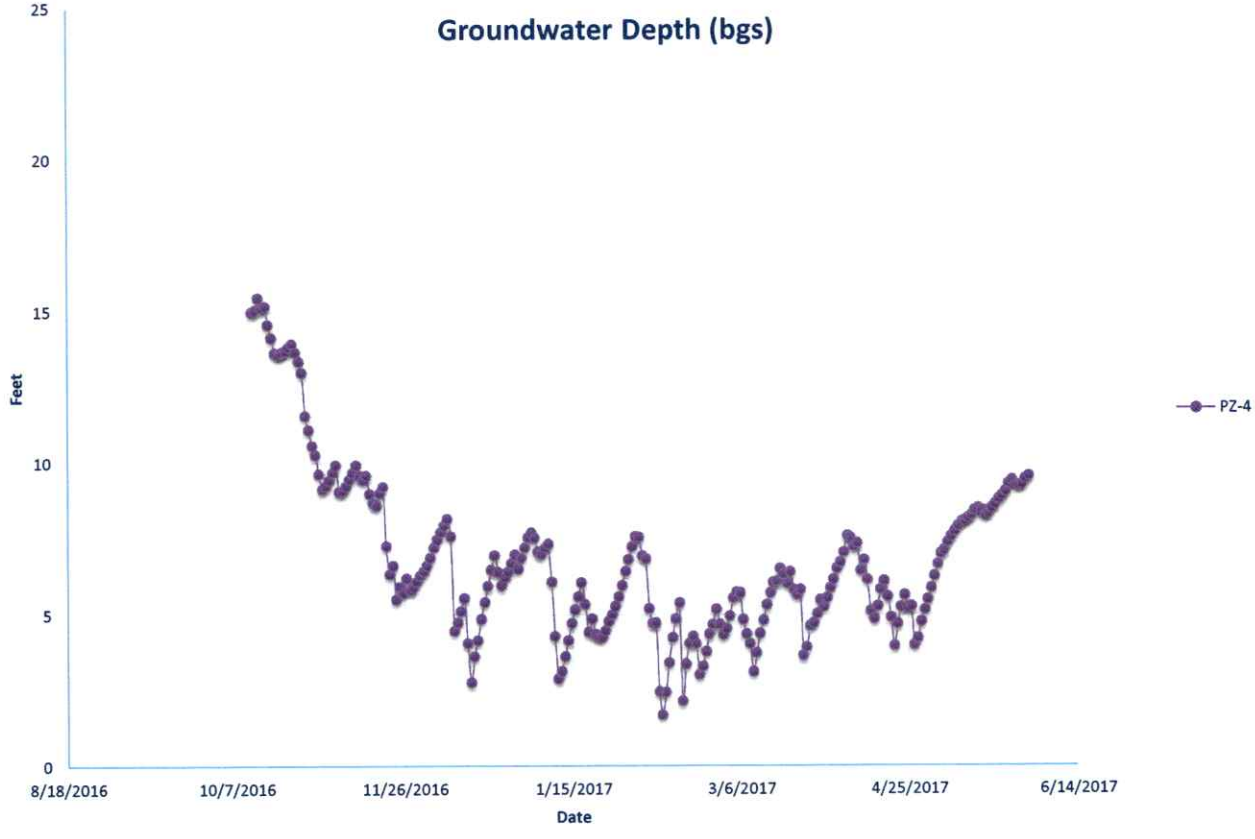
25
20
15
10
5
0
Feet
8/18/16
10/7/16
11/26/16
1/15/17
3/6/17
4/25/17
6/14/17
Date
PZ-2


Groundwater Depth (bgs)
25
20
15
10
5
0
Feet
8/18/2016
10/7/2016
11/26/2016
1/15/2017
3/6/2017
4/25/2017
6/14/2017
Date
PZ-3


Groundwater Depth (bgs)
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15
10
5
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Feet
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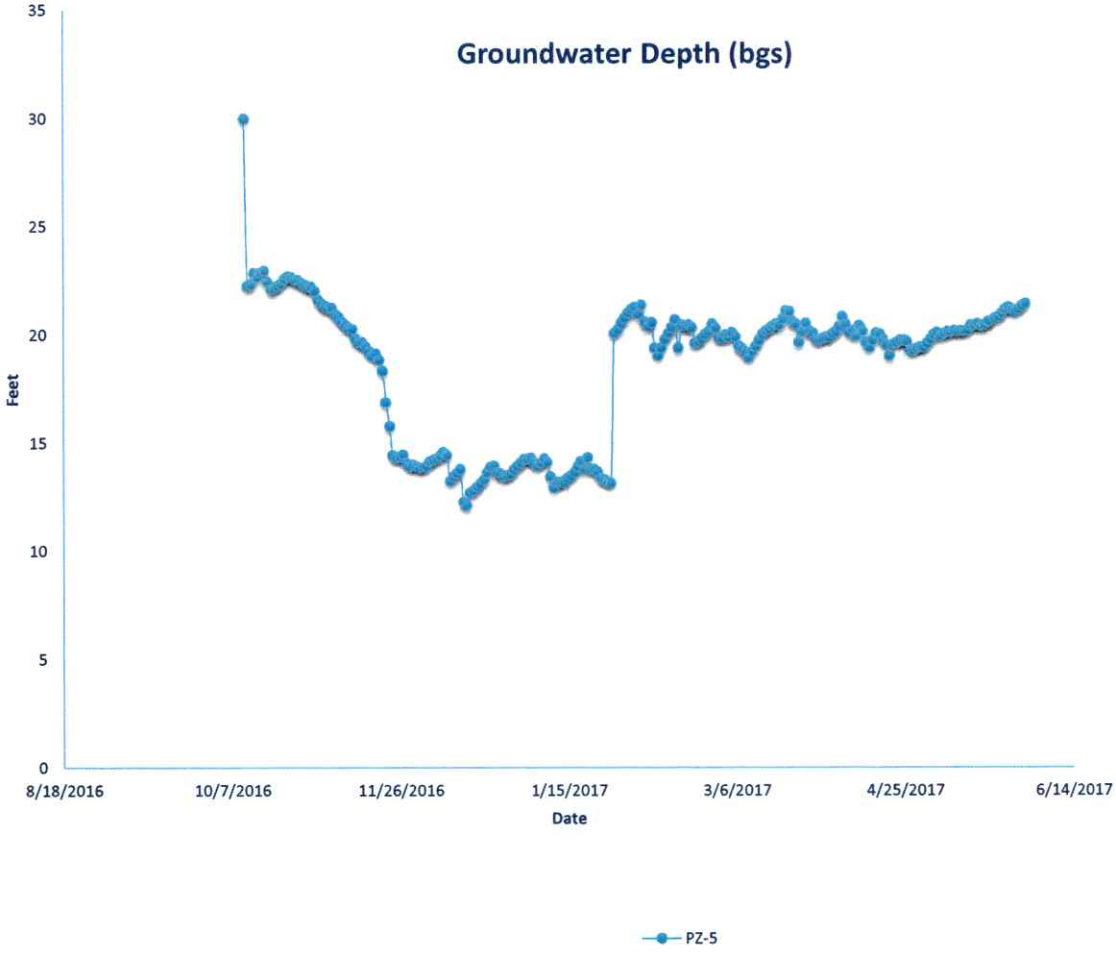
11/26/2016
1/15/2017
3/6/2017
4/25/2017
6/14/2017
Date
PZ-4


Groundwater Depth (bgs)
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15
10
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Feet
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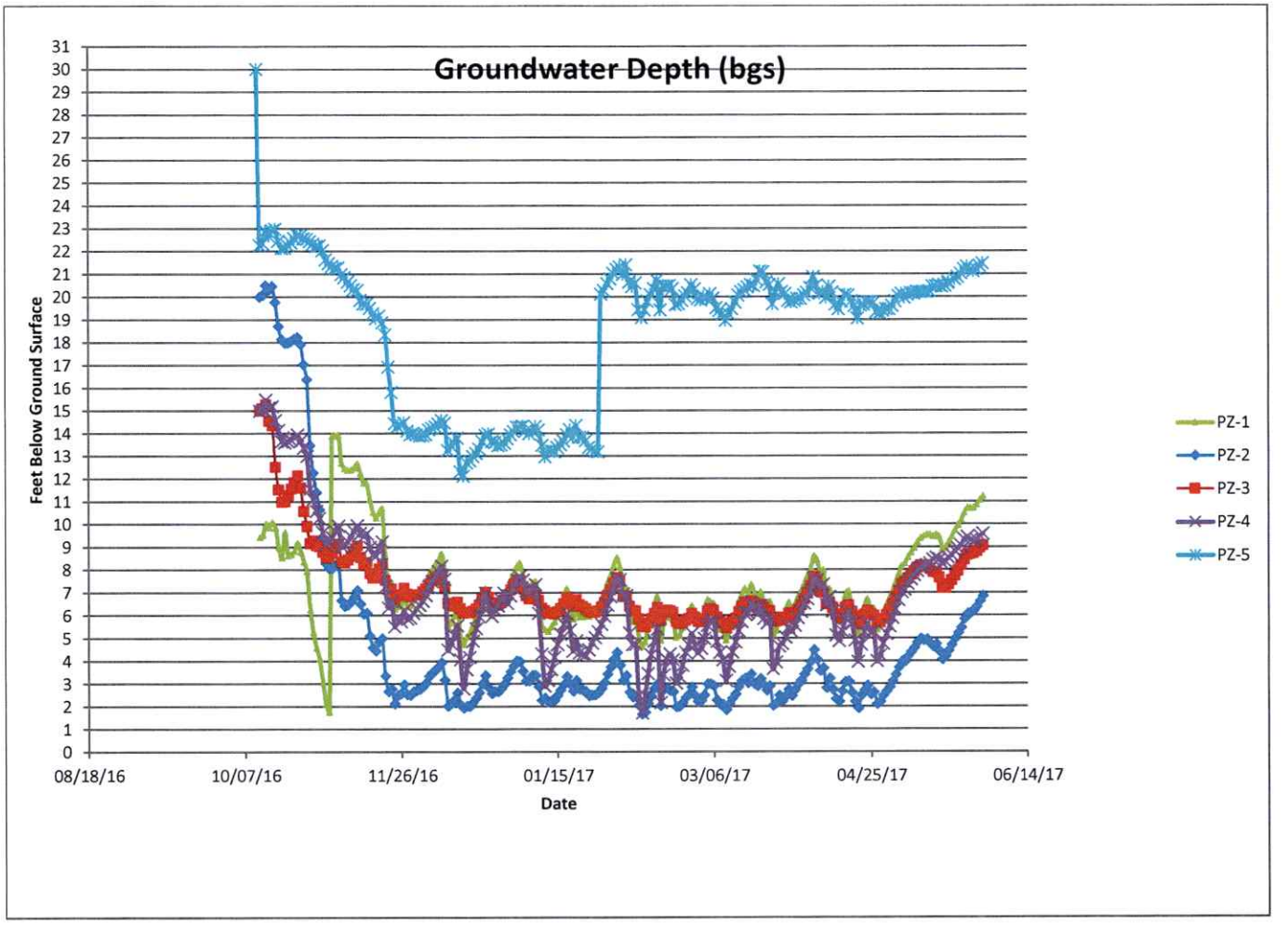
11/26/2016
1/15/2017
3/6/2017
4/25/2017
6/14/2017
Date
PZ-5


Groundwater Depth (bgs)
Feet Below Ground Surface
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29
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3
2
1
0
08/18/16
10/07/16
11/26/16
01/15/17
03/06/17
04/25/17
06/14/17
Date
PZ-1
PZ-2
PZ-3
PZ-4
PZ-5

APPENDIX H

Foresters' Report

Fort Dick Flats Zone Reclassification

Foresters' Report

for Ten-Year-Roll-Out from

Timber Production Zone (TPZ)
to Rural Residential and Manufactured
Housing combining district (RR-3 MFH)

Township 17-North, Range 1-West, Section 26, HB&M

APN 106-021-074 and 106-021-076

Prepared by:

Todd Truesdell

Registered Professional Forester, 2969

July 10, 2019

Blair Forestry Consulting
PO Box 2517
McKinleyville, CA 95519
blairforestry@gmail.com
(707) 496-7322

BLAIR FORESTRY CONSULTING

Project Summary and Location:

Green Diamond Resource Company (GDRCo) is seeking a general plan amendment (GPA) and a ten-year Timberland Production Zone (TPZ) reclassification for approximately 211.7 acres within a portion of the tract known as "Fort Dick Flats". The project area includes two legal parcels identified as Assessor's Parcel Numbers (APNs) 106-021-074 and 106-021-076, located in the unincorporated community of Fort Dick in Del Norte County, California (Site). The legal location is within a portion of Section 26, Township 17-North, Range 1-West Humboldt Base and Meridian, found on the Crescent City 7.5' USGS Quadrangle. The Site is located west of Highway 101 and Wonder Stump Road and includes the triangle-shaped portion of 106-021-074 east of Highway 101 and west of Wonder Stump Road (see Figure 1).[1]

Project Purpose:

The proposed project involves a zone reclassification to amend the Site's current zoning designations. The Site is currently designated as "Timberland" (TBR) under the Del Norte County General Plan and is currently zoned as "Timberland Production Zone" (TPZ) under the Del Norte County Zoning Code. GDRCo would like to amend the existing land use and zoning designations to Rural Residential with one unit per three acres (RR3) and Rural Residential with three- to five-acre lot sizes and a Manufactured Housing combining district (RR-3 MFH), respectively. At this time, only a change in the Site's current land use and zoning designations, including a ten-year TPZ rollout, is being proposed for the Site. A subdivision or any associated development is not currently proposed; however, future residential development is anticipated on-site after the 10-year TPZ rollout is finalized.[1]

Property and Forest Description:

The Site comprises ~212 acres of undeveloped timbered and riparian land that is located outside of the Coastal Zone. Existing development on the Site is limited to seasonal dirt haul roads and skid trails scattered throughout the Site associated with prior timber harvest land uses.

The Site is dominated by a coastal redwood forest type and has been continually managed for timber production since early European settlement in the late 1800s. Timber site quality, which indicates how much timber a forest can potentially produce on any given acre, is considered to be Site II for most of the 212-acre tract of timberland, with Site III and IV associated with wetland features. The redwood-mix conifer stands found on the parcel are third growth stands resulting from multiple harvest entries utilizing predominantly clearcut-based silviculture. Evenaged harvesting (clearcut) has occurred across most of the Site under multiple entries within the last 20 years, resulting in an average stand age of ± 16 years with a minor component of scattered residual trees in the 50 to 80-year classes (generally associated with riparian areas). Timber Harvest Plans have been submitted and conducted in accordance with the Forest Practice Rules and GDRCo's Aquatic Habitat Conservation Plan and regulated by the California Department of Forestry and Fire Protection (CalFire).[2]

[1] *Project Description, Fort Dick Flats Draft Initial Study, July 2019, LACO Associates Project #6872.19.*
[2] *Timber Harvest Plans 1-99-067-DEL, 1-02-210-DEL, 1-04-191-DEL, 1-09-009-DEL.*

The present timber stand condition is a young regenerated conifer stand of moderately dense to dense coast redwood stump sprouts, with minor amounts of Douglas-fir and trace whitewoods that is ± 16 years in age. Associated small trees and shrubs intermixed within the young timber stand include red alder, elderberry, cascara and willow, with a ground cover consisting mainly of swordfern, briars and coyote brush. The present standing conifer timber is primarily redwood (87%) with minor components of Douglas-fir (12%) and trace whitewoods (1%). The stand has an average basal area of 46 square feet per acre, with tree diameters predominantly in the 5" to 10" diameter classes[3]. The hillslope ranges in steepness from 0 to 10 percent slope and is predominantly west facing.

TPZ zoning currently covers the entirety of the Site. Surrounding uses include single family residential homes on 1- to 10-acre lots, undeveloped woodlots from 10-40 acres, and continued GDRCo timberlands to the East of the Site (see Figures 2 and 4). The eastern edge of the site is bisected by Highway 101. Wonder Stump Road borders the eastern boundary.

Watercourses and Forest Practice Rules Setbacks

Unnamed Class I, II and III watercourses are located in the northern and southwestern portions of the Site. These watercourses are tributaries to Lake Earl to the west which flows to the Pacific Ocean. Aquatic vertebrate surveys conducted by GDRCo indicate that the Class I stream provides fish access to much of the drainage for anadromous salmonids.[4] Seasonal wetland habitat is also found within the Site.

As outlined in 14 CCR Section 916.9 of the Forest Practice Rules (FPRs), the Class I and Class II watercourses have a minimum designated setback of 100 and 50 feet respectively. Under the FPRs, Class I watercourses in watersheds supporting anadromous salmonids receive a 100 to 150-foot Watercourse and Lake Protection Zone (WLPZ) buffer depending on the silvicultural harvest method used. Class II watercourses receive a 50 to 100-foot WLPZ buffer based on slope. Both WLPZs are required to retain a minimum level of stocking and canopy coverage as described in 14 CCR Section 916.9 in the FPRs for the purposes of watercourse and watershed protection.

Per LACO correspondence with the California Department of Fish and Wildlife (CDFW), this agency generally recommends a minimum development buffer of 100 feet from the top of bank or outer edge of riparian vegetation, whichever is greater, which is in concurrence with Del Norte County standards. Based on Site characteristics and review of the surrounding Fort Dick area, LACO's analysis assumes a conservative 150-foot setback from the centerline of all on-site Class I and II watercourses to account for a potential additional wetland features within approximately 50 feet from the identified watercourses (see Figure 6). Furthermore, the Biological Report prepared by LACO recommends an official wetland delineation be completed prior to any Site development, which will determine the extent of riparian vegetation and top of bank to determine necessary setback distances from the on-site Class I and II watercourses in order to adequately protect these resources. [4]

These planned setbacks exceed the minimum required setbacks set forth in the FPRs and are adequate to protect the aquatic resources on the Site. Further surveying for aquatic resources is anticipated to occur after the 10-year rollout is finalized and prior to any Site development. In utilizing a conservative 150-foot setback for future development, the proposed rezone should not have an impact on the watercourses and wetland resources within the Site. A change in the designated land use and zoning from TPZ to residential use will not reduce the stream riparian zone or alter its riparian function. Approximately 15 percent of the Site will remain as forested streamside buffers.

[3]Green Diamond Forest Inventory Data for the Fort Dick Flats Tract.
[4]LACO Draft Technical Memorandum: Fort Dick Flats Preliminary Biological Survey, Oct 2018

Additional Setbacks:
As required per the County's General Plan, Section 2 (Safety and Noise), a required 251-foot noise buffer on either side of Highway 101, as measured from the centerline of Highway 101, is to be implemented. This buffer shall remain forested and will provide for visual mitigation for travelers along Highway 101 and a noise buffer for future residences at the Site. After consideration of the identified resources and required buffer zones from each resource, the Site is estimated to have a development potential of ~167 acres (see Figure 6).

TPZ Rezoning:

The project area is presently zoned Timberland Production Zone (TPZ) under County zoning (DNCC §20.43). TPZ is a zoning classification applied to privately owned timberland and State-owned forests by local governments under the Forest taxation Reform Act of 1976. Rezoning lands designated as TPZ involves a different process than rezoning non-TPZ lands due to TPZ land treatment under California tax law. Unlike other lands, TPZ lands are valued for property tax purposes according to their ability to grow trees (i.e., a "timber yield tax" is applied in-lieu of taxing standing timber). The timber yield tax is a property tax paid by timber owners when they harvest trees or timber. Land zoned TPZ is restricted in use for timber growing and compatible uses. In return for accepting stated restrictions associated with TPZ, which are intended to preserve timberlands, landowners receive reduced property tax assessments on the land.

There are two methods by which parcels may be rezoned from TPZ to an alternate zone. A landowner may request the Board of Supervisors (BOS) to immediately rezone land from TPZ to an alternate zoning, i.e. "Immediate Rezone of TPZ". If a four-fifths majority of the BOS decides that the continued use of the land under the TPZ zone is neither necessary nor desirable to accomplish the purpose of the timber yield tax, they may immediately approve the rezone of the property for a new use as outlined by Government Code (GC) Section 51133 or 51134. A tax recoupment fee will be imposed on immediate rezoning. The immediate rezone must also be approved by the CA Board of Forestry.

Alternatively, under non-renewal provisions, the landowner or County can elect to not renew the TPZ and rezone the property as outlined by Government Code Section 51120, i.e. "Ten-Year-Roll-Out of TPZ". The new zoning becomes effective 10-years after the non-renewal request is approved by a majority vote of the Board of Supervisors (BOS). The land is taxed on a gradually increasing scale so that at the end of the 10-year period the taxes are based completely on the new zoning. For the proposed Ten-Year-Roll-Out of TPZ for these parcels, the CA Board of Forestry has no authority to approve, permit or otherwise restrict the rezoning of TPZ in accordance with GC §51120.

Rezoning Assessment:

Current TPZ zoning encompasses both parcels across ~212 acres. The landowner no longer desires to keep the parcels under TPZ and is electing a rezone in accordance with California Government Code (GC) Title 5, Division 1, Part 1, Chapter 6.7, Article 3 §51120 and 51121 (10-year rollout). GDRCo proposes to amend the existing land use and zoning designations to Rural Residential with one unit per three acres (RR3) and Rural Residential with three- to five-acre lot sizes and a Manufactured Housing combining district (RR-3 MFH), respectively (see Figures 3 and 5).

Rezoning Compatibility:
As outlined in the Country General Plan, there will be continued pressure for residential development within the County. Given the location of the Site along Wonder Stump Rd with immediate access to Highway 101, the

property is favorably situated for the proposed rezoning and potential future residential development. The parcels are currently adjoining residential zoned designations to the north, south and west. The site is predominantly flat and the proposed TPZ rezone to Residential is compatible with the adjacent designations as well as utilizing the favorable topographic land base for development. Any future development at the site would be situated near existing public services and improvements. Due to the semi-urban location of the Site, this TPZ rezone will not further fragment valuable forestland in the County but will allow residential use to occur in a location that already has similar land use. The proposed Rural Residential zoning at the Site will serve a public need for a growing population while being in close proximity to existing infrastructure and other residences of similar lot size.

In the future, if a residential subdivision of the Site is proposed, the Site would allow for a minimum of 33 to 55 maximum residential lots, assuming the requested land use and zoning designations of RR3 and RR-3 MFH, respectively, are approved for the Site. Only ~167 acres of the Site are suitable for actual development due to watercourse protection buffers and Highway 101 noise buffer requirements. Ultimate configuration with RR-3 zoning is tentatively targeting the implementation of 3- to 5-acre lot sizes and would likely only allow a maximum of 55 new lots. Arguably, when the parcels are proposed for residential development, only about 55 acres (~26%) of the timberlands within the Site will be converted with home site development and associated infrastructure of roads and drives. Given observed history of residential development on such rural forested lands, home site development is often limited to clearing of 1 acre or less. Homeowners tend to appreciate forested conditions on lots of this size and will retain trees to provide seclusion, screening and buffering from neighboring properties. The presumption is that even following development of the Site much of it will remain in a forested condition though time and any future tree or timber removals in the development and maintenance of residential parcels will remain subject to the Timber Yield Tax.

Current Timber Stock and Future Harvesting Potential:

Currently, the timber stock on the Site is very low as it has been recently harvested under multiple entries over the last 20 years. Merchantable timber on the site is minimal and associated with watercourse protection zones and scattered retained wildlife trees. The easternmost portion of 106-021-074 (the small triangle on the eastern side of Hwy 101) currently contains mature timber but represents only a small portion of the parcel (~5%) which is unlikely to be harvested by GDRCo due to its proximity to Hwy 101 and Wonder Stump Road and possible seasonal wetland habitat.

Harvest of the Site is not likely to occur within the foreseeable future. With an average age of ± 16 years, evenaged harvesting would not occur for a minimum of 30 years under GDRCo's planning horizon. A longer timeframe under the Forest practice Rules may apply to a different landowner. Selection-based harvesting could occur in 15-20 years depending on actual growth at the site but would result in a reduced amount of volume removed due to the partial harvest.

A change in the land use and designated zoning from TPZ to Residential through a ten-year-roll-out is proposed to plan for future housing demand near existing infrastructure and similar land use; at this time property development is only speculative. Until such a time as development occurs, the area shall remain as timberland per definition of Public Resources Code (PRC), Article 2, Section 4526 of the Z'berg-Nejedly Forest Practice Act of 1973 and continue for the allowed management of the timber resources.

Example of Potential Change in Tax Revenue:

The rezone of TPZ lands to residential zoning serves the public interest in that future development of the land will serve a greater benefit to the public than the current yield tax associated with the harvesting of timber. Lands zoned TPZ are assessed at reduced tax rates under the assumption and expectation that supply of timber would be periodically removed from the parcel and then taxed accordingly. A rezone of these lands will capture higher value taxes and increase the annual revenue to the County. The area will remain as timberland in the short term

while increasing the annual tax rate, and any future tree or timber removals in the development of residential parcels at the Site will remain subject to the Timber Yield Tax.

With the observed young regeneration condition of the ~212-acre tract, it will be 30 to 50 years before the property generates any significant yield tax revenue from timber harvests. Timberland values established by the California Department of Tax and Fee Administration for 2018 taxation purposes of Site II coast redwood lands zoned TPZ are to be assessed at $171 per acre. Following rezoning to Rural Residential, the basis per acre value of the Site could be as much as $20,000 per acre or more. The assessed value of the of the original ~212 tract as TPZ lands at the present rate of $171 per acre, assuming it is all Site II lands, would be $36,252. The potential assessed value of the Site following rezone could be as much as $4,240,000. For the given example and at a 1 percent tax rate, the annual taxes on the property would go from a present assessment of $363 to $42,400 per year for all lands involved, theoretically resulting in a considerable increase in annual revenue to the County.

Conclusion:

Green Diamond Resource Company (GDRCo) has elected to rezone two adjoining parcels of approximately 211.7 acres from their current designation of Timberland Production Zone (TPZ) to a Rural Residential zoning (3-acre minimum lots) through a ten-year roll-out process as regulated by Sections 51120 and 51121 of the California Government Code. Due to the recent harvesting and existing timber stocking on the Site, potential timber harvesting is not likely to occur for at least another 30 years. The parcels are located in a semi-urban area near the community of Fort Dick with surrounding land use and zoning dominated by similar residential use as the GDRCo is proposing.

It is the assessment of the RPF that the proposed RR-3 MFH rezone and associated RR-3 land use designation of the Site is compatible with the adjacent land use and zoning, and that future residential development and activities within the Site will not adversely impact neighboring lands. The proposed residential zoning is better suited for the property than continued timber production due to the extremely young conifer stocking on the Site, surrounding land uses, proximity to existing development and infrastructure and benefit to the County through increased tax revenue while not further fragmenting forestland. This RPF supports the ten-year roll-out of the Site from TPZ to new zoning.

References:

1. *California Government Code Title 5, Division 1, Part 1, Chapter 6.7, Article 3, § 51120 et al.*
2. *California Forest Practice Rules, Title 14 of the California Code of Regulations, Chapters 4, 4.5 and 10, with the Z'Berg-Nejedly Forest Practice Act, California Department of Forestry and Fire Protection, 2019*
3. *Del Norte County General Plan, January 28, 2003.*
4. *County of Del Norte 2014 Housing Element, September 23, 2014.*
5. *LACO Associates, Draft Initial Study and Environmental Checklist for Fort Dick Flats General Plan Amendment and Zone Reclassification. Project #6872.19, July 2019.*

6. *LACO Associates, Draft Technical Memorandum: Fort Dick Flats Preliminary Biological Survey, October 23, 2018.*

7. *Timber and Timberland Values Manual, California State Board of Equalization, July 2007, Reprinted 2015, Chapter 4.*

8. *Timber Harvest Plan 1-09-009 DEL, CAL FIRE Regional Office Archive.*

Attached Figures (provided by LACO Associates):

1. *Figure 1: Project Location Map*
2. *Figure 2: Current Land Use Map*
3. *Figure 3: Proposed Land Use Map*
4. *Figure 4: Current Zoning Map*
5. *Figure 5: Proposed Zoning Map*
6. *Figure 6: Fort Dick Flats Preliminary Development Potential Map*

LACO EUREKA • UKIAH • SANTA ROSA 1-800-515-5054 www.lacoassociates.com	PROJECT	FORT DICK FLATS GPA & REZONE	BY	CMB	FIGURE 1
	CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK	MMM	
	LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE	2/4/2019	JOB NO. 6872.19
		LOCATION MAP			

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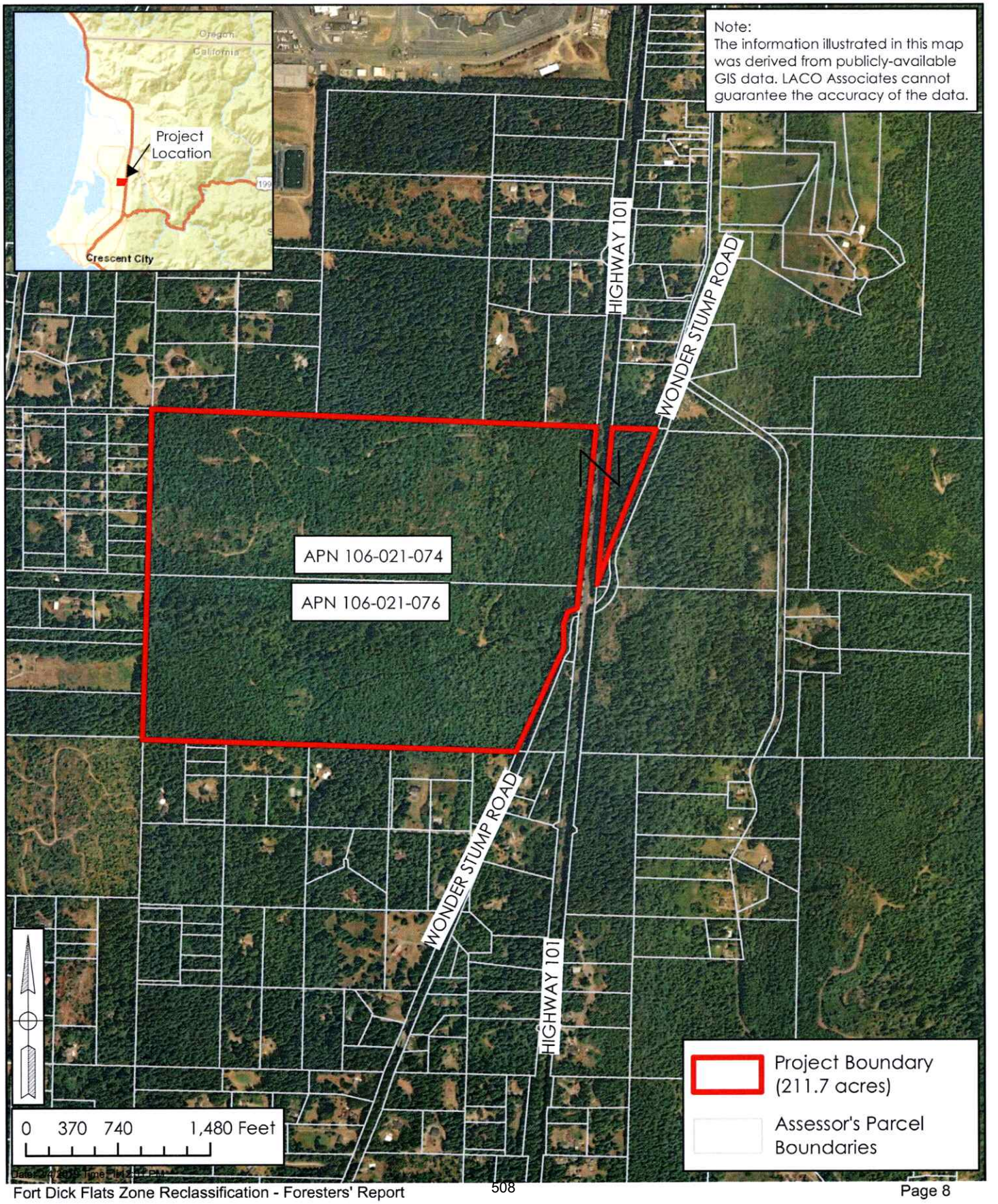

LACO	PROJECT	FORT DICK FLATS GPA & REZONE	BY	CMB	FIGURE
EUREKA • UKIAH • SANTA ROSA	CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK	MMM	2
1-800-515-5054 www.lacoassociates.com	LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE	2/4/2019	JOB NO. 6872.19
		CURRENT LAND USE -- OVERALL AREA			

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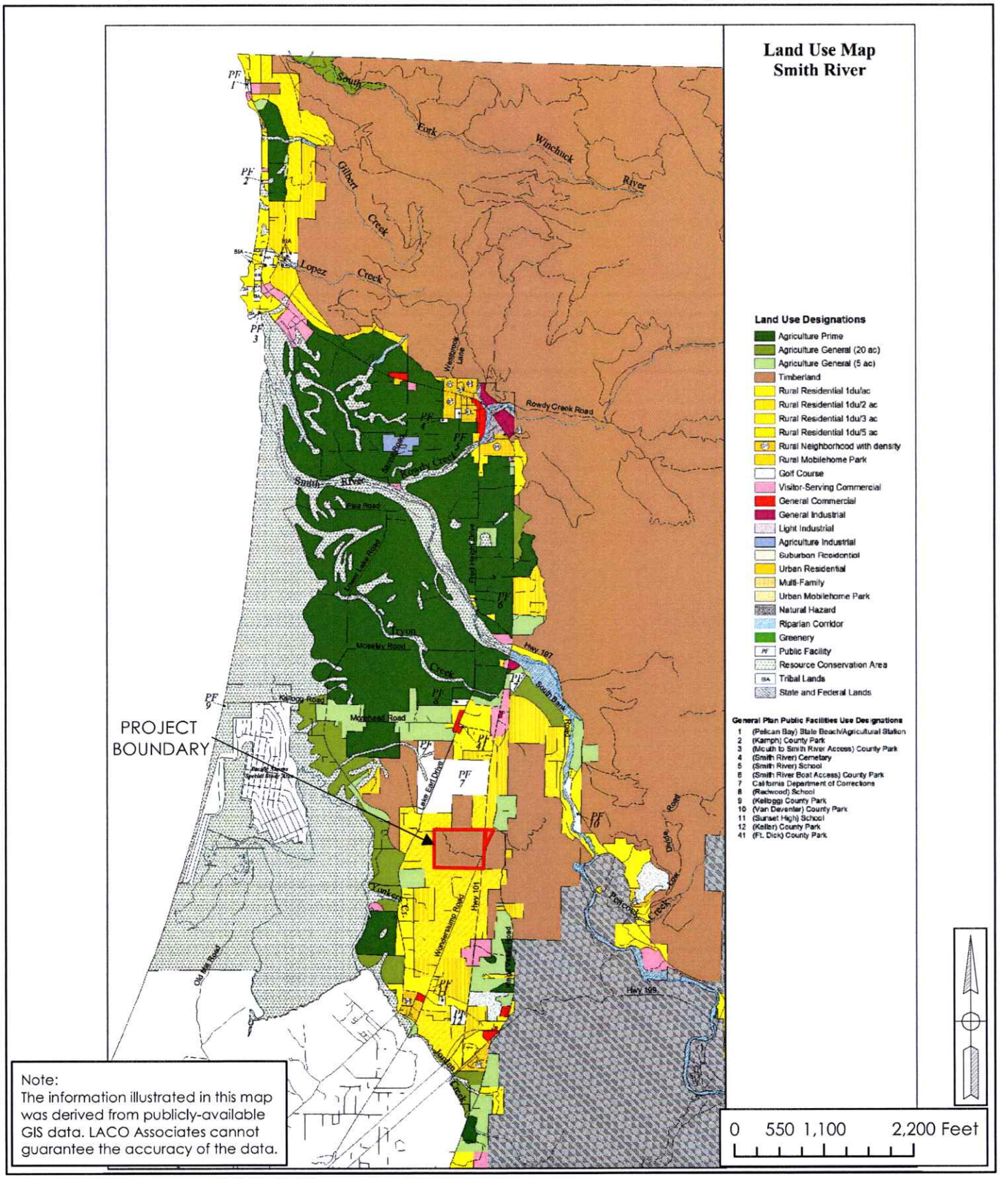

LACO EUREKA • UKIAH • SANTA ROSA 1-800-515-5054 www.lacoassociates.com			
PROJECT	FORT DICK FLATS GPA & REZONE	BY	CMB
CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK	MMM
LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE	2/4/2019
	PROPOSED LAND USE		

FIGURE 3

JOB NO. 6872.19

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LACO EUREKA • UKIAH • SANTA ROSA 1-800-515-5054 www.lacoassociates.com	PROJECT	FORT DICK FLATS GPA & REZONE	BY	CMB	FIGURE
	CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK	MMM	4
	LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE	2/4/2019	JOB NO.
		CURRENT ZONING MAP			6872.19

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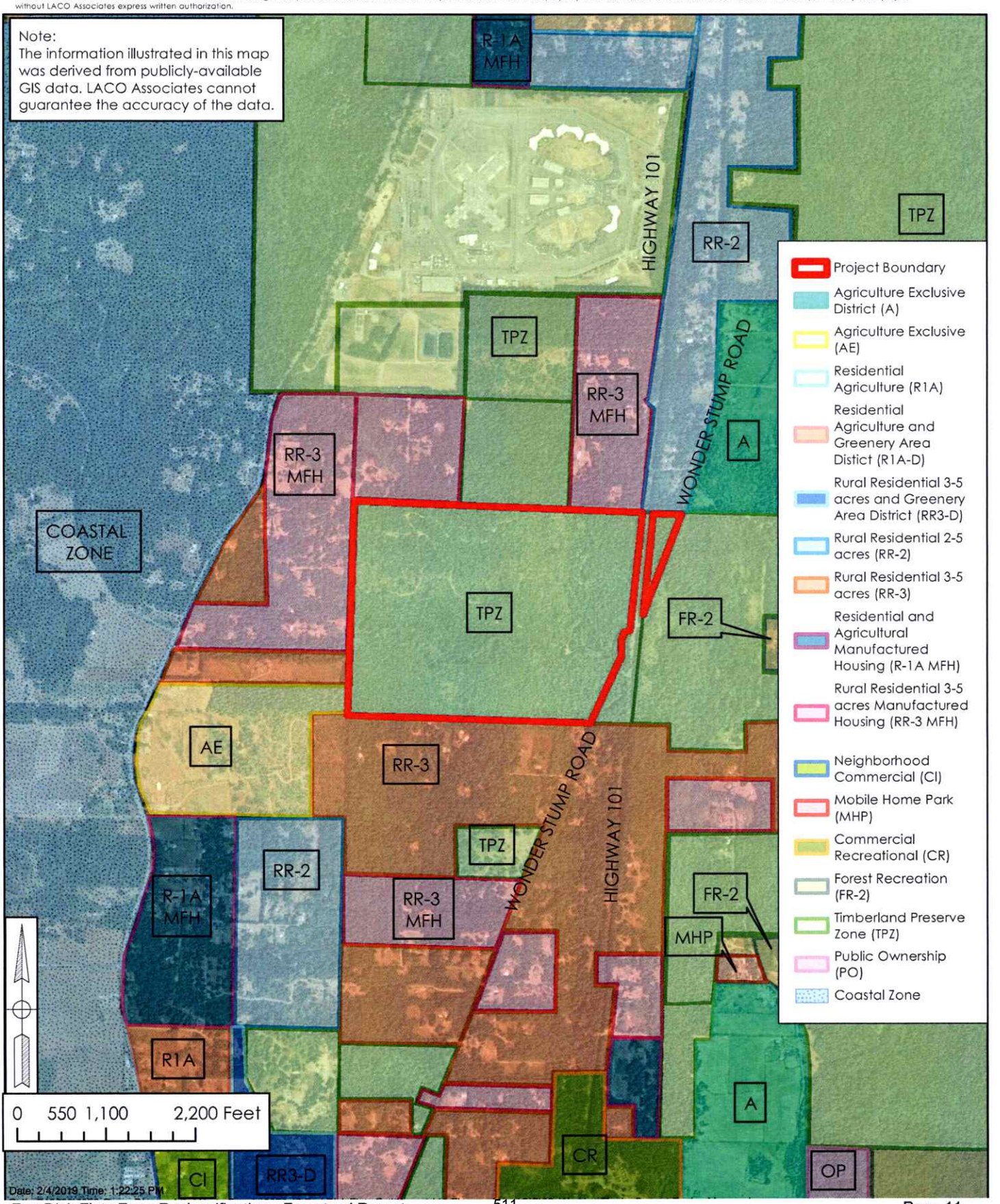
Note:
The information illustrated in this map was derived from publicly-available GIS data. LACO Associates cannot guarantee the accuracy of the data.



LACO EUREKA • UKIAH • SANTA ROSA 1-800-515-5054 www.lacoassociates.com	PROJECT	FORT DICK FLATS GPA & REZONE	BY	CMB	FIGURE
	CLIENT	GREEN DIAMOND RESOURCE COMPANY	CHECK	MMM	5
	LOCATION	HWY 101/WONDER STUMP ROAD, FORT DICK	DATE	2/4/2019	JOB NO.
		PROPOSED ZONING MAP			6872.19

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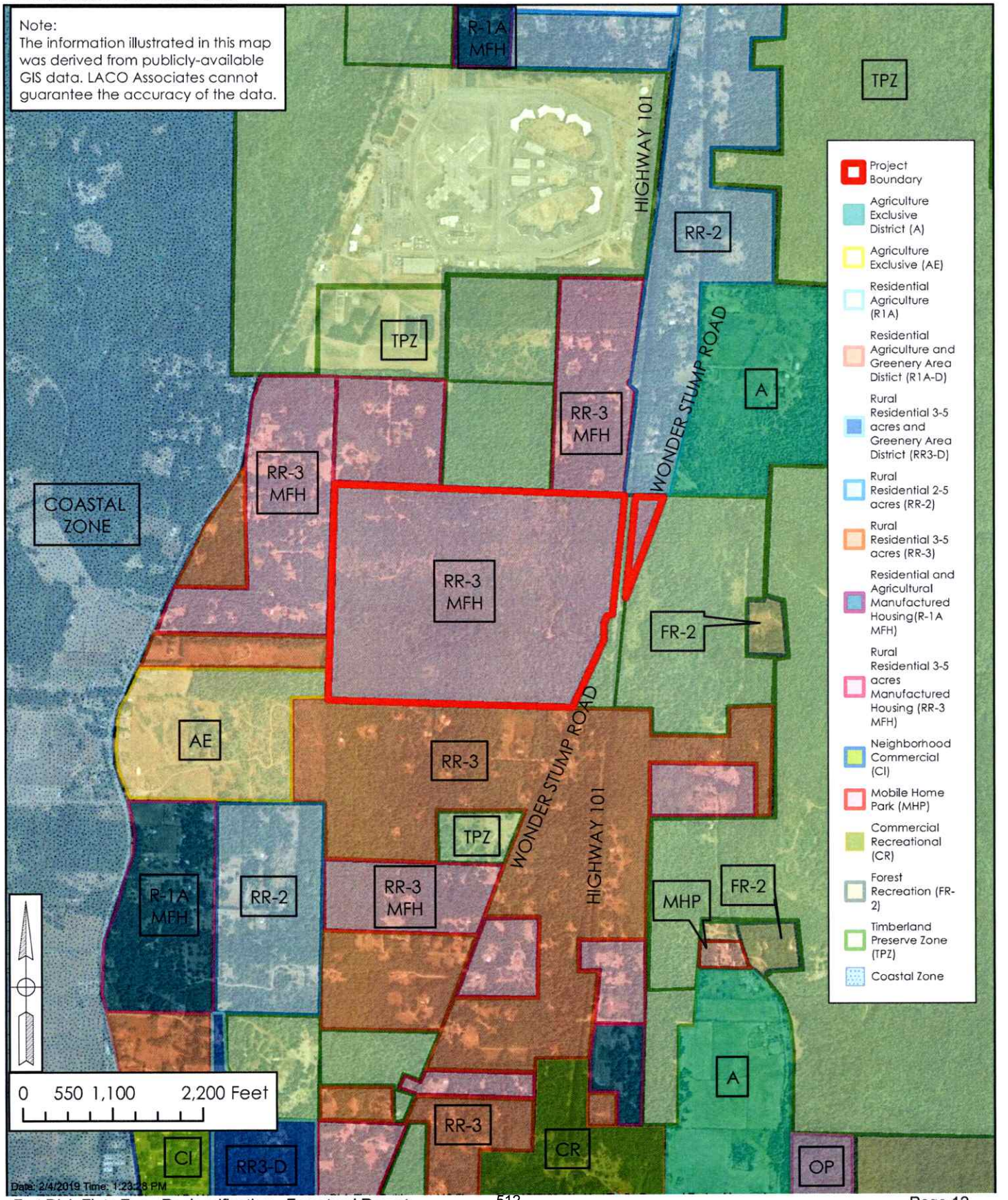
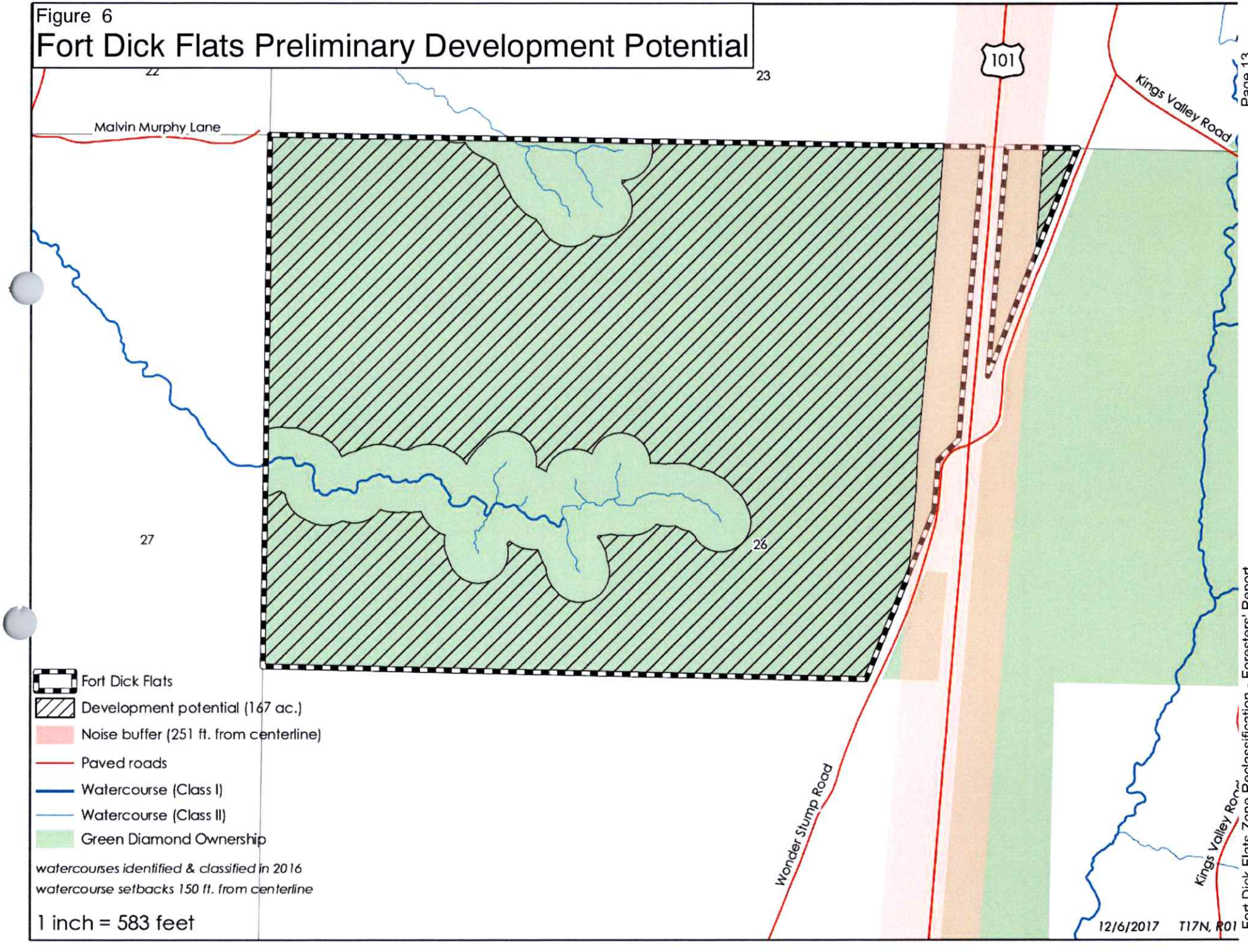


Figure 6

Fort Dick Flats Preliminary Development Potential



APPENDIX I

Pre-Application Conference Comments

COUNTY OF DEL NORTE
COMMUNITY DEVELOPMENT DEPARTMENT

981 "H" Street, Suite 110
Crescent City, California 95531

Fax (707) 465-0340

Planning	Engineering & Surveying	Roads	Building Inspection	Environmental Health
(707) 464-7254	(707) 464-7229	(707) 464-7238	(707) 464-7253	(707) 465-0426

January 19, 2018

LACO Associates
21 West 4th Street
Eureka, California 95531

Attn: Deirdre Clem, Senior Planner

Re: Green Diamond Pre-Application Consultation Comments (APN 106-021-10)

Dear Ms. Clem,

On behalf of Green Diamond Resource Company, LACO Associates requested that the County, acting in a CEQA-designated lead agency capacity, conduct a pre-application consultation concerning a ten-year rezone and General Plan Amendment on a property located west of Wonder Stump Road at its intersection with U.S. Highway 101. The requested consultation occurred on two separate occasions in the field (Thursday, 9/21/17 and Friday, 10/12/17). The second visit was organized by the County Planning Division due to the poor turnout during the first meeting. Cumulatively, the consultations were attended by the following:

1. California Department of Fish and Wildlife (Jennifer Olson and Nick Simpson)
2. County of Del Norte
    a. Assessor (Steve Hart and Skylar Renwick)
    b. Community Development Department (Randy Hooper)
        i. Planning Division (Taylor Carsley)
        ii. Engineering Division (Rosanna Bower)
        iii. Environmental Health Division (Houawa Moua)
3. Fort Dick Fire Protection District (Randy Crawford)

Additionally, the California Department of Forestry and Fire Protection (CAL FIRE), California Department of Transportation (Caltrans), and Tolowa Dee-ni' Nation were invited to appear and submit comments but were unable to attend either field visit. CAL FIRE and Caltrans have submitted comments which are attached to this letter.

Comments

Land Use: The application materials call for a Timber Preserve Zone (TPZ) rezone to Rural Residential – 3 acre minimum (RR3) and a General Plan Amendment of the land use designation from Timberland to Rural Residential – 3 acre minimum (RR-3). The subject property is approximately 320 acres and the proposed land use changes would affect approximately 200 acres: the area west of Wonder Stump Road and the small "triangle" portion between Wonder Stump and Highway 101. The current land use designation and zoning allow for very limited opportunities to utilize the property above that of timber harvesting and related activities. The minimum lot size for purpose of division for sale, lease, or financing is 20 acres and subject to timber management review. The community of Fort Dick, approximately bounded north to south by the Smith River and Jordan Creek, respectively, has historically contained high amounts of timberland resource areas. This is due to a number of natural geographic and geomorphic factors that allow for a sizable redwood crop to grow relatively quickly, as well as the flat topography conducive to timber harvest. Large areas of TPZ exist in the Fort Dick and Kings Valley area, although much of the original timberlands have been rezoned for rural residential uses. The County General Plan values commercial timberland and encourages the conservation of this use:

- *"The County recognizes commercial timberland as a resource in its own right as well as a protector of many other resources and shall strive to maintain commercial forest land as such" (DNCGP 1.H.1).*
- *"The County shall continue to maintain in a commercial timberland use those lands possessing climate and soils suitable for growing commercial conifer timber crops (including spruce) through the State Timberland Production Zone (TPZ) program..." (DNCGP 1.H.2).*
- *"The County shall protect commercial timberland and timber production activities from development practices that erode their economic viability... (DNCGP 1.H.6).*

In regards to a large scale land use change, the County would have to consider the value that the General Plan places on resource lands such as timberland, the potential future value of maintaining this property as timberland, and the benefits of rural residential development. Both rezone and General Plan Amendment processes would require multiple levels of review and public hearing processes.

Parcel Density: The preliminary project description states that the applicant is applying for an entitlement for a TPZ rezone and a timberland General Plan Amendment to a Rural Residential designation with a 1 lot/3-acre density over approximately 200 acres. A moderate estimate of the watercourse and riparian resource areas and their associated development buffer areas is 28 acres. This would lead to a rough approximation of 172 acres of potentially developable land and at a 3-acre density, approximately 57 lots could be estimated, although additional factors and constraints would most certainly be present such as area utilized for right-of-way, other resource areas, layout efficiency losses, unsuitable soils, etc.

The Preliminary Development Potential information submitted by LACO (see attached) on December 15, 2017, calculated the same approximate maximum development potential (55 lots) at 1 dwelling unit/3 acres of developable land. LACO also calculated the potential for 33 lots at 1 dwelling unit/5 acres of developable land. The potential area available for development (167 acres) was based on the assumption that riparian buffers of 150 feet would be used on the currently identified Class I and II streams and that no development would occur within 251 feet of the centerline of Highway 101. This range of values can assist with ensuring that the different parts of review of this project are

representative of the approximate maximum future development potential. The level of specific information required for this application and the review process need to be directly related with the maximum density proposed.

Natural Resources: The County as lead agency is obligated to ensure any land use and zoning amendment proposal accounts for and adequately protects sensitive natural resources. The proposed project creates the potential for future environmental impacts which need to be analyzed in this application though a full biological assessment and wetland delineation. On the field visit, Class I and II streams and associated riparian areas were identified in the southwest and north areas of the property. Future development setbacks adjacent to these riparian areas will be established with bank stability, flooding, biological habitat considerations, and the recommendations of responsible and trustee agencies taken into account. The rezone and General Plan Amendment application would require a full biological assessment of the entire project area which serves to map out the extent of other wetland areas, riparian boundaries, environmentally sensitive habitat, etc. These features may require additional development setback buffers. The level of biological analysis and recommendations for mitigating potentially significant impacts should reflect the residential density proposed. A higher density designation would reasonably contribute more specific and cumulative environmental impacts when development occurs. Mitigation measures for the initial environmental concerns below should be provided. The full biological assessment and wetland delineation necessary must be completed by qualified professional biologists and/or environmental scientists for use in the CEQA review.

CEQA: The project will be subject to an environmental review under the California Environmental Quality Act (CEQA). The CEQA process will involve an initial study which will result in either a Negative Declaration/Mitigated Negative Declaration (ND/MND) or the requirement that a Draft Environmental Impact Report (EIR) be prepared. A ND/MND will be appropriate if it is found that the proposed project would not have a significant effect on the environment or that mitigation applied to environmental impacts resulting from the project would make them less than significant. If a ND/MND is determined to be the appropriate level of environmental review for the project, the County will prepare the document and circulate it for comment via the State Clearinghouse with direct transmittal to select agencies. If certain impacts associated with the project are deemed unavoidable (or not able to be mitigated to a less than significant level) an EIR may be required. In the case of an EIR, the applicant is obligated to pay for the preparation of the document which will then be reviewed by the County Planning Division and circulated.

The CEQA initial study process involves determining whether the project may have a significant effect on the environment which requires a very high level of detail. Per CCR §15063, "*All phases of project planning, implementation, and operation must be considered in the initial study of the project*". The CEQA process requires the County to review individual and cumulative impacts of the project. Because a large scale land use designation change and rezone have environmental implications which depend on development potential, the level of CEQA review must specifically look at the effects of the highest likely amount of development at either a 3-acre density or a 5-acre density. In order for the County as lead agency to adequately complete the initial study, the following items would need to be addressed in detail as part of the project proposal and in separate studies as necessary. The application would require that clear detail is provided about all possible environmental effects to the extent that adequate mitigation measures will also be submitted. The application needs also to contain enough information, at the County's discretion, to determine whether or not a foreseeable environmental impact is unavoidable though mitigation measures. The below items are not all inclusive but are issues that the Planning Division has identified as especially important based on the project understanding at this point:

Aesthetics: The conversion of timberland to a rural residential use on a large scale would potentially have an adverse effect on scenic resources, vistas, visual character, public viewsheds, and the amount of light pollution in the area. Information and potential mitigation measures need to be provided and proposed, respectively, as to how to alleviate the impacts on aesthetics in the area.

Conversion of Forest Resources: The conversion of forestland to residential development would result in the loss of available forest resources in Del Norte County and California for timber resources. An analysis needs to be provided which details the extent of this resource loss and how this potential impact may be mitigated.

Air Quality: The conversion of timberland to residential development would likely have effects on air quality and create an increase in emissions. An analysis supported by data on air quality and emissions increases associated with potential future development needs to be provided as part of this application.

Cultural Resources: The conversion of timberland to residential development could have adverse effects on potential historical, archaeological, or paleontological resources should they exist on site. A preliminary cultural resources report which provides adequate data to address these potential impacts needs to be included in the application.

Geological Resources: A site developed residentially with soils not capable of supporting on-site waste water disposal systems could result in significant impacts. A soils analysis which is representative of the proposed maximum development potential of the property would be necessary to demonstrate that the capability exists to support the sewage disposal systems. The Environmental Health Division has stipulated that a minimum of six (6) soils test pits are necessary for purposes of creating preliminary sewage disposal evaluations . These test pits and associated analyses are to be distributed evenly over the likely developable areas of the parcel (the 167 acres identified by LACO) and subject to the review of the Environmental Health Division.

Greenhouse Gas (GHG) Emissions: Estimated calculations of GHG emissions resulting from the conversion of timberland to residential use at the maximum density would be important to demonstrate that no significant impacts would occur as a result of their increase. This analysis of emissions and any mitigation proposed must be backed up with ample data for the application.

Hazards and Hazardous Materials: The conversion of timberland to residential development would expose more people and property in way of natural hazards. It would also place additional demands on the local fire protection district (see attached comment letter from Fort Dick FPD). Information should be submitted which addresses these potential impacts.

Water Quality, Hydrology: The conversion of timberland to residential development would likely change local drainage patterns, utilize high amounts of ground water, create and contribute additional runoff, and potentially degrade water quality. An initial analysis should be submitted with the application that addresses these concerns and provides mitigation if applicable.

Public Services: The conversion of timberland to residential development would likely contribute to increased demands on public services such as fire and law enforcement protection (see attached comment letter from Fort Dick FPD), schools, parks, etc. An analysis which quantifies the additional demand on public services needs to be submitted with the application. Appropriate mitigation measures for any impacts need to be included.

Transportation/Traffic: The conversion of timberland to residential development would create additional demands on both the state highway system and county roads. A Traffic Impact Study based on the residential density proposed with appropriate mitigation measures would be necessary to assess the impacts of the project on these transportation systems (see attached comment letter from Caltrans).

Application Fees: The following is a breakdown of the estimated fees associated with the anticipated processing of the project. The fees are based on the fee schedule adopted by the Board of Supervisors in 2015 and may be subject to change at the Board's discretion. The Pre-Application Consultation fee ($600) will be credited towards the processing of any application submitted within 90 days of the date of this letter:

1a. Negative Declaration.	$500
or	
1b. Draft EIR Review*	$1,120 + $70/hr > 16 hours
2. General Plan Amendment	$1,900
3. Major Rezone	$1,900

*Preparation of an EIR is at the cost of the applicant and the County will review the EIR.

This letter concludes the pre-application consultation process. I trust that these comments are helpful in the planning process moving forward. If you choose to proceed with the project please contact this office to obtain appropriate application materials. If an application is filed within 90 days of the date of this letter, the Consultation fee will be credited towards the application. If you have any additional questions, please do not hesitate to contact me directly.

Best regards,

Taylor Carsley
Planner

CC: Heidi Kunstal, Del Norte County
Randy Hooper, Del Norte County
Houawa Moua, Del Norte County
Steve Hart, Del Norte County
Jennifer Olson, CDFW
Ray Wedel, CAL FIRE
Kevin Tucker, Caltrans
Randy Crawford, Fort Dick FPD

Enclosures and Attachments (5):

LACO Development Potential Analysis
California Department of Fish and Wildlife Comment Response
CAL FIRE Comment Response
Caltrans Comment Response
Fort Dick Fire Protection District Comment Letter

LACO

RECEIVED
DEC 18 2017
PLANNING
COUNTY OF DEL NORTE

December 15, 2017

County of Del Norte Community Development Department
981 H Street, Suite 110
Crescent City, California 95531

Attention: Taylor Carsley, Planner

Subject: Development Potential of Green Diamond Resource Company's Fort Dick Flats Property
Portion of Assessor's Parcel Number (APN) 106-021-10A
Fort Dick, Del Norte County, California

Dear Mr. Carsley:

Per your request and on behalf of our client, Green Diamond Resource Company (GDRCo), LACO Associates (LACO) is submitting this letter to provide the results of our analysis and memorialize the development potential of GDRCo's property known as the Fort Dick Flats property and identified as Assessor's Parcel Number (APN) 106-021-10A. The entire property is approximately 320 acres in size and straddles Highway 101 between Lake Earl Drive and Kings Valley Road, in the community of Fort Dick in Del Norte County, California. Wonder Stump Road bisects the parcel and provides site access.

The project area (site) under review includes a 200-acre portion of the property located west of Highway 101, in addition to the triangle-shaped area east of Highway 101 and west of Wonder Stump Road. The site is currently designated as "Timberland" (TBR) under the Del Norte County General Plan (General Plan) and is currently zoned as "Timberland Preserve Zone" (TPZ) under the Del Norte County Zoning Code. On August 24, 2017, LACO, on behalf of GDRCo, submitted a Preliminary Project Review request to the County regarding GDRCo's intent to amend the existing land use and zoning designations of the 200-acre portion of the property to Rural Residential with one unit per three acres (RR3A) (land use) and Rural Residential with three to five acre minimum lot sizes (RR-3) (zone), respectively. Since then, two site visits with LACO, GDRCo, the County Planning Department, and several additional agencies were conducted on September 21 and October 13, 2017.

At this time, only a change in land use and zoning designations, including a ten-year TPZ rollout, is being proposed for the site. A subdivision or any associated development is not currently proposed. However, if and when future development is proposed at the site, this letter provides a preliminary assessment of the development potential for the site. Several caveats and assumptions are also assumed in our analysis, including that adequate water and wastewater capacity is available to serve future development and that a sensitive plant survey would be necessary prior to any future development. Additionally, it is our assumption that future development of the site would include any identified wetland resource(s) on a few new lots as possible per California Department of Fish and Wildlife (CDFW) general guidelines to protect the resource and minimize multiple owners and managers.

The property contains several constraint areas, including Class I and II watercourses in the northern and southwestern portions of the site, which require a minimum building setback of at least 100 feet from the top of bank or outer edge of riparian vegetation, whichever is greater, as provided in e-mail correspondence with Jennifer Olson, Environmental Scientist, of the CDFW on December 5, 2017.

21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
311 S. Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 525-1222

Toll Free 800 515 5054 www.lacoassociates.com

Based on site characteristics and review of the characteristics of the surrounding Fort Dick area, our analysis assumes a conservative 150 foot setback from the centerline of all on-site Class I and II watercourses, to account for a potential riparian area of approximately 50 feet from the identified watercourses. This is an estimate and an official botanical survey or wetland delineation of the site has not yet occurred. Additionally, as required per Table 2-1 (Future Traffic Noise Levels Along Del Norte County Roadways) from Section 2 (Safety and Noise) of the General Plan, a required 251-foot noise buffer on either side of Highway 101, as measured from the centerline of Highway 101, is also required.

A figure depicting the identified resources and required buffer zones (Fort Dick Flats Preliminary Development Potential) dated December 6, 2017 and produced by GDRCo, is enclosed for your reference. As provided in the enclosed figure, after consideration of the identified resources and required buffer zones from each resource, the site has a development potential of 167 acres. In the future, if a residential subdivision of the site is proposed, the site would allow for up to a maximum of 55 residential lots, assuming the requested land use and zoning designations of RR3 and RR-3, respectively, are approved for the site, as shown in Table 1 below. A density of one lot per five acres is also calculated in Table 1 to depict the minimum density of the proposed land use density range, which would allow for 33 residential lots on the site.

Table 1: Development Potential of Site

Developable Acres*	**Min. Density (1 du/5 acres)****	**Max. Density (1 du/3 acres)****
167	33	55

** Developable area accounts for a 150 foot setback from the centerline of all identified Class I and II watercourses on-site, in addition to the 251 foot required setback from the centerline of Highway 101.*

*** Minimum and maximum densities calculated assuming the approval of GDRCo's requested modifications to the site's current land use and zoning designations are approved.*

Thank you for your time and consideration. Please feel free to contact me with any questions. I can be reached at (707) 443-5054 or clemd@lacoassociates.com.

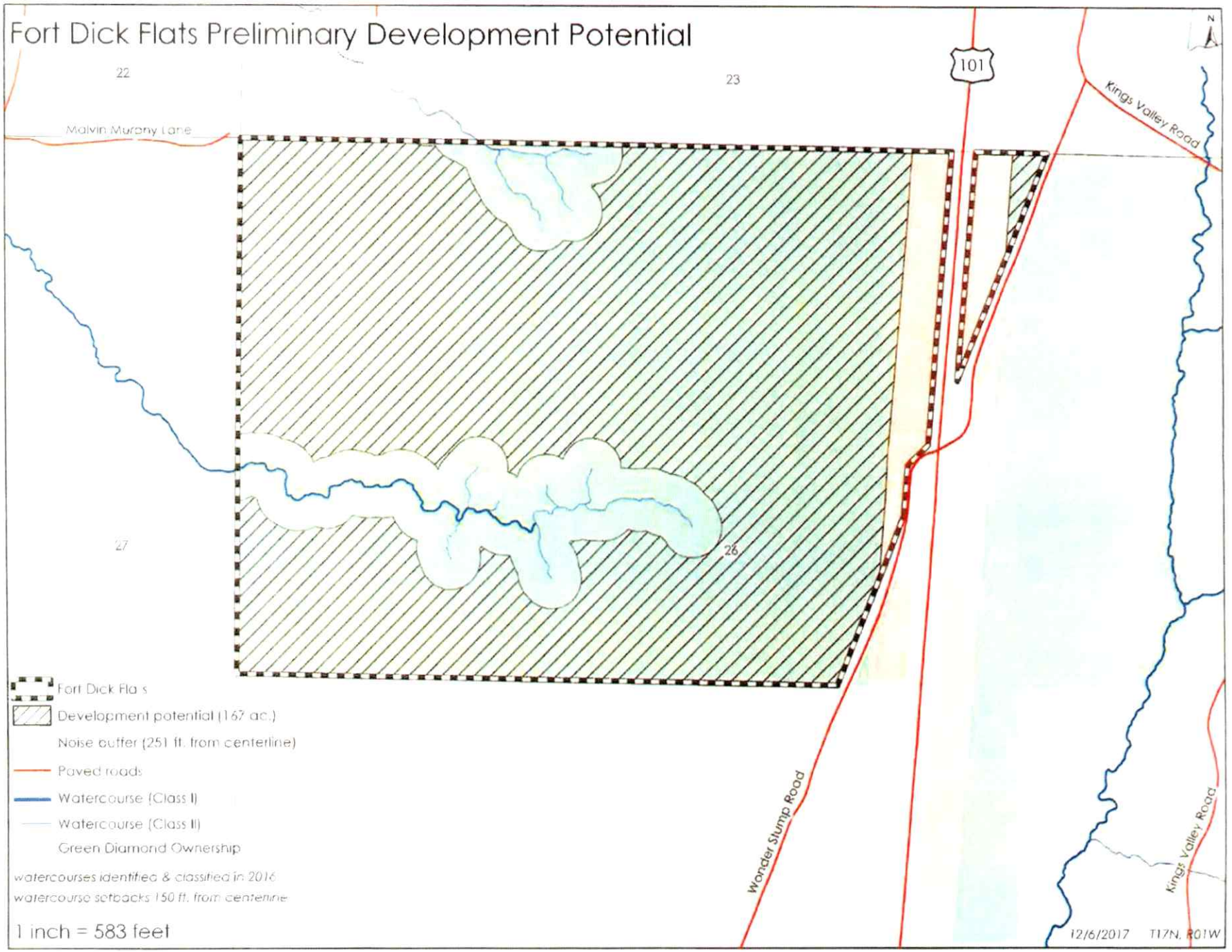
Sincerely,
LACO Associates

Deirdre Clem
Senior Planner

MMM

Enclosure (1)

P:\6800\6872 Green Diamond Del Norte County\6872.19 Fort Dick Flats Entitlements\06 Planning\Permitting\Development Potential Letter to Co\6872.19 Development Potential Letter.docx


Fort Dick Flats Preliminary Development Potential
22
23
27
26
Malvin Murphy Lane
101
Kings Valley Road
Wonder Stump Road
Kings Valley Road
N
Fort Dick Flats
Development potential (167 ac.)
Noise buffer (251 ft. from centerline)
Paved roads
Watercourse (Class I)
Watercourse (Class II)
Green Diamond Ownership
watercourses identified & classified in 2016
watercourse setbacks 150 ft. from centerline
1 inch = 583 feet
12/6/2017
T17N, R01W

COUNTY OF DEL NORTE

Taylor Carsley <tcarsley@co.del-norte.ca.us>

Green Diamond

Olson, Jennifer@Wildlife <Jennifer.Olson@wildlife.ca.gov> Mon, Oct 23, 2017 at 3:43 PM
To: Taylor Carsley <tcarsley@co.del-norte.ca.us>
Cc: "Simpson, Nicholas@wildlife" <Nicholas.Simpson@wildlife.ca.gov>

Hi Taylor,

I don't have much in terms of comments other than the County should ensure that streams and wetlands receive adequate buffers (CDFW recommends a minimum 100 foot buffer from the top of bank or outer edge of riparian vegetation, whichever results in a greater buffer). The environmental document should consider impacts on rare plants and special-status plants, fish, wildlife, and natural communities. Nick, if you haven't already, let Taylor know if you have anything to add to this.

Thank you,
Jen

Jennifer Olson

Environmental Scientist – Coastal Conservation Planning

California Department of Fish and Wildlife

619 2nd Street

Eureka, CA 95501

(707) 445-5387

jennifer.olson@wildlife.ca.gov

From: Taylor Carsley [mailto:tcarsley@co.del-norte.ca.us]
Sent: Monday, October 23, 2017 2:39 PM
To: Olson, Jennifer@Wildlife <Jennifer.Olson@wildlife.ca.gov>
Subject: Green Diamond

[Quoted text hidden]

COUNTY OF DEL NORTE

Taylor Carsley <tcarsley@co.del-norte.ca.us>

Green Diamond Pre-App Comments

Wedel, Ray@CALFIRE <Ray.Wedel@fire.ca.gov> Fri, Oct 20, 2017 at 5:01 PM
To: Taylor Carsley <tcarsley@co.del-norte.ca.us>
Cc: "McCray, Kurt@CALFIRE" <Kurt.McCray@fire.ca.gov>

Taylor,

My apologies for not having the time to research and properly respond to your request.

It is the position of the department to maintain and enhance timberland as per:

PRC 4513. (a) Where feasible, the productivity of timberlands is restored, enhanced, and maintained.

(b) The goal of maximum sustained production of high-quality timber products is achieved while giving consideration to values relating to sequestration of carbon dioxide, recreation, watershed, wildlife, range and forage, fisheries, regional economic vitality, employment, and aesthetic enjoyment.

Following the above guidelines it is CALFIRE Resource Management Humboldt Del Norte Unit to not encourage the removal of this timberland from Timber Preserve Zone (TPZ) designation.

Ultimately it is Del Norte County's decision whether or not to accept GDRCo's request to remove this parcels from TPZ.

Thank-you for the opportunity to respond.

Ray Wedel *RPF #3004*
Forester II Crescent City
CALFIRE Humboldt/Del Norte Unit
Office: (707) 464-4969
Cell: (707) 599-6554

Every Californian should conserve water. Find out how at:
SaveOurWater.com · Drought.CA.gov

From: Taylor Carsley <tcarsley@co.del-norte.ca.us>
Sent: Tuesday, October 17, 2017 2:43:56 PM
To: Deirdre Clem; ccompton@greendiamond.com
Subject: Green Diamond Pre-App Comments

[Quoted text hidden]

COUNTY OF DEL NORTE

Taylor Carsley <tcarsley@co.del-norte.ca.us>

Green Diamond Field Consultation

Tucker, Kevin A@DOT <kevin.tucker@dot.ca.gov>
To: Taylor Carsley <tcarsley@co.del-norte.ca.us>
Cc: "Price, Jason@DOT" <Jason.Price@dot.ca.gov>

Fri, Oct 13, 2017 at 11:38 AM

Hi Taylor,

Unfortunately we will not be able to make it to the pre-application field review. As I mentioned on the phone the main issue for Caltrans is a Traffic Impact Study and appropriate mitigation on the State Highway System. We also suggest that the County look at requesting a vehicle miles traveled analysis. This will be required of projects in the near future and helps to evaluate the impacts of the project. The development should provide a connection to Lake Earl Drive to provide local circulation off of the State Highway System. The project should also consider how transit, bicycles, and pedestrians will access the property. Let me know if you have any questions.

Regards,

Kevin Tucker

Planning North Branch Chief

District 1- Planning and Local Assistance

California Department of Transportation (Caltrans)

Office – 707-441-5770

From: Taylor Carsley [mailto:tcarsley@co.del-norte.ca.us]
Sent: Thursday, October 5, 2017 4:06 PM
To: Deirdre Clem <clemd@lacoassociates.com>; ccompton@greendiamond.com
Subject: Green Diamond Field Consultation

Hi all,

[Quoted text hidden]

Fort Dick Fire Protection District
P.O. Box 369
Fort Dick, California 95538

Email: fdfd81@aol.com
707-487-8185

October 26, 2017

Taylor Carsley
Planner, Del Norte County
Community Development Dept.
981 H St. Suite 110
Crescent City, CA 95531

SUBJECT: Green Diamond Rezoning Project

The Fort Dick Fire Protection District has a few concerns with this proposed project of rezoning from a TPZ to a residential zoning.

The main concern that we have with this proposed rezone is what kind of effect it will have on our Fire District for an increase in fire services. We understand that with this project, it could increase the amount of residences within our district to approximately 100, which would be an approximate 10 percent increase of what we have now. The fire district understands that with a project of this size, we have to look at the future costs of providing an increase for services that would affect our district.

The other concern the Fire District has is that there will be a need to provide water to meet the Fire Flow requirements for the increase of residences, and how this will be provided for.

At this time, these are the main concerns that have been discussed by the District. If you have any other questions, please feel free to contact our office at the above phone number or by email at fdfd81@aol.com.

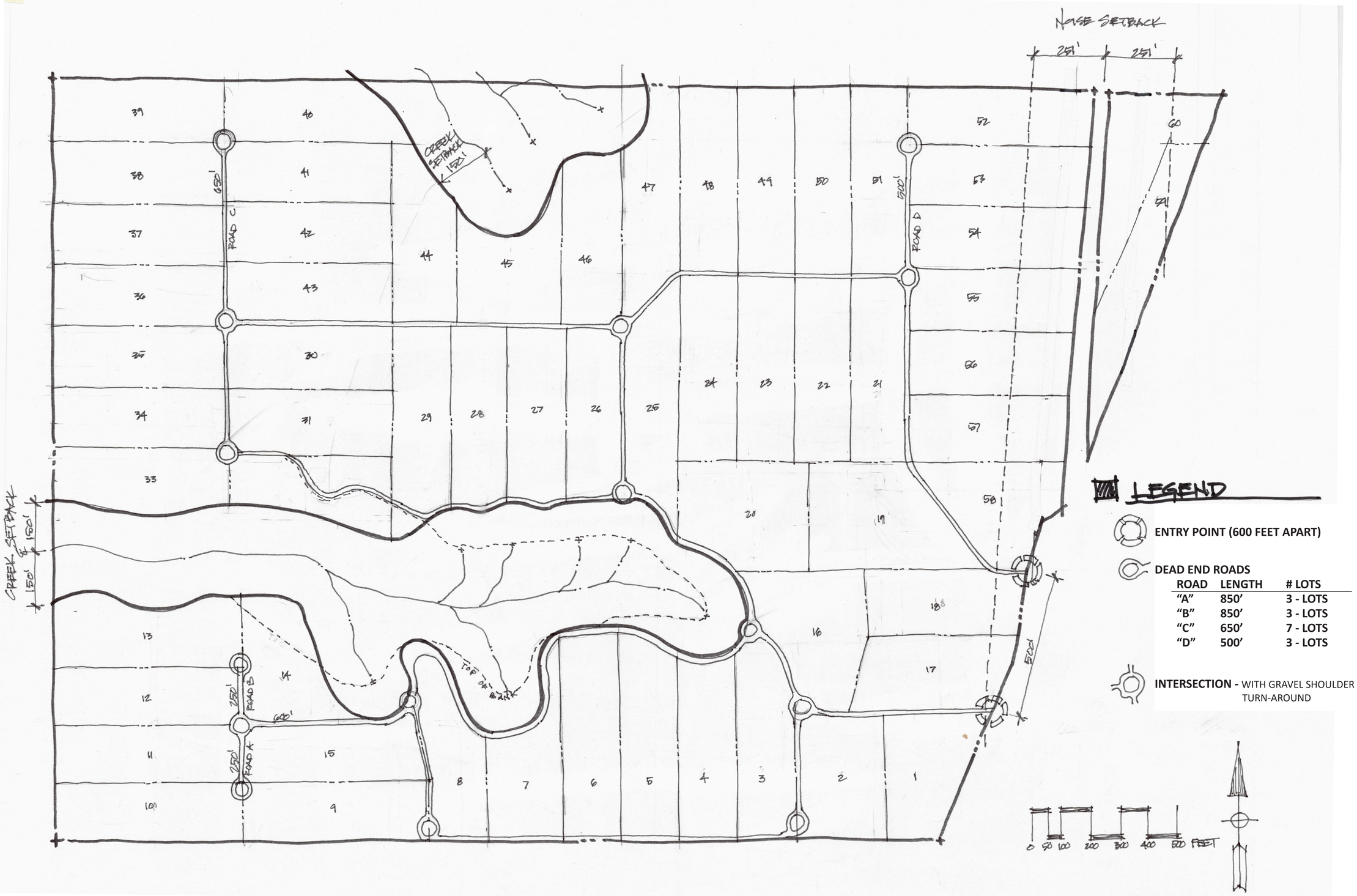
Sincerely,

Randy L. Crawford
Fire Chief

APPENDIX J

Demonstration of Future Ability to Comply with Fire Safe Regulations

60 - 3 Acre Lots



LACO
EUREKA • UKIAH • SANTA ROSA • CHICO
1-800-515-5054 www.lacoassociates.com

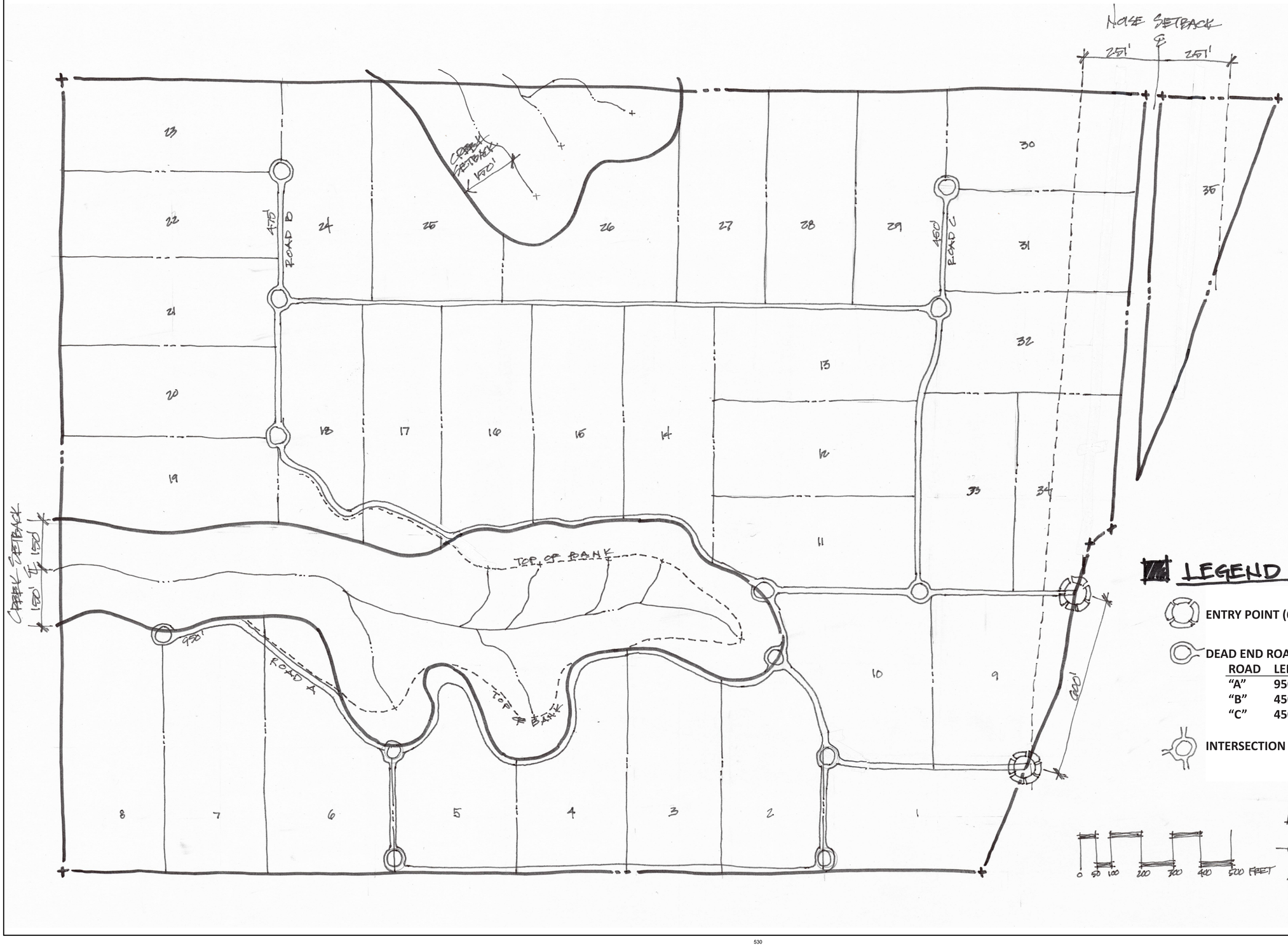
NO.	HISTORY / REVISION	BY	CHK.	DATE

FORT DICKS FLATS - LOT ANALYSIS
60 - 3 ACRE PARCELS

GREEN DIAMOND RESOURCE CO.
HWY 101 / WONDER STUMP RD. FORT DICK

DRAWN	BKS
CHECK	
APPROVED	
DATE	6/16/2020
JOB NUMBER	6872.19
DRAWING	1

35 - 5 Acre Lots



LEGEND

ENTRY POINT (600 FEET APART)

DEAD END ROADS

ROAD	LENGTH	# LOTS
"A"	950'	1 - LOT
"B"	450'	2 - LOTS
"C"	450'	2 - LOTS

INTERSECTION - WITH GRAVEL SHOULDER TURN-AROUND

LACO

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1-800-515-5054 www.lacoassociates.com

NO.	HISTORY / REVISION	BY	CHK.	DATE

FORT DICKS FLATS - LOT ANALYSIS

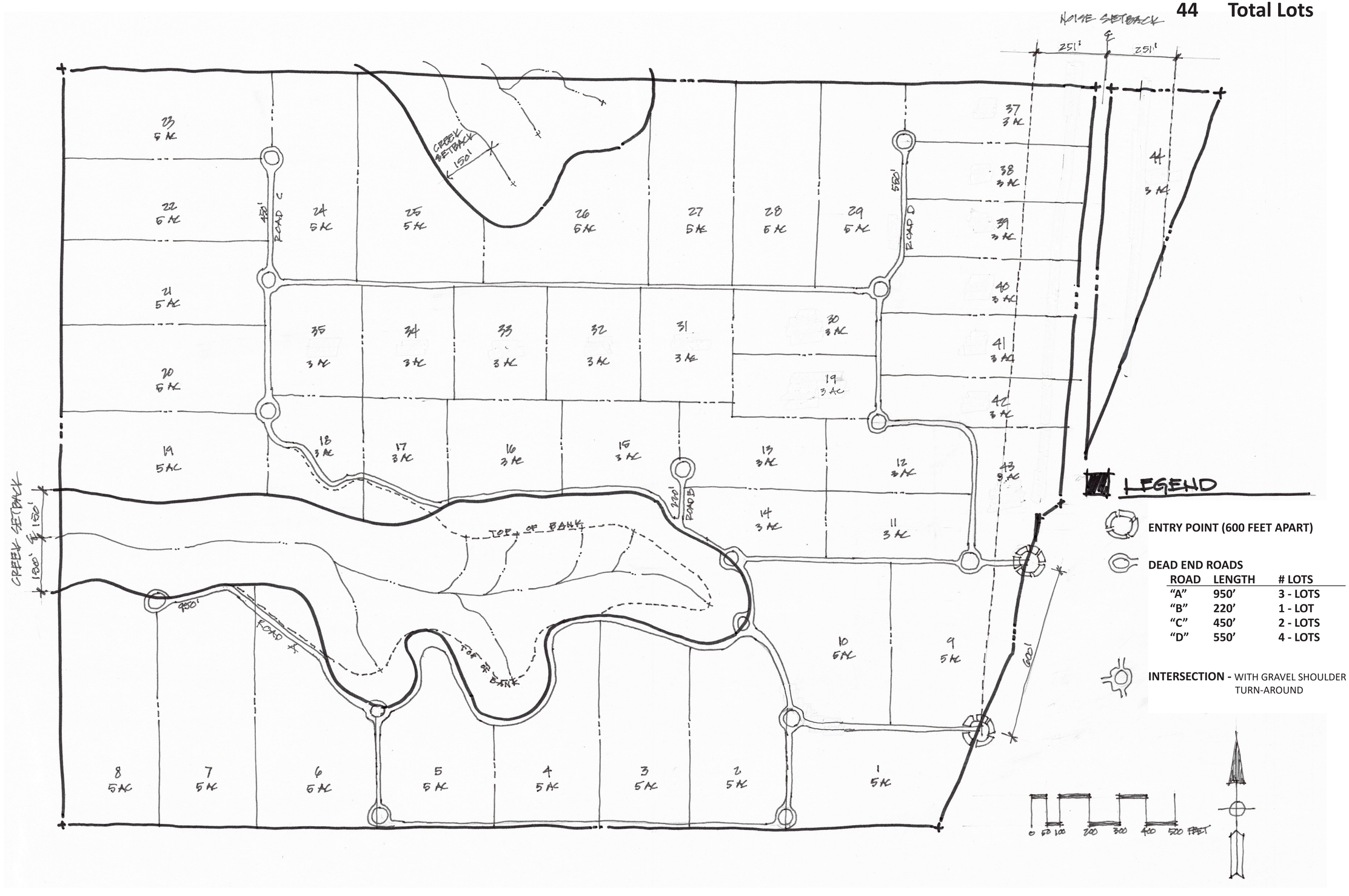
35 - 5 ACRE PARCELS

GREEN DIAMOND RESOURCE CO.

HWY 101 / WONDER STUMP RD. FORT DICK

DRAWN	BKS
CHECK	
APPROVED	
DATE	6/16/2020
JOB NUMBER	6872.19
DRAWING	2

22 - 3 Acre Lots
22 - 5 Acre Lots
44 Total Lots



LEGEND

ENTRY POINT (600 FEET APART)

DEAD END ROADS

ROAD	LENGTH	# LOTS
"A"	950'	3 - LOTS
"B"	220'	1 - LOT
"C"	450'	2 - LOTS
"D"	550'	4 - LOTS

INTERSECTION - WITH GRAVEL SHOULDER TURN-AROUND

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1-800-515-5054 www.lacoassociates.com

NO.	HISTORY / REVISION	BY	CHK.	DATE

FORT DICKS FLATS - LOT ANALYSIS
44 3 & 5 ACRE PARCELS

GREEN DIAMOND RESOURCE CO.
HWY 101 / WONDER STUMP RD. FORT DICK

DRAWN	BKS
CHECK	
APPROVED	
DATE	6/16/2020
JOB NUMBER	6872.19
DRAWING	3

CALIFORNIA HISTORICAL RESOURCES INFORMATION SYSTEM

ALAMEDA, COLUSA, CONTRA COSTA, DEL NORTE, HUMBOLDT, LAKE, MARIN, MENDOCINO, MONTEREY, NAPA, SAN BENITO, SAN FRANCISCO, SAN MATEO, SANTA CLATA, SANTA CRUZ, SOLANO, SONOMA, YOLO

Northwest Information Center
Sonoma State University
150 Professional Center Drive, Suite E
Rohnert Park, California 94928-3609
Tel: 707.588.8455
nwic@sonoma.edu
http://www.sonoma.edu/nwic

October 17, 2018 NWIC File No.: 18-0652

Megan Marruffo
LACO Associates
21 W Fourth St.
Eureka, CA 95501

Re: Record search results for the proposed Wonder Stump Road Project.

Dear Megan Marruffo:

Per your request received by our office on 10/1/18, a records search was conducted for the above referenced project by reviewing pertinent Northwest Information Center (NWIC) base maps that reference cultural resources records and reports, historic-period maps, and literature for Del Norte County. Please note that use of the term cultural resources includes both archaeological resources and historical buildings and/or structures.

Review of this information indicates that there have been two archaeological/cultural resource studies that cover approximately 90% of the Wonder Stump Road project area: S-015153 (Peak & Associates, Inc. 1993) and S-011902 (Roscoe 1989). This project area contains two recorded Native American archaeological resources (P-08-000364, Projectile Point #1; and P-08-000365, Projectile Point #2) and one recorded historic-period cultural resource (P-08-000363, 467 Plank Road). The State Office of Historic Preservation Historic Property Directory (OHP HPD) (which includes listings of the California Register of Historical Resources, California State Historical Landmarks, California State Points of Historical Interest, and the National Register of Historic Places) lists no recorded buildings or structures within or adjacent to the proposed project area. In addition to these inventories, the NWIC base maps show no recorded buildings or structures within the proposed project area.

At the time of Euroamerican contact the Native Americans that lived in the area were speakers of the Tolowa language, part of the Athapaskan language family (Gould 1978: 128). There are no Native American resources in or adjacent to the proposed project area referenced in the ethnographic literature [Drucker 1937; Kroeber 1925; Gould 1978].

Based on an evaluation of the environmental setting and features associated with known sites, Native American resources in this part of Del Norte County have been found in terraces near ridgelines, near intermittent or perennial watercourses, and in particular concentration near lake or coastal shorelines. The Wonder Stump Road project area contains a gently sloped wooded area approximately one mile east of Lake Earl, with at least one watercourse within the project area. Given these environmental factors, there is a moderate potential for further unrecorded Native American resources in the proposed Wonder Stump Road project area.

Review of historical literature and maps indicated mid-19th century historic-period activity within the proposed Wonder Stump Road project area. The General Land Office Survey Plat for Township 17 North/Range 1 West (1856) depicts a "wagon road" within the proposed project area; this road may be associated with P-08-000363 (467 Plank Road). Although the presence of a historic-period road does not necessarily indicate additional historic-period activity, the accessibility of the proposed project area does contribute to its potential archaeological sensitivity. With this in mind, there is a moderate potential for unrecorded historic-period archaeological resources in the proposed Wonder Stump Road project area.

The 1952 USGS Crescent City 15-minute topographic quadrangle fails to depict any buildings or structures within the Wonder Stump Road project area. Therefore, there is a low possibility of identifying any buildings or structures 45 years or older within the project area.

RECOMMENDATIONS:

1) There are two recorded archaeological resources (P-08-000364; P-08-000365) in the proposed project area and one recorded historic-period cultural resource (P-08-000363) within the proposed project area. It is recommended that a professional archaeologist assess the resource(s) and provide project-specific recommendations. Please refer to the list of consultants who meet the Secretary of Interior's Standards at http://www.chrisinfo.org.

2) There is a moderate potential of identifying Native American archaeological resources and a moderate potential of identifying historic-period archaeological resources

in the project area. Due to the passage of time since the previous survey (S-015153, Peak & Associates, Inc. 1993) and the changes in archaeological theory and method since that time, we recommend a qualified archaeologist conduct further archival and field study for the entire project area to identify archaeological resources. Field study may include, but is not limited to, pedestrian survey, hand auger sampling, shovel test units, or geoarchaeological analyses as well as other common methods used to identify the presence of archaeological resources. Please refer to the list of consultants who meet the Secretary of Interior's Standards at http://www.chrisinfo.org.

3) We recommend the lead agency contact the local Native American tribe(s) regarding traditional, cultural, and religious heritage values. For a complete listing of tribes in the vicinity of the project, please contact the Native American Heritage Commission at 916/373-3710.

4) If the proposed project area contains buildings or structures that meet the minimum age requirement, prior to commencement of project activities, it is recommended that this resource be assessed by a professional familiar with the architecture and history of Del Norte County. Please refer to the list of consultants who meet the Secretary of Interior's Standards at http://www.chrisinfo.org.

5) Review for possible historic-period buildings or structures has included only those sources listed in the attached bibliography and should not be considered comprehensive.

6) If archaeological resources are encountered **during construction,** work should be temporarily halted in the vicinity of the discovered materials and workers should avoid altering the materials and their context until a qualified professional archaeologist has evaluated the situation and provided appropriate recommendations. Project personnel should not collect cultural resources. Native American resources include chert or obsidian flakes, projectile points, mortars, and pestles; and dark friable soil containing shell and bone dietary debris, heat-affected rock, or human burials. Historic-period resources include stone or adobe foundations or walls; structures and remains with square nails; and refuse deposits or bottle dumps, often located in old wells or privies.

7) It is recommended that any identified cultural resources be recorded on DPR 523 historic resource recordation forms, available online from the Office of Historic Preservation's website: http://ohp.parks.ca.gov/default.asp?page_id=1069

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the California Historical Resources Information System (CHRIS) Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

The California Office of Historic Preservation (OHP) contracts with the California Historical Resources Information System's (CHRIS) regional Information Centers (ICs) to maintain information in the CHRIS inventory and make it available to local, state, and federal agencies, cultural resource professionals, Native American tribes, researchers, and the public. Recommendations made by IC coordinators or their staff regarding the interpretation and application of this information are advisory only. Such recommendations do not necessarily represent the evaluation or opinion of the State Historic Preservation Officer in carrying out the OHP's regulatory authority under federal and state law.

Thank you for using our services. Please contact this office if you have any questions, (707) 588-8455.

Sincerely,

Cameron Felt
Researcher

LITERATURE REVIEWED

In addition to archaeological maps and site records on file at the Northwest Information Center of the Historical Resources Information System, the following literature was reviewed:

Baumhoff, Martin A.

1958 *California Athabascan Groups*. University of California Publications, Anthropological Records 16(5):157-237. Berkeley and Los Angeles. (Reprint by Kraus Reprint Corporation, New York, 1976).

Conners, Pamela A.

1998 *A History of the Six Rivers National Forest...Commemorating the First 50 Years.* USDA Forest Service, Pacific Southwest Region, Six Rivers National Forest, Eureka, CA.

Cook, S.F.

1956 *The Aboriginal Population of the North Coast of California*. University of California Anthropological Records 16(3):81-130. Berkeley and Los Angeles.

Drucker, Philip

1937 *The Tolowa and their Southerwest Oregon Kin*. University of California Publications in American Archaeology and Ethnology 36(4):221-300. Berkeley.

Fickewirth, Alvin A.

1992 *California Railroads*. Golden West Books, San Marino, CA.

General Land Office

1856 Survey Plat for Township 17 North/Range 1 West.

Gould, Richard A.

1978 Tolowa. In *California*, edited by Robert F. Heizer, pp. 128-136. Handbook of North American Indians, vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Gudde, Erwin G.

1969 *California Place Names: The Origin and Etymology of Current Geographical Names*. Third Edition. University of California Press, Berkeley and Los Angeles.

Hart, James D.

1987 *A Companion to California*. University of California Press, Berkeley and Los Angeles.

Hoover, Mildred Brooke, Hero Eugene Rensch, and Ethel Rensch, revised by William N. Abeloe

1966 *Historic Spots in California*. Third Edition. Stanford University Press, Stanford, CA.

Hoover, Mildred Brooke, Hero Eugene Rensch, and Ethel Rensch, William N. Abeloe, revised by Douglas E. Kyle

1990 *Historic Spots in California*. Fourth Edition. Stanford University Press, Stanford, CA.

Hope, Andrew

2005 *Caltrans Statewide Historic Bridge Inventory Update*. Caltrans, Division of Environmental Analysis, Sacramento, CA.

Kroeber, A.L.

1925 *Handbook of the Indians of California*. Bureau of American Ethnology, Bulletin 78, Smithsonian Institution, Washington, D.C. (Reprint by Dover Publications, Inc., New York, 1976)

Moratto, Michael J.

1973 *An Archaelogical Overview of Redwood National Park.* Publications in Anthropology, Number 8. Cultural Resources Management Division, Western Archaeological Center, National Park Sevice, Tucson, AZ.

Roberts, George, and Jan Roberts

1988 *Discover Historic California*. Gem Guides Book Co., Pico Rivera, CA.

State of California Department of Parks and Recreation

1976 *California Inventory of Historic Resources*. State of California Department of Parks and Recreation, Sacramento.

State of California Department of Parks and Recreation and Office of Historic Preservation

1988 *Five Views: An Ethnic Sites Survey for California*. State of California Department of Parks and Recreation and Office of Historic Preservation, Sacramento.

State of California Office of Historic Preservation **

2012 *Historic Properties Directory*. Listing by City (through April 2012). State of California Office of Historic Preservation, Sacramento.

Thornton, Mark V.

1993 An Inventory and Historical Significance Evaluation of CDF Fire Lookout Stations. CDF Archaeological Reports No. 12.

Williams, James C.

1997 *Energy and the Making of Modern California*. The University of Akron Press, Akron, OH.

Woodbridge, Sally B.

1988 *California Architecture: Historic American Buildings Survey*. Chronicle Books, San Francisco.

Works Progress Administration

1984 *The WPA Guide to California*. Reprint by Pantheon Books, New York. (Originally published as California: A Guide to the Golden State in 1939 by Books, Inc., distributed by Hastings House Publishers, New York.)

**Note that the Office of Historic Preservation's *Historic Properties Directory* includes National Register, State Registered Landmarks, California Points of Historical Interest, and the California Register of Historical Resources as well as Certified Local Government surveys that have undergone Section 106 review.

Megan Marruffo

From: Crista Stewart <cstewart@elk-valley.com>
Sent: Monday, October 22, 2018 2:57 PM
To: Megan Marruffo
Subject: RE: GDRCo's Fort Dick Flats Project - Highway 101/Wonder Stump Road, Fort Dick

Hi Megan:

We have reviewed the information regarding the Fort Dick Flats Project. The Tribe understands that this area may contain additional archaeological materials related to the isolates found but are not aware of specific sites that are of concern. If you locate archaeological materials during the course of work, the Tribe would like to be immediately notified.

We greatly appreciate your consultation efforts Megan.

Please feel free to contact me at 707-465-2620 or via email at cstewart@elk-valley.com.
Crista

Crista D. Stewart
Director of Grants/Tribal Historic Preservation Officer
Elk Valley Rancheria, California
2332 Howland Hill Road
Crescent City, CA 95531
707-465-2620 Office
707-951-4836 Cell
Email: cstewart@elk-valley.com
Website: www.elk-valley.com

From: Megan Marruffo [mailto:marruffom@lacoassociates.com]
Sent: Friday, October 19, 2018 12:49 PM
To: Crista Stewart <cstewart@elk-valley.com>
Subject: GDRCo's Fort Dick Flats Project - Highway 101/Wonder Stump Road, Fort Dick

Good afternoon, Ms. Stewart

I am writing in regards to the Fort Dick Flats project, proposed by our client, Green Diamond Resource Company (GDRCo). GDRCo has retained LACO Associates to assist with permitting and entitlements, including an Initial Study as required under CEQA, for a general plan amendment and zone reclassification for a 211.7 acre site identified as Assessor's Parcel Numbers (APNs) 106-021-074 and -076 (formerly APN 106-021-010), generally located east of Lake Earl Drive and west of Wonder Stump Road and Highway 101 in the unincorporated community of Fort Dick, in Del Norte County, California. This project is currently in the preliminary planning stage and we are looking for early input. The County of Del Norte will be the Lead Agency under CEQA for the proposed project.

We sent you a letter on October 1st regarding the proposed project. Since the date of our original letter, we have been informed of new APNs for the Site and have received a letter from the Northwest Information Center, which includes the results of their record search conducted for the Site. A letter with project details, maps, and the NWIC letter is attached for your reference. A hard copy of the letter has also been mailed to you.

We are respectfully seeking your input regarding any specific areas within the Area of Potential Effect which may be likely to harbor culturally valuable resources and may therefore merit additional protection or require a cultural monitor to be on-site during anticipated future development. Any input you can provide would be most appreciated. Please let me know if you have any questions or require additional information. Thank you for your assistance.

Thank you,

Megan Marruffo
Associate Planner
LACO Associates
Eureka | Ukiah | Santa Rosa
Advancing the quality of life for generations to come
707 443 5054
http://www.lacoassociates.com

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Megan Marruffo

From: Amanda O'Connell <amanda.oconnell@tolowa.com>
Sent: Friday, October 26, 2018 4:45 PM
To: Megan Marruffo
Cc: Karin Levy; Briannon Fraley; Chairman Padgette
Subject: Initiation of CEQA Consultation
Attachments: Signed Response to Fort Dick Flats consultation request.pdf

Dv-laa-ha~ Megan,

Please find attached our response to your request to initiate CEQA consultation. We look forward to working with you.

Shu' shaa nin-la,

Amanda O'Connell
Tribal Historic Preservation Officer
Tolowa Dee-ni' Nation
140 Rowdy Creek Rd.
Smith River, CA 95567
(707) 487-9255 x1174

"Xwii-day shu' waa-sinlh-'a~'vt xwii-day shvm naa waa-tr'vslh-'aa~-le'"
(When you live correct everything shall be blessed)

*****Tolowa Dee-ni' Nation Confidentiality Notice***** This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed.

Tolowa Dee-ni' Nation

140 Rowdy Creek Rd, Smith River, CA 95567-9525
Ph: (707) 487-9255 Fax: (707) 487-0930

Denise Richards-Padgette
Chairperson

Jeri Lynn Thompson
Vice Chairperson

Leann McCallum
Council Secretary

Dr. Joseph Giovannetti
Treasurer

Marvin Richards Sr.
Council Member

Kara Brundin-Miller
Council Member

Cari Nelson
Council Member

October 26, 2018

LACO Associates
Megan Marruffo
21 W. Fourth Street
Eureka, CA 95501

RE: Initiation of CEQA consultation for Proposed General Plan Amendment and Zone Reclassification

Dv-laa-ha~ Ms. Marruffo,

Tolowa Dee-ni' Nation ("Nation") recently received a request from you to review your client's (Green Diamond Resource Company "GDRCo") Proposed General Plan Amendment and Zone Reclassification for potential impacts to significant cultural resources. The Nation understands that due to your requirements to comply with California law, LACO (in care of GDRCo) must initiate consultation through the California Environmental Quality Act ("CEQA").

As the Tribal Historic Preservation Officer, I will serve as the Nation's staff liaison to facilitate regular communications between LACO and the Tribal Council of the Nation. Any and all official consultation will be done with the Tribal Council directly or delegated upon their approval. With that said, the Nation does have concerns about cultural resources within the Area of Potential Effect (APE), and we would like to request a site visit to the project location.

The Nation is grateful for your compliance with California law and looks forward to working with you on the protection of cultural resources located within our aboriginal territory. To continue communications please contact me by phone at (707) 487-3237 or by email at amanda.oconnell@tolowa.com.

Shu' shaa nin-la,

Amanda O'Connell
Tribal Historic Preservation Officer

CC: Tribal Council of Tolowa Dee-ni' Nation

Waa-saa-ghitlh-'a~ Wee-ni Naa-ch'aa-ghitlh-ni
Our Heritage Is Why We Are Strong

PRESENT: Branden Hendrix, Environmental Health Division *, Brandon Rodgers, CAL FIRE, Craig Compton, Green Diamond Resource Company*, Chris Curtis, CAL FIRE, George Williamson, Planwest Partners*, Heidi Kunstal, Community Development, Houawa Moua, Environmental Health Division, Lizo Phillips, Green Diamond Resource Company*, Megan Marruffo, LACO Associates*, Rosanna Bower, Engineering and Surveying Division, Robin Hartwick, Association of Realtors, Scott Huffman, Building Inspection Division, Mitzi Travis, Public, Mike Nelson, LACO Associates*, Paula Thams, Planning Secretary*

ABSENT: Justin Riggs, Agriculture, Skylar Renwick, Assessors Office, Amanda O'Connell, Tolowa Dee-ni' Nation, Brantley Cobb, Assessors Office, Del Norte County Assessor's Office

*Denotes non-voting

Field Review of new projects conducted on: May 6, 2021

Field Review participants: Building, Planning, Engineering,

#Denotes projects included in this field review

APPLICANT: JONES, WILLIAM – Extension of Time | Minor Subdivision – MS1901– APN 126-180-041 located at Big Flat Road, Big Flat.

Agent: N/A

RECOMMENDATION: Approval twelve (12) month extension as allowed under Del Norte County Code §16.12.50.B.

June Planning Commission HK

APPLICANT: STATE OF CALIFORNIA – Grading Permit - GP2021-11C – APN State-Owned Property No APN located at Highway 101 at Post Mile 15.28.

Agent: Sherry Constancio, Caltrans

RECOMMENDATION: Application incomplete pending receipt of the following items:

1. Biological Assessment.

Incomplete HK

APPLICANT: GREEN DIAMOND RESOURCE COMPANY – General Plan Amendment from Timberland to Rural Residential – 1 dwelling unit per 3-acres and rezone from TPZ to RR3-MHF – GPA2001-R2001 – APN 106-021-074 and 076 located at the end of Wonder Stump Road, on the west side of Hwy 101, between Lake Earl Drive and Kings Valley Road, Crescent City.

Agent: LACO Associates c/o Megan Marruffo

RECOMMENDATION: Post Public Hearing Notice. Adopt mitigated negative declaration. Forward to the Board of Supervisors.

1. Within 6 months of the approval of the Rezone and General Plan Amendment by the Board of Supervisors, the applicant must propose mitigation consistent with the *2020 Del Norte Region SB 743 Implementation Plan* and acceptable to the Community Development Department Director;
2. Upon approval of the SB 743 mitigation and within 1 year of approval of the Rezone and General Plan Amendment by the Board of Supervisors, the applicant shall submit road improvement plans for the SB 743 mitigation to the Engineering and Surveying Division for review and acceptance. The plans shall be prepared by a California Registered Civil Engineer. The road improvement plans must include mitigation for at least the VMT impacts created by 55 single-family equivalents; and
3. Within 30 days of the approval of the Rezone and General Plan Amendment by the Board of Supervisors, a *Notice of Requirement for SB 743 Implementation* including the following condition must be recorded against the properties associated with this Rezone and General Plan Amendment:

   "The total vehicle miles traveled (VMT) impacts for the project (Rezone R2001 and General Plan Amendment GPA2001) were determined to be 55 single-family equivalents. At the time of complete application for Rezone R2001 and General Plan Amendment GPA2001 the Community Development Department determined that payment in lieu of physical improvements to meet SB 743 mitigation obligations could not be accepted since the County does not have a bank of credits to purchase from for the purpose of VMT mitigation.

   Prior to the issuance of a Certificate of Occupancy on each residential unit within the boundaries of the rezone and general plan amendment the anticipated vehicle miles traveled (VMT) must be mitigated to less than significant using the *2020 Del Norte Region SB 743 Implementation Plan*. Acceptable mitigation for each single-family (or the equivalent) includes the installation of either 0.5 curb ramp with asphalt patch; 15 linear feet of sidewalk with no curb and gutter; or 7.5 linear feet of sidewalk with curb, gutter, and asphalt patch; improvements must be functional upon completion to effectively mitigate VMT impacts (e.g. half of a curb ramp is not functional). The County Engineer may approve alternative improvements that effectively mitigate VMT impacts or require up to an additional 25% increase in area of constructed improvement if it would result in an infrastructure gap closure. At the time of permit issuance and if the County is willing to accept payment in lieu of physical improvements, the amount would be $1,275 per single-family (or equivalent), plus 25% for infrastructure gap closures, and an additional 50% for administration and compliance with public works construction obligations for public agencies which would total $2,390.63 in 2020 dollars. The $2,390.63 must be adjusted for inflation at the time of payment using the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W)."

June Planning Commission HK

APPLICANT: RAWSON, RON – Grading Permit – GP2021 -14C – APN 103-020-030 located at 1881 S. Fred Haight Drive, Smith River.

Agent: Smith River Alliance/Marisa Parish Hanson

RECOMMENDATION: Application complete. Previously circulated environmental reviews apply – see SCH#2019109011 and SCH# 2012098078. Post Public Hearing Notice. Approve with conditions.

1. The project shall be pursued in a diligent manner and completed in a reasonable period of time. If development has not commenced, the permit will expire within two years from the date of final approval. Application for extension of permit must be made prior to the date of expiration. All field activities must be completed in the same year and as one event;
2. All work shall be completed be completed while the unnamed tributary to Morrison Creek is dry and after August 15 to avoid impacts to fish, amphibians, birds, or other stream/riparian dependent species;
3. Nesting bird surveys shall be conducted for any vegetation disturbance that is conducted prior to August 15;
4. All heavy equipment shall be inspected for leaks and washed prior to working within the project area. All fueling shall occur at 100 feet from any wetland and stream;
5. Permanent removal of vegetation, except non-native vegetation must be avoided. Any trees removed must be documented and replanted or replaced once the project is finished;
6. Access by equipment will occur on both sides of the stream to minimize disturbance and to reduce effects to soil;
7. Project activities must occur between 8:00 a.m. and 5:00 p.m.;
8. Should any archaeological resources be found during project activities, construction activities shall be halted until an evaluation of the find is made by either a qualified archaeologist or representatives of the local tribes. Any mitigation measures that may be deemed necessary must have the approval of the local tribes and the County of Del Norte, and shall be implemented by a qualified archeologist representing the County of Del Norte prior to resumption of construction activities. If human remains are exposed by a project related activity, the County of Del Norte shall comply with California State Health and Safety Code, Section 7050.5, which states that no further disturbance shall occur until the County Coroner has made the necessary findings as to the origin and disposition pursuant to California Public Resources Code, Section 5097.98;
9. This entitlement is specifically conditioned on the applicant agreeing to indemnify and hold harmless the County of Del Norte, the Planning Commission of the County of Del Norte, the Board of Supervisors of the County of Del Norte, their officers, employees and agents against any and all claims arising out of the issuance of the entitlement and specifically against any expense arising from defending any legal action challenging the issuance of the entitlement, including but not limited to the value of time devoted to such defense by County officers, employees and agents and the amount of any judgment, including costs of suit and attorney fees, recovered against the County or any of its officers, employees or agent in such legal action. The County of Del Norte reserves the option to either undertake the defense of any such legal action or to tender such defense to the applicant. Should the County tender such defense to the applicant and the applicant fail or neglect to diligently defend such legal action, the County may consider such failure or neglect to be a material breach of this conditions and forthwith revoke this entitlement;
10. The activities associated with this permit are not within the State Responsibility Area;
11. The applicant shall consult the Building Inspection Division to determine if a building permit is required for any portion of the project. Issuance of any building permit shall be subject to final review and approval by the Building Inspection Division;
12. Prior to the issuance of the Grading Permit, the applicant shall submit improvement plans for the project to the Engineering and Surveying Division for review and acceptance. The plans shall be prepared by a California licensed design professional;
13. All improvements shall be constructed per the approved set of plans;

14. No grading shall occur between October 30 and April 30 of any year unless the applicant has obtained written authorization from the County Engineer;
15. All soils removed during grading activities shall be retained upon the parcel or, if removed from the parcel, shall be limited to surrounding, similarly designated parcels (e.g. Prime Agriculture Agricultural Exclusive), where the soils will serve to facilitate ongoing agricultural activities pursuant to policies identified in the County's Local Coastal Program (Land Resources, Section III: General Policies for Agricultural Lands) and shall be subject to separate permitting (i.e. Coastal Development/Grading Permit) and environmental review; and
16. It is the applicant's responsibility to determine if permits are required from other agencies and to obtain said permits. *The following are likely required: Section 404 Nationwide Permit from the United States Army Corps of Engineers, Section 401 Water Quality Certification from the California North Coast Regional Water Quality Control Board, and Section 1602 Streambed Alteration Agreement from the California Department of Fish and Wildlife.*

June Planning Commission HK

APPLICANT: COX, CHARLES & KATHLEEN – Minor Subdivision – MS2101 – APN 116-040-044 located at 220 Lazy Lane. Crescent City, CA.

Agent: N/A

RECOMMENDATION: Application incomplete pending receipt of the following item:

1. The applicant shall provide a PE plot plan of all existing and proposed wells, all septic tanks, and all primary and reserve leach fields for the subdivision. The plot plan shall show the 100-foot setbacks of all existing or proposed wells that will be utilized for a residence.

Incomplete HK

APPLICANT: PATEL, BHANU & ANGNA (Trust 1999) – Environmental Review of a Grading Permit for Vegetation Restoration – GP2020-30 – 120-032-012 located at 700 N. Pebble Beach Drive, Crescent City.

Agent: Bruce Thompson

RECOMMENDATION: Application incomplete pending receipt of the following items:

1. Copy of the final *Cultural Resources Investigation Report for the Proposed Development of Assessor's Parcel Number 120-032-012*, *Del Norte County* prepared by Roscoe and Associates;
2. Supplement/Addendum to the *Cultural Resources Investigation Report for the Proposed Development of Assessor's Parcel Number 120-032-012*, *Del Norte County* to address earth disturbing activities and supplement recommendations if warranted;
3. Wetland Delineation;
4. Biological Assessment;
5. Vegetation Restoration Plan;
6. Monitoring Plan for Restoration Plan.

#	Incomplete	HK

APPLICANT: PATEL, BHANU & ANGNA (Trust 1999) (property owner County of Del Norte) – Coastal Grading Permit Vegetation Restoration – CGP2021-16C– APN 120-031-001 located at 800 N. Pebble Beach Drive, Crescent City.

Agent: Bruce Thompson

RECOMMENDATION: Application incomplete pending receipt of the following items:

1. Submit Grading Permit Application with the County of Del Norte as Property Owner;
2. Wetland Delineation;
3. Biological Assessment;
4. Vegetation Restoration Plan;
5. Monitoring Plan for Restoration Plan.

#	Incomplete	HK

APPLICANT: BENNER, RAY/CURREN TEASHA – Environmental Review – MAP2104 – APN 116-160-068 located at 175 Arnett Street, Crescent City.

Agent: N/A

RECOMMENDATION: Conclude AB 52 consultation period and circulate initial study/draft environmental document when complete.

	June ERC	HK

APPLICANT: TOLOWA DEE-NI' NATION – Environmental Review for Fish Hatchery Upgrades – MAP2101 – APN 103-080-043, 026, 028, 063, 056, 044, 014, 103-720-0 located at N. Fred Haight Drive, Smith River.

Agent: Kerry McNamee

RECOMMENDATION: Conclude AB 52 consultation period and circulate initial study/draft environmental document when complete.

	June ERC	HK

APPLICANT: TOLOWA DEE-NI' NATION – Use Permit for a Public Use (Food Storage and Warehousing) –

UP2113C – APN 101-021-002 located at 16500 Ocean View Drive, Smith River

Agent: Bobby Bergman

RECOMMENDATION: Conclude AB 52 consultation period and circulate initial study/draft environmental document when complete.

June ERC HK