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Initial Study/Mitigated Negative Declaration

Oflyng Water Quality Project

November 2018

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF EXHIBITS

LIST OF APPENDICES

LIST OF ABBREVIATIONS

AB	Assembly Bill
APE	Area of Potential Effect
APN	Assessor Parcel Number
AQMD	Air Quality Management District
ASR	Archaeology Survey Report
Basin Plan	Water Quality Control Plan for the Lahontan Region
BMP	Best Management Practice
CAAQS	California Ambient Air Quality Standards
Cal-IPC	California Invasive Plant Council
CARB	California Air Resources Board
CCR	California Code of Regulations
CDFA	California Department of Food and Agriculture
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CLUP	Comprehensive Land Use Plan
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2E	carbon dioxide equivalent
County	El Dorado County
CRHR	California Register of Historical Resources
CSP	corrugated steel pipe
CTC	California Tahoe Conservancy
CWA	Clean Water Act
CWHR	California Wildlife Habitat Relationship
CWPP	community wildfire protection plan

EIP	Environmental Improvement Program
EIR	Environmental Impact Report
EO	Executive Order
EPA	Environmental Protection Agency
ETCC	Environmental Threshold Carrying Capacities
FEMA	Federal Emergency Management Agency
GHG	greenhouse gas
GIS	geographic information system
GWP	Global Warming Potential
LRWQCB	Lahontan Regional Water Quality Control Board
LTAB	Lake Tahoe Air Basin
LTBMU	Lake Tahoe Basin Management Unit
mg/m^3	milligrams per cubic meter
MND	Mitigated Negative Declaration
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NOx	nitrogen oxides
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
O_3	ozone
OHP	Office of Historic Preservation
OHWM	ordinary high-water mark
PAS	plan area statements
PM	particulate matter
ppb	parts per billion
ppm	parts per million
PRC	Public Resources Code
Project	Oflyng Water Quality Project

ROG	reactive organic gases
ROW	right-of-way
SO_3	sulfur dioxide
SOx	sulfur oxides
SEZ	stream environment zones
sf	square foot/feet
SMAQMD	Sacramento Metropolitan Air Quality Management District
SWMP	Stormwater Management Plan
SWPPP	Stormwater Pollution Prevention Plan
TCR	Tribal Cultural Resource
TMDL	Total Maximum Daily Load
TRPA	Tahoe Regional Planning Agency
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish & Wildlife Service
VMT	vehicle miles traveled
WOUS	Waters of the United States
$\mu g/m^3$	micrograms per cubic meter

Section 1 Project Information

1. Project title:	Oflyng Water Quality Project
2. Lead agency name and address:	County of El Dorado Community Development Agency Transportation Division 924B Emerald Bay Road South Lake Tahoe, CA 96150
3. Contact person and phone number:	Daniel Kikkert, P.E. County of El Dorado (530) 573-7914
4. Project location:	El Dorado County, California. Sections 20, 21, 28, and 29 in Township 12 North and Range 18 East
5. Project sponsor's name and address:	County of El Dorado Community Development Agency Transportation Division 924B Emerald Bay Road South Lake Tahoe, CA 96150
6. General Plan designations:	N/A
7. Zoning:	Residential, Conservation
8. Description of project:	Erosion control and stormwater management treatments for water quality improvements.
9. Surrounding land uses and setting:	Residential subdivision and Forest Land

10. Other public agencies whose approval is required:	Tahoe Regional Planning Agency
11. 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, has consultation begun?	No. The tribes were notified of the project on June 20, 2018 and none have responded.

Section 2 Executive Summary

The County of El Dorado (County) has prepared this Initial Study to identify any potentially significant impacts from the Oflyng Water Quality Project. The project proposes erosion and stormwater improvements to address water quality issues.

All potential environmental effects were determined to be less than significant, except the following:

- Biological Resources. Potential impact to 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 & Wildlife (CDFW) or U.S. Fish & Wildlife Service (USFWS) including migratory birds. This potential impact has been mitigated through Mitigation Measure BR-1 to a less-than-significant level.
- Biological Resources. Potential impact to sensitive natural community identified in local or regional plans, policies, or regulations or by the CDFW or USFWS; and impact to state or federally protected wetlands. This potential impact has been mitigated through Mitigation Measure BR-2 to a less-than-significant level.
- Cultural Resources. Potential impact to previously undiscovered resources during construction. This potential impact has been mitigated through Mitigation Measure CR-1 and CR-2 to a less-than-significant level.
- Water Quality/Hydrology. Potential impact to groundwater resources due to unknown groundwater depths. This potential impact has been mitigated through Mitigation Measure WQ-1 to a less-than-significant level.

FOCUS OF THE ENVIRONMENTAL REVIEW

This proposed Mitigated Negative Declaration (MND), pursuant to the California Environmental Quality Act (CEQA), is provided to give notice to interested agencies and the public that it is the County's intent to adopt an MND. This MND is subject to modification based on comments received by interested agencies and the public.

The County has prepared an Initial Study for this project and, pending public review, expects to determine from this study that the proposed project would not have a significant effect on the environment for the following reasons:

- The proposed project would have *no impact* on mineral resources, population and housing, recreation, and public services.
- The proposed project would have a *less-than-significant* effect on aesthetics, agricultural and forestry resources, air quality, energy, geology and soils, greenhouse gasses, hazards and hazardous waste, land use and planning,

noise, transportation, tribal cultural resources, utilities and service systems, and wildfire.

- The proposed project would have no significant adverse effect on biological resources, cultural resources, and water quality because the following mitigation measures have been incorporated into the project and would reduce potential effects to insignificance:
- *Mitigation Measure BR-1*: If any construction activities (e.g., grubbing or grading) are scheduled during the bird nesting season (typically defined by CDFW as February 1 to September 1), the County or approved construction contractor shall retain a qualified biologist to conduct a pre-construction survey of the project area to include a 100-foot buffer, as access is available, to locate active bird nests, identify measures to protect the nests, and locate any other special status species. The pre-construction survey shall be conducted no more than 14 days prior to the implementation of construction activities (including staging and equipment storage). Any active nest should not be disturbed until young have fledged or under the direction provided by a qualified biologist. Any special status species shall not be disturbed unless under the direction provided by a qualified biologist.
- *Mitigation Measure BR-2*: Prior to construction, the County shall apply for and obtain a U.S. Army Corps of Engineers Section 404 Clean Water Act permit for proposed impacts to a Water of the U.S., including applicable permits from the state of California, including a Section 401 permit from the Lahontan Regional Water Quality Control Board and CDFG Code Section 1602 (Streambed Alteration Agreement), if applicable. These permit applications establish appropriate mitigation measures for impacts to waters of the U.S. and waters of the State that protect against significant impacts.
- *Mitigation Measure CR-1*: The Contractor and key members of crews working on excavation, trenching, and grading for site preparation shall be instructed to be wary of the possibility of destruction of buried cultural resource materials. They shall be instructed to recognize signs of prehistoric use and their responsibility to report any such finds (or suspected finds) immediately, as specified by measure CR-2 below, so damage to such resources may be prevented. No historic properties will be affected in compliance with Advisory Council on Historic Preservation regulations (36 C.F.R. part 800). However, in the event that cultural resources are discovered during Project implementation, Project personnel will halt all activities in the immediate area and will notify a qualified archaeologist to determine the appropriate course of action.
- *Mitigation Measure CR-2*: Final plans and specifications shall include guidance in the event that human remains are discovered. The County Coroner and

local law enforcement shall be notified within 24 hours of the discovery in accordance with Public Resources Code Section 5097.98 and Section 7050.5 of California Health and Safety Code to conduct proper evaluation and treatment of remains. The coroner and law enforcement agency with jurisdiction will evaluate the find to determine whether it is a crime scene or a burial. If human remains are determined to be associated with an archaeological site (burial), the California Office of Historic Preservation (OHP) will be notified. The OHP will work with appropriate tribes to determine measures to take.

- *Mitigation Measure WQ-1*: Groundwater is not expected to be encountered during construction. If groundwater is encountered and the excavated area requires dewatering, Tahoe Regional Planning Agency and the State of California Lahontan Regional Water Quality Control Board shall be notified immediately to determine the appropriate course of action. The Stormwater Pollution Prevention Plan shall include a Dewatering Contingency Plan that the Contractor would follow.

Section 3 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" as indicated by the environmental checklist (Section 5.0).

	I. Aesthetics		II. Agricultural and Forestry Resources		III. Air Quality
x	IV. Biological Resources	x	V. Cultural Resources		VI. Energy
	VII. Geology/Soils		VIII. Greenhouse Gas Emissions		IX. Hazards and Hazardous Materials
x	X. Hydrology/Water Quality		XI. Land Use/Planning		XII. Mineral Resources
	XIII. Noise		XIV. Population/Housing		XV. Public Services
	XVI. Recreation		XVII. Transportation		XVIII. Tribal Cultural Resources
	XIX. Utilities/Service Systems		XX. Wildfire		Mandatory Findings of Significance

LEAD AGENCY DETERMINATION

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.

X_ 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 (EIR) 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 EIR 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.

____________________________________ __________________

Signature Date

____________________________________ __________________

Signature Date

Section 4 Project Description

INTRODUCTION

The Oflyng Water Quality Project (project) proposes water quality improvements that would address erosion, sediment, and stormwater runoff issues impacting water quality flowing away from the project area. The project area is within an existing residential subdivision known as Tahoe Paradise, located along Oflyng Drive from Southern Pines Drive to the intersection with Pioneer Trail in El Dorado County, California. Project activities would occur within existing El Dorado County (County) right-of-way (ROW) and on publicly owned parcels. Specifically, the project is located in Sections 20, 21, 28, and 29 in Township 12 North and Range 18 East (Mt. Diablo Meridian) (Figure 1).

The proposed project has been identified by the Tahoe Regional Planning Agency's (TRPA's) Environmental Improvement Program (EIP) as a water quality and soil conservation project. EIP projects are implemented for purposes of treating stormwater runoff related erosion and sediment transport issues that impact water quality of the Upper Truckee River and Trout Creek, and ultimately Lake Tahoe.

The Oflyng project area experiences concentrated stormwater runoff that flows from County ROWs (primarily streets) through naturally vegetated (pervious) land and ultimately into the Upper Truckee River and Trout Creek. Existing storm drain systems in this area collect and convey stormwater through a series of corrugated metal pipe risers, pipes, drainage inlets, and roadside channels to existing outfalls. The outfalls discharge runoff primarily into an existing conveyance system that parallels Pioneer Trail. The purpose of the existing storm drain system is to facilitate the flow of stormwater runoff to the Upper Truckee River and Trout Creek. However, this stormwater contains excessive sediments that are causing harm to the waterways. Because the project area is connected to Lake Tahoe through Meyers Creek and the Upper Truckee River, there is potential for fine sediments produced in the residential area to deposit into Lake Tahoe, further reducing lake clarity.

Current sediment sources within the project area include residential landscaping and impervious surfaces, vehicular traffic, road sand/cinder accumulation from local and collector roadways, eroding cut slopes, drainages, and roadside ditches throughout the project area. This project is focused on increasing the water quality of the runoff through a reduction of sediment prior to reaching these outfalls, as well as reducing the peak flows and volumes to minimize localized flooding. Less sediment would enter Lake Tahoe from the project area once the project is completed, thereby improving water quality in Lake Tahoe.

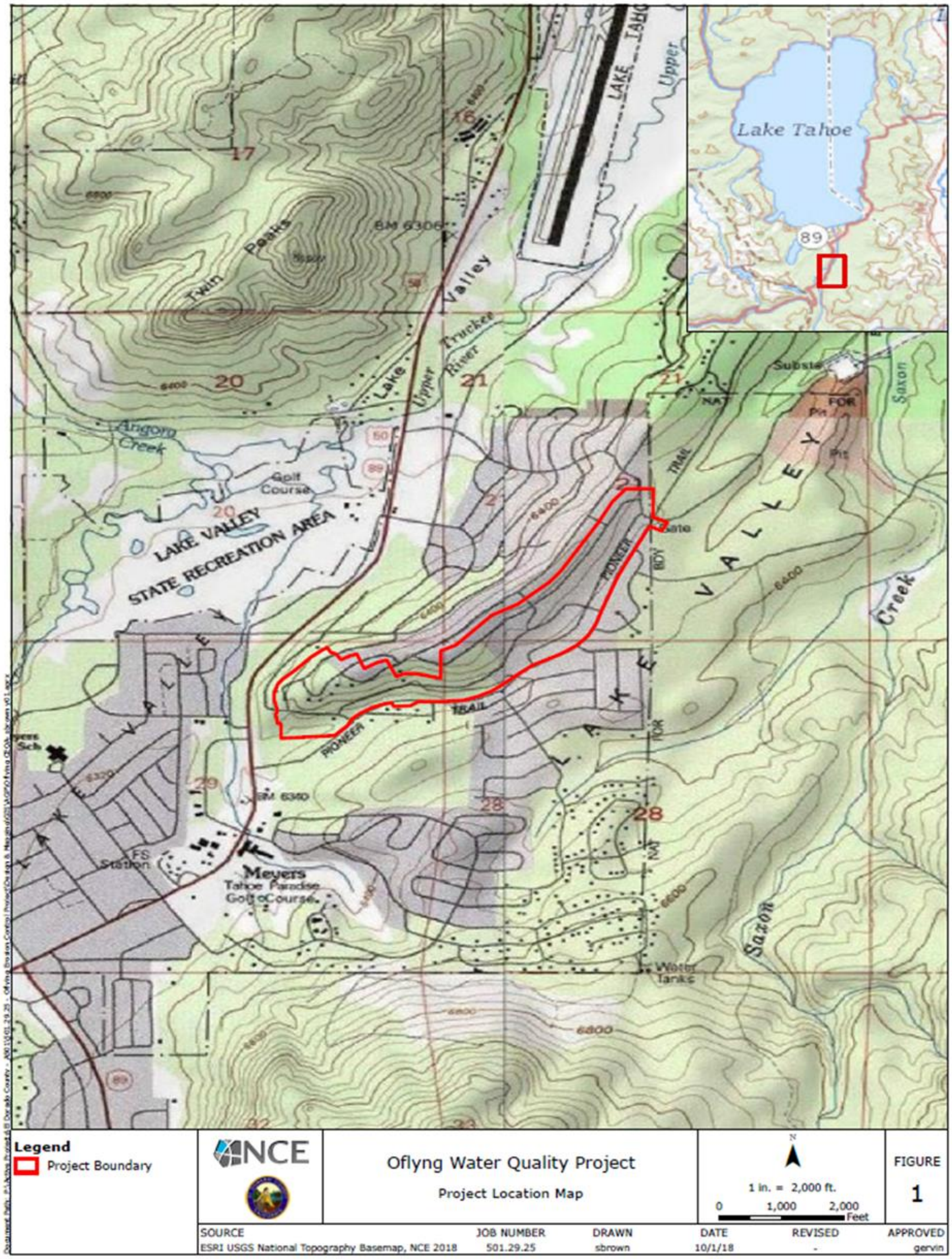


Figure 1. Project Location Map

PROJECT GOALS AND OBJECTIVES

The overall goal of the project is to reduce stormwater pollution from County roads and improve water quality of the Upper Truckee River, Trout Creek, and ultimately Lake Tahoe. A secondary goal is to maximize opportunities for pollutant source control and provide for treatment of surface flows where feasible within the existing storm drain system.

The objective of the project is to implement stormwater management, erosion control and water quality improvement measures that would reduce the discharge of sediment and pollutants to Lake Tahoe from County-administered ROW.

PROJECT BACKGROUND

In 1997, TRPA developed a Basin-wide Environmental Improvement Program that defined various projects which, once implemented, would assist in attaining and maintaining TRPA Environmental Threshold Carrying Capacities (ETCC) as well as meet other federal and state environmental goals. TRPA has established thresholds for air quality, water quality, soil conservation, vegetation, noise, scenic resources, recreation, fisheries, and wildlife to address public health and safety of residents and visitors as well as the scenic, recreation, education, scientific, and natural values of the Lake Tahoe Basin. TRPA threshold standards are minimum standards of environmental quality to be achieved in the Tahoe Region.

The project is identified in TRPA's EIP list as project #01.01.01.0074 – Oflyng Water Quality Project and is located within the TRPA designated Priority 2 Watersheds 44 (Upper Truckee River) and 43 (Trout Creek). The project is identified in the EIP program as one that once implemented, would help the County and TRPA meet the minimum threshold standards established for water quality and soil conservation environmental quality. The purpose of the threshold for water quality is to return Lake Tahoe to 1960s water clarity and algal levels by reducing nutrient and sediment in surface runoff and groundwater. The threshold for soil conservation is preserve natural stream environment zones (SEZ), restore 25% of disturbed urban SEZ areas (1,100 acres), and reduce total land coverage (TRPA, 2011). Implementation of the proposed project is intended to help attain the water quality and soil conservation thresholds by implementing stormwater and erosion control improvements that address erosion and sediment transportation onsite and ultimately improve the quality of runoff from the project area potentially discharging into Lake Tahoe.

Consideration of Alternatives

The County utilized the Lake Tahoe Basin Stormwater Quality Improvement Committee's "Formulating and Evaluating Alternatives for Water Quality Improvement Projects" document for guidance in selecting the preferred project alternative. Additionally, the County Project Development Team investigated a range of possibilities for the water quality improvements in the project area. The process of evaluating and selecting a preferred alternative for this project included the production and analysis of a Project Feasibility Report in 2018. The feasibility report investigated existing conditions and identified problem areas within the project boundary as well as proposed alternative solutions within the project boundary.

As part of the project design, alternatives were evaluated for different water quality improvements and erosion control mitigation measures for the problem areas. The proposed project measures are a compilation of the most comprehensive design ideas for each street in the project area that meet the goals and objectives of the EIP, which include measures to help the County and TRPA attain water quality and soil conservation thresholds.

PROJECT SETTING

The project area is located just south of Lake Tahoe and to the east of Washoe Meadows State Park, State Route 89/Emerald Bay Road/U.S. Highway 50, the Upper Truckee River, and Meyers Creek. Topography in the area consists of moderately dissected, stream cut, riverine terraces. The project area slopes from east to west, with an eastern elevation of 6,440 feet above mean sea level (amsl), and a western elevation of 6,400 amsl. The lowest elevation of the project area is located in the northwest corner at 6,270 feet amsl. The project area has been substantially impacted over the last 150 years from logging, grazing, residential development, utility construction, and highway construction.

The laws, ordinances, regulations, and standards applicable to the project include the El Dorado County General Plan (2004) and zoning ordinance, TRPA Code of Ordinances (2015), and Caltrans Standard Specifications and Standard Plans.

Land Use and Ownership

The project is located within an existing residential subdivision surrounded by other similar development. There are forested mountains to the east of the project area designated as Forest Service lands. There is also similar single-family residential development across Pioneer Trail south of the project area.

Three plan area statements (PAS) present general land use zoning information within the project area. PAS are considered land use and zoning guidance documents for both the TRPA and the County. The majority of the project area is included within PAS 120 (Tahoe Paradise Meadowvale – Residential land use), while small portions of the southern section of the project area is part of PAS 123 (Meyers Forest – Conservation land use), PAS 122 (Tahoe Paradise Mandin – Residential land use) and PAS 095 (Trout/Cold Creek – Conservation land use)

(Figure 2). Land use for the majority of the project area is primarily characterized as single family residential. Planning considerations mentioned in the PAS documents note "steep and high cutbanks now protected by gunite may start to erode within the next 20 years (TRPA 2002a)" in PAS 120. The erosion of gunite-protected slopes is clearly observable within the project area.

The Oflyng project boundary encompasses County ROW and parcels owned by the California Tahoe Conservancy (CTC), U.S. Forest Service (USFS) Lake Tahoe Basin Management Unit (LTBMU), the County, and private individuals. Figure 3 shows the proposed project improvements and ownership information. In order to construct the proposed water quality aspects of the project, license agreements must be obtained from the CTC and Special Use Permits from the USFS. The project parcels are listed below in Tables 1 and 2 by Assessor Parcel Number (APN):

Table 1. California Tahoe Conservancy APNs

APN	Bordering Street	Proposed Use	Estimated Temporary Disturbance (sf)	Estimated Permanent Disturbance (sf)
081-092-009	Tionontatti / Pioneer Trail	Infiltration Basin / System	775	1,500
081-092-010	Tionontatti / Pioneer Trail	Infiltration Basin / System	775	1,500
081-111-012	Oflyng Drive	Offline Infiltration Gallery	40	400
034-772-020	Oflyng Drive	Rock check to backup water for infiltration	2,300	100
034-761-008	Southern Pines	Hand crew access to drainage easement from Southern Pines	800	0

sf = square feet

Table 2. United States Forest Service APNs

APN	Bordering Street	Proposed Use	Estimated Temporary Disturbance (sf)	Estimated Permanent Disturbance (sf)
081-031-009	Pioneer Trail	Construction of an infiltration basin and inlet and outlet channels to the new basin	500	2,800
081-020-003	Pioneer Trail	Armor eroding channel (rock lined)	0	800

sf = square feet

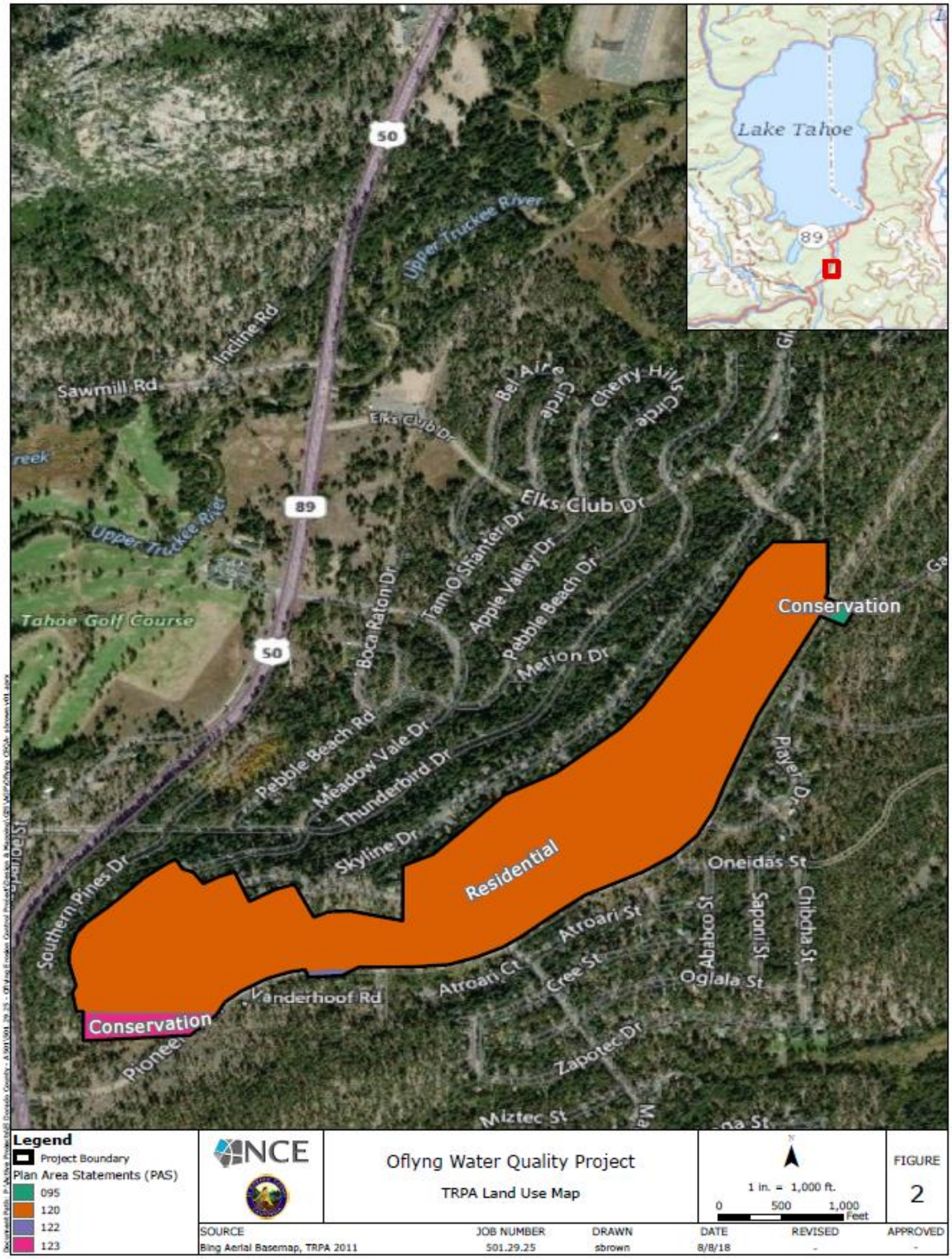


Figure 2. TRPA Land Use Map

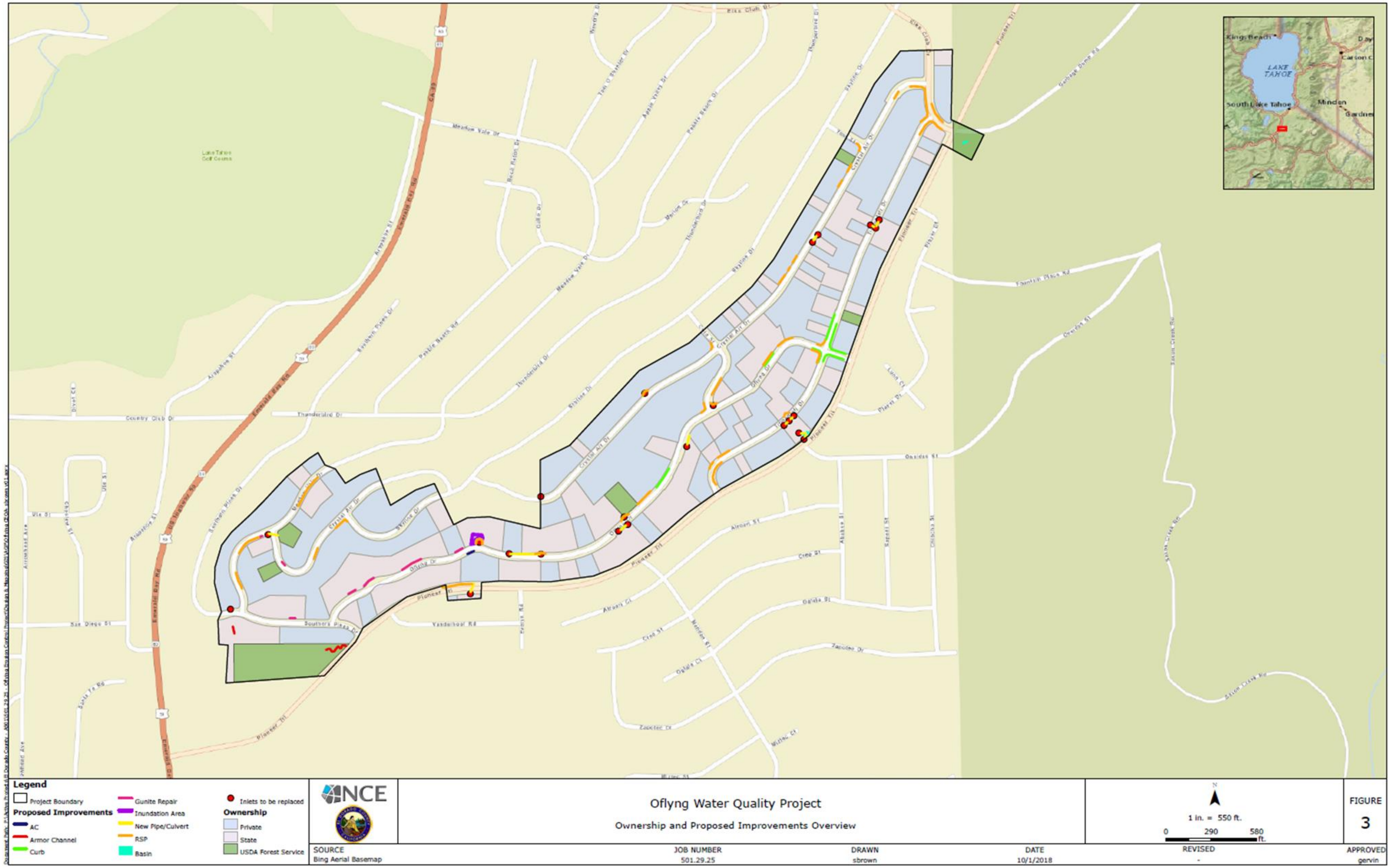


Figure 3. Ownership and Proposed Improvement Overview

PROJECT CHARACTERISTICS

This project would provide infiltration improvements within the County ROW and on publicly owned parcels throughout the project area. Stormwater runoff from the project area would be directed into infiltration improvements providing a direct reduction in the transport of fine sediment to Lake Tahoe. Stormwater infrastructure would also be upgraded to current design specifications with conveyances improved to allow for proper flow sizing, routing, and treatment. The effects of climate change have also been considered to assess whether flow sizing, routing, and treatment have been adequately addressed for future conditions.

Project improvements include infiltrating and/or treating stormwater from County ROWs, stabilizing eroding cut slopes with vegetation and/or rock protection, and stabilizing existing drainages with rock. Where feasible, incorporation of bio-engineering techniques and disconnecting existing storm drain conveyance systems would be used to halt stormwater runoff from directly discharging into the Upper Truckee River and Trout Creek. Sediment trapping devices would be used to capture road sand, cinders, and sediment. Infiltration basins on publicly owned parcels would also be used to reduce the overall stormwater volume discharging to the Upper Truckee River and Trout Creek.

The specific problem areas and proposed treatments are described below.

Existing Problem Areas

Problem areas identified for treatment are displayed on Figure 4. The following descriptions of problem areas are associated with the figure’s legend:

Table 3. Existing Problem Area Description

Map Label	Description
Damaged Dike	Damaged sections of asphalt concrete dike
Damaged Pipe	Damaged culvert
Eroded Slope	Area requiring slope stabilization
Eroding Channel	Eroded or incised roadside channel
Impaired Gunite Slope	Gunite slope that is showing preliminary signs of failure or has failed completely
Sediment	Depositional area of sediment

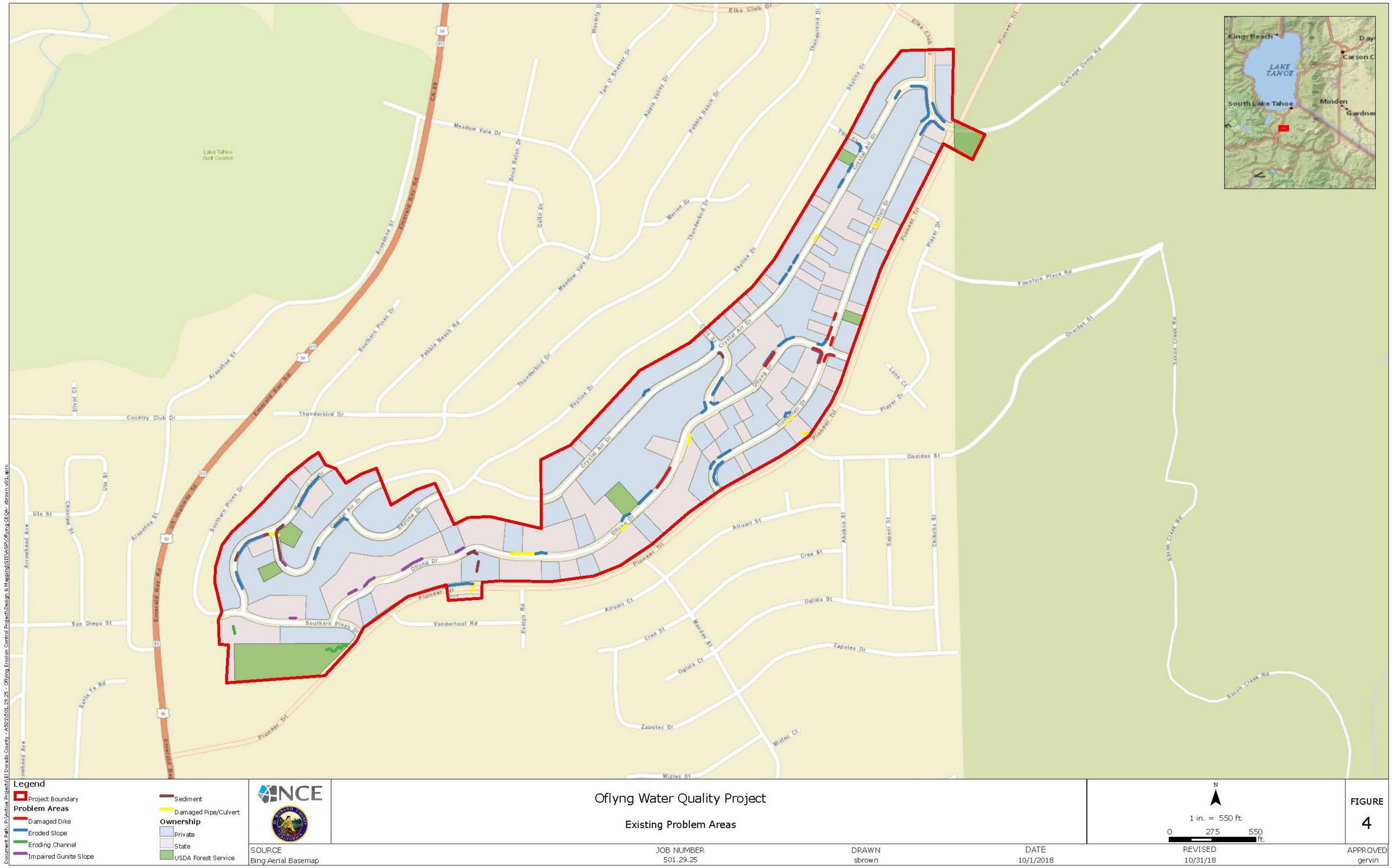


Figure 4. Existing Problem Areas

Proposed Improvements

The proposed project would implement source control, hydrologic control, and treatment options to meet the project goals and objectives. Source control treatment would include targeted erosion control measures for treating eroding roadside slopes and shoulders as well as stabilizing roadside drainages. Hydrologic controls would be met through construction of roadside conveyance systems, replacement of ineffective culverts, replacement or placement of new corrugated steel pipe (CSP) inlets, and construction of offline/inline infiltration systems which would work towards reductions in peak flows and volumes. Treatment measures would consist of infiltration basins and subsurface infiltration systems which have been designed to capture and infiltrate the first flush of stormwater runoff.

Proposed project improvements are displayed on Figure 3. Table 4 presents the associated descriptions of the proposed improvement types in the figure legend. Appendix A contains the engineered plan drawings.

Table 4. Proposed Project Improvements

Map Label	Description
Armor Channel	Proposed location of armoring of eroded channel (rock lined channel)
Basin	Proposed location of infiltration basin
Curb	Proposed location of curb and gutter
Gunite Repair	Proposed repair of the failing sections of gunite wall
Inundation Area	Proposed area of inundation from backing up of stormwater
New Pipe	Proposed new or replacement culvert
Rock Slope Protection (RSP)	Proposed rock slope protection or rock toe protection

Rock Slope Protection

The locations requiring source control improvements include isolated areas of bare eroding slopes and shoulders on Meadowvale Drive, Crystal Air Drive, Oflyng Drive, Coto Street, Tionontatti Street, Elks Club Drive, and Pioneer Trail (Figure 3). The primary best management practice (BMP) proposed for stabilization in these areas is rock slope protection primarily at the toe of slope, with revegetation improvements. All locations to receive this treatment are within County ROW or within existing slope easements. It is anticipated that this work will involve the use of a backhoe and loader to remove material and bring in rock.

Gunite Wall

On Oflyng Drive there is a section of the existing gunite wall that has failed completely (Figure 4 – Problem Areas); an in-kind replacement or mechanically stabilized earthen wall as well as construction of a benched slope would be the preferred treatment for this problem area. In both cases, the work will occur in previously disturbed areas within the existing County ROW and slope easements. It is anticipated that this work will involve the use of backhoe and a loader for both the removal of material and the supply and placement of rock material.

Channel Stabilization

The other identified source control issue is eroding and incised channels. Stabilization of the eroding and incised channels will be addressed with the addition of turf reinforcement fabric and rock and rock bowls or dissipators at the pipe inlets/outlets. The rock will offer better protection against erosion than erosion control blanket alone. The areas below Southern Pines Drive and Oflyng Drive are steep and difficult to get equipment down to. It is anticipated that the work will be completed with hand crews using wheel barrows to remove deposited material and to re-establish the channel with rock with access from Southern Pines via CTC parcel APN 034-761-008. For the channel to the west of Southern Pines and Pioneer Trail (USFS parcel APN 081-020-003), hand crews will be used in order to limit disturbance to the existing channel system.

Stormwater Management and Infiltration Basins

Multiple hydrologic conveyance issues, including problematic road side conveyance systems and identified opportunities for treatment of runoff, would be addressed by the project. Elks Club Drive, identified as a major runoff collector, provides a connection between Highway 50 and Pioneer Trail. The road is relatively steep from the ridge of Skyline Drive to the intersection with Pioneer Trail. Because the road is steep, current County maintenance practices include the application of abrasives to the road during the winter. Current inlets along this section of Elks Club Drive have no sumps and therefore do not provide capacity to capture sand from winter abrasive applications.

To address this problem, the County is proposing to install treatment facilities at the outlet of the storm system, on the southern side of Pioneer Trail, below the intersection with Elks Club Drive. This includes the construction of an offline infiltration gallery at the outlet of the storm drain system before it discharges onto USFS owned land, and construction of an offline infiltration basin on the USFS parcel (APN 081-031-009) where initial flows would be directed into the basin through a new channel until it reaches the design capacity, at which point flows would continue on in the existing channel (Figure 3). An overflow channel would also be constructed to safely deliver flows into the existing channel for redundancy. The basin would have an overall footprint of approximately 2,500 square feet, with an approximate additional disturbance area of 300 square feet for the inlet and outlet channels. The maximum grading depth below existing surface elevation would be 4 linear feet. There would be approximately 500 square feet of temporary disturbance for access to construct the proposed improvements, to be stabilized by revegetation once construction of these improvements is complete. It is anticipated that the basin would be constructed using an excavator and a loader to remove material and shape the basin. Access to the work zone would be from the garbage dump road limiting any traffic impacts to Pioneer Trail. No trees would be removed for construction.

Culverts

A new 18-inch high-density polyethylene pipe culvert would be installed across Pioneer Trail (Figure 3). Currently, flows from this discharge outlet area fall into the curb line on Pioneer Trail, continually washing debris and fine sediment to the next outlet west of this location, which conveys flow to the Pioneer Trail channel system identified as possible Waters of the United States (WOUS). Installation of the culvert would allow treated flows to be conveyed under Pioneer Trail without comingling with more turbid water on Pioneer Trail. The outlet would be protected with rock rip rap and located to be above the ordinary highwater mark of the Pioneer Trail channel so as to minimize any impacts to potential WOUS.

Inlets and Offline Infiltration Systems

Throughout the project area, a select number of existing CSP inlets would be replaced. The current inlets have no sump for retaining of runoff or fine sediment. The new inlets would have sumps with a minimum depth of 3 feet, and open bottoms allowing for better infiltration of stormwater runoff. Maximum excavation depth for inlet construction would be ten feet. In addition, for the existing conveyance systems that border publicly owned parcels, offline infiltration systems would be installed within the County ROW, outside of the road shoulder. These systems would take the first flush of stormwater runoff, allowing for both volume reduction and capture of fine sediments. These offline galleries would be installed in areas that would be considered previously disturbed.

Construction Access and Staging

During construction, workers and equipment would use Pioneer Trail to access the project area. Staging would occur within the project boundary and would utilize either CTC parcels, USFS parcels, or other open space areas within the project area. No clearing or grading would occur due to staging or access.

Construction Labor Force

It is anticipated the proposed project would require 30 days of construction during the 2019 or 2020 construction period (May 1 to October 15 per TRPA seasonal limitations on grading, TRPA Code of Ordinances subsection 33.3.1.a). Construction would require 15 workers per day at the site, 5 vehicles, and approximately 12 pieces of machinery (including excavators, backhoe, haul trucks, water truck).

CONSTRUCTION CONTROLS

The project is required to comply with local, state, and federal regulations pertaining to protection of human health, safety, and environment. Specifically, the project would be required to comply with the TRPA Code of Ordinances, El Dorado County General Plan, State of California Lahontan Regional Water Quality Control Board (LRWQCB), and Lake Tahoe Regional Plan.

The following required construction controls from local, state, and federal agencies have been incorporated into the project design.

Air Quality

The El Dorado County Air Quality Management District (AQMD) District Rule 223 includes requirements for construction projects. Control measures for construction and other earth moving activities must follow the guidelines presented in Table 1 of Rule 223-1 'Best Management Practice'. These requirements include, but are not limited to, creation and implementation of a Fugitive Dust Control Plan, trackout management practices at the construction site, visible emissions limitation, vehicle speed limitations, material handling, and control for stockpiles and disturbed areas.

Biological Resources

The project is required to implement the following applicable TRPA Code of Ordinance standards which protect biological resources:

Vegetation

Vegetation shall not be disturbed, injured, or removed except in accordance with the Code or conditions of project approval. All trees, major roots, and other vegetation not specifically designated and approved for removal in connection with a project shall be protected according to methods approved by TRPA. All vegetation outside the construction site boundary, as well as other vegetation designated on the approved plans, shall be protected by installing temporary fencing pursuant to subsections 33.6.9 and 33.6.10. Disturbed areas shall be revegetated pursuant to 33.6.8.

Geology and Soils

The project would require the County to prepare and submit a Stormwater Pollution Prevention Plan (SWPPP) to the Lahontan Regional Water Quality Control Board to comply with the Stormwater General Permit. The purpose of the SWPPP is to protect soil and water resources from impacts during construction, including groundwater. The plan would designate BMPs to minimize impact from erosion and sedimentation. At a minimum, the following geology and soils controls must be implemented:

- Temporary erosion control devices shall be placed down-gradient of dirt piles, excavated areas, or stockpiles
- Coverings shall be placed on all dirt piles during non-working hours
- Vegetation protection fencing shall be installed to protect existing vegetation where feasible
- Disturbed areas shall be revegetated to stabilize soils
- Stabilize disturbed areas with mulch until vegetation is reestablished
- Use of tracking controls
- Parking on paved areas only.

Greenhouse Gas Emissions and Green Energy

The project must implement the *Basic Construction Emission Control Practices* and the measures listed in the *Guidance for Construction GHG Emissions Reductions* developed by the Sacramento Metropolitan Air Quality Management District (SMAQMD 2016), which includes measures to improve fuel efficiency, limit emissions, use green energy sources, and recycling of materials.

- Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes [required by California Code of Regulations (CCR), Title 13, sections 2449(d)(3) and 2485]. Provide clear signage that posts this requirement for workers at the entrances to the site.
- Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated.
- Train equipment operators in proper use of equipment.
- Use the proper size of equipment for the job.
- Use equipment with new technologies (repowered engines, electric drive trains).
- Perform on-site material hauling with trucks equipped with on-road engines (if determined to be less emissive than the off-road engines).
- Use alternative fuels for generators at construction sites such as propane or solar or use electrical power.

- Use a California Air Resources Board (CARB) approved low carbon fuel for construction equipment. (NOx emissions from the use of low carbon fuel must be reviewed and increases mitigated.)
- Encourage and provide carpools, shuttle vans, transit passes, and/or secure bicycle parking for construction worker commutes.
- Reduce electricity use in the construction office by using compact fluorescent bulbs, powering off computers every day, and replacing heating and cooling units with more efficient ones.
- Recycle or salvage non-hazardous construction and demolition debris (goal of at least 75% by weight).
- Use SmartWay certified trucks for deliveries and equipment transport.
- Develop a plan to efficiently use water for adequate dust control.

Hydrology and Water Quality

The permittee must develop and implement a Stormwater Management Plan (Order No. R6T-2017-0010, NPDES No. CAG616002) and Stormwater Pollution Prevention Plan Construction (Tahoe Construction Permit R6T-2016-0010). These plans must outline measures which will protect hydrology and water quality resources, including groundwater, from negative impacts during construction.

Additionally, TRPA Code of Ordinances Chapter 60: Water Quality – outlines standards intended to protect water quality through requirements for the installation of BMPs to protect and restore water quality, as set forth in Section 60.4.6 – Standard BMP Requirements.

Construction site stormwater BMPs would follow the *Caltrans Construction Site Best Management Practices Manual* (Caltrans 2017) and the *TRPA BMP Handbook* (TRPA 2014) to control and minimize the impacts of construction related activities. The following BMPs, at a minimum, are required at the site during construction:

- Temporary erosion and sediment control BMPs to prevent the transport of earthen materials and other construction waste materials from disturbed land areas, stockpiles, and staging areas during periods of precipitation or runoff (such as silt fence, erosion control fabric, fiber rolls).
- Tracking controls (such as designated ingress and egress areas) and designated staging areas outside of drainage, swale, and SEZ areas. Staging area to be restored in accordance with TRPA Code Section 61.4 (Revegetation).
- Temporary BMPs to prevent wind erosion and sediment transport of disturbed areas, such as use of water for dust control and covering of stockpiles.

- Limit grading to May 1 through October 15, unless an exemption is granted by TRPA. At the end of the grading season or before completion of the project, all surplus or waste earthen materials from the project site would be removed and disposed of at a TRPA approved disposal site or stabilized on-site in accordance with TRPA regulations.
- Implement the Spill Prevention Plan (as discussed in section 4.5.6). Project contractors would be responsible for storing on-site materials and temporary BMPs capable of capturing and containing pollutants.
- Use of vegetation protection fencing to prevent damage to trees or other vegetation where possible.
- Use of construction boundary fencing to limit land disturbance to areas not planned for construction.
- Temporary erosion and sediment control devices will be placed in accordance with the shown plans to protect sediment laden runoff from discharging from the site.
- Construction fencing shall be placed around SEZ/wetland areas as identified on the TRPA land capability map (Figure 8).

Hazards and Hazardous Materials

A Spill Prevention Plan shall be developed along with the project specific SWPPP to detail site specific BMPs and TRPA approved methods to prevent accidental spills from impacting water and land resources. The plan shall outline response protocols and information for contacting the Lahontan Regional Water Quality Control Board and other responsible agencies. Additionally, spill containment and absorbent materials shall be kept onsite at all times, and petroleum products and hazardous waste shall be removed from the project area and disposed of at an appropriate location.

Traffic During Construction

A project specific traffic control plan shall be developed for the project to outline measures to protect resident and worker safety during the 30 days of construction. At a minimum, the following will be implemented:

- Guide signs installed to maintain traffic flow and direction
- An 11-foot paved travel lane will be maintained during construction hours.

REGULATORY REQUIREMENTS

The Initial Study for the proposed project has been prepared in conformance with specifications of CEQA and the CEQA Guidelines. Compliance with CEQA is required due to state and local jurisdiction over the proposed project.

The County of El Dorado is the Lead Agency for this project.

The following responsible and trustee agencies have jurisdiction over some or all the proposed project components:

- California Tahoe Conservancy
- Tahoe Regional Planning Agency
- Lahontan Regional Water Quality Control Board

Permits and/or approvals required from the following state and federal agencies include:

- California Tahoe Conservancy
- Tahoe Regional Planning Agency
- Lahontan Regional Water Quality Control Board

Permits and/or approvals required from the following state and federal agencies include:

- U.S. Forest Service Special Use Permit
- U.S. Army Corps of Engineers Clean Water Act Section 404 permit
- Lahontan Regional Water Quality Control Board Section 401 Water Quality Certification
- Lahontan Regional Water Quality Control Board Stormwater General Permit
- Tahoe Regional Planning Agency Permit
- California Tahoe Conservancy License Agreement.

Section 5 Evaluation of Environmental Effects

The Environmental Checklist and discussion describes the impacts of the project, as detailed in the Project Description. The Environmental Checklist is based on the questions provided in Appendix G of the CEQA Guidelines (Revised 2018). This checklist focuses on 20 different categories. If substantial evidence exists for impacts not described in the checklist, these impacts should also be considered. Potential environmental impacts are described as follows:

Potentially Significant Impact: An environmental impact that could be significant and for which no feasible mitigation is known. If any potentially significant impacts are identified in this Checklist, an Environmental Impact Report must be prepared.

Less than Significant with Mitigation Incorporated: An environmental impact that requires the implementation of mitigation measures to reduce that impact to a less than significant level.

Less than Significant Impact: An environmental impact may occur; however, the impact would not be considered significant based on CEQA environmental standards.

No Impact: No environmental impacts would result from implementation of the project.

INITIAL STUDY CHECKLIST

I. Aesthetics

Would the project:

Environmental Issue	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?			X	
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings, within a state scenic highway?			X	
c) Substantially degrade the existing visual character or quality of public views of the site and its surroundings? If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?			X	
d) Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?				X

Environmental Setting

To protect scenic quality thresholds, specific areas have been identified as scenic corridors or scenic resources. Scenic corridors include views from Lake Tahoe and from all highways and Pioneer Trail in the Lake Tahoe Basin. These corridors have been divided into 33 shoreline and 45 roadway units. The scenic quality of these units was rated in 1982 and then again in 1986, 1991 and 1996. The ratings received by these units indicate if the area is "in attainment," (meeting the scenic threshold standards) or not "in attainment" (not meeting the scenic threshold standards).

The project is in an area zoned single-family residential and contains single-family homes, with open space conservation areas east and west of the residential area. The Plan Area Statement contains Scenic Roadway Unit 36. Both the TRPA Regional Plan and Code of Ordinances outline the requirements for development in or near major scenic view corridors and vistas within the Lake Tahoe Basin and project vicinity. All federal and state highways that lie within the Tahoe region and Pioneer Trail are designated as scenic highways.

Thresholds of Significance

For purposes of this Initial Study, an impact would be significant if the proposed project 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.
- In urban areas, conflict with applicable zoning and other regulations governing scenic quality.
- Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

Answers to Checklist Questions

a) **Less than significant impact**. There are no scenic vistas within or visible from the project area. The project area can be seen from scenic corridors State Route 89/Highway 50 and Pioneer Trail (Figure 5); however, both of these sections of road are currently in attainment, meaning the minimum threshold standard has been met. For scenic resources, the minimum threshold is to 'maintain or improve 1982 roadway and shoreline scenic travel route ratings, maintain or improve views of individual scenic resources, and maintain or improve quality of views from public outdoor recreation areas' (TRPA, 2014).

The project will implement stormwater drainage features that will update the stormwater infrastructure based on current TRPA design standards, with improved conveyance to allow for proper flow sizing and routing. Drainage improvements have been identified by the TRPA as community improvements that have the ability to also improve scenic resources, if designed according to applicable design standards (TRPA, 1989).

Because there are no scenic vistas impacted by the project, adjacent scenic corridors are in attainment, and proposed project features are anticipated to improve scenic quality in the area, impacts to scenic quality within a state scenic highway corridor would be less than significant.

b) **Less than significant impact**. As discussed above, the project area is visible from TRPA designated scenic corridors State Route 89/Highway 50 and Pioneer Trail. These scenic corridors are in attainment, and project design must comply with the TRPA Design Review Guidelines for scenic highway corridors. These guidelines contain restrictions for structure height within scenic highway corridors; because the project does not propose new structures, and proposes to construction stormwater features at grade with minimal changes to the existing area after construction and no removal of trees, the impact on scenic quality would be less than significant.

c) **Less than significant impact**. The project is in a residential area; however, there are views from surrounding open space areas into the project area that would be temporarily impacted during construction of the project. Implementation of construction measures and best management practices would minimize the impacts of construction, as well as proper staging and scheduling. Additionally, the project would conform with the TRPA Design Review Guidelines for scenic highway corridors; as no new structures are being proposed, the project would not degrade the existing visual character or quality of public views of the site and its surroundings and would be consistent with applicable zoning and other regulations governing scenic quality.

d) **No impact**. There are no new sources of glare or lighting associated with the project and no construction would occur at night. Therefore, there would be no light impact on day or nighttime views in the area.

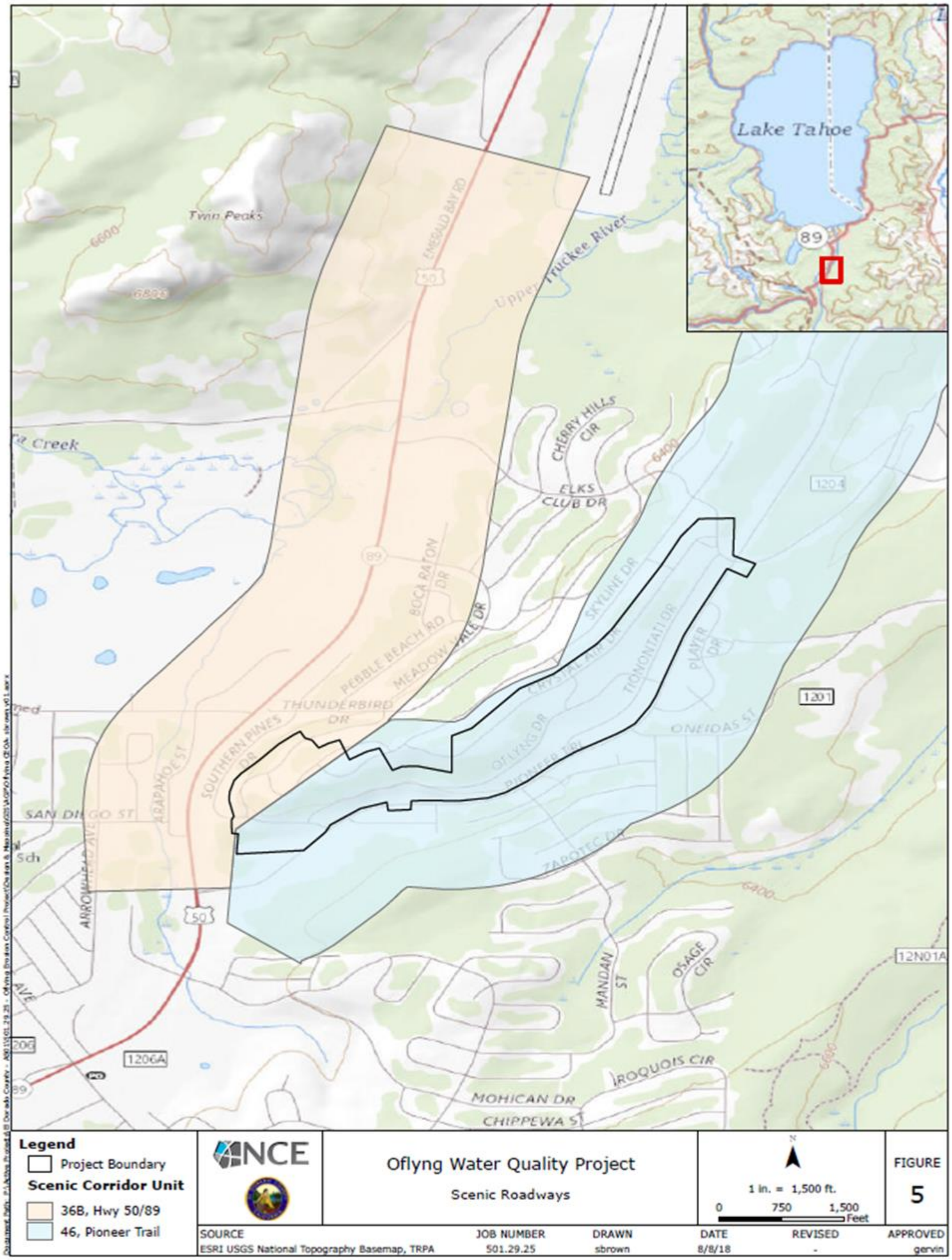


Figure 5. Scenic Roadways

II. Agricultural and Forestry Resources

Would the project:

Environmental Issue	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 or Local 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?				X
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code (PRC) § 12220(g)), timberland (as defined by PRC § 4526), or timberland zoned Timberland Production (as defined by Government Code § 51104(g))?			X	
d) Result in the loss of forest land or conversion of forest land to non-forest use?			X	
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland (including livestock grazing) to non-agricultural use?				X

Environmental Setting

As discussed in Section 4.3 – Project Setting, the majority of project area is zoned single-family residential. There is no farmland or agricultural use land associated with the project. Some project features would be constructed on U.S. Forest Service land, zoned as TRPA conservation land use (PAS 095 and 123) (Figure 2).

Thresholds of Significance

For purposes of this Initial Study, an impact would be significant if implementation of the proposed project would conflict with adopted agricultural policies or zoning, and/or result in the conversion or loss of farmland or forestry land.

Answers to Checklist Questions

a) **No Impact**. The project area does not contain Prime Farmland, Unique Farmland, or Farmland of Statewide or Local Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Division of Land Resource Protection (2018). Implementation of the project does not require conversion of land from the existing land use. Because the project does not propose to convert land or contain farmland, there would be no impact.

b) **No Impact**. The project area is zoned single-family residential and forest – conservation (Figure 2); there is no existing agricultural zoning associated with the project area. The Williamson Act is a means to restrict the uses of agricultural and open space lands to farming and ranching uses; because these uses are not associated with the project area, there would be no impact.

c) **Less than significant impact**. As discussed above, the majority of project impacts are within County ROWs. Minor impacts for purposes of installing an infiltration basin and placement of armored rock channel would occur on U.S. Forest Service land, zoned as conservation land use (Figure 2). Construction of these features would not require a conversion of land use or require tree removal. Therefore, the project would not cause rezoning of existing forest land within the project area. There is no land zoned as timberland production (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g)). Additionally, required placement of BMPs and protection of vegetation resources would ensure impacts to forest land are less than significant.

d) **Less than significant impact**. Refer to response ‘c’ above. The project would not require tree removal for construction. Construction within USFS parcels would not require a conversion of land use from forest to non-forest use. Because the project would not result in land conversion, and impact within forest land is minimal for stormwater features, the project impact would be less than significant.

e) **No Impact.** Refer to responses a-b. There is no farmland associated with the project area. There would be no impact.

III. Air Quality

Would the project:

Environmental Issue	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?			X	
b) Violate any air quality standard or result in a cumulatively considerable net increase in an existing or projected air quality violation?			X	
c) Expose sensitive receptors to substantial pollutant concentrations?			X	
d) Result in substantial emissions (such as odors or dust) adversely affecting a substantial number of people?			X	

Environmental Setting

The project is located in the Lake Tahoe Air Basin (LTAB), which extends into portions of El Dorado and Placer Counties in California, Washoe and Douglas Counties in Nevada, and Carson City Rural District in Nevada. The LTAB is affected by both the rate and location of pollutant emissions and by meteorological conditions that influence movement and dispersal of pollutants. Atmospheric conditions such as wind speed, wind direction, air temperature gradients, and existing air pollutant sources coupled with local topography affect the dispersion of air pollution and air quality in the LTAB.

Most airborne pollutants in the LTAB come from three sources related to populated areas that generate airborne anthropogenic materials: road dust, vehicle exhaust, and chimney smoke. Undeveloped areas in the LTAB produce airborne dust and smoke from natural sources like forest fires as well as direct and indirect effects of land management practices (i.e. controlled burns). In addition, airborne materials generated in downwind areas, including the San Francisco Bay area and the Central Valley, are carried upwind to the LTAB by the region's prevailing winds. As a result of the various potential emission sources, air quality regulations in the LTAB focus on the following air pollutants: ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), fine particulate matter (PM10 and PM2.5), and lead. These pollutants are commonly referred to as "criteria air pollutants."

Air quality within the LTAB is regulated by several agencies including the United States (U.S.) Environmental Protection Agency (EPA), California Air Resources

Board (CARB), El Dorado County AQMD and Tahoe Regional Planning Agency (TRPA). These agencies develop rules, regulations, policies, and/or plans to achieve the goals and directives imposed through legislation. Summary descriptions of the applicable agency regulations are provided in the following sub sections.

According to the TRPA ETCC (Table 7 below), of the eight threshold indicators under air quality and transportation, four have shown a positive trend over the past five years. The indicators for carbon monoxide, ozone, particulate matter, and vehicle miles traveled (VMT) are in non-attainment, while visibility and the Hwy 50 traffic volume thresholds are in attainment. For other criteria pollutants, the LTAB is either in attainment or unclassified for the remaining national, state, and regional standards.

Federal Regulations

The EPA is responsible for implementing the federal Clean Air Act (1970), including establishing health based National Ambient Air Quality Standards (NAAQS) for air pollutants, hazardous air pollutant standards, approval of state attainment plans, motor vehicle emission standards, stationary source emission standards and permits, acid rain control measures, stratospheric ozone (O_3) protection, and enforcement provisions. NAAQS are established for criteria pollutants under the Clean Air Act are O_3, CO, NO_2, SO_2, PM10 and PM2.5, and lead. The standards set for criteria pollutants are periodically reviewed and revised as applicable. The NAAQS describe acceptable air quality conditions designed to protect the health and welfare of the citizens of the nation and are shown in Table 5 below.

Table 5. California and National Air Quality Standards

Pollutant	Averaging Time	California Standards		National Standards		
		Concentration[3]	Method[4]	Primary [3,5]	Secondary[3,6]	Method[7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m³)		0.070 ppm (137 µg/m³)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m³	Gravimetric or Beta Attenuation	150 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m³		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m³	Gravimetric or Beta Attenuation	12.0 µg/m³	15 µg/m³	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m³)	Non-Dispersive Infrared Photometry	35 ppm (40 mg/m³)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m³)		9 ppm (10 mg/m³)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m³)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m³)	Gas Phase Chemiluminescence	100 ppb (188 µg/m³)	—	Gas Phase Chemiluminescence

Pollutant	Averaging Time	California Standards		National Standards		
		Concentration[3]	Method[4]	Primary [3,5]	Secondary[3,6]	Method[7]
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			

Pollutant	Averaging Time	California Standards		National Standards		
		Concentration[3]	Method[4]	Primary [3,5]	Secondary[3,6]	Method[7]
Hydrogen Sulfide	1 Hour	0.03 ppm (42 μg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 μg/m³)	Gas Chromatography			

Source: California Air Resources Board (5/4/16). *https://www.arb.ca.gov/research/aaqs/aaqs2.pdf*, accessed 10/18/18.

Notes:

California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m³ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national polices.

Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volumes, or micromoles of pollutant per mole of gas.

Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.

On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary of 15 $\mu g/m^3$ standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 15 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100ppb. Note that the national 1-hour standard is in units of parts ber billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identified to 0.075 ppm.

The ARB has identified leas and vinyl chloride as ‘toxic air contaminants’ with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

The national standard for leas was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until one year after and area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are “extinction of 0.23 per kilometer” and “extinction of 0.07 per kilometer” for the statewide and Lake Tahoe Air Basin standards, respectively.

State Regulations

The CARB is responsible for implementing the California Clean Air Act, 1988 and has established California Ambient Air Quality Standards (CAAQS), which are generally more restrictive than the NAAQS. In general, the CARB works with local agencies to develop policies, guidance, and regulations related to State and federal ambient air quality standards; coordinates with local agencies on transportation plans and strategies; and provides assistance to local districts and transportation agencies to meet air quality standards established under both the federal and California Clean Air Acts. The CARB is also the lead agency in the development of reduction strategies for greenhouse gases for the State of California (CARB, 2017). The CAAQS are presented in Table 5 above.

Local Regulations

El Dorado County Air Quality Management District

The El Dorado County AQMD is the primary agency responsible for air quality regulation in the LTAB. As part of that role, the El Dorado County AQMD has prepared the 2002 CEQA Guide to Air Quality Assessment. The purpose of the Guide is to facilitate the evaluation and review of air quality impacts for projects in El Dorado County that are subject to CEQA. The guide's intent is to facilitate and provide consistency in the preparation of analyses that inform decision-makers and the public about the air quality implications of a project. The Guide to Air Quality Assessment has established construction thresholds for air quality for priority pollutants shown in Table 6.

Table 6. El Dorado County AQMD Threshold of Significance

Pollutant	Construction Threshold
ROG	82 lbs/day
NOx	82 lbs/day
PM10	Project would cause or contribute to a violation of Ambient Air Quality Standards
CO	

Source: El Dorado County 2002

For construction projects, the County has identified screening criteria to assist with determining whether a construction project would substantially impact air quality. Screening of construction equipment exhaust emissions may be done using one of two possible methods:

1) based on fuel use; and

2) based on implementation of mitigation measures. Screening of fugitive dust PM10 emissions may be accomplished based on implementation of mitigation measures. If it is determined that a construction project would have a less than significant effect on air quality after use of the appropriate screening criteria, then modeling or other steps to estimate the amount of emissions that would be generated are not required (El Dorado County 2002).

Tahoe Regional Planning Agency

TRPA takes air quality into consideration in its planning and permitting activities to ensure compliance with State and District air quality standards for projects in the LTAB. Because the TRPA's authority is granted directly from Congress, the TRPA has the authority to adopt air quality and other environmental quality thresholds, and to enforce ordinances designed to achieve the thresholds. Table 7 below describes the ETCC for the LTAB.

Table 7. Tahoe Regional Planning Agency Air Quality Threshold of Significance

Pollutant	Construction Threshold	
ROG	82 lbs/day	
NOx	82 lbs/day	
CO	8-hour average: 6 parts per million (ppm)	1-hour average: 20 ppm
PM10	Annual arithmetic mean: 20 µg/m3	24-hour average: 50 µg/m3
PM2.5	Annual arithmetic mean: 12 µg/m3	24-hour average: 65 µg/m3
Ozone	8-hour average: 0.07 ppm	1-hour average: 0.08 ppm

Thresholds of Significance

The following thresholds are based on the CEQA Guidelines, as amended. For purposes of this Initial Study, an impact would be significant if implementation of the proposed project would result in any of the following:

- Conflict with or obstruct implementation of the applicable air quality plan.
- Exceed adopted air quality thresholds.
- Result in a cumulatively considerable net increase in an existing or projected air quality violation.
- Expose sensitive receptors to substantial pollutant concentrations.

- Result in substantial emissions (such as odors or dust) adversely affecting a substantial number of people.

Answers to Checklist Questions

a) **Less than significant impact**. Projects that could generate emissions in excess of the El Dorado County AQMD and the TRPA ETCC recommended significance thresholds would be considered to potentially conflict with or obstruct implementation of the applicable air quality plan. The AQMD has identified the most common sources of emissions from construction projects as site preparation, earthmoving, and general construction. The emissions generated from these activities include the following:

- Combustion emissions: (reactive organic gases [ROG], NOx, CO, SOx, PM10) from mobile heavy-duty diesel and gasoline powered equipment, portable auxiliary equipment, and worker commute trips;
- Fugitive dust (PM10) from soil disturbance or demolition.

The proposed project improvements would not result in long-term increases of mobile-source emissions beyond normal County drainage maintenance activities. Short-term construction-generated emissions are not projected to exceed applicable thresholds of significance due to the short duration required for construction and adherence to applicable County and TRPA requirements as discussed in the construction controls Section 4.5.1, Air Quality. The project is required to comply with AQMD Rule 223, which includes requirements for construction projects, including preparation of a Fugitive Dust Control Plan. Other control measures for construction and other earth moving activities must follow recommendations presented in Table 1 of Rule 223-1 'Best Management Practice'. These BMPs include, but are not limited to, stabilizing disturbed soil, limiting vehicular traffic, applying water to disturbed soil, limiting size of staging area, and use of tarps to cover loose soils. Implementation of these controls is anticipated to reduce construction emissions to less than significant.

Thus, implementation of the project would not conflict with nor obstruct implementation of applicable air quality plans.

b) **Less Than Significant**. Construction of the project would result in short-term increases in emissions caused by typical construction activities, such as grading and excavation, and vehicle exhaust from construction equipment. Increased emissions would consist of ROG, NO_2 and emissions of PM1O, CO, SO_2 and NOx. Emissions of ozone-precursors could result from the operation of both on and off-road motorized vehicles and equipment.

Anticipated construction equipment to be used for the proposed project includes: backhoe, loader, excavator, haul truck, and water truck. Project construction is scheduled for summer 2019 or 2020 and is expected to last approximately 30 days.

Emissions of airborne PM would be dependent on the amount of ground disturbance associated with site preparation activities and could result in increased concentrations of PM10.

Project Screening - Emissions

Construction would take place Monday through Friday for approximately 30 days. The project would disturb less than 2 acres at a time during construction. Air quality emissions analysis was recently performed for the nearby Bijou Area Erosion Control Project which is much larger (32 acres of disturbance) than the Oflyng Water Quality Project. Daily emissions modeling was conducted for the Bijou Area project which revealed that the maximum daily emissions would not exceed thresholds (City of South Lake Tahoe 2011a).

Since the Oflyng Water Quality Project is much smaller than the Bijou Area project it can be inferred that the daily emissions for the project would not exceed emissions thresholds. Air quality construction controls as listed in Section 4.5.1, including implementation of a Dust Control Plan and compliance with the AQMD requirements for implementation of BMPs during construction, would further reduce emissions and protect air quality. If ROG and NOx emissions are deemed not significant, then exhaust emissions of CO and PM10 from construction equipment, and exhaust emissions of all constituents from worker commute vehicles, may also be deemed not significant (El Dorado County 2002).

Project Screening – Fugitive Dust

For fugitive dust emissions (PM10), the screening approach is based on specific dust suppression measures that will prevent visible emissions beyond the boundaries of the project. If those measures are incorporated into project design, then further calculations to determine PM10 are not necessary.

The proposed project is required to implement dust control practices in compliance with the provisions of the El Dorado County Air Pollution Control District Rule 223, TRPA Regional Plan Goals and Policies related to Air Quality and the NAAQS. The following BMPs, at a minimum, will be implemented during construction.

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day or to the extent necessary to adequately suppress dust.

- All haul trucks transporting soil, sand, or other loose material on or off-site shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of the CCR).
- Post a publicly visible sign with the telephone and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The El Dorado County Air Pollution Control District's phone number shall also be visible to ensure compliance with applicable regulations.

Due to the temporary nature of emissions generation, implementation of a Dust Control Plan, and implementation of standard BMPs to reduce fugitive dust and other emissions, impacts would be less than significant.

c) **Less than significant impact**. Sensitive receptors include, but are not limited to, hospitals, schools, daycares, elderly housing, and convalescent facilities. These are areas where the people or institutions with people that are particularly susceptible to illness from environmental pollution, such as the elderly, very young children, people already weakened by illness (e.g., asthmatics), and persons engaged in strenuous exercise (University of California 2002).

The nearest sensitive receptor to the project area is the Tahoe Barton Hospital, located approximately 3.5 miles north. Residential uses adjacent to the project area may also be considered sensitive to emissions. However, it was determined that the emissions generated during project construction would be less than significant due to the temporary nature of activities and minor use of emissions generating equipment. Additionally, as discussed in above, the project design incorporates construction controls that protect against significant amounts of pollutants from being generated by the project during construction, including fugitive dust control, should persons susceptible to pollution be present within the project area. Project effects on sensitive receptors would therefore be less than significant.

d) Less than significant impact. During construction, operations may periodically generate odors from exhaust emissions, ground disturbance, and paving operations. Odors created by construction operations would be temporary, would occur within road ROWs, and would dissipate rapidly from the source with an increase in distance and due to the linear nature of construction activities.

e) Dust and emission reduction BMPs as discussed in section 4.5.1 would minimize the impact on ambient odors of the natural area. Once the project is complete it would not generate objectionable odors. Therefore, impacts would be short-term and would not be objectionable to a substantial number of residents within the area; impacts would be less than significant.

IV. Biological Resources

Would the project:

Environmental Issue	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 & Wildlife (CDFW) or U.S. Fish & Wildlife Service (USFWS)?		X		
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies or regulations or by the CDFW or USFWS?			X	
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?		X		
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?		X		
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				X
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?				X

Environmental Setting

To determine the potential for presence of threatened, endangered, or other special status species at the Oflyng project area, and to determine potential project impact on species and special habitats, a literature and database review was conducted from the following sources:

USFWS, 6/1/2018

- Federally Protected Species List for threatened, endangered, candidate, de-listed, and special concern species (USFWS 2018)

U.S. Department of Agriculture (USDA), 7/18/2018

- CALVEG geographic information system (GIS) layers (USDA, 2009)

California Department of Fish and Wildlife, 6/1/2018

- California Wildlife Habitat Relationship (CWHR) Model Version 9.0 (CDFW, 2018a)
- California Natural Diversity Database (CNDDB) (CDFW, 2018b)
- State & Federally Listed Endangered & Threatened Animals of California (CDFW, 2018c)

California Native Plant Society (CNPS), 6/1/2018

- Inventory of Rare and Endangered Plants of California (CNPS, 2018)

TRPA, 7/18/2018

- TRPA Threshold Evaluation Report (TRPA, 2011)
- TRPA Code of Ordinances (TRPA, 2015)

Wildlife

All species protected under the TRPA, USFWS, and the CDFW were evaluated for the project area using CWHR, CNDDB, additional background research, and on-site field investigations. According to the TRPA 2015 Threshold Evaluation Report and recent information provided by TRPA, a northern goshawk Protected Activity Center occurs approximately 0.75 miles southeast of the project area, deer fawning habitat exists 0.75 miles south of the project area, willow flycatcher habitat occurs 0.85 miles north of the project area, waterfowl habitat occurs 0.75 miles west of the project area, and suitable habitat for Sierra Nevada Yellow Legged Frog is present in Meyers Creek, west of the project area (NCE, 2018).

No special status animal species were found during the on-site field investigations (Figure 6).

Vegetation

Vegetation types were initially identified with the CALVEG GIS data (USDA 2009a) and then verified based on the NCE reconnaissance field survey. The entire project area can be described as a mix of forested vegetation within urban development, in the following major classifications, and can be referenced on Figure 7:

- Jeffrey Pine Alliance (CALVEG Code JP).
- Perennial Grasslands (CALVEG Code HM).
- Urban or Developed (CALVEG Code UB).

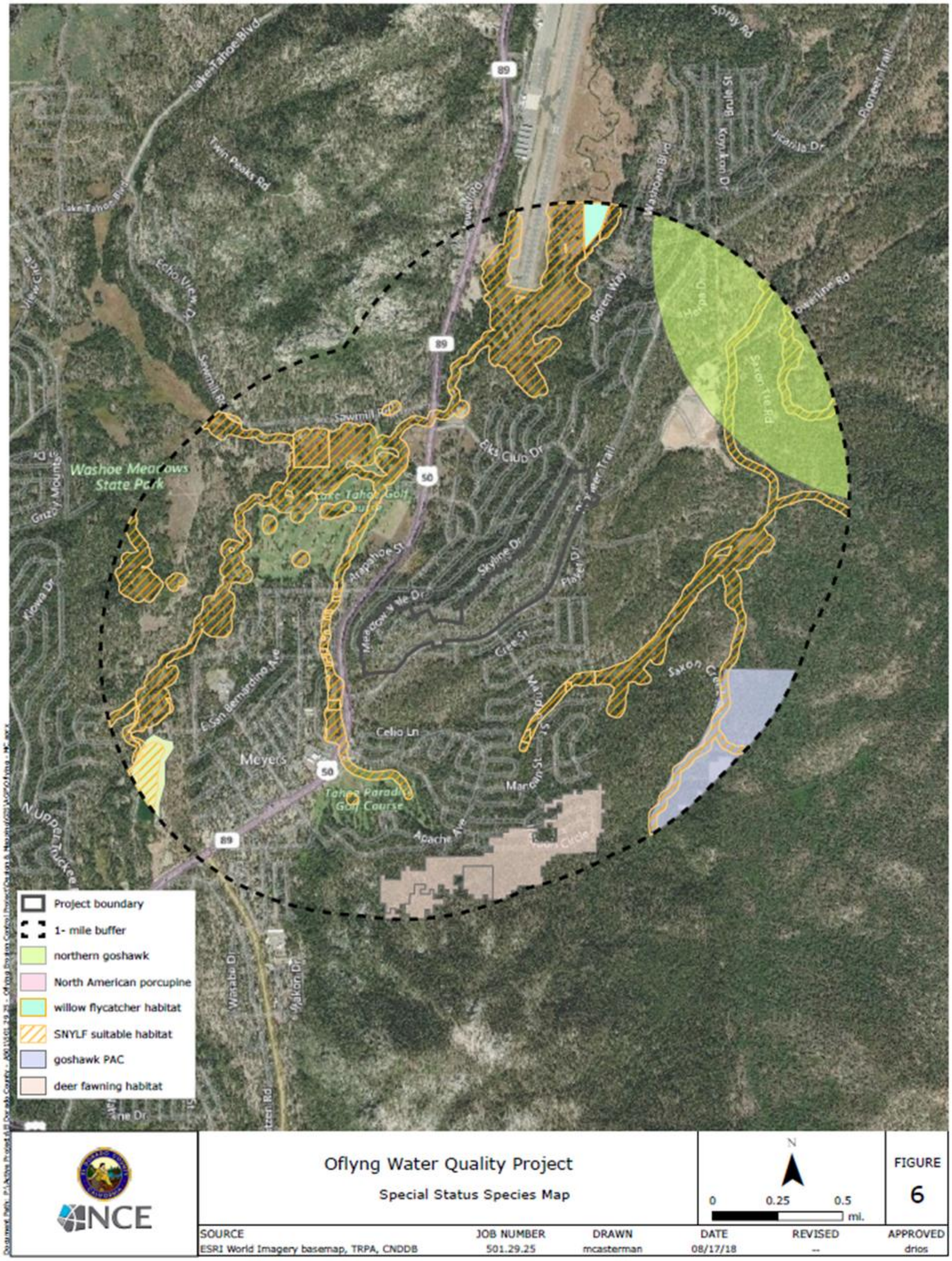


Figure 6. Special Status Species Map

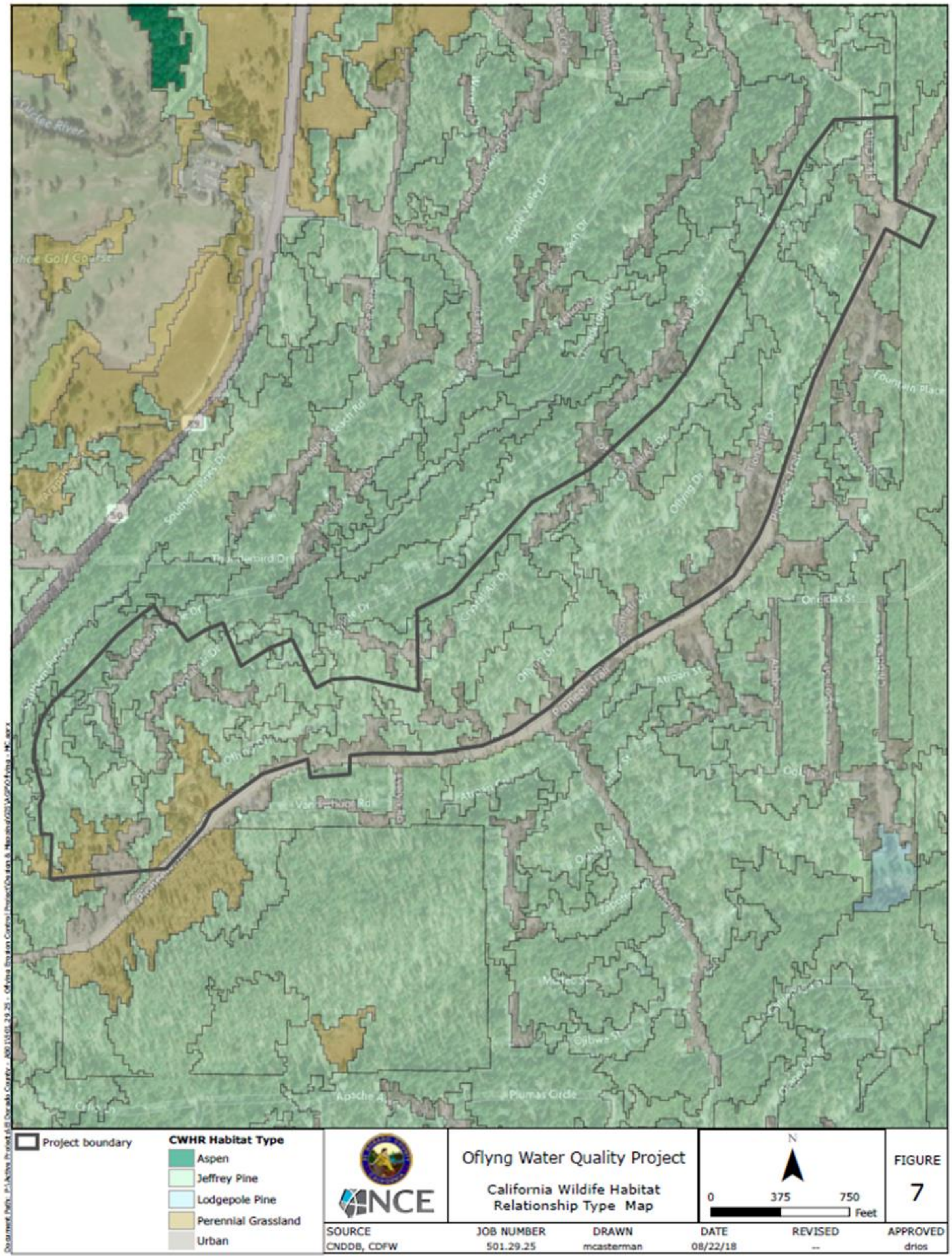


Figure 7. California Wildlife Habit Relationship Type Map

A botanical field survey was conducted by NCE biologists in June of 2018. No special status species were encountered in the project area during the botanical field surveys and no recorded occurrences of special status plant species occurrences were found within the project area during database research (NCE, 2018).

The full Botanical Baseline Report is attached as Appendix B.

Noxious and Invasive Weeds

A database review, field survey, and Invasive Plant Risk Assessment was prepared for the Oflyng project to identify noxious and invasive species within the project area and provide treatment options for populations encountered within the project area. The literature and database review included the *Sierra Nevada Forest Plan Amendment Table 1: Invasive non-native plant species occurrence in Sierra Nevada National Forest* (D'Antonio 2004); the *California Department of Food and Agriculture (CDFA) California Noxious Weed Species List* (CDFA, 2016); and the *Lake Tahoe Basin Weed Coordination Group Priority Invasive Weeds of Tahoe Basin List* (2011). Table 8 lists the invasive and/or noxious weed species that were documented in the project area.

Table 8. Invasive Plant Species within the Project Area

Species	Common Name	CDFA rating[1]	Cal-IPC rating[2]	Number of sites within:	
				USFS Parcels in Project Area	Entire Project Area (USFS + Non-USFS)
Bromus tectorum	cheatgrass	n/a	High	1	7
Cirsium vulgare	bull thistle	C	Moderate	0	2
Hypericum perforatum	klamathweed	C	Limited	0	1
Lepidium latifolium	perennial pepperweed	B	High	1	1
Verbascum thapsus	wooly mullein	n/a	Limited	0	4
TOTAL				2	15

[1] CDFA ratings - A-listed weeds: eradication or containment is required at the state or County level; B-listed weeds: eradication or containment is at the discretion of the County Agricultural Commissioner; C-listed weeds: eradication or containment required only when found in a nursery or at the discretion of the County Agricultural Commissioner. (California Department of Food and Agriculture 2009).

[2] California Invasive Plant Council (Cal-IPC) ratings- High: attributes conducive to moderate to high rates of dispersal and establishment; usually widely distributed among and within ecosystems. Moderate: impacts substantial and apparent, but not severe; attributes conducive to moderate to high rates of dispersal; distribution may range from limited to widespread. Limited: ecological impacts are minor or information is insufficient to justify a higher rating, although they may cause significant problems in specific regions or habitats; attributes result in low to moderate rates of invasion; distribution generally limited, but may be locally persistent and problematic. (California Invasive Plant Council 2010).

The Invasive Plant Risk Assessment report, contained in Appendix C, presents recommendations for treatment to prevent spread of invasive and noxious weeds during construction.

Wetlands

A wetlands delineation survey was conducted by NCE wetland specialists in June of 2018 to evaluate the potential jurisdictional status of waters of the United States for the Oflyng Water Quality Project. Within the survey area no wetlands were recognized by the United States Fish and Wildlife Service National Wetlands Inventory.

NCE delineated two unnamed drainages that are potentially jurisdictional waters of the United States and State of California due to the presence of ordinary high water mark (OHWM) indicators and a connection to the Upper Truckee River, which is a tributary to Lake Tahoe, a navigable waterway. No wetlands or other special hydrological features (including seeps, springs) were identified onsite.

The full Aquatic Resources Delineation Report is included as Appendix E.

Stream Environment Zones

The TRPA Code of Ordinances defines SEZ as, "Generally an area that owes its biological and physical characteristics to the presence of surface or ground water." This definition includes perennial, intermittent, and ephemeral streams; wet meadows, marshes, and other wetlands; riparian areas, beaches, and other areas expressing the presence or influence of surface or ground water. The TRPA regulates SEZ within the Tahoe Basin under the Clean Water Act's 208 Plan program.

The project contains a small area of SEZ zone (TRPA Land Capability area 1B) as shown on Figure 8. This is the same area that NCE identified as containing OHWM indicators within a channel and is therefore potentially jurisdictional under Section 404 of the Clean Water Act due to connection to the Upper Truckee River. Planned impact within this area is armoring (placement of rock) within the channel for stabilization against erosion.

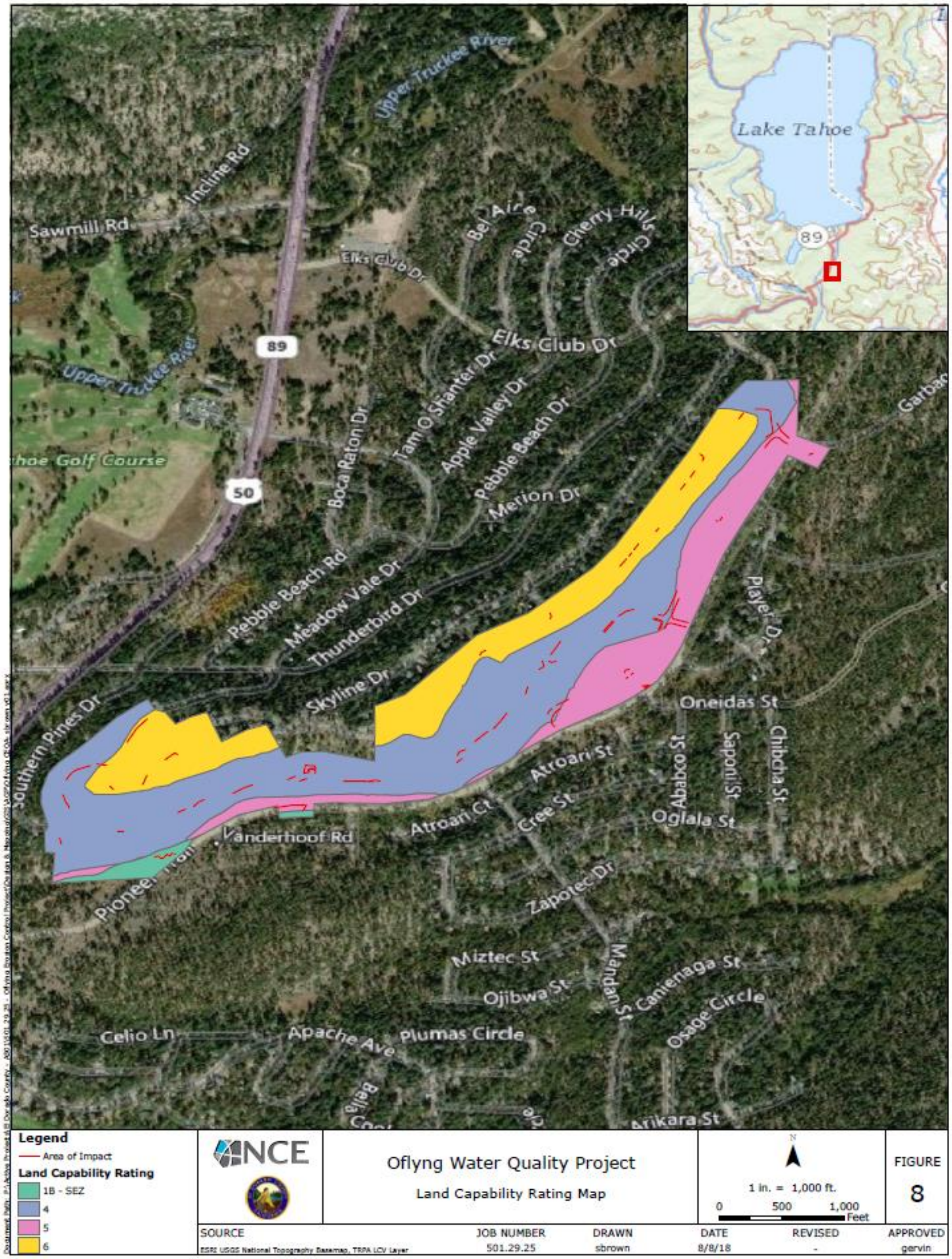


Figure 8. Land Capability Rating Map

Thresholds of Significance

For purposes of this Initial Study, an impact would be significant if implementation of the proposed project would do any of the following:

- 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 USFWS.
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFW or USFWS.
- 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.
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

Answers to Checklist Questions

a) **Less than significant impact with mitigation**. As discussed in the Environmental Settings section, the project area was assessed for the presence of any threatened, endangered, or special status species that may occur in the project area.

Wildlife

All species protected under the TRPA, USFWS, and the CDFW were evaluated for the project area using CWHR, CNDDB, additional background research, and on-site investigations.

No special status animal species were found during the on-site field investigations. .

Suitable habitat for a range of special status species does exist within one mile of the project area, including habitat for the bald eagle, bank swallow, willow flycatcher, northern goshawk, osprey, California spotted owl, waterfowl, Sierra Nevada mountain beaver, American badger, Sierra Nevada snowshoe hare, fisher (West Coast distinct population segment), Sierra Nevada red fox, and mule deer.

Of these, bald eagle, bank swallow, northern goshawk, osprey, waterfowl, and mule deer have a moderate likelihood of occurring within the project boundary as they are not uncommon species to observe in this vicinity. However, suitable nesting or denning habitat does not exist within the project area; therefore, it is unlikely that they would use the project area for reproduction.

In addition, there is a low potential for willow flycatcher to occur within the project area. Although suitable habitat does exist within one mile of the project, habitat requirements for cover, breeding, and foraging are lacking within the project area. This species may pass through but is not expected to establish a nesting site in the project area.

The remaining species noted above are not expected to occur as they have very isolated populations, specific habitat requirements, and/or are sensitive to human disturbances. These include California spotted owl, Sierra Nevada mountain beaver, American badger, Sierra Nevada snowshoe hare, fisher, and Sierra Nevada red fox.

The proposed project would have a less-than-significant impact on wildlife.

Migratory Birds

It is possible that adjacent habitat could be temporarily disturbed during construction due to noise and vibrations from construction equipment. This would be a potentially significant impact on migratory birds. Implementation of Mitigation Measure BR-1 would reduce potentially significant impacts to migratory birds to less than significant.

b) **Less than significant impact.** As discussed in the environmental settings section, the project area contains a small area of TRPA mapped SEZ in the southwestern portion of the project. Within this SEZ, the project proposes to armor (place rock) in an existing channel that exhibits signs of erosion. Placement of armoring would not require grading or tree removal in the SEZ.

The TRPA prohibits disturbance within Land Capability District 1B (SEZ) but provides an exemption for erosion control projects. This project is an erosion control and water quality improvement project; therefore, the following findings can be made that allow disturbance within the SEZ according to TRPA Code of Ordinances subsection 30.5.2:

a. The project, program, or facility is necessary for environmental protection.

This project is within TRPA designated Priority 2 watersheds 44 (Upper Truckee River) and 43 (Trout Creek) for implementation of BMPs and water quality features. The project is listed on the TRPA EIP list for water quality and soil conservation. Projects listed on the EIP list are identified as necessary for environmental protection.

b. There is no reasonable alternative, including relocation, which avoids or reduces the extent or encroachment in the SEZ.

   In order to protect against continued erosion and sediment transport at this location, and ultimately water quality, armoring the channel (i.e., placement of rock) is required. Armoring the channel using this treatment option would not require grading or tree removal and would provide for minimal encroachment while protecting the area.

c. Impacts are fully mitigated.

   Section 4.5.3 (Geology and Soils) and 4.5.5 (Hydrology and Water quality) describe construction controls that are designed as part of the project and would reduce potential impacts to the SEZ. Some of these BMPs include revegetation, erosion control products, limiting disturbance, covering of dirt piles during rain events, and use of fencing to limit disturbance to SEZ areas not required for disturbance. Additionally, because the project will involve ground disturbance in excess of one acre, the County will be required to apply for coverage under the Lake Tahoe Construction General Permit. This permit will require the County to develop and implement a project-specific Stormwater Pollution Prevention Plan (SWPPP). This plan shall ensure temporary Best Managements Practices (BMPs) are properly installed and maintained to minimize water quality impacts to sensitive habitats.

   Therefore, temporary impacts to the SEZ for purpose of installing water quality protection would be less than significant because BMPs and a project specific SWPPP would be implemented during construction, and the area would be restored after construction is complete.

c) **Less than significant impact with mitigation**. As discussed in the environmental setting section, a wetland delineation was conducted for the Oflyng project area. A potentially jurisdictional drainage under Section 404 of the Clean Water Act (CWA) was observed in the project area. No wetlands, springs, or other wetland features including marsh, vernal pool, etc. were identified in the project area. The project proposes minor fill within a potential WOUS for purposes of placing rock to armor a section of channel in the SEZ area described above. Placement of fill in this channel could be a potentially significant impact and would require permitting pursuant to sections 401 and 404 of the CWA or California Department of Fish and Game Code Section 1602 (Streambed Alteration Agreement).

With implementation of mitigation measure BR-2, which outlines requirements for obtaining applicable permits pertaining to impact of waters of the US and state of California, the impact would be mitigated to less than significant.

d) **Less than significant impact with** mitigation. The channels within the project area do not contain sufficient habitat or sustained water flows to support fish species, therefore there is no potential to impact migratory fish. The project area is not a known wildlife corridor; however, it is possible for migratory species such as birds and mammals to passively use the area. The project does not propose to modify any undeveloped land areas in a manner that would impede wildlife migration, and the project does not propose tree removal that could affect migratory bird species. As provided in Mitigation Measure BR-1, the project will be surveyed for migratory birds nesting in the project area prior to construction, and buffers around the nests will be established, if warranted.

e) **No Impact**. The project does not propose tree removal. Therefore, there would be no conflict to the TRPA Code of Ordinances Tree Removal ordinance. There would be no impact.

f) **No Impact**. The project does not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan as none exist for the project area.

Mitigation Measures

BR-1: If any construction activities (e.g., grubbing or grading) are scheduled during the bird nesting season (typically defined by CDFW as February 1 to September 1), the County or approved construction contractor shall retain a qualified biologist to conduct a pre-construction survey of the project area to include a 100-foot buffer, as access is available, to locate active bird nests, identify measures to protect the nests, and locate any other special status species. The pre-construction survey shall be conducted no more than 14 days prior to the implementation of construction activities (including staging and equipment storage). Any active nest should not be disturbed until young have fledged or under the direction provided by a qualified biologist. Any special status species shall not be disturbed unless under the direction provided by a qualified biologist. If an active nest is found during construction, disturbance should not occur without direction from a qualified biologist.

BR-2: Prior to construction, the County shall apply for and obtain a U.S. Army Corps of Engineers Section 404 CWA permit for proposed impacts to a water of the U.S., including applicable permits from the state of California, including a Section 401 permit from the Lahontan Regional Water Quality Control Board and California Department of Fish and Game Code Section 1602 (Streambed Alteration Agreement), if applicable. These permit applications establish appropriate mitigation measures for impacts to waters of the U.S. and waters of the State that protect against significant impacts.

V. Cultural Resources

Would the project:

Environmental Issue	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 CEQA Guidelines § 15064.5?		X		
b) Cause a substantial adverse change in the significance of a unique archaeological resource pursuant to CEQA Guidelines § § 15064.5?		X		
c) Disturb any human remains, including those interred outside of formal cemeteries?		X		

Environmental Setting

Project screening for cultural and historic resources as part of the Oflyng Water Quality Project consisted of an archival review, Native American consultation, an intensive pedestrian survey, recordation of any identified resources, and evaluation of those resources. The associated Archaeology Survey Report (ASR) (Appendix D) addresses only archaeological resources that date to the prehistoric and historic periods. The Area of Potential Effect (APE) includes County ROW and existing residential parcels identified by the County on which improvements may be constructed.

Key objectives of the ASR included:

- Establishing an APE;
- Identifying prehistoric, ethnohistoric, and/or historic period archaeological resources within or immediately adjacent to the APE;
- Evaluating identified resources as to their eligibility for listing on the National Register of Historic Places (NRHP) and the
- California Register of Historical Resources (CRHR); and
- Providing a determination of effect and management recommendations for those properties considered eligible to the NRHP/CRHR

In total, 24.7 acres within the project area were surveyed. Two resource sites were mapped in the project area. Results of the field inventory are as follows:

- The historic archaeological resource Pine Grove House Way Station, site P-09-005228, is mapped in the project area; however, evidence of such a resource was not identified. As such, it was not evaluated. A DPR continuation sheet with an updated map has been prepared.
- A segment of the Lake Valley Utility Line, site P-09-003805, is mapped through the project area; however, evidence of such a resource was not identified. As such, it was not evaluated. A DPR continuation sheet with an updated map has been prepared.

The ASR identified no significant cultural resources within the project's APE.

Regulatory Environment

National Historic Preservation Act

The National Historic Preservation Act (NHPA) was enacted by Congress in 1966 to establish national policy for historic preservation in the United States. The NHPA establishes the role and responsibilities of the federal government in historic preservation. The NHPA directs agencies to identify and manage historic properties under their control; to undertake actions that will advance the Act's provisions, and avoid actions contrary to its purposes; to consult with others while carrying out historic preservation activities; and to consider the effects of their actions on historic properties.

California Register of Historical Resources

The CRHR is a guide to cultural resources that must be considered when a government agency undertakes a discretionary action subject to CEQA. The CRHR helps government agencies identify and evaluate California's historical resources and indicates which properties are to be protected, to the extent prudent and feasible, from substantial adverse change (PRC § 5024.1(a)). Any resource listed in, or eligible for listing in, the CRHR is to be taken into consideration during the CEQA process.

Public Resources Code § 5097.5:

PRC § 5097.5 prohibits excavation or removal of any "vertebrate paleontological site […] or any other archaeological, paleontological or historical feature, situated on public lands, except with express permission of the public agency having jurisdiction over such lands." Public lands are defined to include lands owned by or under the jurisdiction of the state or any city, county, district, authority or public corporation, or any agency thereof. PRC § 5097.5 states that any unauthorized disturbance or removal of archaeological, historical, or paleontological materials or sites located on public lands is a misdemeanor.

Tahoe Regional Planning Agency

The project is subject to Section 67 of the TRPA Code of Ordinances (Historic Resource Protection). Section 67.3 – *Resource Projection* outlines requirements for the accidental discovery of resources during construction (subsection 67.3.1), requirements for site survey and consultation with the Washoe Tribe (subsection 67.3.2), and requirements for protection of known resources.

Thresholds of Significance

For purposes of this Initial Study, an impact would be significant if implementation of the proposed project would do any of the following:

- Cause a substantial change in the significance of a historic or archaeological resource pursuant to CEQA Guidelines § 15064.5.
- Cause a substantial adverse change in the significance of a unique archaeological resource pursuant to CEQA Guidelines § 15064.5.
- Disturb any human remains, including those interred outside of formal cemeteries.

Answers to Checklist Questions

a) **Less than significant with mitigation incorporated**. The APE consists mostly of developed roadways within a developed residential setting. As such, the majority of the ground surface has undergone some level of disturbance. In addition, the project proposes only stormwater improvements that would be constructed at grade and with minimal excavation/trenching and primarily within road ROWs.

However, without physical confirmation, the possibility of exposing previously undiscovered buried historic, archaeological or paleontological resources still remains. In particular, two resources were identified in the ASR research, although no current surface evidence is apparent. Based on the archival research and site reconnaissance conducted as part of the cultural resources investigation, the project area has low potential to contain undocumented historic or paleontological resources. While neither historic or paleontological resources are likely to be affected by the project, there is general concern that the cumulative loss of any cultural resources would be significant, thus mitigation for inadvertent discoveries is recommended. Incorporation of the mitigation measure CR-1 would ensure that potential impacts to buried or previously undiscovered resources are less than significant.

b) See answer to Checklist Question a).

c) **Less than significant with mitigation incorporated**. Based on the prehistoric and historic uses of the area and the prior ground disturbance of the project area, human remains are not expected to be discovered during construction activities. However, in the event that unknown burials or human remains are discovered, mitigation measure CR-2 would ensure that potential impacts to human remains would be less than significant.

Mitigation Measures

CR-1: The Contractor and key members of crews working on excavation, trenching, and grading for sites preparation shall be instructed to be wary of the possibility of destruction of buried cultural resource materials. They shall be instructed to recognize signs of prehistoric use and their responsibility to report any such finds (or suspected finds) immediately, as specified by measure CR-2 below, so damage to such resources may be prevented. No historic properties will be affected in compliance with Advisory Council on Historic Preservation regulations (36 C.F.R. part 800). However, in the event that cultural resources are discovered during Project implementation, Project personnel will halt all activities in the immediate area and will notify a qualified archaeologist to determine the appropriate course of action.

CR-2: Final plans and specifications shall include guidance in the event that human remains are discovered. Work in the area surrounding the remains shall cease and the County Coroner and local law enforcement shall be notified immediately of the discovery in accordance with PRC Section 5097.98 and Section 7050.5 of California Health and Safety Code to conduct proper evaluation and treatment of remains. The coroner and law enforcement agency with jurisdiction will evaluate the find to determine whether it is a crime scene or a burial. If human remains are determined to be associated with an archaeological site (burial), the California OHP will be notified. The OHP will work with appropriate tribes to determine measures to take.

VI. Energy

Would the project:

Environmental Issue	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?			X	
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?				X

Environmental Setting

The goal of conserving energy implies the wise and efficient use of energy. The means of achieving this goal include:

- Decreasing overall per capita energy consumption,
- Decreasing reliance on natural gas and oil, and
- Increasing reliance on renewable energy resources.

TRPA has adopted a Regional Plan for energy, which includes the following goal:

> Goal E1 – Promote energy conservation programs and development of alternative energy sources to lessen dependence on scarce and high-cost energy supplies.

Thresholds of Significance

For purposes of this Initial Study, an impact would be significant if implementation of the proposed project would do any of the following:

- 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.
- Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

Answers to Checklist Questions

a) **Less than significant impact**. The project would not result in a new need or use of energy. Energy for the project would only be required during construction and would not require additional capacity on a local or regional scale.

b) **No Impact**. The California Air Resources Board has set a goal to increase energy efficiency and derive 50% of electricity in 2030; the project will have no effect on this program. Additionally, the project would not conflict or obstruct the goals and policies of the TRPA Regional Plan for energy.

Goal E1 – Promote energy conservation programs and development of alternative energy sources to lessen dependence on scarce and high-cost energy supplies.

The following energy policy in the Regional Plan, pertaining to the Project, will be implemented: E-1.1, Encourage recycling of waste products.

Because the project will conform with the Goals and Policies of the Regional Plan and state of California energy goals, there would be no impact.

VII. Geology & Soils

Would the project:

Environmental Issue	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 risk of loss, injury, or death involving:				X
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.				X
ii. Strong seismic ground shaking?				X
iii. Seismic-related ground failure, including liquefaction?				X
iv. Landslides?				X
b) Result in substantial soil erosion or the loss of topsoil?			X	
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?				X
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?				X
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 wastewater?				X
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				X

Environmental Setting

The project is located primarily within previously disturbed road ROW and public parcels within the unincorporated Meyers residential area in El Dorado County California, in the Lake Tahoe basin of the Sierra Nevada Mountain Range. The Lake Tahoe basin elevations range from 6,225 feet at lake level to 10,891 feet at the highest point in the basin. Lake Tahoe is the second deepest lake in the United States and represents the westernmost extension of the basin and range fault block system present in much of the inland western United States. The Lake Tahoe Basin is seismically active with many known faults including the North Tahoe Fault, West Tahoe Fault, and the East Tahoe Fault (Saucedo, 2005). The Geologic Map of the Lake Tahoe Basin, California and Nevada has a northeast-southwest trending Quaternary fault mapped through the project area, but its continuation or existence is uncertain (Saucedo, 2005) (Figure 9). A Quaternary fault is one that has been recognized at the surface and has moved in the past 1,600,000 years.

The approximate elevation range of the project area is between 6,315 to 6,535 feet above mean sea level. Project area topography consists of gently sloping to steep terrain with typical slopes ranging from 3% to 30% with some areas exceeding 60% as shown on Figure 10.

The Sierra batholith was formed during the late Jurassic and early Cretaceous periods due to the collision of tectonic plates. Materials from the subducting oceanic plate melted as it moved under the continental margin, forming volcanic or plutonic masses that slowly worked their way toward the surface. Intrusions and compressions caused a composite plutonic mass to form, that was some 75 miles wide running the entire length of California. The continental margin swelled upward, and large amounts of overlying rock were removed by erosion. In time, the uplifted roof of the batholith was exposed and subjected to erosion (Saucedo, 2005).

The Tahoe Basin is an intermountain basin formed by faulting within the Sierra batholith. In the Lake Tahoe Basin and nearby areas, major landforms developed due to faulting, warping, or a combination of both processes. Lake Tahoe occupies a down-dropped block bordered by steeply dipping faults. The major north-south fault zone which separates the eastern edge of the Sierra Nevada Mountains from the sequence of parallel fault block mountains of Nevada and Utah is located about six miles east of the Lake Tahoe Basin. The east front of the Carson Range is a large fault scarp more than 4,000 feet high. Faults along the lake margins have not been delineated in detail, but the presence of steep, near vertical drop-off areas along the shoreline clearly suggest that faults are present. Numerous other north and northeast-trending faults have been identified and are associated predominantly with Basin and Range tectonics and the emplacement of intrusive igneous rocks. Numerous fault lines are depicted in the vicinity of the expanded project area and most are roughly north-south trending.

The project area is composed of two geologic map units (Saucedo 2005). Pleistocene alluvium deposits (Q) and Pleistocene to Holocene glacial deposit (Qg) (Figure 9). Pleistocene glaciation played a major role in shaping the landscape visible today. Four glacial episodes were evident, which is common in most portions of the basin. The most easily recognized features are moraines that formed along the edges of glacial lobes as they advanced away from the mountains.

There are five soils mapped in the project area (Figure 11). The predominant soil unit is 7442, the Christopher loamy coarse sand, 9 to 30 percent slopes (NRCS 2018). This soil consists of loamy coarse sand occurring on hillslopes on outwash terraces, is somewhat excessively drained, and contains a depth to water table of more than 80 inches, and the runoff class is medium. This soil is also present at 0 to 9 percent slopes (unit 7441, Figure 11). Other soil within the project area is composed of Jabu coarse sandy loam, 0 to 9 percent slopes, and 9 to 30 percent slopes (units 7461 and 7462, Figure 11). This soil is composed of coarse sandy loam, gravelly coarse sandy loam, and stratified fine sandy loam to silty clay (NRCS 2018). This soil is naturally well drained, and the runoff class is medium. The depth to water table is approximately 39 to 79 inches. A small portion of the project area also contains oneidas coarse sandy loam, 0 to 5 percent slopes (unit 7491, Figure 11). This soil is found on the east and southeastern fringes of the project area and is composed of coarse sandy loam and loamy coarse sand, found on hillslope landmarks with outwash terraces. This soil type is shallow, poorly drained, and contains a depth to water table of approximately 8 to 18 inches.

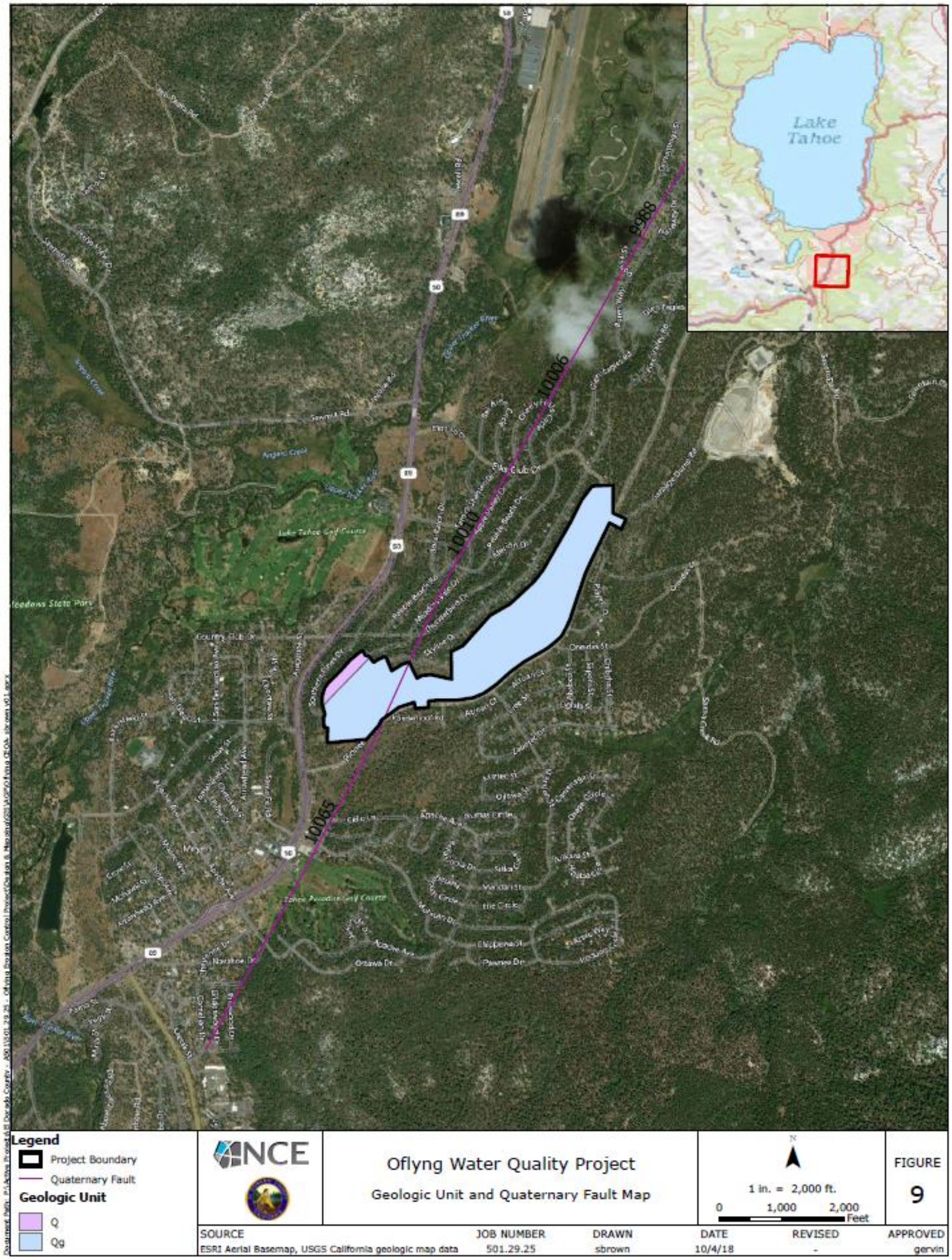


Figure 9. Geologic Unit and Quarternary Fault Map

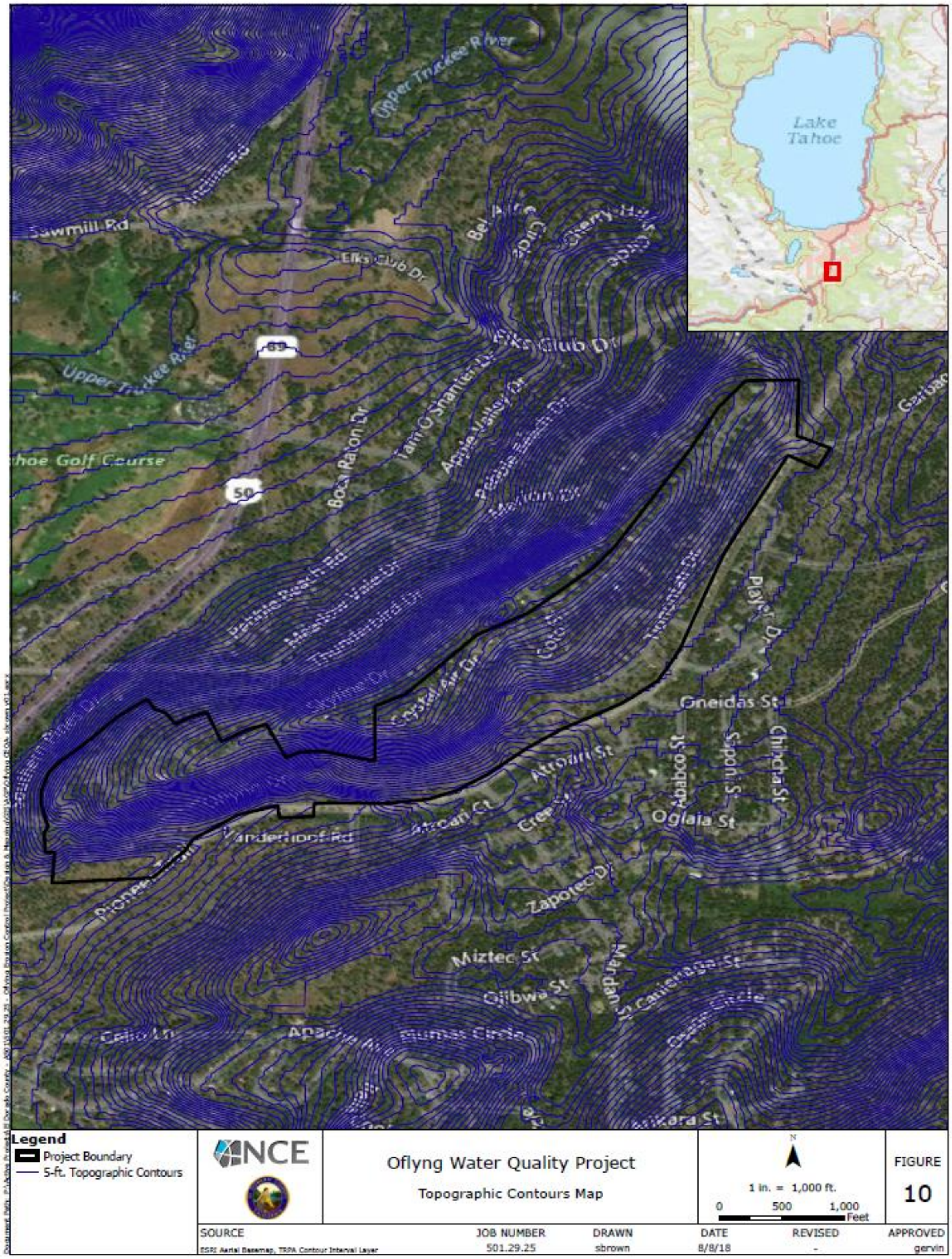


Figure 10. Topographic Contours Map

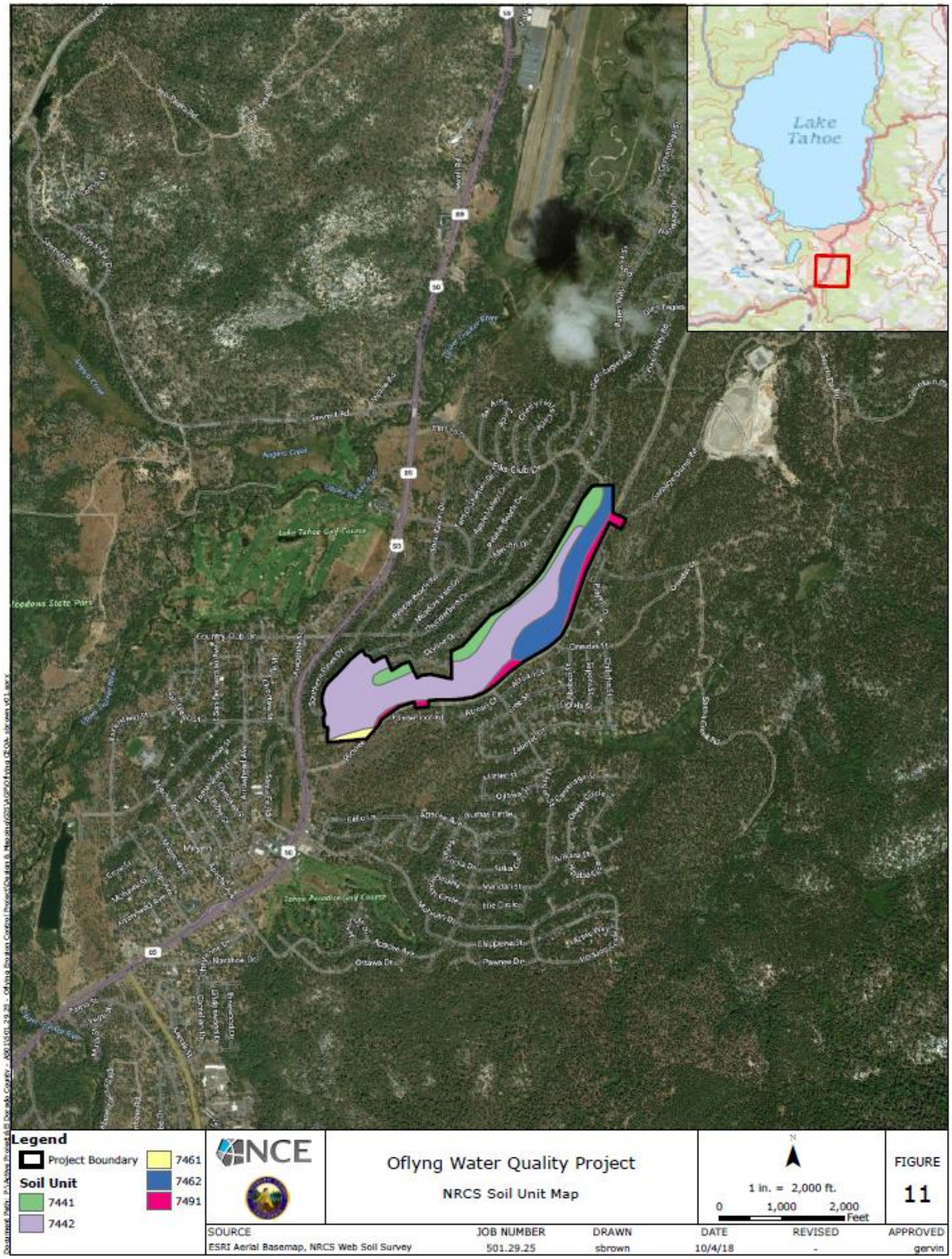


Figure 11. NRCS Soil Unit Map

Thresholds of Significance

For purposes of this Initial Study, an impact would be significant if the proposed project would result in activities that would:

- Directly or indirectly cause potential substantial adverse effects, including risk of loss, injury, or death by allowing a project to be built on a site that would introduce either geologic or seismic hazards without protection against those hazards.
- 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.
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

Answers to Checklist Questions

a) **No Impact.** The project will be constructed in an already developed area and will be constructed at grade. The project does not include the construction of features or structures that would have potential to directly or indirectly cause potential substantial adverse effects, including risk of loss, injury, or death; therefore, there is no impact.

i) **Earthquake fault**. The project is not located in an Alquist-Priolo Earthquake Fault Zone (California Geological Survey 2005). The purpose of the Alquist-Priolo Geologic Hazards Zones Act is to prohibit the location of most structures for human occupancy across the traces of active faults and to mitigate potential hazards of fault-rupture. According to the Earthquake Potential Map for Portions of Eastern California and Western Nevada, the southern Tahoe Area is considered to have a relatively low to moderate potential for shaking caused by earthquakes (California Geological Survey 2005). The Geologic Map of the Lake Tahoe Basin, California and Nevada has a northeast-southwest trending fault mapped through the project area, but its continuation or existence is uncertain (Saucedo, 2005).

ii) Seismic Shaking. The intensity of ground shaking due to an earthquake is determined by several factors including the proximity of the earthquake, the magnitude of the earthquake, fault rupture characteristics, and the type of soil or bedrock in the area. The International Building Code's Seismic Zone Map of the United States places El Dorado County, including the project area, within Seismic Hazard Zone III, which corresponds to an area that may experience damage due to earthquakes having moderate intensities of V or more on the Modified Mercalli Scale, which corresponds to maximum momentum magnitudes of 4.9 or greater. Ground shaking also increases the risk of avalanche during winter months. The project is primarily developed and treed, which minimizes the potential for avalanche to affect the project. No buildings are proposed with the project therefore there is no potential to expose people or structures from substantial adverse effects due to seismic ground shaking.

iii) Risk of ground failure. Liquefaction occurs in water-saturated sediments that are shaken during moderate to large earthquakes. Liquefied soil may become unstable and fail causing damage to structures. Soils most susceptible to liquefaction are saturated, loose, clean, uniformly graded, and fine-grained sand deposits (California Division of Mines and Geology 1997). As discussed in the Environmental Settings section, the mapped soil in the project area is late Pleistocene age (older than 100,000 years) deposits and loamy coarse sand. Sediments deposited within the past few thousand years are generally much more susceptible to liquefaction than the more resistant Pleistocene sediments; and pre-Pleistocene sediments are generally immune to liquefaction (California Division of Mines and Geology 1997). Older, well-consolidated, well-graded soils make failure from liquefaction very unlikely, but under the right hydrologic conditions, this unit might be susceptible to liquefaction during seismic events.

iv) Landslides. A landslide is the downslope movement of rock, debris, earth, or soil. Landslides occur when gravitational and other types of shear stresses within a slope exceed the shear strength of the materials that form the slope. Factors contributing to landslide include proximity to faults, springs, seeps, or shallow groundwater, and unstable or steep terrain. The project area primarily has a depth to groundwater of more than 80 inches, is moderately to gently sloping, and does not contain unstable soils; therefore, landslides are unlikely.

b) Less than significant impact. During construction, the project may have potential to cause the loss of topsoil or cause erosion during earth moving and clearing activities. The project will implement the erosion control, geology and soils BMPs as outlined Section 4.5 – *Construction Controls* that would prevent significant soil loss or erosion during construction, including use of revegetation to stabilize disturbed areas. Implementation of the project SWPPP will further reduce potential for erosion and topsoil loss during construction.

Once the project is constructed, it is anticipated for there to be a beneficial impact on erosion and topsoil, due to the constructed stormwater improvements that will better manage and direct stormwater flows through the area and capture sediments. The project has been designed with a combination of erosion control, stormwater, and water quality treatments that would reduce erosion and topsoil loss in the project area.

c) **No Impact.** As discussed above, the area is already developed, residential, and the project proposes only stormwater improvements that would be constructed at grade and with minimal excavation/trenching and primarily within road ROWs. These areas have already been determined through past construction to be suitable for development and are not located in areas with unstable soils or subject, and the proposed improvements are not sensitive to landslide, lateral spreading, subsidence, liquefaction or collapse; therefore, there would be no impact.

d) **No Impact.** The project area does not contain expansive soils as defined in Table 18-1-B of the Uniform Building Code (1994). As discussed in the Environmental Settings section, soils within the project area are primarily composed of loamy coarse sand and contain a very low clay content and are not susceptible to expansion. There would be no impact.

e) **No Impact.** The project would not require the use of septic tanks or alternative wastewater disposal systems. The project area contains sewers that can support the minimal amount of wastewater generated by dust control suppression activities.

f) **No Impact.** No paleontological resources or unique geologic features have been identified in the project area and the likelihood of them being present in this area is considered very low. Additionally, excavation depths will be minor and within existing ROW areas, and not at depths that would encounter such resources. The project would have no impact on paleontological resources or unique geologic features.

VIII. Greenhouse Gas Emissions

Would the project:

Environmental Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?			X	
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?			X	

Environmental Setting

Federal Regulatory Environment

The U.S. EPA currently has no regulations or legislation enacted specifically addressing greehouse gas (GHG) emissions reductions and climate change at the project level. In addition, the U.S. EPA has not issued explicit guidance or methods to conduct project level GHG analysis.

State Regulatory Environment

The State of California has taken several legislative steps including Assembly Bills (AB) and Executive Orders (EO) to reduce increases in GHG emissions. A summary of California legislative actions is provided below:

- AB 1493 Vehicular Emissions: Greenhouse Gases, 2002: This bill requires the CARB to develop and implement regulations to reduce automobile and light truck GHG emissions. Stricter emission standards were designated by AB 1493 to apply to automobiles and light trucks beginning with the 2009 model year.
- EO S-3-05 (June 1, 2005): The goal of this EO is to reduce California's GHG emissions to 1) year 2000 levels by 2010, 2) year 1990 levels by 2020, and 3) 80 percent below year 1990 levels by 2050. In 2006, this goal was further reinforced by AB 32.
- AB 32, The Global Warming Solutions Act of 2006. This bill sets the same overall GHG emissions reduction goals as outlined in EO S-3-05 while further mandating that the CARB create a scoping plan and implement rules to achieve 'real, quantifiable, cost-effective reductions of greenhouse gasses.'

- EO S-20-06 (October 18, 2006): This EO defines the roles and responsibilities of the Secretary of the California Environmental Protection Agency and state agencies in regard to climate change.
- EO S-01-07 (January 18, 2007): This EO sets forth a low carbon fuel standard for California. Under the EO, the carbon intensity of California's transportation fuels is to be reduced by at least 10 percent by the year 2020.
- SB 97 Chapter 185, 2007, Greenhouse Gas Emissions: Required the Governor's Office of Planning and Research to develop recommended amendments to the CEQA Guidelines for addressing GHG emissions. The amendments became effective on March 18, 2010.
- SB 375, Chapter 728, 2008, Sustainable Communities and Climate Protection: This bill requires the CARB to set regional emissions reduction targets from passenger vehicles. The Metropolitan Planning Organization for each region must then develop a Sustainable Communities Strategy that integrates transportation, land use, and housing policies to plan for the realization of the emissions target for their region.
- SB 391, Chapter 585, 2009 California Transportation Plan: This bill requires the State's long-range transportation plan to meet California's climate change goals under AB 32.

Local Regulatory Environment

The El Dorado County AQMD is the primary agency responsible for air quality regulation in the LTAB. As part of that role, the El Dorado County AQMD has prepared CEQA Guide to Air Quality Assessment. The purpose of the guide is to facilitate the evaluation and review of air quality impacts for projects in El Dorado County that are subject to CEQA. The guide's intent is to facilitate and provide consistency in the preparation of analyses that inform decision-makers and the public about the air quality implications of a project. At this time, El Dorado County does not have any adopted quantitative federal or state guidelines for GHG emission impacts.

However, the El Dorado County AQMD was part of the committee of air districts in the Sacramento Region involved in the development of GHG thresholds of 1,100 metric tons CO_2E per year for the construction phase of projects or the operational phase of land use development projects, or 10,000 direct metric tons CO_2E per year from stationary source projects. If a project exceeds this threshold, the level of mitigation is based on demonstrating consistency with CARB's Climate Change Scoping Plan and the AB 32 State goals for reducing GHG emissions, which is currently 21.7 percent reduction from 2020 "no action taken" emissions (SMAQMD 2014).

Thresholds of Significance

The following thresholds are based on the CEQA Guidelines, as amended. For purposes of this Initial Study, an impact would be significant if implementation of the proposed project would result in activities that:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.
- [Exceed 1,100 metric tons CO_2E per year for the construction phase of projects or the operational phase of land use development projects, or 10,000 direct metric tons CO_2E per year from stationary source projects.]

Answers to Checklist Questions

a) **Less than significant impact.** Because the project's main components are focused on improvements for erosion and water quality, the project does not propose any actions that would result in long term GHG emissions or overall increases in GHGs from operational sources. The project would result in short-term, temporary increases in GHG emissions during construction due to equipment and vehicle use at the site, for the period of 30 days. During the construction period (30 days) heavy equipment, such as excavators and haul trucks, and worker commute would generate GHGs.

Total CO_2 for project construction was calculated using anticipated levels of diesel and gasoline use, on and off site (hauling) associated with the project's construction. Total CO_2 over the course of 30 days of construction was estimated to be 43.1 metric tons. The calculation spreadsheet is included as Appendix F.

The GHG threshold of 1,100 metric tons CO_2E per year for the construction phase of projects was set using the Global Warming Potential (GWP) multiplier established by the International Panel of Climate Change. The GWP was developed to allow comparisons of the global warming impacts of different gases. Specifically, it is a measure of how much energy the emissions of 1 ton of a gas will absorb over a given period of time, relative to the emissions of 1 ton of CO_2 (EPA 2018).

Carbon Dioxide has a GWP multiplier of 1; therefore, 43.1 metric tons of CO_2 is equivalent to 43.1 metric tons of CO_2E. Because total CO_2E during the construction phase of the project is below the threshold of 1,100 metric tons, impacts would be less than significant.

Construction controls would be implemented during construction to further minimize GHGs emissions. Some of these controls include minimizing idling time of vehicles and equipment, using CARB compliant equipment where possible, encouraging carpooling, use green energy sources and recycling of materials.

Since the project would contribute to emissions temporarily, would be below the significance threshold of 1,100 metric tons CO_2E and would incorporate construction controls to minimize impacts to GHGs, the project GHG emissions would be less than significant.

b) **Less than significant impact.** Given that emissions would be short-term over the course of 30 days, increases in GHG emissions that could be attributed to the project would not result in a significant impact on the environment. The GHG emissions generated during construction would not be considered significant and would not limit the State's ability to attain the goals identified in AB 32 because impacts would be temporary and are below the significance threshold amount. Therefore, the project would have a less than significant impact to GHG emissions and would not conflict with goals defined in AB 32.

IX. Hazards & Hazardous Materials

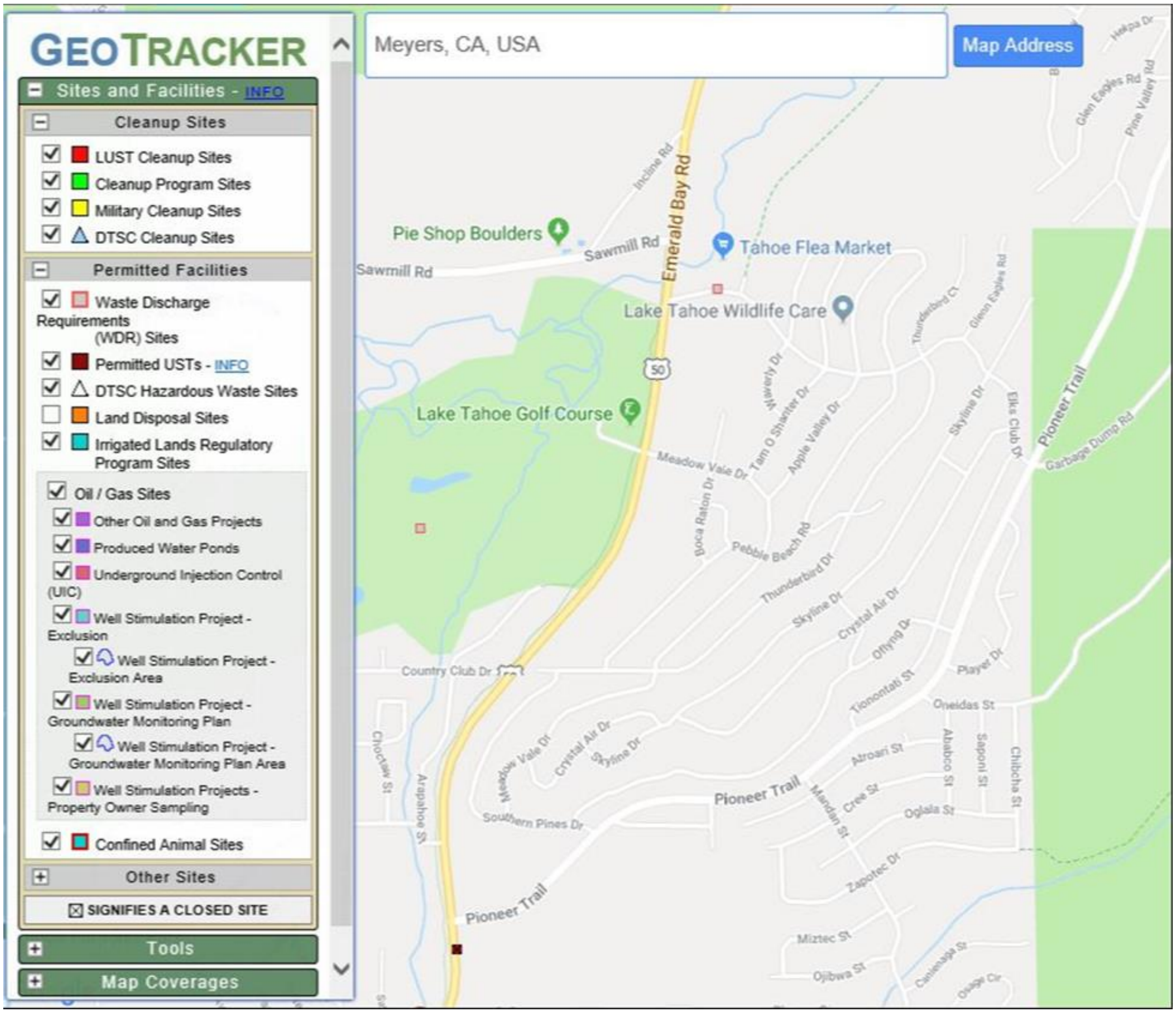
Would the project:

Environmental Issue	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?			X	
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?			X	
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				X
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				X
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 for people residing or working in the project area?			X	
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?			X	
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?			X	

Environmental Setting

Data available from the LRWQCB Geotracker and California Department of Toxic Substances Control EnviroStor websites was reviewed for existing hazardous sites located in or near the project area. The databases track cleanup sites, permitted sites, and leaking underground fuel tank sites. No sites were recorded within the project area (Exhibit 1 below). The closest recorded site is the Meyers Landfill located approximately 0.35 miles away from the northern most part of the project boundary. This site is recorded as a 'rural county survey program' and would not be impacted by the project.

Exhibit 1. Geotracker Results



Source: State Water Resources Control Board, GeoTracker: http://geotracker.waterboards.ca.gov/

Thresholds of Significance

For purposes of this Initial Study, an impact would be significant if the project would result in activities that would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- 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 compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the environment.
- 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 for people residing or working in the project area.
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.
- Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires.

Answers to Checklist Questions

a) **Less than significant impact.** During construction the project would require the transport and use of a minimal amount of hazardous materials for use with construction equipment, including oil, gasoline, diesel fuel, solvents, and degreasers. The project would implement the site-specific Spill Prevention Plan included with the SWPPP. All hazardous materials would be removed from the site after the project is completed.

Additionally, the project would comply with requirements of TRPA Code of Ordinance, Section 60.1.6 Spill Control: All persons handling, transporting, using, or storing toxic or hazardous substances shall comply with the applicable requirements of state and federal law regarding spill prevention, reporting, recovery, and clean-up.

Because the project would implement a site-specific Spill Prevention Plan and SWPPP, and comply with TRPA requirements for spill control, impact to persons or the environment through the use, transport, and disposal of hazardous materials would be less than significant.

b) **Less than significant impact.** As discussed above, the project would be required include development and implementation of a site-specific Spill Prevention Plan as part of the project SWPPP, that outlines measures to protect humans and the environment from accidental spills, should they occur. Compliance with requirements for use of hazardous materials would ensure impacts would be less than significant.

c) **No impact.** There are no existing or proposed schools within one-quarter mile of the project area; the nearest school is the Lake Tahoe Environmental

Science Magnet, a public elementary school approximately 0.5 mile from the project area.

d) **No impact.** The project area is not located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5. The project area was queried on DTSC's EnviroStor database, as well as the State's Geotracker database, and no sites appeared in or within the vicinity of the project location; therefore, there would be no impact.

e) **Less than significant impact.** The northern portion of the project area is located within two miles of the Lake Tahoe Airport, and is within Safety Zone 3 – Overflight Zone.

The Lake Tahoe Airport Comprehensive Land Use Plan (CLUP) implements the plan to protect the public health, safety, and welfare of persons through the adoption of land use standards that minimize the public's exposure to safety hazards and excessive levels of noise (CSLT 2007). For safety zone 3, Residential land use category is listed as a compatible land use for this area. The project does not propose structures or features that would be constructed at heights higher than the existing residences. Stormwater features would be constructed at grade; therefore, there would be no interference with flight paths. Because the CLUP outlines guidelines and policies for safety, and construction workers would be operating within an area determined to be acceptable residential land use area, impacts would be less than significant.

f) **Less than significant impact.** The project specific Traffic Control Plan would identify measures to ensure that emergency vehicles retain access to the project area during construction. During construction, a minimum 11-foot travel lane will be maintained in the ROWs to ensure traffic circulation is not impeded during construction. Because the project would implement a Traffic Control Plan, with measures to protect persons and access to the project area during an emergency, impacts would be less than significant.

g) **Less than significant impact.** The project would not expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires. The project is located in a developed, residential area, and proposes construction of stormwater improvements at grade level. As discussed in Section XX. *Wildfire*, the project area is within CalFire designated 'Very High' Fire Hazard Severity Zone. Workers constructing the project would temporarily be exposed to the risk of wildfire that exists for the area. The Amador-El Dorado Strategic Fire Plan serves El Dorado County, including the project area. The Amador El Dorado Unit's Fire Management Plan addresses fire safe planning and hazardous fuel reduction concerns of adjacent CalFire Units, National Forests, and local collaborators.

The Plan outlines fire safety, evacuation planning, and hazardous fuels reduction through a community wildfire protection plan (CWPP). Because no new structures are proposed for the project, and persons temporarily constructing the project would be protected by the Amador El Dorado Unit's Fire Management Plan, exposure to wildfire risks in the project area would be less than significant.

X. Hydrology & Water Quality

Would the project:

Environmental Issue	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?			X	
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?			X	
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:			X	
i. result in substantial erosion or siltation on- or off-site;			X	
ii. substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;			X	
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; or			X	
iv. impede or redirect flood flows?			X	
d) If within flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?			X	
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?		X		

Environmental Setting

State of California

The project is within the jurisdictional limits of the State of California, Lahontan Regional Water Quality Control Board (LRWQCB), and is subject to Order No. R6T-

2017-0010 which renewed the updated the waste discharge requirements and National Pollutant Discharge Elimination System (NPDES) Permit (No. CAG616001) for stormwater and urban runoff discharges from portions of El Dorado County lying within the Lake Tahoe Hydrologic Unit. Under this order, El Dorado County is required as a 'permittee' to develop and implement a Stormwater Management Plan (SWMP) to minimize water quality impacts resulting from various municipal activities.

Additionally, because the project will result in disturbance in excess of 1-acre, the project also requires coverage under the Lake Tahoe Construction General Permit (R6T-2016-0010), which requires development and implementation of a project specific Stormwater Pollution Prevention Plan.

Tahoe Regional Planning Agency

The TRPA Code of Ordinances contains requirements and standards intended to achieve water quality thresholds, goals, and policies. TRPA Code Chapter 60 - *Water Quality*, includes requirements for installation of best management practices (BMPs) and standards for grading and excavation. The following TRPA water quality standards that apply to the project are as follows: Section 60.4 – runoff shall be controlled with implementation of BMPs; Chapter 35 – regulations pertaining to development, grading or filling of lands within 100-year floodplains, recognition of natural hazards including development within floodplains (with certain exceptions for erosion control and water quality projects); Chapter 33.3 – standards for grading and excavation, including requirement of grading to take place between May 1 and October 15.

Thresholds of Significance

For purposes of this Initial Study, an impact would be significant if the proposed project would result in activities that 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 that would
- Result in substantial erosion or siltation on- or off-site
- Substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site

- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff
- Impede or redirect flood flows.
- Be in flood hazard, tsunami, or seiche zones, and risk release of pollutants due to project inundation.
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

Answers to Checklist Questions

a) **Less than significant impact.** As discussed in the Environmental Setting section, the LRWQCB requires preparation and implementation of both a SWPPP and SWMP. These documents would include measures to minimize impacts to stormwater quality during construction; therefore, impacts would be less than significant from construction. Overall, the project is intended to improve stormwater quality discharging from the site by constructing infiltration basins, erosion control measures, curb and gutters, new culvert piping, rock slope protection, and armoring of channel. Construction site stormwater BMPs would follow the *Caltrans Construction Site BMPs Manual* (Caltrans 2017) and the *TRPA BMP Handbook* (TRPA 2014) to control and minimize the impacts of construction related activities. The following BMPs, at a minimum, would be required at the site during construction:

- Temporary erosion and sediment control BMPs to prevent the transport of earthen materials and other construction waste materials from disturbed land areas, stockpiles, and staging areas during periods of precipitation or runoff (such as silt fence, erosion control fabric, fiber rolls)
- Tracking controls (such as designated ingress and egress areas) and designated staging areas outside of drainage, swale, and SEZ areas. Staging area to be restored in accordance with TRPA Code Section 61.4 (Revegetation)
- Temporary BMPs to prevent wind erosion and sediment transport of disturbed areas, such as use of water for dust control and covering of stockpiles
- Limit grading to May 1 through October 15, unless an exemption is granted by TRPA, and a variance from the Lahontan RWQCB. At the end of the grading season or before completion of the project, all surplus or waste earthen materials from the project site would be removed and disposed of at a TRPA approved disposal site or stabilized on-site in accordance with TRPA and Lahontan regulations.

- Implement the Spill Prevention Plan (as discussed in section 4.5.6). Project contractors would be responsible for storing on-site materials and temporary BMPs capable of capturing and containing pollutants.
- Use of vegetation protection fencing to prevent damage to trees or other vegetation where possible.
- Use of construction boundary fencing to limit land disturbance to areas not planned for construction.

Because the project must comply with requirements to implement a project specific SWPPP, SWMP, and the associated BMPs, and is overall anticipated to improve water quality once constructed, impact would be less than significant.

b) **Less than significant impact.** As part of the proposed stormwater features and improvements, the project proposes to direct stormwater runoff to infiltration areas to allow for increased groundwater recharge; the project is anticipated to have a beneficial impact on groundwater resources within the Lake Tahoe basin.

c) **Less than significant impact.** The proposed project would not 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:

i) **Less than significant impact.** The project proposes stormwater improvements that are designed and intended to reduce erosion and siltation discharges from the project area. Impacts resulting from the project are anticipated to be beneficial.

ii) **Less than significant impact.** The project proposes features intended to decrease the rate or amount of stormwater runoff in or outside of the project area. The project improvements are designed to better manage stormwater flows within the project area and improve quality of water leaving the site by implementing stormwater, erosion, and water quality features which address current erosion issues at the site. Therefore, impacts are anticipated to beneficial.

iii) **Less than significant impact.** The project proposes to increase the capacity of existing stormwater drainage systems to reduce sources of polluted runoff. As part of the proposed improvements, greater amounts of stormwater runoff would be contained onsite and allowed to infiltrate to groundwater within the infiltration basin.

iv) **Less than significant impact.** The project proposes improvements for stormwater runoff, which include installation of erosion control and stormwater management features at-grade. There are no structures proposed that would have potential to impede flood flows. It is anticipated for the project to have a beneficial impact on potential flooding, as the project area would have better management of runoff and areas for infiltration once implemented.

d) **Less than significant impact.** The majority of the project area is within Federal Emergency Management Agency (FEMA) Flood Zone D – Area of Undetermined Flood Hazard, and a small portion of the northeastern project area (El Dorado County 060040) is within Zone Z – Area of Minimal Flood Hazard (see FEMA exhibits below). The project is not located within or adjacent to any dams, levees, or mapped 100-year flood plains. The nearest 100-year floodplain is associated with the Upper Truckee River corridor, approximately 0.45 miles from the project area. Because the project area is primarily outside of designated flood hazard areas, and due to the project area's distance from the lake (approximately 5 miles), it is not anticipated for the project area to be subject to seiche or tsunami that would cause inundation. During construction, installation of BMPs would minimize release of pollutants should flooding occur. During operation, the drainage improvements would assist in clearing floodwaters if a flood event occurred.

e) **Less than significant impact with mitigation.** The LRWQCB uses the Water Quality Control Plan for the Lahontan Region (Basin Plan) as its regulating document. The Basin Plan sets forth water quality standards for the surface and ground waters of the Region. The project is included in the TRPA EIP for water quality improvement; projects listed in the EIP would help the TRPA comply with the environmental thresholds for water quality and would therefore comply with the regional Basin Plan.

For groundwater resources, according to the TRPA Code of Ordinances, excavations over 5 feet in depth or that may interfere with groundwater is prohibited unless the following findings can be made (TRPA Code subsection 33.3.6B):

1. A soils/hydrologic report has been prepared and approved by TRPA, and demonstrates that no interference or interception of groundwater will occur as a result of project excavation; and
2. The excavation is designed such that no trees occurs to mature trees, except where tree removal is allowed pursuant to Subsection 33.6.5: Tree Removal, including root systems and hydrologic conditions of the soil. To ensure the protection of vegetation necessary for screening, a special vegetation protection report shall be prepared by a qualified professional identifying measures necessary to ensure damage will not occur as a result of the excavation; and

3. Excavated material is disposed of pursuant to subsection 33.3.4: Disposal of Materials, and the project area's natural topography is maintained. If groundwater interception or interference will occur as demonstrated by a soils/hydrologic report, then the excavation can be made as an exception provided that measures are included in the project to maintain groundwater flows to avoid adverse impacts to SEZ vegetation and to prevent any groundwater or subsurface water flow from leaving the project area as surface flow.

The project proposes excavations to depths of 4 feet maximum for construction of the basins, and up to ten feet maximum for CSP inlets; this excavation would not occur in SEZ area. The dewatering effluent will be pumped into and discharged from water truck(s) and applied to high land capability areas (Class 3, 4, 5, 6, 7) and not to SEZ, Class 1b areas. A soils/hydrologic report prepared for the project would be approved by TRPA prior to construction. Because depth to groundwater within the project boundary is unknown at this time, significant impact could occur if groundwater is encountered during construction. Implementation of mitigation measure WQ-1 would ensure impact to groundwater would be less than significant because a Dewatering Contingency Plan would be implemented and the TRPA and LRWQCB contacted to determine any additional necessary measures.

Mitigation Measures

WQ-1: Groundwater is not expected to be encountered during construction. If groundwater is encountered and the excavated area requires dewatering, TRPA and the LRWQCB shall be notified immediately to determine the appropriate course of action. The SWPPP shall include a Dewatering Contingency Plan that the Contractor would follow.

Exhibit 2. FEMA Flood Zones Overview

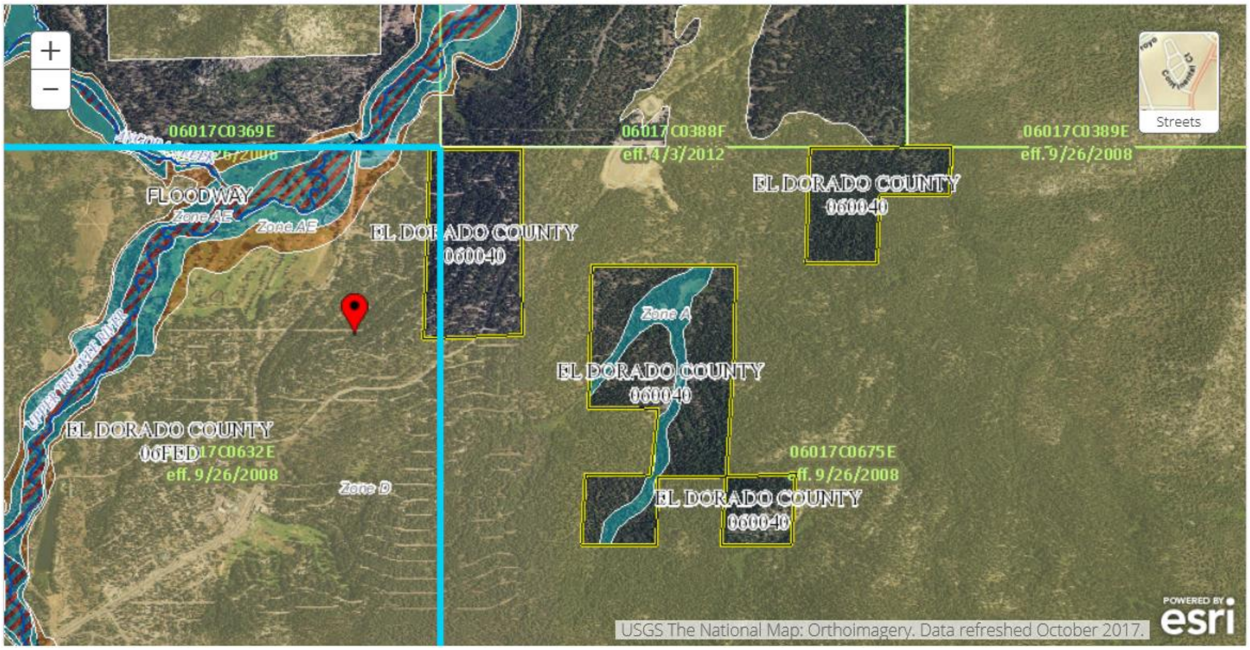


Exhibit 3. FEMA Zone X (Northeastern Project Area)

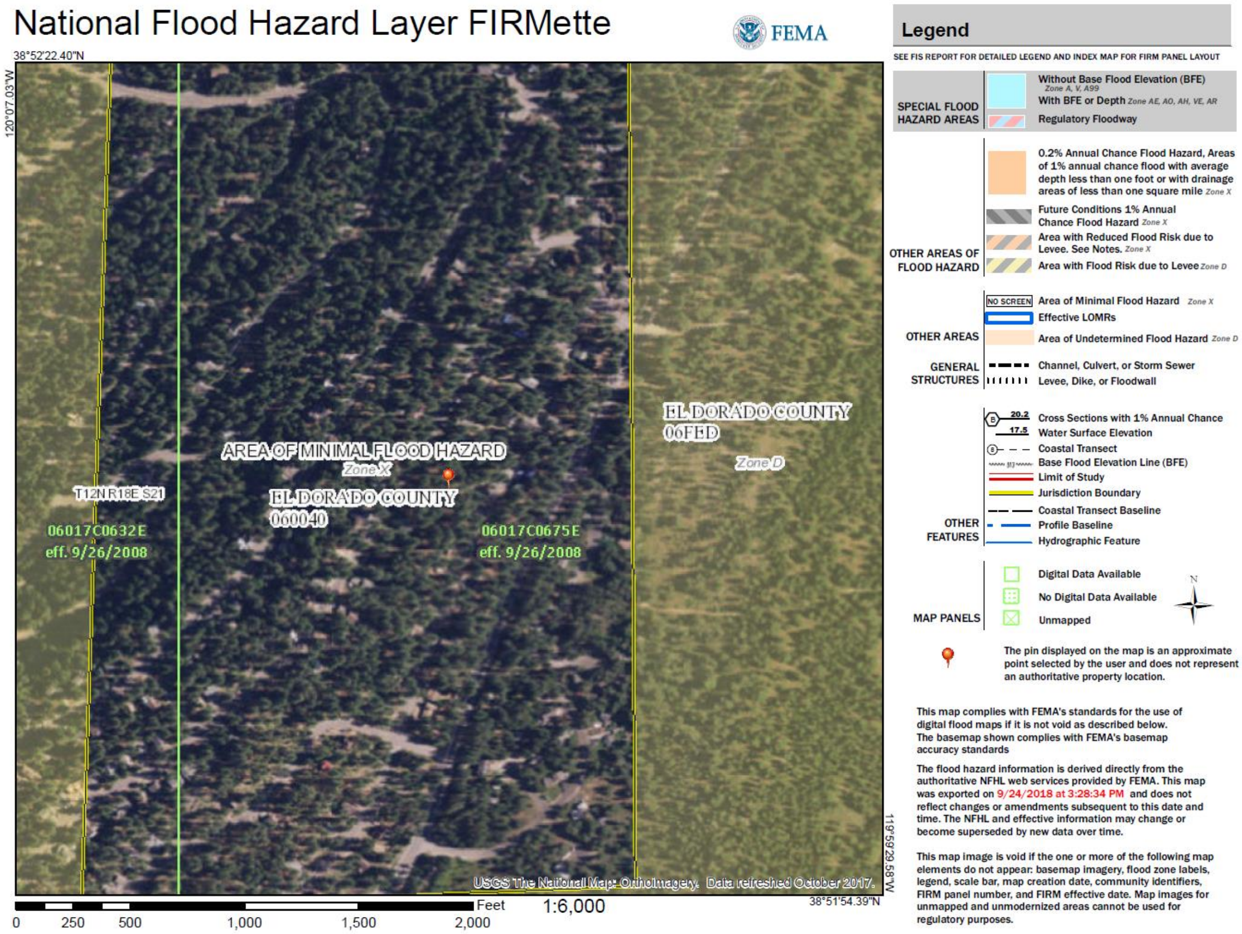
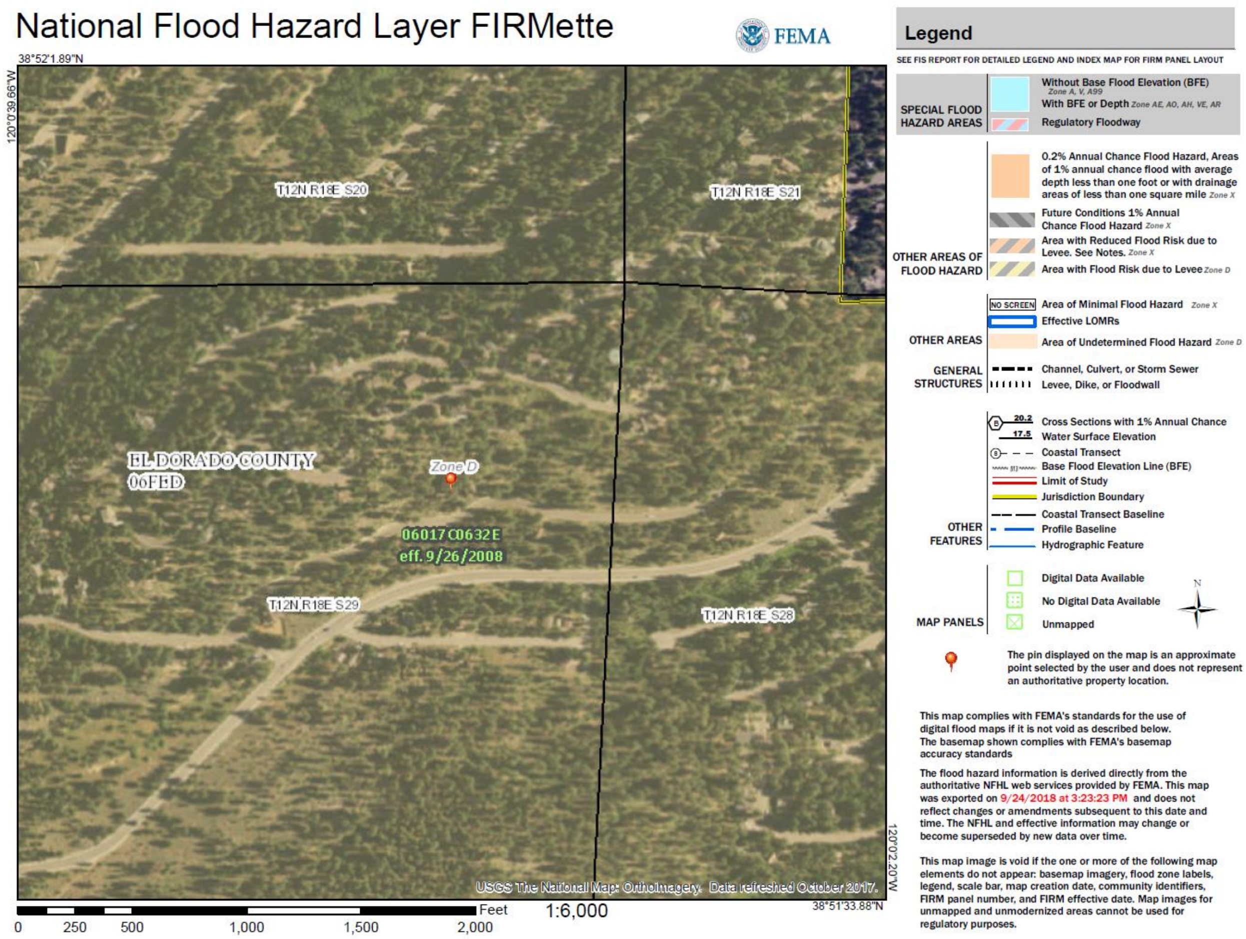


Exhibit 4. FEMA Zone D (Central Project Area)



XI. Land Use & Planning

Would the project:

Environmental Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Physically divide an established community?				X
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?			X	
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?				X

Environmental Setting

The project area is within the planning boundaries of El Dorado County, the Tahoe Regional Planning Agency, the U.S. Forest Service – Lake Tahoe Basin Management Unit, the Basin Plan administered by the LRWQCB, and the Lake Tahoe Airport Comprehensive Land Use Plan.

The project area is composed of single-family homes in the Tahoe Paradise subdivision of Meyers. Three PAS present general land use zoning information within the project area. PAS are considered land use and zoning guidance documents for both the TRPA and the County. The majority of the project area is included within PAS 120 (Tahoe Paradise Meadowvale – Residential land use), while small portions of the southern section of the project area is part of PAS 123 (Meyers Forest – Conservation land use), PAS 122 (Tahoe Paradise Mandin – Residential land use) and PAS 095 (Trout/Cold Creek – Conservation land use) (previous Figure 2). Land use for the majority of the project area is primarily characterized as single family residential. Planning considerations mentioned in the PAS documents note "steep and high cutbanks now protected by gunite may start to erode within the next 20 years (TRPA 2002a)" in PAS 120. The erosion of gunite-protected slopes is clearly observable within the project area.

The Oflyng project boundary encompasses County rights-of-way and parcels owned by the CTC, USFS-Lake Tahoe Basin Management Unit (LTBMU), the County, and private individuals.

El Dorado County

Projects within El Dorado County that are within the Tahoe Basin must be consistent with the TRPA's Code of Ordinances, Plan Area Statements, and other TRPA regulations, as well as with the County's General Plan and County Code. One of the goals of the County General Plan is to integrate the County's regulations within the Tahoe Basin with those of TRPA, to eliminate inconsistencies with the TRPA Regional Plan.

TRPA

The project is within the jurisdictional boundaries of the Tahoe Regional Planning Agency. The TRPA has jurisdiction of all projects implemented within the Tahoe Basin and implements and enforces policies which protect Lake Tahoe and associated development. The TRPA also administers the EIP program. The project is subject to the TRPA Code of Ordinances (TRPA 2013), which regulates land use, density, land coverage, natural resources, scenic quality, among other things. The TRPA adopted the amended Regional Plan, which identifies the nine environmental thresholds that apply today to screening for impacts of projects. The project area is also within TRPA Plan Area Statements which contain zoning information, establishes community noise equivalent levels (CNELs), among other community specific zoning designations.

LRWQCB

The LRWQCB is the implementing agency of the Basin Plan, which regulates the Lake Tahoe Basin and specifies standards, policies, and measures related to discharges that could impact Lake Tahoe's water quality. The Basin Plan designates the Total Maximum Daily Load (TMDL) for waterways that discharge into the lake. TMDLs are the amount of a pollutant that a waterway can contain to stay within the water quality standards.

U.S. Forest Service – Lake Tahoe Basin Management Unit

A small portion of the project area is designated forest land. The Forest Service Land Management Plan (also known as Forest Plan) provides guidance to the LTBMU for management over forest lands. The plan guides the restoration or maintenance of the health of the land and provides associated standards and guidelines associated with activities within those lands, including species and habitats of concern.

Lake Tahoe Airport Comprehensive Land Use Plan

The project area is within two miles of the Lake Tahoe Airport, and within a portion of the Overflight Zone – 3 safety area. The airport implements the Comprehensive Land Use Plan which identifies findings of impact, safety and land use policy and guidelines (City of South Lake Tahoe, 2007). The project area, zoned Residential, is listed as a 'compatible use' within the Zone 3 safety area.

Thresholds of Significance

For purposes of this Initial Study, a project would have a significant effect on the environment if it would:

- Physically divide an established community.
- 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.

Answers to Checklist Questions

a) **No impact.** The project area is within a residential area in the Tahoe Paradise subdivision of Meyers. Implementation of the project's stormwater improvements, including temporary construction, would be constructed at grade and does not contain features with potential to divide an established community; therefore, there would be no impact.

b) **Less than significant impact.** The applicable TRPA (and therefore, County) land use PAS within the project are 120 Tahoe Paradise Meadowvale, 123 Meyers Forest, 122 Tahoe Paradise Mandan, and 095 Trout/Cold Creek conservation area. Both PAS 120 and 122 contain planning considerations for erosion and runoff control. PAS 095 (Trout/Cold Creek) is designated as conservation use and identifies resource management/erosion control as a permissible use of the plan area. PAS 123 (Meyers Forest) is also designated conservation land use and has a special designation as a scenic restoration area, as Scenic Roadway Unit 36 is located within the PAS.

The proposed project is a permissible use within all PAS and proposes features that would improve erosion and runoff from within the project area and repair failing gunite slopes, as mentioned in the planning considerations in PAS 120. Erosion control is listed as an allowable use under resource management, therefore the proposed project is consistent with TRPA and County plans, policies and regulations. Additionally, as discussed in Section I. Aesthetics, stormwater improvements would also benefit scenic quality as identified by the TRPA Scenic Quality Improvement Program.

Within CLUP Safety Zone 3, the following incompatible land uses are as follows:

- Schools not satisfying the requirements of Section 39005 of the State Education Code, stadiums, arenas, spectator sports facilities, auditoriums, concert halls, outdoor amphitheaters, and theaters.

The project area, zoned Residential, is listed as a 'compatible use' within the Zone 3 safety area, and as infrastructure improvements, is compatible with the CLUP.

The project would result in an improvement in water quality affecting Lake Tahoe, therefore the resulting impact of the project would be a benefit to the environment and implements goals and policies of the LRWQCB, the LTBMU and applicable land use policies. Because the project would not be incompatible with any of the applicable planning documents and implements features that would have a beneficial impact on the environment, impact would be less than significant.

c) **No Impact.** There are no applicable habitat conservation plans or natural community conservation plans established for the project area. The project does encompass small areas of forest land (PAS 095 and PAS 123) that have conservation land use designations. Because erosion control is an allowable use under resource management designations of the PAS, impacts are anticipated to be beneficial and would not conflict with the goals of conservation of these areas.

XII. Mineral Resources

Would the project:

Environmental Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) The loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				X
b) 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?				X

Environmental Setting

The Surface Mining and Reclamation Act of 1975 requires that the State Mining and Geology Board identify, map, and classify aggregate resources throughout California that contain regionally significant mineral resources. Designations of land areas are assigned by California Department of Conservation and California Geological Survey following analysis of geologic reports and maps, field investigations, and using information about the locations of active sand and gravel mining operations. The California Mineral Land Classification System represents the relationship between knowledge of mineral deposits and their economic characteristics (grade and size). Lands classified as Mineral Resource Zones are considered important mineral resource areas.

There are no regionally significant aggregate resources (i.e., sand and gravel resources) in the project area, as identified by the California Department of Conservation and there are no ongoing mining activities in or near the project.

Thresholds of Significance

For purposes of this Initial Study, an impact would be significant if implementation of the project would result in the loss of availability of a known mineral resource that would be of value to the region and residents of the state, or a locally important mineral resource recovery site delineated in the applicable city or county land use plans.

Answers to Checklist Questions

a) No impact. As noted above, there are no regionally significant aggregate resources (i.e., sand and gravel resources) in the project area, as identified by the California Department of Conservation, and there are no ongoing mining activities in or near the project. The project would not result in the loss of availability of a known mineral resource and would not result in the loss of a locally important mineral resource, as identified in TRPA Regional Plan or the PASs. There would be no impact.

b) No impact. Refer to discussion above. The project area is not located within or near any active mining operations, and no known mineral resources of value or recovery sites exist within the project area. There are no locally-important mineral resource recovery sites delineated for the project area location the El Dorado County General Plan or within the applicable TRPA PASs. There would be no impact.

XIII. Noise

Would the project result in:

Environmental Issue	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 standards established in the local General Plan or noise ordinance, or applicable standards of other agencies?			X	
b) Generation of excessive groundborne vibration or groundborne noise levels?			X	

Environmental Setting

The noise thresholds established by TRPA for the project area PASs define a maximum CNEL of 50 CNEL; however, PAS 123 (Meyers Forest) and PAS 120 (Tahoe Paradise Meadowvale) define that the established CNELs for the community areas may not be met because of the adjacent airport transportation corridor (CNEL 60) and adjacent Highway 50 corridor (65 CNEL).

Thresholds of Significance

Thresholds of significance are those established by the California Code of Regulations Title 24 standards, the General Plan Noise Element, and the local Noise Ordinance. For purposes of this Initial Study, an impact would be significant if implementation of the proposed project would do any of the following:

- Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local General Plan or noise ordinance, or applicable standards of other agencies.
- Generate excessive groundborne vibration or groundborne noise levels.

Answers to Checklist Questions

a) **Less than significant.** During construction, workers and persons residing in the area would be temporarily exposed to minor groundborne vibration and noise generated by construction equipment, such as excavators, backhoes, and water trucks; no pile driving is required for this project, which is the primary source of groundborne vibrations and noise during construction.

However, work would be conducted during daytime hours while most people are away from home, or inside of residential buildings. The work would take place within public roads and on public undeveloped parcels. As discussed above, the area may already not meet the CNELs established for the PAS in the project area due to the Overflight zone of the Tahoe Airport.

The project would not result in a long-term, permanent increase in noise or ground vibration; impact would be temporary only during construction. While some construction noises may produce exceedances of the PAS CNEL, according to TRPA Code of Ordinances, Chapter 68, Noise Limitations, TRPA-approved construction activities are exempt from noise limitations if work is conducted between 8 am and 6:30 pm (TRPA, 2013). Safety measures implemented for land within the Airport CLUP would protect workers from significant noise from the airport. Therefore, the project impact to community noise levels during construction would be less than significant due to noise being temporarily increased, and work would be conducted during the TRPA construction ordinance exempt periods.

b) See response to comment a).

XIV. Population & Housing

Would the project:

Environmental Issue	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 (i.e. by proposing new homes and businesses) or indirectly (i.e. through extension of roads or other infrastructure)?				X
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?				X

Environmental Setting

The project area is within an already developed residential land use area. The project proposes stormwater improvements to address erosion and stormwater quality impacts.

Thresholds of Significance

For purposes of this Initial Study, the project would have a significant effect if the project would:

- Induce substantial unplanned population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure).
- Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere.

Any physical impacts associated with unplanned increases in or displacement of population or housing (e.g., traffic) are addressed in the appropriate environmental sections of this Initial Study.

Answers to Checklist Questions

a) **No impact.** The project constructs drainage improvements and does not propose features that would cause direct or indirect population growth in the area, such as homes or water or sewer infrastructure that would allow more residential construction. All work would be done within road right-of way and public parcels. The project does not propose change to existing land use or impacts to housing (such as demolition) that would cause need for housing elsewhere. Therefore, there would be no impact, direct or indirect, to population growth or housing.

b) See response to Comment a).

XV. Public Services

Would the project result in:

Environmental Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Substantial adverse physical impacts associated with the provision of new or physically altered governmental services and/or 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?				X
i. Fire Protection?				X
ii. Police Protection?				X
iii. Schools?				X
iv. Parks?				X
v. Other Public Facilities?				X

Environmental Setting

Fire Protection

The South Lake Fire Department consists of three fire stations. The closest station to the project area is the South Lake Tahoe Fire Station 4 at the Lake Tahoe Airport, and the Lake Valley Fire Protection District Station 5. Both stations are approximately 2 miles from the project area. The South Lake Tahoe Fire Department participates in automatic aid and mutual aid response with Lake Valley Fire Protection District, which serves the residents of El Dorado County in the Lake Tahoe Basin through formal contract. The City of South Lake Tahoe Fire Department also participates in mutual aid with CalFire in the Tahoe Basin and throughout the State.

Police Protection

The project area is served by the City of South Lake Tahoe Police Department. The Police Department has a mutual aid Critical Incident Protocol with El Dorado County Sheriff's Office for additional policing needs.

Schools

The project area is within the service area of the Lake Tahoe Unified School District, which includes four elementary schools, one middle school, and one high school in the City of South Lake, California.

Parks

The nearest park to the project area is Tahoe Paradise Park, located approximately one mile to the southwest of the project area. Additional parks in the surrounding area are the Washoe Meadows State Park, an undeveloped woodland and meadows area with hiking trails approximately 1.5 miles away, and the Bijou Community Park located on Al Tahoe Boulevard approximately 5 miles from the project area.

Libraries

The only public library located within the City of South Lake Tahoe is the El Dorado County library, located approximately 1.6-miles northeast of the project on Rufus Allen Boulevard.

Thresholds of Significance

A significant impact would occur if substantial adverse physical impacts associated with construction of new or physically altered governmental services and/or facilities were required as part of the project.

Answers to Checklist Questions

a) **No Impact (Issues i-v).** Construction of stormwater improvements to address erosion and provide water quality benefits would not necessitate new or physically altering government services or facilities, therefore significant environmental impact could not occur as this type of construction is not associated with the project. Need for altered or new service facilities is related to an increase in population, which the project would have no effect on. Because the project is an erosion control and water quality improvement project and does not propose actions that would require altering existing public services or features, and has no effect on population growth, there would be no impact.

XVI. Recreation

Would the project:

Environmental Issue	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?				X
b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				X

Environmental Setting

There are no designated recreation areas within the project area; however, the surrounding area adjacent to the neighborhood contains open land that could be passively used for recreational purposes, such as hiking.

Thresholds of Significance

For purposes of this Initial Study, an impact would be significant if the proposed project would:

- Cause or accelerate substantial physical deterioration of existing area parks or recreational facilities.
- Create a need for construction or expansion of recreational facilities beyond those anticipated in local plans.

Answers to Checklist Questions

a) **No impact.** The project does not include recreational features, or require construction or expansion of recreational facilities, because the project does not influence population growth which is the driver for new or expansion of facilities. Therefore, there would be no effect on recreation and no subsequent environmental impact from construction or expansion of facilities.

b) **No impact.** The project does not propose recreational features or improvements, such as trial building or connectivity, therefore there is no potential for the project to cause a significant environmental impact from those features.

XVII. Transportation

Would the project:

Environmental Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with a plan, ordinance or policy addressing the circulation system, including transit, roadways, bicycle lanes and pedestrian paths?			X	
b) For a land use project, would the project conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)(1)?				X
c) For a transportation project, would the project conflict with or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)(2)?				X
d) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				X
e) Result in inadequate emergency access?			X	

Environmental Setting

The project area includes County ROW roads that provide access to the residential subdivision of Tahoe Meadowvale.

The 2017 Regional Transportation Plan is the transportation element of the Lake Tahoe Regional Plan. The plan's vision is a first-class transportation system that prioritizes bicycling, walking, and transit and serves residents and visitors while contributing to the environmental and socioeconomic health of the Region. The plan offers strategies to jump start innovation through electric vehicle infrastructure, address the routine travel demands of residents and commuters, and the recreational travel demands of visitors that during peak periods stress and cause congestion on Lake Tahoe's transportation system.

Thresholds of Significance

For purposes of this Initial Study, an impact would be significant if the proposed project would:

- Conflict with a plan, ordinance, or policy addressing the circulation system, including transit, roadways, bicycle lanes, and pedestrian paths.
- For a land use project, conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)(1) regarding VMT.
- For a transportation project, conflict with or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)(2) regarding impacts that result from certain transportation projects. Projects that reduce VMT, such as pedestrian, bicycle and transit projects, should be presumed to have a less than significant impact.
- Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).
- Result in inadequate emergency access.

Answers to Checklist Questions

a) **Less than significant impact.** The project would generate short-term vehicle trips to and from the project area during construction. These trips would include worker commute, construction equipment and materials transport, and import of fill materials and asphalt. These vehicle trips would add to existing traffic volumes on local and regional roadways. Apart from the initial transport of construction equipment and materials, relatively minor construction-related traffic would occur. Construction would be intermittent and only occur during two consecutive summer construction seasons. Final construction plans would incorporate a Traffic Control Plan using the Caltrans Manual of Uniform Traffic Control Devices to address the worker commutes, equipment and materials transport, and haul truck trips. Construction staging would be located within the project area and would maintain local circulation throughout the construction period. The project would not result in any permanent, operational changes to traffic. Because impact to traffic is temporary during construction, and the project would implement a Traffic Control Plan to minimize impacts during construction, impact would be less than significant.

b) **No Impact.** The project has been designed as a water quality and erosion control project and is not a land use project. Therefore, there would be no impact.

c) **No Impact.** The project is a water quality and erosion control project, not a transportation project. Therefore, there would be no impact.

d) **No Impact.** The project does not propose changes to existing road layout, circulation, alignment, or structure which would have potential to increase hazards. There would be no impact.

e) **Less than significant impact**. See discussion "a" above. The project specific Traffic Control Plan shall incorporate measures to ensure adequate emergency access to the area is maintained during construction; therefore, impacts would be less than significant.

XVIII. Tribal Cultural Resources

Would the project:

Environmental Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Cause a substantial adverse change in the significance of a tribal cultural resource, defined in PRC § 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:				
a) Listed or eligible for listing in CRHR, or in a local register of historical resources as defined in PRC § 5020.1(k), or				X
b) 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 PRC § 5024.1. In applying the criteria set forth in subdivision (c) of PRC § 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.			X	

Environmental Setting

As of the mid-1800s, the Washoe inhabited the region of the study area. A Hokan-speaking hunting and gathering group, the Washoe inhabited the chain of valleys along the eastern slope of the Sierra Nevada, from Honey Lake to Antelope Valley. The Pine Nut Mountains and the Virginia Range formed the eastern boundary of Washoe territory, while the western boundary extended several miles beyond the Sierra crest. A great deal of information has been written about Washoe land-use in the Tahoe Basin and their use of the region's resources. Lake Tahoe is the center of the Washoe world, both geographically and socially. Legendary and mythological associations to places within the basin are common. Ethnographic data on the Washoe are contained in d'Azevedo (1956, 1963, and 1986), Barrett (1917), Dangberg (1968), Downs (1966), Fowler et al. (1981), Freed and Freed (1963), Lowie (1939), Nevers (1976), Price (1962, 1980), and Siskin (1941). Lake Tahoe is the center of the Washoe world, both geographically and socially. Legendary and mythological associations to places within the basin are common. While they were an informal and flexible political collectivity, Washoe ethnography hints at a level of technological specialization and social complexity uncharacteristic of their neighbors in the Great Basin. Semi-sedentism and higher population densities, concepts of private property, and communal labor and ownership are reported and may have developed in conjunction with their residential and subsistence resource stability. Additional discussion of the Washoe Ethnography can be found in Appendix D.

Native American Consultation

On June 6, 2018 a letter was sent to the Native American Heritage Commission (NAHC) requesting a search of their Sacred Lands database and a list of contacts that may have knowledge of cultural or tribal resources within or immediately adjacent to the project area. A response was received June 13, 2018 indicating that the Sacred Lands database search did not reveal the presence of Native American cultural resources within or immediately adjacent to the project area. The NAHC requested that several Native American cultural resource representatives be contacted (Table 9). As requested by the County, tribal representative inquiry letters were mailed on June 20, 2018 using the County letterhead. Receipt confirmation of the letters was received from every individual, except Grayson Coney and Don Ryberg of the Tsi Akim Maidu Tribe.

Table 9. Native American Cultural Resource Representatives Contacted

Individual	Tribe Affiliation	Receipt Confirmation	Individual	Tribe Affiliation
Grayson Coney, Cultural Director	Tsi Akim Maidu	No - Letter returned to sender; NAHC notified	None	n/a
Darrell Cruz, Director	Washoe Tribe of Nevada and California	Yes	Yes	No consultation requested
Pamela Cubbler, Treasurer	Colfax-Todds Valley Consolidated Tribe	Yes	None	n/a
Regina Cuellar, Chairperson	Shingle Springs Band of Miwok Indians	Yes	None	n/a
Clyde Prout, Chairman	Colfax-Todds Valley Consolidated Tribe	Yes	None	n/a
Don Ryberg, Chairperson	Tsi Akim Maidu	No - Letter returned to sender; NAHC notified	None	n/a
Sara Dutschke Setchwaelo, Chairperson	Ione Band of Miwok Indians	Yes	None	n/a
Cosme Valdez, Chairperson	Nashville-El Dorado Miwok	Yes	None	n/a

Individual	Tribe Affiliation	Receipt Confirmation	Individual	Tribe Affiliation
Gene Whitehouse, Chairperson	United Auburn Indian Community of the Auburn Rancheria	Yes	Yes	No consultation requested

Correspondence related to Native American consultation can be found in Appendix D.

Thresholds of Significance

For purposes of this Initial Study, an impact would be significant if the proposed project would cause a substantial adverse change in the significance of a tribal cultural resource, defined in PRC § 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 CRHR, or in a local register of historical resources as defined in PRC § 5020.1(k).
- 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 PRC § 5024.1. In applying the criteria set forth in subdivision (c) of PRC § 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Answers to Checklist Questions

a) **No impact.** As discussed in CEQA V, there are no resources within the project area listed or recommended eligible for listing in CRHR, or in a local register of historical resources as defined in PRC § 5020.1(k). The project would have no impact on listed resources.

b) **Less than significant impact.** Significant impacts to a Tribal Cultural Resource (TCR) are those that diminish the integrity, research potential, or other characteristics that make a TCR significant or important. To be considered a TCR, a resource must be either: (1) listed, or determined to be eligible for listing, on the national, state, or local register of historic resources, or (2) a resource that the lead agency chooses, in its discretion, to treat as a TCR and meets the criteria for listing in the state register of historic resources pursuant to the criteria set forth in Public Resources Code Section 5024.1(c).

As of June 25, 2018, two of the identified Native American tribes have replied to NCE's inquiry letters. The United Auburn Indian Community has deferred to the Washoe Tribe of Nevada and California for any additional follow up or request to monitor for the project. The Washoe Tribe's response stated that they are not aware of cultural resources located in the project area that could be affected by the project.

As discussed in the environmental setting section, TCR that meet significant or importance criteria as defined in Public Resources Code Section 5024.1(c) were not identified within the project area. The proposed shallow construction in mostly previously disturbed areas is highly unlikely to inadvertently uncover buried resources. However, due to uncertainty prior to ground disturbance, mitigation measure CR-1 ensures that inadvertent discoveries during construction are handled appropriately; therefore, impacts to Native American resources would be less than significant.

XIX. Utilities & Service Systems

Would the project:

Environmental Issue	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?			X	
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?			X	
c) Result in a determination by 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?				X
d) Generate solid waste in excess of State or local standards or in excess of the capacity of local infrastructure?			X	
e) Negatively impact the provision of solid waste services or impair the attainment of solid waste reduction goals?				X
f) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?				X

Environmental Setting

The project area contains numerous waterlines, sewers, electrical lines, and telecommunications lines that serve the Tahoe Paradise Meadowvale subdivision. Proposed project impacts would avoid direct impact to existing utilities.

Thresholds of Significance

For purposes of this Initial Study, an impact would be significant if the proposed project would:

- Require or result in the relocation or construction of new or expanded water, or wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.

- Have insufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years.
- Result in a determination by a wastewater treatment provider that serves or may serve the project that it has inadequate 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.
- Negatively impact the provision of solid waste services or impair the attainment of solid waste reduction goals.
- Fail to comply with federal, state, and local statutes and regulations related to solid waste.

Answers to Checklist Questions

a) **Less than significant impact.** Water: There is sufficient water supply available to serve the project as the only water needs would occur during construction for dust suppression. The project would not require the construction or expansion of any new water or wastewater facilities. Water trucks would be filled using designated fire hydrants located in the project vicinity. Water usage for the construction and implementation of the project would be negligible and existing entitlements and resources have the capacity to serve any temporary water needs for the project.

Electric power: The project does not propose expansion of relocation of electric power, natural gas, or telecommunications; there would be no impact on these utilities.

b) **Less than significant impact.** As discussed above, the only water required for the project is during construction for dust control. Water usage for the construction and implementation of the project would be negligible and existing entitlements and resources have the capacity to serve any temporary water needs for the project and have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years.

c) **No impact.** The project does not involve direct or indirect discharge of wastewater to sanitary sewer or on-site septic systems. Project construction does not require any dewatering into the sewer system. No demand for wastewater treatment or facilities would occur as a result of the project. The project would not create wastewater and therefore would have no impact on a wastewater treatment operator.

d) **Less than significant impact.** Construction activities for the project would generate solid wastes requiring disposal at area landfills. Waste generated during project construction would be limited to vegetation debris, asphalt, and road subgrade. Waste generation would be temporary and would not reduce available capacities at existing landfills. Disposal of construction waste would comply with federal, state, and local statutes and regulations related to solid waste including TRPA requirement of exporting solid waste from the basin.

e) **No impact.** The project would not result in the need for additional solid waste services or impair the attainment of solid waste reduction goals. Solid waste is required to be hauled to a County approved dump site which has sufficient capacity available. There would be no impact.

f) **No impact.** Disposal of construction waste would comply with federal, state, and local statutes and regulations related to solid waste including TRPA requirement of exporting solid waste from the basin.

XX. Wildfire

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:

Environmental Issue	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?			X	
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?				X
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?				X
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 changes?			X	

Environmental Setting

The CalFire Fire Hazard Severity Zones Map was developed to guide construction standards for building permits, use of natural hazard disclosure at time of sale, guide defensible space clearance around buildings, set property development standards, and considerations of fire hazard in City and County general plans. The project area is located within a 'Very High' State Responsibility Area hazard zone (CalFire 2018).

In 2007-2008, CalFire updated the existing maps to coincide with the adoption of the new wildland-urban interface building standards, which are used by building officials to determine appropriate construction materials for new buildings in the wildland-urban interface.

Amador-El Dorado Strategic Fire Plan

The project area lies within the boundaries of the Amador-El Dorado Strategic Fire Plan boundary. The Amador El Dorado Unit's Fire Management Plan assesses the fire potential within the unit and addresses fire safe planning and hazardous fuel reduction concerns of adjacent CalFire Units, National Forests, and local collaborators. The plan is the foundation for planning, prioritizing, and funding the Unit's projects. The Plan also outlines fire safety, evacuation planning, and hazardous fuels reduction through the CWPP.

Thresholds of Significance

For purposes of this Initial Study, an impact would be significant if the proposed project 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.
- 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 changes.

Answers to Checklist Questions

a) **Less than significant impact.** As mentioned in Section 4.5 *Construction Controls,* Transportation and Traffic, the project would maintain an 11-foot roadway for travel through during construction, as well as adequate signage for safety and mobility through the project area. The project construction does not require rerouting of traffic or closure of roads. Construction activities could result in minor delays for emergency vehicles or law enforcement; however, the project specific Traffic Control Plan would be required to coordinate with emergency services prior to construction to ensure project activities would not impair response services.

b) **No Impact.** The project's stormwater improvements will be constructed at grade and do not propose grading which would exacerbate wildfire risk; therefore, there would be no impact on wildfire risk or spread of pollutants from such thereafter.

c) **No impact.** The project is located in an already developed residential area, and stormwater improvements would be constructed at grade. Implementation of the project would not require the installation or maintenance of additional infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that would exacerbate fire risk or that may result in temporary or ongoing impacts to the environment; therefore, there is no impact.

d) **Less than significant impact.** Implementation of the project's stormwater improvements does not require grading of slopes or creation of slopes. Project features will be constructed at grade, and the area will be stabilized during construction by use of construction BMPs and will be revegetated once construction is complete. Additionally, implementation of the project's stormwater features would help stabilize the project area from negative impacts related to stormwater runoff, as the project proposes features to better manage, direct, and contain runoff, and has been designed to maintain stormwater flows within the project area.

MANDATORY FINDINGS OF SIGNIFICANCE

Environmental Issue	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Does the project have the potential to 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, 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?		X		
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, or the effects of probable future projects.)			X	
c) Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?			X	

Answers to Checklist Questions

a) **Less than significant impact with mitigation incorporated.** As discussed in Section IV, *Biological Resources*, project construction could potentially impact sensitive biological resources, including migratory birds, but mitigation has been provided to reduce these impacts to less than significant levels. After mitigation, the project would not have the potential to degrade the quality of the environment; would not substantially reduce the habitat of a fish or wildlife species; would not cause a fish or wildlife population to drop below self-sustaining levels; would not threaten to eliminate a plant or animal community; and would not reduce the number or restrict the range of a rare or endangered plants or animals. Additionally, impact within a jurisdictional water of the U.S. may cause significant impact to a sensitive habitat; however, mitigation measure BR-2 would reduce impacts to less than significant by requiring the County to apply for and secure a Clean Water Act Section 404 permit, and Section 401 permit, and CDFG Section 1602 permit, all of which require implementation of measures to mitigate for impacts.

As discussed in Section V, *Cultural Resources*, and Section XVIII, *Tribal Cultural Resources*, impacts on archaeological, paleontological resources and human remains would be less than significant with implementation of mitigation measures requiring Contractors and workers to be informed and trained to report any such findings, and Compliance with state health and safety code related to handling the inadvertent discovery of human remains.

As discussed in Section X. *Water Quality*, significant impacts to groundwater resources could occur if groundwater is intercepted during construction activities. However, with implementation of mitigation measure WQ-1, impacts would be mitigated to less than significant because a Dewatering Contingency Plan would be implemented and the TRPA and LRWQCB contacted to determine any additional necessary measures.

The project would not result in significant impacts on scenic resources, agriculture and forestry, air quality, energy, geology and soils, greenhouse gas emissions, hazards and hazardous materials, land use and planning, mineral resources, noise, population and housing, public services, recreation, transportation, utilities and services, or wildfires.

b) **Less than significant impact.** The project is a water quality improvement project that proposes to implement erosion control and stormwater management features that would improve environmental quality, as identified by TRPA EIP program. There were no significant impacts from construction and implementation of the project identified that could not be reduce to less than significant with mitigation incorporated. The project does not result in an increase in population or growth that would require new housing, facilities, or structures that would cause environmental degradation. Implementation of the project would be consistent with the Goals and Policies of the TRPA Regional Plan, including the EIP program which was implemented to improve environmental quality. As discussed throughout the environmental document, implementation of the project would have long term beneficial effects on water quality and would not lead to cumulative negative effects.

c) **Less than significant impact.** All potential impacts associated with construction and implementation of the project identified in this Mitigated Negative Declaration on biological or cultural resources are either less than significant after mitigation or less than significant and do not require mitigation. No adverse effects on human beings, such as noise or hazards was identified. Therefore, the project would not result in environmental effects that cause substantial adverse effects on human beings either directly or indirectly.

Section 6 Mitigation Monitoring Plan

This Mitigation Monitoring Plan has been required by and prepared for the Oflyng Water Quality Project, pursuant to PRC § 21081.6. Table 10 presents the plan by resource area.

PROJECT IDENTIFICATION

Project Name:

Oflyng Water Quality Project

Owner/Developer/Applicant:

County of El Dorado
Community Development Agency
Transportation Division
924B Emerald Bay Road
South Lake Tahoe, CA 96150

Project Manager:

Daniel Kikkert, P.E.
County of El Dorado
(530) 573-7914

Environmental Consultant:

Nichols Consulting Engineers

Project Location:

El Dorado County, California
Sections 20, 21, 28, and 29 in Township 12 North and Range 18 East

Proposed Project:

Water Quality Improvement Project

Table 10. Mitigation Monitoring Plan

Resource	Mitigation	Responsibility	Scheduling/Timeline
Aesthetics	No significant impacts to aesthetics were identified.	-	-
Biological Resources	**BR-1:** If any construction activities (e.g., grubbing or grading) are scheduled during the bird nesting season (typically defined by CDFW as February 1 to September 1), the County or approved construction contractor shall retain a qualified biologist to conduct a pre-construction survey of the project area to include a 100-foot buffer, as access is available, to locate active bird nests, identify measures to protect the nests, and locate any other special status species. The pre-construction survey shall be conducted no more than 14 days prior to the implementation of construction activities (including staging and equipment storage). Any active nest should not be disturbed until young have fledged or under the direction provided by a qualified biologist. Any special status species shall not be disturbed unless under the direction provided by a qualified biologist. If an active nest is found during construction, disturbance should not occur without direction from a qualified biologist.	County/ Contractor	Prior to construction
	BR-2: Prior to construction, the County shall apply for and obtain a U.S. Army Corps of Engineers Section 404 CWA permit for proposed impacts to a water of the U.S., including applicable permits from the state of California, including a Section 401 permit from the Lahontan Regional Water Quality Control Board and California Department of Fish and Game Code Section 1602 (Streambed Alteration Agreement), if applicable. These permit applications establish appropriate mitigation measures for impacts to waters of the U.S. and waters of the State that protect against significant impacts.	County	Prior to Construction

Resource	Mitigation	Responsibility	Scheduling/Timeline
Cultural Resources	**CR-1:** The Contractor and key members of crews working on excavation, trenching, and grading for sites preparation shall be instructed to be wary of the possibility of destruction of buried cultural resource materials. They shall be instructed to recognize signs of prehistoric use and their responsibility to report any such finds (or suspected finds) immediately, as specified by measure CR-2 below, so damage to such resources may be prevented. No historic properties will be affected in compliance with Advisory Council on Historic Preservation regulations (36 C.F.R. part 800). However, in the event that cultural resources are discovered during Project implementation, Project personnel will halt all activities in the immediate area and will notify a qualified archaeologist to determine the appropriate course of action.	County/ Contractor	Prior to Construction/ Ongoing
	CR-2: Final plans and specifications shall include guidance in the event that human remains are discovered. The County Coroner and local law enforcement shall be notified immediately of the discovery in accordance with PRC Section 5097.98 and Section 7050.5 of California Health and Safety Code to conduct proper evaluation and treatment of remains. The coroner and law enforcement agency with jurisdiction will evaluate the find to determine whether it is a crime scene or a burial. If human remains are determined to be associated with an archaeological site (burial), the California OHP will be notified. The OHP will work with appropriate tribes to determine measures to take.	County/ Contractor	During Construction/ Ongoing
Geology/Soils	No significant impacts to geology and/or were identified.	-	-

Resource	Mitigation	Responsibility	Scheduling/Timeline
Hydrology/Water Quality	**WQ-1:** Groundwater is not expected to be encountered during construction. If groundwater is encountered and the excavated area requires dewatering, TRPA and the LRWQCB shall be notified immediately to determine the appropriate course of action. The SWPPP shall include a Dewatering Contingency Plan that the Contractor would follow.	County/ Contractor	During Construction
Land Use and Planning	No significant impacts to land use or planning were identified.	-	-
Mineral Resources	No significant impacts to mineral resources were identified.	-	-
Noise	No significant impacts to noise were identified.	-	-
Population and Housing	No significant impacts to population and housing were identified.	-	-
Public Services	No significant impacts to public services were identified.	-	-
Recreation	No significant impacts to recreation were identified.	-	-
Transportation	No significant impacts to transportation were identified.	-	-
Tribal Cultural Resources	No significant impacts to tribal cultural resources were identified.	-	-
Utilities and Service Systems	No significant impacts to utilities and service systems were identified.	-	-
Wildfire	No significant impacts to wildfire were identified.	-	-

Section 7 References

California Air Resources Board. 2017. Air Quality and Land Use Handbook. Accessed online at: https://www.arb.ca.gov/ch/landuse.htm. July 2017.

California Air Resources Board (CARB). 2018. 'Ambient Air Quality Standards.' Retrieved online October 12, 2018: https://www.arb.ca.gov/research/aaqs/aaqs2.pdf.

California Department of Fish and Wildlife. 2016. State of California Endangered, Threatened, and Rare Plants of California List. Revised July 2016. Retrieved 9/26/2016. State of California Resources Agency. Sacramento, CA.

California Department of Fish and Wildlife. 2018a. California Wildlife Habitat Relationship (CWHR) Model Version 9.0.

California Department of Fish and Wildlife. 2018b. California Natural Diversity Database (CNDDB). Commercial Version 5.45.13.

California Department of Fish and Wildlife. 2018bc. "State of California Endangered, Threatened, and Rare Plants of California List." Revised April 2018. Retrieved 6/1/2018. State of California Resources Agency. Sacramento, CA.

California Department of Food and Agriculture (CDFA). 2009. *California Noxious Weed Rating List.*

California Department of Food and Agriculture. 2016. California Noxious Weed Species. Division of Plant Health & Pest Services, Last updated 7/15/16, Retrieved online 7/11/18: http://www.cdfa.ca.gov/plant/ipc/encycloweedia/weedinfo/winfo_table-sciname.html.

California Department of Transportation. 2017. *Construction Site Best Management Practices (BMP) Manual*. CTSW-RT-17-314.18.1. May 2017. Accessed online: http://www.dot.ca.gov/hq/construc/stormwater/documents/CSBMP-May-2017-Final.pdf.

California Division of Land Resource Protection. 2018. Farmland Mapping and Monitoring Program. Retrieved online October 15, 2018: http://www.conservation.ca.gov/dlrp/fmmp.

California Division of Mines and Geology. 1997. *Guidelines for Evaluating and Mitigating Seismic Hazards in California*. Special Publication 117. Sacramento, CA. May 2017.

California Geological Survey. 2005. *Earthquake Shaking Potential Map for Portions of Eastern California and Western Nevada*. Accessed online: https://ssc.ca.gov/forms_pubs/shaking_canv751a.pdf.

California Invasive Plant Council (CIPC). 2010. Cal-IPC Ratings.

California Native Plant Society (CNPS). 2018. Inventory of Rare and Endangered Plants (online edition). California Native Plant Society, Sacramento, CA. Accessed online: http://www.rareplants.cnps.org. Retrieved on 6/1/2018.

CalFire. 2018. Fire Hazard Severity Zone Map Viewer. Accessed online: http://fire.ca.gov/fire_prevention/fire_prevention_wildland_zones_maps.

City of South Lake Tahoe (CSLT). 2007. *Lake Tahoe Airport Comprehensive Land Use Plan*. July 1990. Revised 1992, 1995, 2002, 2004, May 2007.

D'Antonio, Carla M., Berlow, Eric L., and Haubensak, Karen L. 2004. *Invasive exotic plant species in Sierra Nevada ecosystems*. Gen. Tech. Rep. PSW-GTR-193. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture: 175-184.

El Dorado County. 2002. *Determining Significance of Air Quality Impact Under the California Environmental Quality Act (CEQA)*. First Edition, February 2002.

Environmental Protection Agency (EPA). 2018. 'Understanding Global Warming Potentials' Retrieved online September 15, 2018: https://www.epa.gov/ghgemissions/understanding-global-warming-potentials.

Lake Tahoe Basin Weeds Coordinating Group (LTBWCG). 2011. *Priority Invasive Weeds of the Lake Tahoe Basin*. Revised April 2011.

Natural Resources Conservation Service (NRCS). 2018. Web Soil Survey. Retrieved online October 1, 2018: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

NCE. 2018. Oflyng Water Quality Project. EIP Project #01.01.01.0074 *Botanical Baseline Report*. December 4, 2018.

Sacramento Metropolitan Air Quality Management District. 2016. *CEQA Guide*. December 2009, Revised September 2010, May 2016.

Saucedo, G.J. 2005. Geologic Map of the Lake Tahoe Basin, California and Nevada. California Department of Conservation, California Geological Survey. http://www.quake.ca.gov/gmaps/RGM/tahoe/tahoe.html.

State Water Resources Control Board, GeoTracker: http://geotracker.waterboards.ca.gov/

Tahoe Regional Planning Agency. 1989. *Regional Plan for the Lake Tahoe Basin*. Scenic Quality improvement program (SQIP) and technical appendices, 1989, Chapter II implementation, 11-1. Accessed online: http://www.trpa.org/documents/rseis/3.9%20Scenic/3.9_TRPA%201989_Scenic%20Quality%20Improvement.pdf.

Tahoe Regional Planning Agency. 2002a. "Plan Area Statement 120 Tahoe Paradise Meadowvale." Tahoe Regional Planning Agency, Retrieved on 6/1/2018. Stateline, NV.

Tahoe Regional Planning Agency. 2002b. "Plan Area Statement 122 Tahoe Paradise Mandin." Tahoe Regional Planning Agency, Retrieved on 6/1/2018. Stateline, NV.

Tahoe Regional Planning Agency. 2011. *Threshold Evaluation Report*. Chapter 5, Updated 10/2012. Stateline, NV.

Tahoe Regional Planning Agency. 2013. Code of Ordinances. February 9, 2013. http://www.trpa.org/wp-content/uploads/TRPA-Code-of-Ordinances_February18.pdf.

Tahoe Regional Planning Agency. 2014. *Best Management Practices Handbook*. May 2014. Accessed online: https://tahoebmp.org/Documents/BMPHandbook/BMP_Handbook.pdf.

Tahoe Regional Planning Agency. 2015. Code of Ordinances, Rules of Procedures. Sections 61.3.6.C and 61.3.1-2. Stateline, NV.

United States Department of Agriculture. 2009. "Existing Vegetation Data (CALVEG) by Tiles (EvegTile17B_05_24k_v1) in Albers for Lake Tahoe Basin Management Unit." USDA Forest Service Remote Sensing Lab, Ecosystem Planning, Last updated on 1/5/2009, Retrieved online 7/22/2015: http://www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/?cid=stelprdb5347192.

United States Environmental Protection Agency. 2018. *Understanding Global Warming Potentials*. Accessed online: https://www.epa.gov/ghgemissions/understanding-global-warming-potentials.

United States Fish and Wildlife Service. 2018. *Information for Planning and Conservation*. Fish and Wildlife Service, Sacramento Field Office. Retrieved 8/10/2015 from http://ecos.fws.gov/ipac/project/3F4BA-POUCN-BXNNB-T6EY2-KYJZKQ.

University of California. 2002. *CEQA Handbook*. Office of Planning, Design and Construction. Accessed online: https://www.ucop.edu/ceqa-handbook/cover.html.

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Appendix A

SITE PLANS

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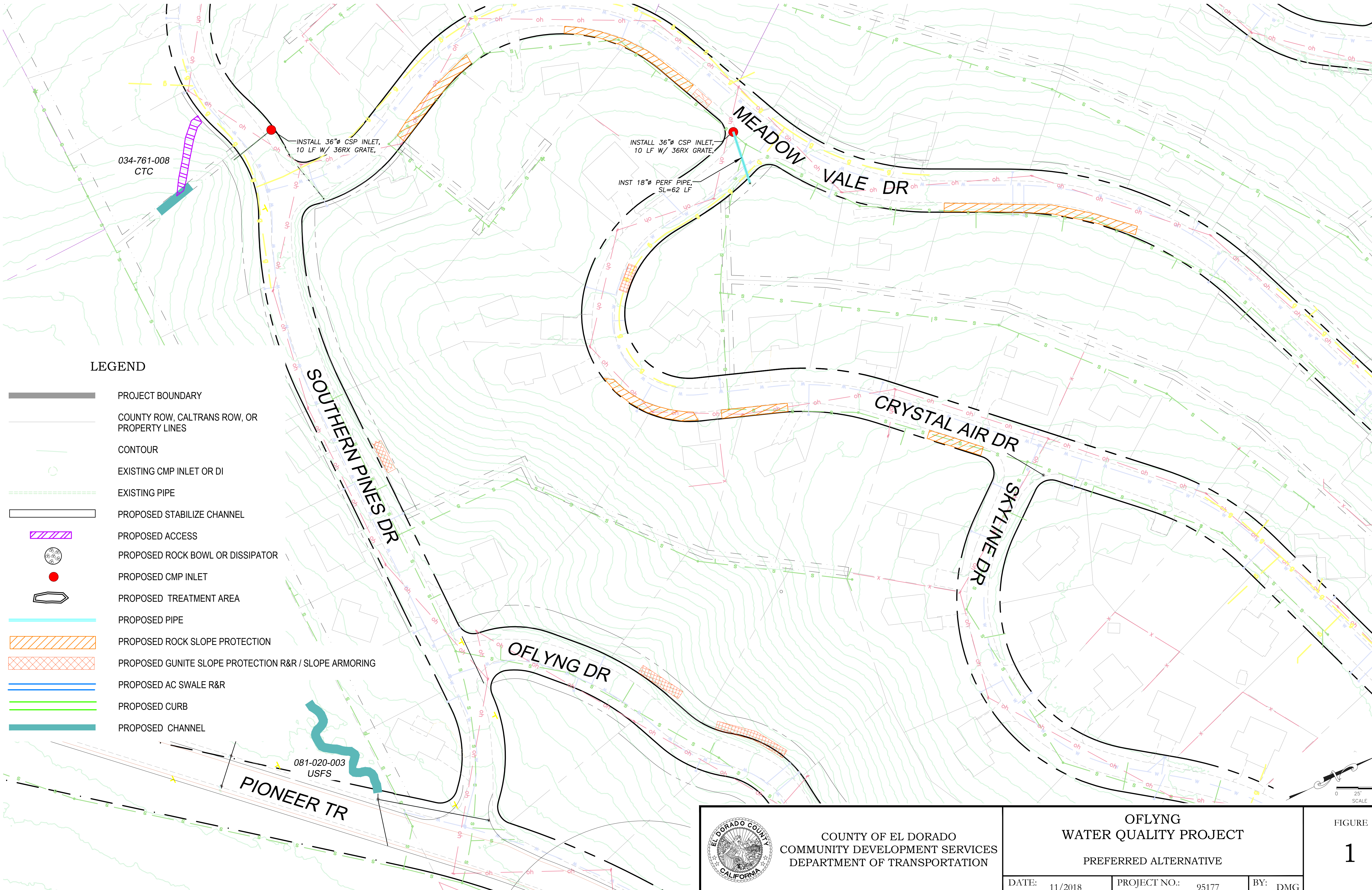


COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT SERVICES
DEPARTMENT OF TRANSPORTATION

OFLYNG
WATER QUALITY PROJECT

PREFERRED ALTERNATIVE

FIGURE 1

DATE: 11/2018 | PROJECT NO.: 95177 | BY: DMG

LEGEND

- PROJECT BOUNDARY
- COUNTY ROW, CALTRANS ROW, OR PROPERTY LINES
- CONTOUR
- EXISTING CMP I OR DI
- EXISTING PIPE
- PROPOSED STABILIZE CHANNEL
- PROPOSED ACCESS
- PROPOSED ROCK BOWL OR DISSIPATOR
- PROPOSED CMP INLET
- PROPOSED TREATMENT AREA
- PROPOSED PIPE
- PROPOSED ROCK SLOPE PROTECTION
- PROPOSED GUNITE SLOPE PROTECTION R&R / SLOPE ARMORING
- PROPOSED AC SWALE R&R
- PROPOSED CURB
- PROPOSED CHANNEL

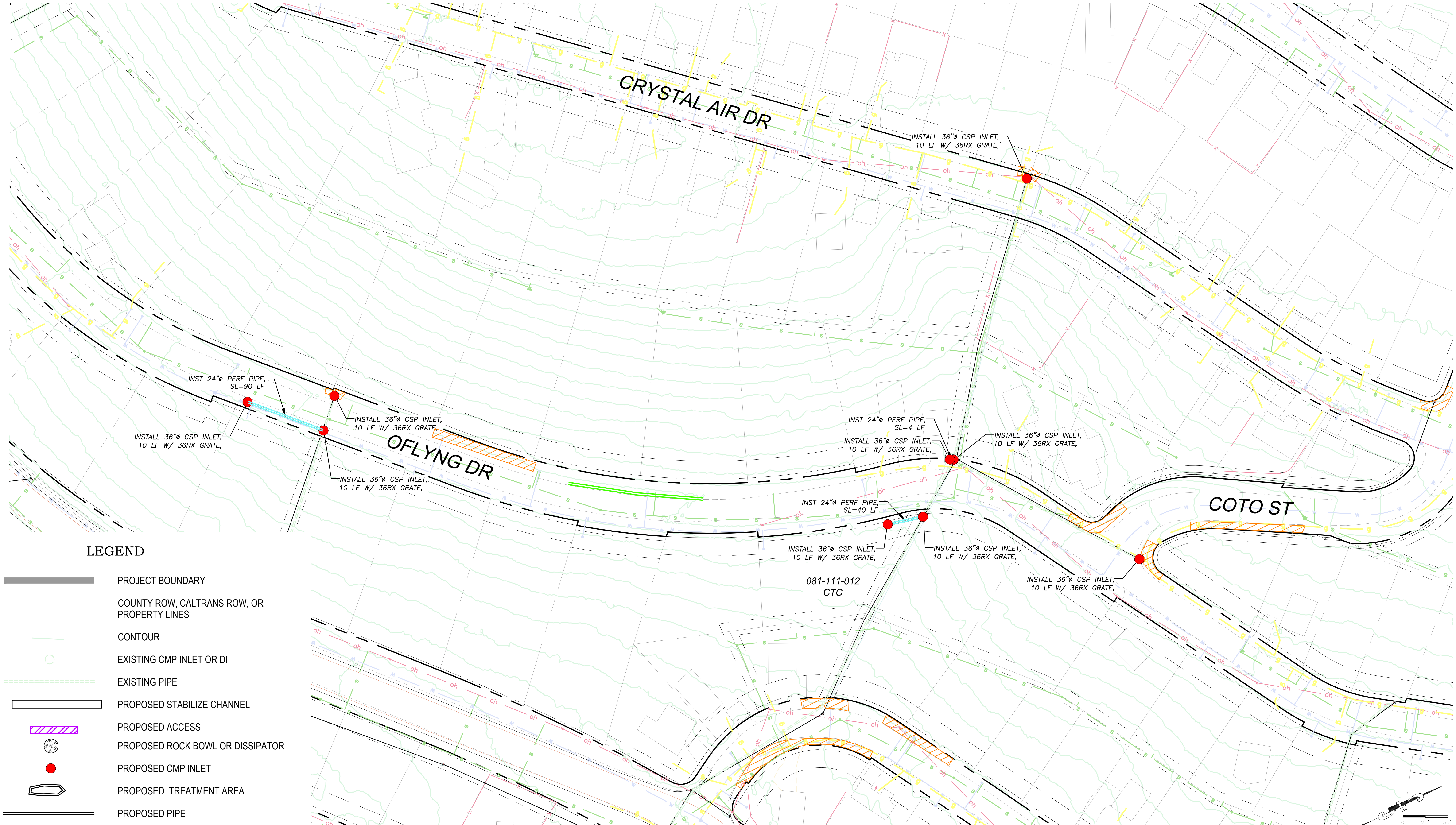
COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT SERVICES
DEPARTMENT OF TRANSPORTATION

OFLYNG
WATER QUALITY PROJECT

PREFERRED ALTERNATIVE

FIGURE 2

DATE: 11/2018	PROJECT NO.: 95177	BY: DMG



LEGEND

- PROJECT BOUNDARY
- COUNTY ROW, CALTRANS ROW, OR PROPERTY LINES
- CONTOUR
- EXISTING CMP INLET OR DI
- EXISTING PIPE
- PROPOSED STABILIZE CHANNEL
- PROPOSED ACCESS
- PROPOSED ROCK BOWL OR DISSIPATOR
- PROPOSED CMP INLET
- PROPOSED TREATMENT AREA
- PROPOSED PIPE
- PROPOSED ROCK SLOPE PROTECTION
- PROPOSED GUNITE SLOPE PROTECTION R&R / SLOPE ARMORING
- PROPOSED AC SWALE R&R
- PROPOSED CURB
- PROPOSED CHANNEL

COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT SERVICES
DEPARTMENT OF TRANSPORTATION

OFLYNG
WATER QUALITY PROJECT

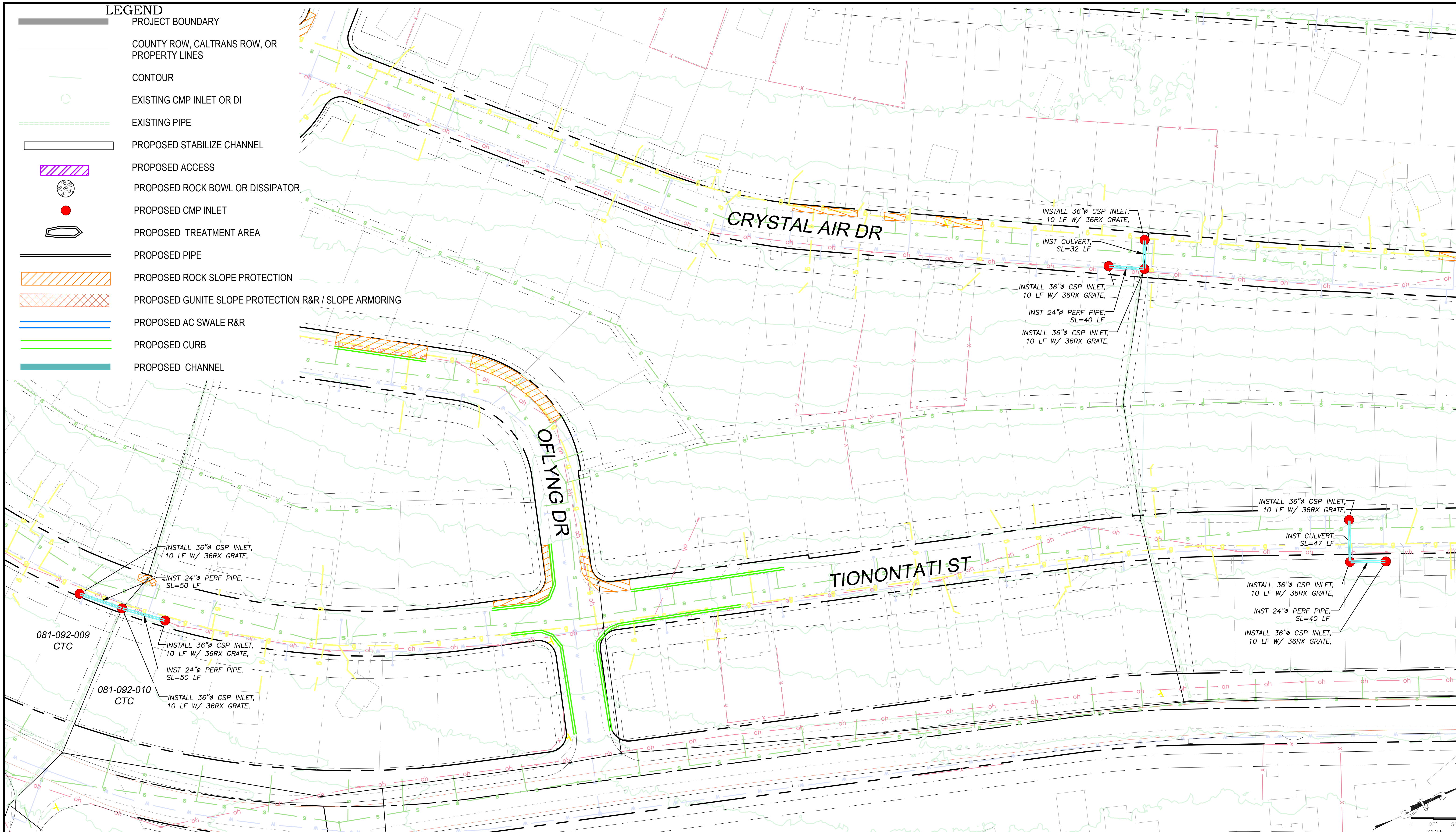
PREFERRED ALTERNATIVE

FIGURE 3

DATE: 11/2018	PROJECT NO.: 95177	BY: DMG

LEGEND

PROJECT BOUNDARY
COUNTY ROW, CALTRANS ROW, OR PROPERTY LINES
CONTOUR
EXISTING CMP INLET OR DI
EXISTING PIPE
PROPOSED STABILIZE CHANNEL
PROPOSED ACCESS
PROPOSED ROCK BOWL OR DISSIPATOR
PROPOSED CMP INLET
PROPOSED TREATMENT AREA
PROPOSED PIPE
PROPOSED ROCK SLOPE PROTECTION
PROPOSED GUNITE SLOPE PROTECTION R&R / SLOPE ARMORING
PROPOSED AC SWALE R&R
PROPOSED CURB
PROPOSED CHANNEL



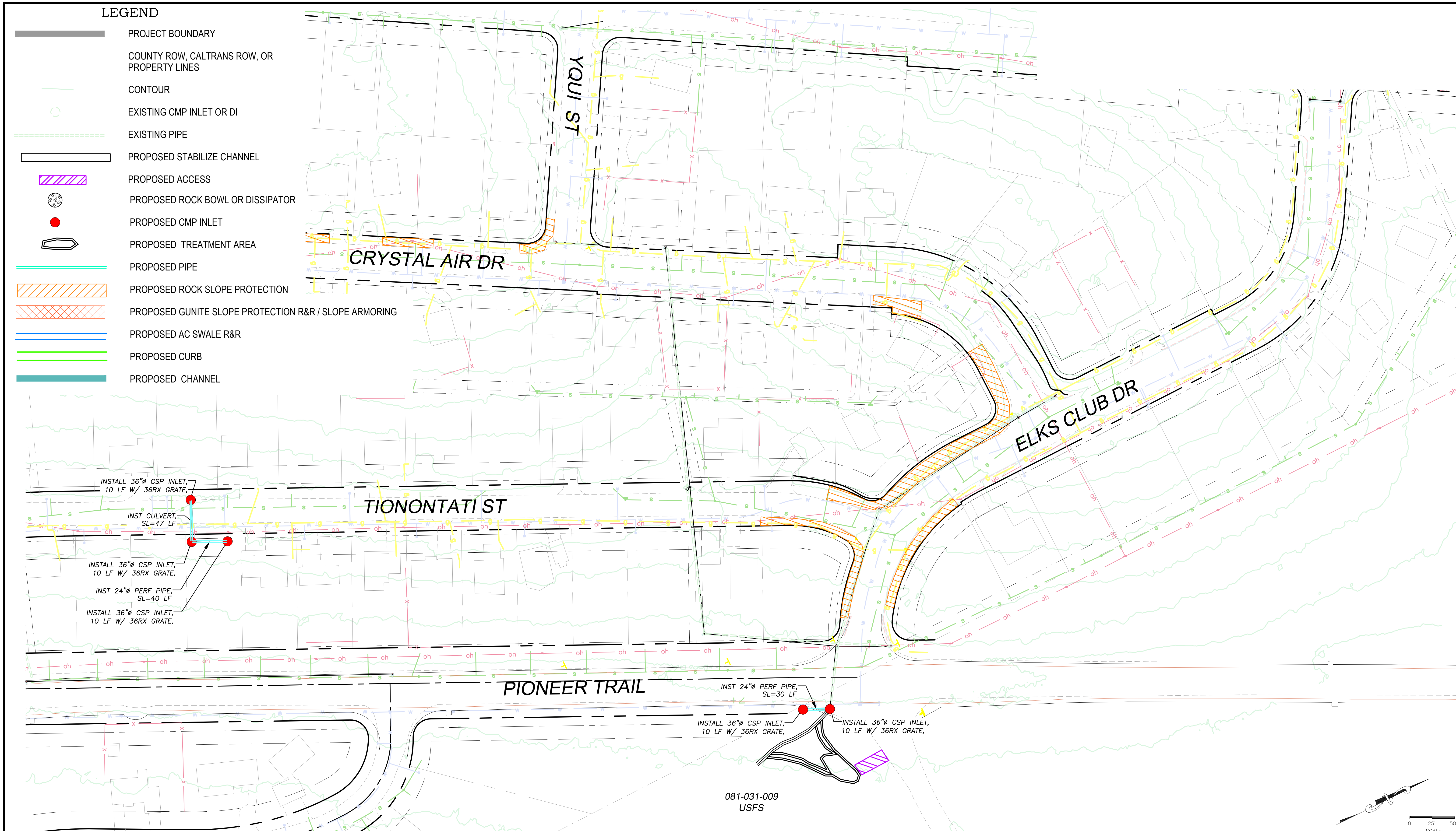
COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT SERVICES
DEPARTMENT OF TRANSPORTATION

OFLYNG
WATER QUALITY PROJECT

PREFERRED ALTERNATIVE

DATE: 11/2018	PROJECT NO.: 95177	BY: DMG

FIGURE
4



COUNTY OF EL DORADO
COMMUNITY DEVELOPMENT SERVICES
DEPARTMENT OF TRANSPORTATION

OFLYNG
WATER QUALITY PROJECT

PREFERRED ALTERNATIVE

FIGURE
5

DATE: 11/2018	PROJECT NO.: 95177	BY: DMG

Appendix B

BOTANICAL REPORT

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Collaboration. Commitment. Confidence.℠

OFLYNG WATER QUALITY PROJECT
EIP PROJECT #01.01.01.0074
BOTANICAL BASELINE REPORT

Prepared For:
County of El Dorado
Community Development
Agency Transportation Division
924B Emerald Bay Road
South Lake Tahoe, CA 96150

Prepared By:
NCE
155 Hwy 50, Suite 204
Stateline, NV 89449

NCE Project Number:
501.29.25

Date:
October 4, 2018

Mack Casterman
Staff Scientist

Dave Rios
Senior Scientist

TABLE OF CONTENTS

LIST OF APPENDICES

1.0 INTRODUCTION

The purpose of this document is to conduct an initial baseline assessment for botanical resources that satisfies the U.S. Fish and Wildlife Service (USFWS), Tahoe Regional Planning Agency (TRPA), and the California Department of Fish and Wildlife (CDFW) requirements to determine potential project effects on botanical special status species. Furthermore, the Botanical Baseline Assessment will provide the project proponent with relevant resources as they pertain to special status plant species and communities within the project area, as well as guide the decision-making process during project final design. This report summarizes the literature review and research findings, field assessment data, and potential impacts to the special status species in the Lake Tahoe Basin within and adjacent to the project area. For the purposes of this report, the term special status species encompasses those species designated as federally threatened and endangered species by the USFWS; those designated as state endangered, threatened, or rare by the State of California; and TRPA special interest species.

2.0 BACKGROUND

In 1997, TRPA developed a Basin-wide Environmental Improvement Program (EIP) that defined various projects which, once implemented, would assist in attaining and maintaining TRPA Environmental Threshold Carrying Capacities (ETCC) as well as meet other federal and state environmental goals. TRPA has established these ETCC thresholds for air quality, water quality, soil conservation, vegetation, noise, scenic resources, recreation, fisheries, and wildlife to address public health and safety of residents and visitors as well as the scenic, recreation, education, scientific, and natural values of the Lake Tahoe Basin. Whereas the Oflyng Water Quality Project (Oflyng WQP) is defined in the TRPA EIP as project #01.01.01.0074, these thresholds apply to the botanical resources in the proposed project area.

The area within the Oflyng WQP project boundary (project area) encompasses county rights of way and parcels owned by the California Tahoe Conservancy (CTC), USFS-LTBMU, El Dorado County (County), and private individuals. The project area is characterized by predominantly urban development intermixed with fragmented Jeffrey pine forest. This area produces concentrated stormwater runoff that flows from county rights of way to pervious naturally vegetated land and ultimately to the Upper Truckee River and Trout Creek.

Because the project area is connected to Lake Tahoe through the Upper Truckee River and Trout Creek, there is potential for fine sediment produced in the residential area to be deposited into Lake Tahoe. The overall goal of the project is to design and implement erosion control and water quality improvement measures that will reduce the discharge of sediment and pollutants to Lake Tahoe from County administered rights of way in the Oflyng WQP and assist the County with achieving goals associated with the EIP. Current sediment sources within project area include residential use and vehicular traffic; road sand/cinder accumulation from local and collector roadways; and eroding cut slopes, drainages, and roadside ditches throughout the project area.

To reduce the amount of sediment leaving the project area, proposed project improvements may include infiltrating and/or treating of stormwater from county rights of way, stabilizing eroding cut slopes with vegetation and/or rock protection, stabilizing existing drainages with rock and/or bio-engineering techniques (where feasible), and disconnecting existing storm drain conveyance systems from directly discharging into the Upper Truckee River and Trout Creek. Sediment trapping devices and infiltration basins (on publicly owned parcels) will be used to capture stormwater and road abrasives and treat pollutants to reduce the overall stormwater volume discharging to the Upper Truckee River and Trout Creek.

2.1 Project Location

The Oflyng WQP is located in the County of El Dorado, California. The project is located in Sections 20, 21, 28, and 29 in Township 12 North and Range 18 East of the Mt. Diablo Meridian which may be found on the Echo Lake and Freel Peak U.S. Geological Survey 7.5-minute quadrangle maps in El dorado County, California. It is within the TRPA Priority Two Watersheds 44 (Upper Truckee River) and 43 (Trout Creek).

The Oflyng WQP is located within an existing residential development located in the community of Meyers in South Lake Tahoe, bordered by Skyline Drive to the north, Elks Club Drive to the East, Pioneer Trail to the south, and Southern Pines Drive to the West (**Figure 1**). The project area covers approximately 108 acres; however, the survey area was limited to county rights of way, areas immediately adjacent to the rights of way that displayed habitat potential, and indicated parcels of interest within the project area where improvements will be installed. The survey area is approximately 25 acres.

Three plan area statements (PAS) present general land use zoning information within the project area. PAS are considered land use and zoning guidance documents for both the TRPA and the County of El Dorado. The majority of the project area is included within PAS 120 Tahoe Paradise Meadowvale, while small portions of the southern section of the project area is part of PAS 123, Meyers Forest, and PAS 122, Tahoe Paradise Mandin (TRPA 2002a, 2002b, 2002c). Land use in the majority of the project area is primarily characterized as single family residential. The area is 30 percent built out with 15 percent of the land covered and 25 percent disturbed. Additional planning considerations mentioned in the PAS documents note "steep and high cutbanks now protected by gunnite may start to erode within the next 20 years (TRPA 2002a)" in PAS 120 Tahoe Paradise Meadowvale.

3.0 RECORDS AND INFORMATION SEARCHES

A literature and database review was conducted to identify existing botanical information within and adjacent to the project area. This review assisted with the determinations contained in this document. All of the references utilized for this report are listed in Section 9.0. The most relevant searches, reviews, and requests are listed below.

Agency/Entity	Date	Information Received
USFWS	6/1/2018	• Federally Protected Species List for threatened, endangered, candidate, de-listed, and special concern species (USFWS 2018)
USDA	7/18/2018	• CALVEG GIS layers (USDA 2009a)
California Department of Fish and Wildlife (CDFW)	6/1/2018	• California Natural Diversity Database (CNDDB 2018) • State of California Endangered, Threatened, and Rare Plants of California List (CDFW 2018)
California Native Plant Society (CNPS)	6/1/2018	• Inventory of Rare and Endangered Plants of California (CNPS 2018)
TRPA	7/18/2018	• TRPA Threshold Evaluation Report (TRPA 2015) • TRPA Code of Ordinances (TRPA 2015)

4.0 FIELD ASSESSMENT AND SURVEYS

This section includes a summary of field assessments and survey information collected during site investigations. Surveys were conducted by NCE biologists on June 13, 2018. The methods used for the NCE botanical survey were similar to the CNPS methodology. These methods include conducting walking transect surveys across the survey area to identify plant communities and habitat types that may support special status species. In addition, the survey focused on plant identification to a level that allowed for the determination of rarity and listing status. During field surveys, the phenology of vegetation on site was appropriate for identification of special status species. Therefore, the timing was appropriate for presence/absence surveys of the special status plant species assessed during the evaluation. The entire project area was surveyed. The survey area included county rights of way, areas immediately adjacent to the rights of way that displayed habitat potential, and indicated parcels of interest within the project area where improvements are to be installed. The survey area is illustrated in **Figure 1** (Survey Area in yellow).

No special status plant species were found during field surveys. During background information research, three historical observations or detections of special status species (broad-nerved hump moss, mud sedge, and meesia moss) were found within 1 mile of the project area (**Figure 3**). None of the special status species identified during background research were observed within the project area during the June 13 survey.

The mapped Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) Alliances were found to be consistent with the project location, density, and size; however, this area is predominantly residential and does not reflect characteristics associated with these vegetation alliances in most locations in the project area. Common disturbances include altered and non-native landscapes, litter, domestic pets, humans, and vehicular traffic.

5.0 ASSESSMENT OF HABITAT TYPES

Vegetation types were initially identified with the CALVEG GIS data (USDA 2009a) and then verified based on the NCE reconnaissance field survey. Vegetation types found in and/or adjacent to the project area are typical of those found in the Lake Tahoe Basin. The project area is composed mainly of Jeffrey pine forest that is fragmented by urban land classification and pockets of perennial grasslands (**Figure 2**). Unless otherwise noted, the descriptions below are taken from the USFS North Sierran Ecological Province Vegetation Descriptions (USDA 2008). It should be noted that vegetation community data presented **Figure 2** are intended for planning purposes at a scale of 1:24,000. While this figure is a useful tool to determine the general location and types of vegetation communities found within the project area, data cannot be interpreted on a parcel basis at this scale.

Jeffrey Pine Alliance (CALVEG Code JP)
The Jeffrey pine alliance can be found in eastside northern Sierra Nevada habitats up to an elevation of about 7,300 feet. This alliance grows in xeric micro-environments on granitic outcrops or on glaciated soils such as tills and outwash deposits. It is prominent in the Sierra Valley and Carson Range Subsections on the east side of the range. This forest is tall and open, and is dominated by Jeffrey pine (*Pinus jeffreyi*) with a sparse understory of chaparral or sagebrush shrubs and young trees. The understory may include white fir (*Abies concolor*), greenleaf manzanita (*Arctostaphylos patula*), mountain whitethorn (*Ceanothus cordulatus*), wax currant (*Ribes cereum*), and mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Lodgepole pine (*Pinus contorta* ssp. *murrayana*) can be found in areas that collect more moisture (Holland 1986). This alliance is mapped throughout the project area.

Perennial Grasslands (CALVEG Code HM)
Perennial grasslands have been mapped sparsely in fourteen subsections of the Sierran zone at elevations between 2000 – 9400 ft (610 – 2867 m). This type is a form of dry to moist grassland in which it is difficult to determine species composition without detailed onsite surveys. Some of these areas are currently being used for livestock pasture and are a mix of perennial and annual grasses and legumes that vary according to management practices. Perennial bunchgrasses introduced from Eurasia such as desert, tall, and intermediate wheatgrasses (*Agropyron desertorum, Elytrigia pontica, Elytrigia intermedia*), in addition to tall fescue (*Festuca arundinacea*), clover (*Trifolium* spp.), needlegrass (*Achnatherum* spp.), squirreltail (*Elymus elymoides*), rock cress (*Arabis* spp.), monardella (*Monardella* spp.), buckwheat (*Eriogonum* spp.), cheatgrass (*Bromus tectorum*) and others generally found in northern California may be included in the mixture. Mules-ears (*Wyethia mollis*) are a typical associate towards the east. This Alliance is often associated with moist openings in Red Fir (*Abies magnifica*) forests.

Urban or Developed (CALVEG Code UB)
The urban or developed category applies to landscapes that are dominated by urban structures, residential units, or other developed land use elements such as highways or city parks. Areas mapped as urban or developed exist throughout the project area but are primarily located along the roads and southern commercial corridor. Furthermore, the entire project area can be described as a mix of forested vegetation within urban development.

6.0 SPECIAL STATUS SPECIES

This report considers the potential effects of the proposed project on species protected under the USFWS, State of California, and TRPA that may occur in or adjacent to the project area. These species are presented in **Table 1**, which includes the name, regulatory status, habitat requirements, identification period, potential for occurrence in the project area, and survey results. This analysis was based on the literature and database reviews and the field surveys.

Although Lake Tahoe Basin Management Unit (LTBMU) special status species are not evaluated in this report, USFS modeled habitat data within one mile of the project area was reviewed as this information is useful in analyzing the project area for similar special-status species. There are eight recorded USFS modeled habitats within one mile of the project area: *Arabis rectissima* var. *simulans, Botrychium* spp., *Bruchia bolanderi*, *Epilobium howelii*, *Helodium blandowii. Lewisia kelloggii*, *Meesia triquetra* and *Peltigera hydrothyria*. These species were not observed on surveyed parcels and their probability for occurrence ranges from unlikely to potential. Please refer to **Table 1** for more details.

Conclusion

It is not likely the project will have a negative effect on special status species with similar modeled habitat as this area has been impacted by urbanization and disturbance. Any species that do occur within the project area have demonstrated an ability to tolerate an ongoing level of disturbance associated with urban development. If special status plants were to occur within the project area during construction, any project impacts to these species would not reduce the species ability to colonize adjacent areas and would not affect long-term viability of the species, making any potential impacts less than significant.

7.0 SUMMARY

The project area represents a typical residential environment found within the Lake Tahoe Basin. The project area covers approximately 108 acres while the survey area was approximately 25 acres. Dominant vegetation is primarily Jeffrey pine with a heavy urban influence.

No special status species were encountered in the project area during the botanical field surveys and no recorded occurrences of special status plant species occurrences were found within the project area during database research.

To avoid potential impacts due to construction, TRPA approved BMPs will be in place and maintained for the duration of construction to ensure impacts are minimized and/or eliminated. No special conditions outside of TRPA approved vegetation protection BMPs are recommended at this time. The goal of the Oflyng WQP is to minimize erosion and improve the quality of stormwater discharged from the County rights of way. The project will not change the use of the site or surrounding area, and will provide benefits to the natural environment through the proposed improvements. After the project is completed, less sediment will enter Upper Truckee River from the project area, thereby improving water quality in Lake Tahoe and special status species habitat.

8.0 REFERENCES

California Department of Fish and Wildlife (CDFW). (2000). Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities. Revised November 24, 2009. California Natural Resources Agency. Sacramento, CA.

CDFW. (2018). "State of California Endangered, Threatened, and Rare Plants of California List." Revised April 2018. Retrieved 6/1/2018. State of California Resources Agency. Sacramento, CA.

California Native Plant Society (CNPS). (2018). Inventory of Rare and Endangered Plants (online edition). California Native Plant Society, Sacramento, CA. Website http://www.rareplants.cnps.org, Retrieved on 6/1/2018.

California Natural Diversity Database (CNDDB). (2018). California Department of Fish and Wildlife, Commercial Version 5.66.18.

Hickman, J. C. (1993). *The Jepson Manual: Higher Plants of California.* University of California Press, Berkeley, CA.

Holland, R. F. (1986). *Preliminary Descriptions of the Terrestrial Natural Communities of California.* California Department of Fish and Wildlife. Sacramento, CA.

Sawyer, John O. and Todd Keeler-Wolf. (2009). *A Manual of California Vegetation* Second Edition. California Native Plant Society. Sacramento, CA.

TRPA. (2002a). "Plan Area Statement 120 Tahoe Paradise Meadowvale." Tahoe Regional Planning Agency, Retrieved on 6/1/2018. Stateline, NV.

TRPA. (2002b). "Plan Area Statement 122 Tahoe Paradise Mandin." Tahoe Regional Planning Agency, Retrieved on 6/1/2018. Stateline, NV.

TRPA. (2002c). "Plan Area Statement 123 Meyers Forest." Tahoe Regional Planning Agency, Retrieved on 6/1/2018. Stateline, NV

TRPA. (2015). *Threshold Evaluation Report.* Chapter 6, Updated 2016. Stateline, NV.

TRPA. (2015). *Code of Ordinances, Rules of Procedures.* Sections 61.3.6.C and 61.3.1-2. Stateline, NV.

TRPA. (2012). *Regional Plan for the Lake Tahoe Basin: Code of Ordinances.* Section IX. Stateline, NV.

TRPA. (1986). *Goals and Policies.* Stateline, NV.

USDA. (1988). *Land and Resource Management Plan.* USDA Forest Service, South Lake Tahoe, CA.

U.S. Department of Agriculture (USDA). (2008). "Vegetation Descriptions North Sierran Ecological Province - CALVEG Zone 3." USFS Remote Sensing Lab, Ecosystem Planning, Last updated on 12/17/2008, Retrieved on 10/14/2011 from http://www.fs.fed.us/r5/rsl/projects/classification/nsierran-veg-descript.shtml.

USDA. (2009a). "Existing Vegetation Data (CALVEG) by Tiles (EvegTile17B_05_24k_v1) in Albers for Lake Tahoe Basin Management Unit." USDA Forest Service Remote Sensing Lab, Ecosystem Planning, Last updated on 1/5/2009, Retrieved 7/22/2015 from http://www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/?cid=stelprdb5347192.

USDA. (2009b). "Erosion Control Grants NEPA Decision Guidelines." USDA Forest Service, Lake Tahoe Basin Management Unit (LTBMU). September 22, 2009.

U.S. Fish and Wildlife Service (USFWS). (2018). "Information for Planning and Conservation." Fish and Wildlife Service, Sacramento Field Office. Retrieved 6/1/2018 from http://ecos.fws.gov/ipac/.

APPENDIX A

Tables

Table 1. Special Status Species List and Habitat.							
Species	Regulatory Status				Habitat Requirements	Identification Period	Potential for Occurrence in the Project Area and Results of Survey
	Federal	State	TRPA	CNPS			
Arabis rigidissima* var. *demota Galena Creek rockcress			SI	1B.2	Broad-leaved upland forests, upper montane coniferous forests on rocky substrates. Known in CA from only two occurrences near Martis Peak and in NV from eleven occurrences in the Carson Range. Elevation range 7,398 to 8,398 feet.	August	**Unlikely.** Outside of elevation range and site lacks suitable habitat.
Astragalus austiniae Austin's astragalus				1B.3	Alpine boulder and rock field, subalpine coniferous forest. Elevation range 8,005 to 9727 feet.	July to September	**Unlikely.** Outside of elevation range. Not encountered during surveys.
Boechera tularensis Tulare rockcress				1B.3	Perennial herb that prefers rocky slopes, subalpine coniferous forest, and upper montane coniferous forest. Elevation range is from 6,000 to 11,000 feet.	June to July	**Potential.** May occur. Not encountered.
Bolandra californica Sierra bolandra				4.3	Perennial herb that prefers mesic, rocky soils in lower to upper montane coniferous forests at elevations from 3,200 – 8,000 feet.	June to July	**Potential.** May occur. Not encountered.
Botrychium ascendens Upswept moonwort				2B.3	Wet or moist soils in lower montane coniferous forests, such as along the edges of lakes and streams. Elevation range 4,950 to 6,039 feet.	Fertile early July to early September	**Potential.** May occur as USFS modeled habitat exists within project area. Not encountered.
Botrychium crenulatum Scalloped moonwort				2B.2	Lower montane coniferous forests, meadows and seeps, marshes and swamps. Elevation range 4,950 to 10,800 feet.	Fronds mature June to September	**Potential.** May occur. Not encountered.
Botrychium minganense Mingan moonwort				2B.2	Wet or moist soils in lower montane coniferous forests, such as along the edges of lakes and streams. Elevation range 4,950 to 6,039 feet.	Fronds mature June to September	**Potential.** May occur. Not encountered.

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	Federal	**State**	**TRPA**	**CNPS**			
Brasenia schreberi Watershield				2B.3	Perennial rhizomatous herb that prefers marshes and swamps or freshwater. Elevation range 100 to 7,200 feet.	June to September	**Potential.** May occur. Not encountered.
Bruchia bolanderi Bolander's bruchia				4.2	Meadows in mixed conifer and subalpine communities, streams and wet meadows, from 5,577 to 9,186 feet.	Moss	**Potential.** May occur as USFS modeled habitat exists within project area. Not encountered.
Carex davyi Davy's sedge				1B.3	Perennial herb that prefers subalpine and upper montane coniferous forests between 5,000 to 10,500 feet.	May to August	**Unlikely.** Site lacks suitable habitat.
Carex hystericina Porcupine sedge				2B.1	Marshes and swamps (streambanks). 2,000 to 3,000 feet.	May to June	**Unlikely.** Site lacks suitable habitat.
Carex limosa Mud sedge				2B.2	Perennial rhizomatous herb that prefers bogs, fens, meadows, seeps, marshes, swamps, and both lower and upper montane coniferous forests. Elevation range is between 3,900 and 8,900 feet.	June to August	**Unlikely.** CNDDB records exist within1 mile of project area, but suitable habitat does not exist on site; it was not encountered during surveys.
Carex tahoensis Tahoe sedge				4.3	Perennial rhizomatous herb that prefers alpine boulder and rock fields and subalpine coniferous forests. Elevation range is between 9,300 and 12,500 feet.	July to August	**Unlikely.** Site lacks suitable habitat, outside of elevation range.
Chaenactis douglasii* var. *alpina Alpine dusty maidens				2B.3	Open, subalpine to alpine gravel and crevices; granitic substrate. Elevation range is between 7,749 and 11,007 feet.	July to September	**Unlikely.** Site lacks suitable habitat, outside of elevation range.
Clarkia virgata Sierra clarkia				4.3	Annual herb that prefers Cismontane woodland and lower montane coniferous forest. Elevation range is between 1,300 and 5,300 feet.	May-August	**Unlikely.** Site lacks suitable habitat, outside of elevation range.

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Species	**Regulatory Status**				**Habitat Requirements**	**Identification Period**	**Potential for Occurrence in the Project Area and Results of Survey**
	Federal	**State**	**TRPA**	**CNPS**			
Cryptantha crymophila Subalpine cryptantha				1B.3	Subalpine coniferous forest. On dry talus of volcanic formation. Elevation range is between 8,792 and 10,810 feet.	July to August	**Unlikely.** Site lacks suitable habitat, outside of elevation range.
Draba asterophora* var. *asterophora Tahoe draba			SI	1B.2	Alpine boulder and rock fields in crevices, and open talus slopes of decomposed granite in subalpine coniferous forests. Elevation range 8,325 to 11,670 feet.	July to September	**Unlikely.** Outside of elevation range.
Draba asterophora* var. *macrocarpa Cup Lake draba			SI	1B.1	Alpine boulder and rock fields in shade of granitic rocks in subalpine coniferous forest. Elevation range 8,202 to 9,235 feet.	July to August	**Unlikely.** Outside of elevation range and site lacks suitable habitat.
Epilobium howellii Subalpine fireweed				4.3	Meadows and seeps in upper montane coniferous forests. Elevation range 6,600 to 8,910 feet.	July to August	**Potential.** USFS Modeled habitat occurs within project area, but project area is outside of elevation range and site lacks suitable habitat. Not encountered during surveys.
Epilobium oregonum Oregon fireweed				1B.2	Perennial herb that prefers mesic habitat including bogs and fens, but also lower and upper montane coniferous forests. Elevation is between 1,650 and 7,300 feet.	June to September	**Unlikely.** Site lacks undisturbed suitable habitat.
Epilobium palustre Marsh willowherb				2B.3	Perennial rhizomatous herb that prefers mesic habitat including bogs, fens, meadows, and seeps.	July to August	**Unlikely.** Site lacks undisturbed suitable habitat.
Eriastrum sparsiflorum Few-flowered erastrum				4.3	Chaparral, Cismontane woodland, Great Basin scrub, Joshua tree woodland, Mojavean desert scrub, Pinyon and juniper woodland. Elevation range between 3,500 and 5,610	May to September	**Unlikely.** Site lacks suitable habitat.

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Eriogonum luteolum* var. *saltuarium Jack's wild buckwheat				1B.2	Upper montane coniferous forest, great basin scrub on sandy, granitic substrates. Elevation range between 5,577 and 7,874 feet.	July to September	**Unlikely.** Site lacks suitable habitat.
Erytrhanthe carsonensis Carson Valley monkeyflower				1B.1	Annual herb that grows in open areas of Great Basin sagebrush/bitterbrush scrub in coarse granite soils on gentile to moderate slopes, usually on a N aspect. Elevation range between 4,600 and 5,200 feet.	April to June	**Unlikely.** Plant is known in only one area of California on the east side of the Sierra Nevada range. Site lacks suitable habitat.
Glyceria grandis American manna grass				2B.3	Perennial rhizomatous herb that prefers bogs, fens, meadows, seeps, marshes, and swamps along stream banks, or lake margins. Elevation range is from 50 to 6,500 feet.	June to August	**Potential.** May occur. Not encountered.
Helodium blandowii Blandow's bog-moss				2B.3	Bogs and fens that are not too rich in iron. Elevation range 6,562 to 8,859 feet.	Moss	**Unlikely.** Site lacks suitable habitat.
Lewisia kelloggii Kellogg's lewisia				3.2	Ridge tops or flat open spaces with widely spaced trees and sandy granitic to erosive volcanic soil. Elevation range 5,000 to 7,000 feet.	June to July	**Potential.** May occur as it has USFS modeled habitat within project area; however, it was not encountered.
Lewisia longipetala Long-petaled lewisia			SI	1B.3	Alpine boulder and rock fields in subalpine coniferous forests. Elevation range 8,325 to 9,740 feet.	June to August	**Unlikely.** Outside of elevation range.
Meesia triquetra Three-ranked hump-moss				4.2	Bogs and fens, meadows and seeps in montane coniferous forests. Elevation range 4,290 to 8,250 feet.	Moss	**Unlikely.** Site lacks suitable habitat.

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Species	**Regulatory Status**				**Habitat Requirements**	**Identification Period**	**Potential for Occurrence in the Project Area and Results of Survey**
	Federal	**State**	**TRPA**	**CNPS**			
Meesia uliginosa Broad-nerved hump-moss				2B.2	Bogs and fens, meadows and seeps in montane coniferous forests. Elevation range 4,290 to 8,250 feet.	Moss	**Unlikely.** CNDDB records exist within1 mile of project area, but suitable habitat does not exist on site; it was not encountered during surveys.
Peltigera hydrothyria Veined water lichen					Mixed coniferous forests, bogs, fens, wet meadows, seeps, and clear, cold streams. Elevation range 4,000 to 8,000 feet.	Lichen	**Potential.** May occur as it has USFS modeled habitat within project area; however, it was not encountered.
Peltigera gowardii Western waterfan lichen				4.2	This foliose lichen (aquatic) is found in cold water creeks with little or no sediment or disturbance in riparian forests. Elevation range is from 3,490 to 8,595 feet.	n/a	**Unlikely.** Site lacks suitable habitat.
Phacelia stebbinsii Stebbins' phacelia				1B.2	This annual herb grows in cismontane woodland, lower montane coniferous forests, and in meadows and seeps. Plant is generally found among rocks and rubble on metamorphic rock benches, mostly on northern exposure. Elevation range 2,000 to 6500 feet.	May to July	**Unlikely.** Site lacks suitable habitat.
Polystichum lonchitis northern holly fern				3	This perennial rhizomatous herb prefers granitic or carbonate soils in subalpine coniferous forest and upper montane coniferous forests. Elevation range 5,900 to 8,530 feet.	June to September	**Unlikely.** Site lacks suitable habitat.
Potamogeton robbinsii *Robbins' pondweed*				2B.3	This perennial rhizomatous herb prefers marshes and swamps (deep water, lakes). Elevation range 5,000 to 8,530 feet.	July to August	**Unlikely.** Site lacks suitable habitat.

Table 1. Special Status Species List and Habitat.							
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	Federal	State	TRPA	CNPS			
Rhamnus alnifolia Alder buckthorn				2B.2	This perennial deciduous shrub that prefers lower montane coniferous forest, meadows and seeps, riparian scrub, and upper montane coniferous forest. Elevation 4,400 to 7,000 feet.	May to July	**Potential.** May occur. Not encountered.
Rorippa subumbellata Tahoe yellow cress			SI	1B.1/ SE	Shoreline supporting decomposed granitic soils; known only from the shoreline of Lake Tahoe. Elevation range 6,210 to 6,230 feet.	Blooms May to September	**Unlikely.** Outside of elevation range and site lacks suitable habitat.
Schoenoplectus subterminalis Water bulrush				2B.3	Perennial rhizomatous herb that prefers bogs, fens, marshes and swamps, especially along montane lake margins. Elevation range from 2,400 to 7,300 feet.	June to August	**Unlikely.** Site lacks suitable habitat.
Scutellaria galericulata Marsh skullcap				2B.2	Perennial rhizomatous herb that prefers lower montane coniferous forests, meadows, seeps, marshes, and swamps. Elevation range from 0 to 6,800 feet.	June to September	**Unlikely.** Site lacks suitable habitat.
Stuckenia filiformis* ssp. *alpina Slender-leaved pondweed				2B.2	Perennial rhizomatous herb that prefers marshes, swamps, and a variety of shallow freshwater habitats. Elevation range from 980 to 7,000 feet.	May to July	**Potential.** May occur. Not encountered.
Utricularia ochroleuca Cream-flowered bladderwort				2B.2	Perennial stoloniferous herb that can be found in meadows, seeps, marshes, swamps, and lake margins. Elevation range from 4,700 to 4,730 feet.	June to July	**Unlikely.** Site lacks suitable habitat.
Viola purpurea* ssp. *aurea Golden violet				2B.2	Perennial herb that can be found in Great Basin scrub and pinyon/juniper woodland. Elevation range from 3,000 to 8,202 feet.	April to June	**Unlikely.** Site lacks suitable habitat.

Table 1. Special Status Species List and Habitat.							
Species	Regulatory Status				Habitat Requirements	Identification Period	Potential for Occurrence in the Project Area and Results of Survey
	Federal	State	TRPA	CNPS			
Federally Listed Species (Federal): FE = Federally Endangered FT = Federally Threatened FD = Federally Delisted PT = Proposed Threatened FCE = Federally Endangered Candidate FPD = Proposed for Delisting		California State Listed Species (CA): SE = State Endangered ST = State Threatened SR = State Rare SC = State Candidate Tahoe Regional Planning Agency (TRPA): SI = TRPA Special Interest Species				California Native Plant Society (CNPS) List Categories: 1 = Rare in California and elsewhere 2 = Rare in California, but not elsewhere A = Presumed extirpated or extinct B = Rare, threatened, or endangered 3 = Plants about which we need more information 4 = Plants of limited distribution CNPS Threat Code Extensions: .1 = Seriously endangered in California (Over 80% of occurrences threatened) .2 = Fairly endangered in California (20-80% occurrences threatened) .3 = Not very endangered in California (<20% of occurrences threatened)	

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APPENDIX B

Figures

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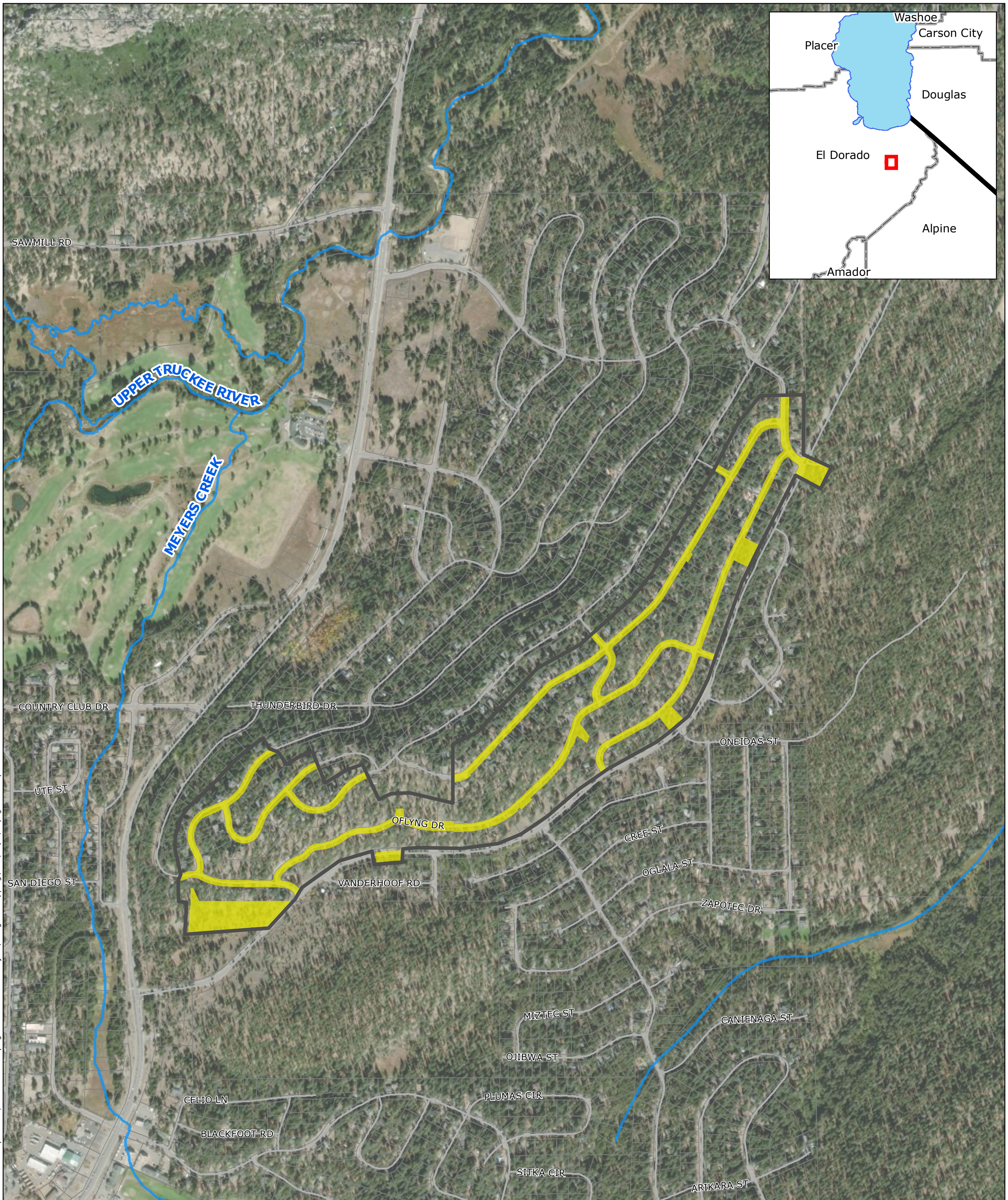


Legend

- Project Boundary
- Survey Area
- Parcels
- Streams

NCE

Oflyng Water Quality Project

Project Area Basemap

N

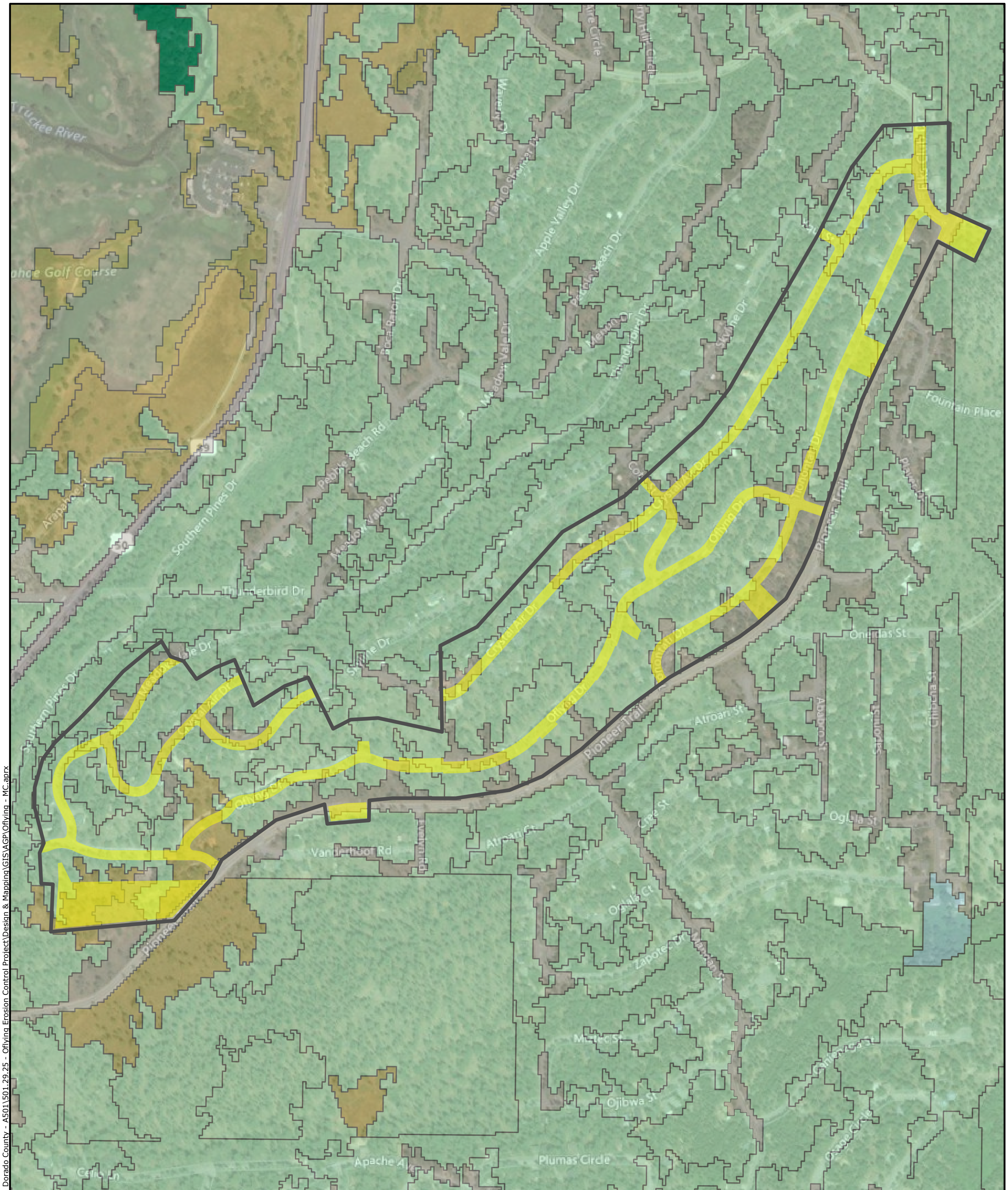
1 in. = 1,000 ft.

0 1,000 ft.

FIGURE 1

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
ESRI World Imagery basemap	501.29.25	mcasterman	6/5/2018	--	drios

Document Path: P:\Active Projects\El Dorado County - A501\501.29.25 - Oflying Erosion Control Project\Design & Mapping\GIS\Maps\Oflyng Basemap final.mxd



Survey area

Project boundary

CWHR Habitat Type

- Aspen
- Jeffrey Pine
- Lodgepole Pine
- Perennial Grassland
- Urban

EL DORADO COUNTY CALIFORNIA

NCE

Oflyng Water Quality Project

Vegetation Community Map

N

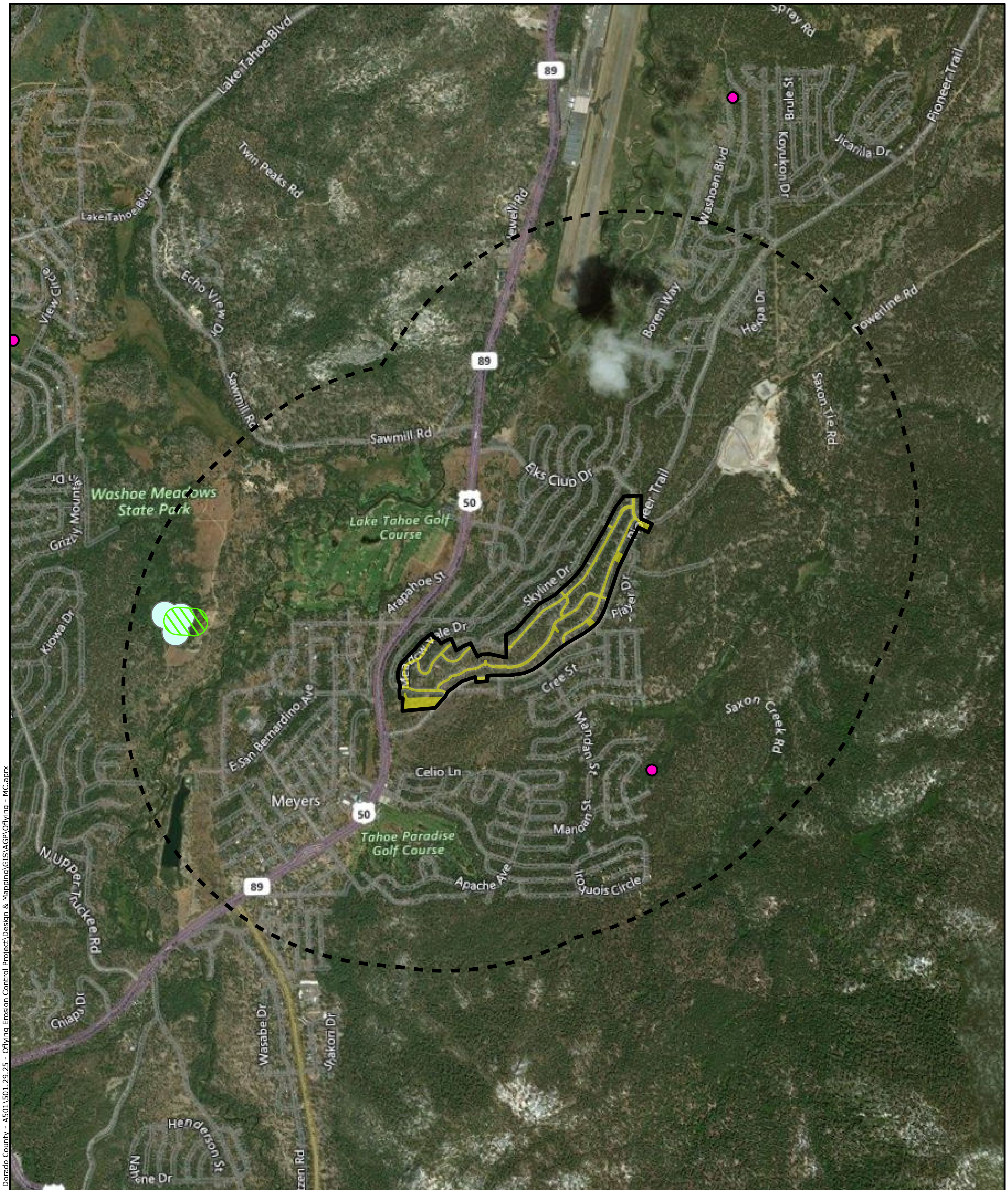
0 375 750 Feet

FIGURE

2

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
CNDDB, CDFW	501.29.25	mcasterman	08/22/18	--	drios

Document Path: P:\Active Projects\El Dorado County - A501\501.29.25 - Oflying Erosion Control Project\Design & Mapping\GIS\AGP\Oflying - MC.aprx



Survey area

Project boundary

1-mile buffer

CNDDB Occurrence

broad-nerved hump moss

mud sedge

USFS Occurrence

Meesia triquetra

NCE

Oflying Water Quality Project

Vegetation Basemap

N

0 0.25 0.5 mi.

FIGURE

3

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
CNDDB, USFS	501.29.25	mcasterman	08/17/18	--	drios

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Appendix C

INVASIVE PLANT RISK ASSESSMENT

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INVASIVE PLANT RISK ASSESSMENT

OFLYNG WATER QUALITY PROJECT
EIP PROJECT #01.01.01.0074

LAKE TAHOE BASIN MANAGEMENT UNIT
USDA FOREST SERVICE

Prepared by: _______Mack Casterman, NCE, Staff Scientist________ Date: ___10/4/2018___

TABLE OF CONTENTS

1 INTRODUCTION

In 2003, the United States Forest Service (USFS) identified invasive species as one of four critical threats to the nation's ecosystems (Bosworth 2003). Invasive plants pose a significant threat to ecological function due to their ability to displace native species, alter nutrient and fire cycles, decrease the availability of forage for wildlife, and degrade soil structure (Bossard et al. 2000). Infestations can also reduce the recreational or aesthetic value of native habitats.

Forest management activities can contribute to the introduction and spread of invasive plants by creating suitable environmental conditions for establishment and by acting as vectors for spread. The following risk assessment has been prepared to evaluate the risk associated with invasive plant introduction and spread as a result of the proposed project.

1.1 ANALYSIS FRAMEWORK: PERTINENT LAWS, POLICIES, AND DIRECTION

A comprehensive summary of principal statutes governing the management of invasive plants on the National Forest System is available in FSM 2900. A brief summary of the pertinent laws, policies, and direction is provided below.

1.1.1 *Federal Laws and Executive Orders*

Executive Order 13112 (1999)—directs federal agencies to prevent the introduction of invasive species; detect and respond rapidly to control such species; and to minimize the economic, ecological, and human health impacts from invasive species on public lands.

1.1.2 *Forest Service Policies and Direction*

Forest Service Manual 2080 (USDA Forest Service 1995)—Was replaced by FSM 2900 in 2011. FSM 2080 revised USFS national policy on noxious weed management to emphasize integrated weed management, which includes prevention and control measures, cooperation, and information collection and reporting.

Forest Service Manual 2900 (USDA Forest Service 2011)—directs the Forest Service to manage invasive species with an emphasis on integrated pest management and collaboration with stakeholders, to prioritize prevention and early detection and rapid response actions, and ensure that all Forest Service management activities are designed to minimize or eliminate the possibility of establishment or spread of invasive species on the NFS or to adjacent areas.

Forest Service Manual 2070 (USDA Forest Service 2008)—provides guidelines for the use of native material on National Forest System lands. It restricts the use of persistent, non-native, non-invasive plant materials and prohibits the use noxious weeds for revegetation, rehabilitation and restoration projects. It also requires that all revegetation projects be reviewed by a trained or certified plant material specialist for consistency with national, regional, and forest policies for the use of native plant materials.

USFS National Strategy and Implementation Plan for Invasive Species Management (USDA Forest Service 2004a)—identifies for all Forest Service programs the most significant strategic actions for addressing invasive species. It emphasizes prevention, early detection and rapid response, prioritization in control and management, and restoration or rehabilitation of degraded areas.

Region 5 Noxious Weed Management Strategy (USDA Forest Service 2000)—guides regional Forest Service goals and objectives for invasive plant management, emphasizing actions necessary to: promote the overall management of noxious weeds; to prevent the spread of weeds; control existing stands of weed infestations; and promote the integration of weed issues into all forest service activities.

1.1.3 *Forest Plan Direction*

LTBMU Land and Resource Plan (USDA Forest Service 1988)—Does not specifically address invasive plants (except the removal of noxious plants in grazing allotments), though it does provide for the protection and enhancement of threatened and sensitive plant habitat. It is amended by the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) to address invasive plant management.

Sierra Nevada Forest Plan Amendment (USDA Forest Service 2004b)—Establishes goals, standards, and guidelines for invasive plant (noxious weed) management for the Sierra Nevada forests. It emphasizes prevention and integrated weed management. It establishes the following invasive plant management prioritization: 1) prevent the introduction of new invaders; 2) conduct early treatment of new infestations; 3) contain and control established infestations. It also requires forests to conduct an invasive plant risk assessment to determine risks for weed spread (high, moderate, or low) associated with different types of proposed management activities and develop mitigation measures for high and moderate risk activities with reference to the weed prevention practices in the Regional Noxious Weed Management Strategy.

2 PROJECT DESCRIPTION

2.1 PROPOSED ACTIVITIES

The project proposes to provide water quality improvements to the project area. Infiltration improvements are proposed within the County of El Dorado (County) rights-of-way (ROW) and on publicly owned parcels throughout the project area. Storm water runoff from the project will be directed into infiltration improvements providing a direct reduction in the transport of fine sediment to Lake Tahoe. It is also anticipated that urban stormwater infrastructure will be upgraded to current design specifications with conveyances improved to allow for proper flow sizing and routing. The effects of climate change will also be taken into consideration to ensure that flow sizing, routing, and treatment are addressed for future conditions.

The overall goal of the project is to address impacts from urban development in the Oflyng residential area. This area produces concentrated storm water runoff that flows from County rights of way to pervious, naturally vegetated land and ultimately the Upper Truckee River. Current sediment sources within project area include residential and vehicular traffic, road sand/cinder accumulation from both arterial and collector roadways, and eroding cut slopes and roadside ditches throughout the project area. Existing evidence of erosion is seen on road shoulders, unimproved parking areas, and stream banks. The hydrologic connectivity between Lake Tahoe and the Oflyng area results in a high to moderate potential to deliver fine sediment to Lake Tahoe. The completion of this water quality project will help reduce the delivery of fine sediment to the Upper Truckee River and Trout Creek, and in turn Lake Tahoe.

Three plan area statements (PAS) present general land use zoning information for the project area. PAS are considered land use and zoning guidance documents for both the TRPA and the County of El Dorado. The majority of the project area is included within PAS 120 Tahoe Paradise Meadowvale, while small portions of the southern section of the project Area is part of PAS 123, Meyers Forest, and PAS 122, Tahoe Paradise Mandin (TRPA 2002a, 2002b, 2002c). Land use in the majority of the project area is primarily characterized as single family residential. The area is 30 percent built out with 15 percent of the land covered and 25 percent disturbed. Additional planning considerations mentioned in the PAS documents note “steep and high cutbanks now protected by gunnite may start to erode within the next 20 years (TRPA 2002a)” in PAS 120 Tahoe Paradise Meadowvale.

2.2 Location and Extent

The project area is located in the County of El Dorado, California. The project is located in Sections 20, 21, 28, and 29 in Township 12 North and Range 18 East of the Mt. Diablo Meridian which may be found on the Echo Lake and Freel Peak U.S. Geological Survey 7.5-minute quadrangle maps in El Dorado County, California. It is within the TRPA designated Priority 2 Watersheds 44 (Upper Truckee River) and 43 (Trout Creek).

The Oflyng Water Quality Project is located within an existing residential development located in the community of Meyers in South Lake Tahoe, bordered by Skyline Drive to the north, Elks Club Drive to the east, Pioneer Trail to the south, and Southern Pines Drive to the West (**Figure 1**). The project boundary area (project area) covers approximately 108 acres; however, the survey area was limited to county rights of way, areas immediately adjacent to the rights of way, and indicated parcels of interest within the project area where improvements would be installed. The survey area is approximately 25 acres.

3 Non-Project Dependent Factors

3.1 Inventory

3.1.1 *Surveys and existing data*

A literature and database review was conducted to identify documented noxious weed species within and adjacent to the project area. All of the references utilized for this Assessment are listed in Section 6.0. The most relevant searches, reviews, and requests are listed below.

Table 1. Database and Literature Review Summary

Agency/Entity	Date	Information Received
USDA	Accessed 6/1/2018	• SNFPA Table 1: Invasive non-native plant species occurrence in Sierra Nevada National Forest (D’Antonio 2004)
CDFA	Accessed 6/1/2018	• Noxious Weed Species List (CDFA 2016)
LTBWCG	Accessed 6/1/2018	• Priority Invasive Weeds of the Lake Tahoe Basin (LTBWCG 2011)

Field investigations were conducted to identify the presence of noxious weeds on Forest Service (FS) and non-Forest Service land (Non-FS) by NCE biologists on June 13, 2018. The focus of this investigation was to document all noxious weeds occurring within county rights of way and areas immediately adjacent to the right of way, as well as parcels of interest within the project area where improvements are to be installed (**Figure 2**). The methods used for the NCE survey included a walking transect survey of the extended project area to identify invasive plants to the extent necessary to determine listing status.

Infestations were mapped in the field using a hand held electronic tablet and ESRI ArcGIS Collector (used to collect photographs, spatial, and attribute information).

3.1.2 *Assessment summary*

During field surveys, it was determined that the phenology of vegetation on site was appropriate for identification of invasive plants. It was therefore concluded that the timing was appropriate for presence/absence surveys of the invasive plant species assessed in this evaluation. This survey, in conjunction with the review of existing data of known infestations, is sufficient to complete this Invasive Plant Risk Assessment.

3.2 KNOWN INVASIVE PLANTS IN ANALYSIS AREA

The results of the field surveys found five non-native/invasive plant species in the project area: bull thistle (*Cirsium* vulgare), cheatgrass (*Bromus tectorum),* klamathweed (*Hypericum perforatum*), white sweetclover (*Melilotus albus*), yellow salsify (*Tragopogon dubius*), and wooly mullein (*Verbascum Thapsus*). USFS 2008 invasive plant data supplied by the USFS documents an additional species in the southwest corner of the project area: perennial pepperweed (*lepidium latifolium*); however this species was not identified during the June 2018 field survey. Weed species identified during the June 2018 field survey and their locations are shown in **Figure 2**.

Table 2. Invasive plant species within the project area

Species	Common Name	CDFA rating[1]	Cal-IPC rating[2]	Number of sites within: Forest Service Parcels in Project Area (FS)	Number of sites within: Entire Project Area (FS + Non-FS)
Bromus tectorum	cheatgrass	n/a	High	1	7
Cirsium vulgare	bull thistle	C	Moderate	0	2
Hypericum perforatum	klamathweed	C	Limited	0	1
Lepidium latifolium	perennial pepperweed	B	High	1	1
Verbascum Thapsus	wooly mullein	n/a	Limited	0	4
TOTAL				**2**	**15**

[1] CDFA ratings - A-listed weeds: eradication or containment is required at the state or county level; B-listed weeds: eradication or containment is at the discretion of the County Agricultural Commissioner; C-listed weeds: eradication or containment required only when found in a nursery or at the discretion of the County Agricultural Commissioner. (California Department of Food and Agriculture 2009)

[2] Cal-IPC ratings- High: attributes conducive to moderate to high rates of dispersal and establishment; usually widely distributed among and within ecosystems. Moderate: impacts substantial and apparent, but not severe; attributes conducive to moderate to high rates of dispersal; distribution may range from limited to widespread. Limited : ecological impacts are minor or information is insufficient to justify a higher rating, although they may cause significant problems in specific regions or habitats; attributes result in low to moderate rates of invasion; distribution generally limited, but may be locally persistent and problematic. (California Invasive Plant Council 2010)

3.2.1 Cheatgrass *(Bromus tectorum)*

3.2.1.1 Species description and summary of management options

Cheatgrass is a winter annual in the grass family (*Poaceae*), bearing many finely hairy, drooping, yellowish-green, bristly spikelets in a loose, much-branched, terminal cluster. It forms small tufts 8 to 24 inches tall, and has a fine, fibrous root system. Stems are erect and slender; leaf blades are flat and pubescent. At maturity, the foliage and seed heads often become reddish; after maturity the fine herbage is characterized by a light tan reflectance. Cheatgrass reproduces by seed that germinates in the fall, over-winters as a seedling, then flowers in the spring. Seeds have the potential to remain viable in the seed bank for 2 to 5 years. Cheatgrass commonly grows on roadsides, open areas, and eroded sites, and is most commonly found on coarse textured soils that are low in nitrogen. Mulch and litter promote germination and establishment of seedlings. Cheatgrass was found along road shoulders and vacant lots throughout the botany analysis area.

Cheatgrass is not a ranked species on the CDFA list. It has a "high" rating on the Cal-IPC list, which implies "attributes conducive to moderate to high rates of dispersal and establishment; usually widely distributed among and within ecosystems (Cal-IPC 2018)." Cheatgrass is a low priority on the LTBMU list, which suggests it is a lower priority species managed on LTBMU and not always treated. It is not ranked on the Lake Tahoe Basin Weed Coordination Group (LTBWCG) top priority weed list. Within the LTBMU, the primary focus for this species is to prevent further spread where possible through management practices including a combination of chemical control, cultural control, seeding perennial grasses, and proper land management (USFS 2010).

3.2.1.2 Infestations in the Project Area

There are seven infestations of cheatgrass in the project area for a total of .02 acres (780 square feet) of infested area; one infestation occurs on FS parcel APN 081-020-03. This occurrence was found by NCE biologists and subsequently was not assigned a USFS occurrence number. Six infestations occur on non-FS land, all of which were found by NCE biologists and not assigned USFS occurrence numbers. Two of these are within 150 feet of FS parcel APN 081-020-03, one is 500 feet east of FS parcel APN 034-753-08, one is 50 feet north-east of FS parcel APN 034-772-25, one is 100 feet north of FS parcel APN 081-093-03, and one is 500 feet north of FS parcel APN 081-093-03.

3.2.1.3 Management Actions

Management outside of project areas focuses on avoidance and prevention. When this species intersects with proposed project activities, it is mapped and managed (avoided or treated); recommended management will be project- and site-specific, consisting of the following methods:

- Manual: Preferred treatment method for small infestations. Pull plants prior to seed set. Plants without flowers can be left on site. Plants with flowers should be bagged and disposed properly. Repeat as new plants appear. May not be feasible for large infestations.

- Mechanical: Disk/till live plants in spring (prior to seed set). Repeat as new plants appear. Revegetate with native species. Do not mow; mowed plants can still produce seed. May not be feasible for large infestations.

- Cultural (small infestations only): Flaming in late spring-early summer may be considered in consultation with the Forest Botanist and Forest Fuels Officer (requires an approved burn plan). Not feasible for large infestations.

- Manage to avoid spread (large infestations): Use a combinations of the following techniques: 1) flag and completely avoid infestations; 2) lay down barriers over infestations during staging and construction; 3) work in infested areas first, then wash equipment before moving to uninfested areas; and/or 4) use manual or mechanical techniques (above) in staging or construction areas.

- Chemical: Chemical treatment of cheatgrass is not approved.

3.2.2 Bull Thistle *(Cirsium vulgare)*

3.2.2.1 Species description and summary of management options

Bull thistle is a conspicuous biennial plant that can grow to a height of six feet. It has large, pinnately divided, spiny leaves that extend down the stem. It produces spiny, purple flower heads about two inches wide starting in June and continuing until first snowfall or frost. Bull thistle produces large numbers of seeds that are transported by wind to disturbed areas where new plants can be established. This species is somewhat aggressive and is now widely distributed throughout the west up to 7,546 feet in elevation.

Bull thistle is not a ranked species on the CDFA list. It has a "moderate" rating on the Cal-IPC list, which implies that it's "impacts are substantial and apparent, but not severe; attributes conducive to moderate to high rates of dispersal; distribution may range from limited to widespread (Cal-IPC 2018)." Bull thistle is a low priority on the LTBMU list, which suggests it is a lower priority species managed on LTBMU and not always treated. Lastly, it is a class two weed on the LTBWCG list which indicates that this species is known to be found in the Lake Tahoe Basin and the group is "currently working to manage these species and eradicate isolated infestations to prevent further spread (LTBWCG 2016)." Within the LTBMU, the primary focus for this species is to eradicate smaller, isolated infestations while exerting the best control feasible over large infestations through containment, prevention and other integrated pest management measures (USFS 2010).

3.2.2.2 Infestations in the Project Area

There are two infestations of bull thistle in the project area for a total of 15 square feet of infested area. These infestations are not located on Forest Service land and were documented by NCE biologists. One infestation occurs 80 feet north of FS parcel APN 081-020-04 and the other is 250 feet north of FS parcel APN 081-020-04.

3.2.2.3 Management Actions

Bull thistles are tap-rooted biennial and can be controlled manually, if enough root is removed and no seed is produced. Manual removal is the preferred method for bull thistle treatment; chemical treatment of known bull thistle infestations is not approved. In the rosette or bolt stage: dig out getting as much of the root as possible and either bag it up or lay it on a rock or log where the roots will not be in contact with the ground. In the bud or flower stage: clip all buds and flowers, bag, and dispose properly. Pull or dig roots out and lay to dry out or bag. Leave as much of the plant behind to minimize landfill space (i.e. stems and leaves) (LTBMU 2016).

3.2.3 Klamathweed *(Hypericum perforatum)*

3.2.3.1 Species description and summary of management options

Klamathweed is an erect, perennial for that can grow up to five feet tall, but is typically around two to three feet tall. The plant is native to Europe, western Asia and North Africa. Multiple stems emerge from a woody root crown. Stems are woody at the base and branched and leafy at the upper half. Leaves are about one inch long by 0.4 inch wide and are opposite and lack a petiole. When held to light, foliage is dotted with tiny translucent and black oil glands. Flowers occur at stem tips and are yellow and about 0.8 inch wide with five petals and numerous stamens. Klamathweed spreads by seeds and by rhizomes, but seeds are the primary mechanism of reproduction. Seed generally falls below the parent plant, but can be transported by water (DiTomaso 2013). This weed can spread aggressively in sites where competition is limited.

Klamathweed is a “C” ranked weed on the CDFA list. CDFA C ranked weeds require eradication or containment only when found in a nursery or at the discretion of the County Agricultural Commissioner. (California Department of Food and Agriculture 2009). It has a “limited” rating on the Cal-IPC list, which implies that its “ecological impacts are minor or information is insufficient to justify a higher rating, although they may cause significant problems in specific regions or habitats; attributes result in low to moderate rates of invasion; distribution generally limited, but may be locally persistent and problematic. (Cal-IPC 2018).” Klamathweed is a “low priority” on the LTBMU list, which suggests it is a lower priority species managed on LTBMU land, but not always treated (USDA Forest Service 2011a). Lastly, it is a class two weed on the LTBWCG list which indicates that this species is known to be found in the Lake Tahoe Basin and the group is “currently working to manage these species and eradicate isolated infestations to prevent further spread” (LTBWCG 2016).

3.2.3.2 Infestations in the Project Area

There is one infestation of Klamathweed in the project area. This infestation is not located on Forest Service land and was documented by NCE biologists. The infestation occurs 500 feet north of FS parcel APN 081-020-04 and consists of a single plant taking up one square foot of area.

3.2.3.3 Management Actions

Klamathweed is rhizomatous and is difficult to control by manual methods. Chemical treatment is preferred, unless infestation is very small. However, manual treatment should be attempted on newly discovered and small infestations. Clipping, mowing, and prescribed burning alone are not recommended as they can stimulate regrowth (LTBMU 2016). Since this infestation is limited to a single individual, manual control is recommended.

Manual: pull or dig up plants removing as much root as possible. Bag and dispose of plant properly.

3.2.4 Wooly mullein *(Verbascum thapsus)*

3.2.4.1 Species description and summary of management options

Wooly mullein, also called common mullein is a densely wooly, sturdy biennial that may reach more than seven feet tall in its flowering year. Wooly mullein occurs throughout most of North America. A basal rosette of large furry leave s and a substantial crown are produced in the first year with a single, stout, erect flowering stem developing in the second year. Basal leaves are simple, measure three to 20 inches long and may be persistent. Stem leaves are alternate, and their size is reduced toward the inflorescence. Yellow flowers are short lived and develop on a spike-like terminal inflorescence from May through September. Wooly mullein develops a thick, deep taproot with fibrous lateral roots (Gucker, 2008). Wooly mullein seeds can survive over 100 years in the soil, and seedling establishment is dependent on periodic disturbance. Wooly mullein establishment is greatly enhanced in bare ground areas (DiTomaso, 2013).

Wooly mullein is not a ranked species on the CDFA list. It has a limited rating on the Cal-IPC list, which implies that the species is "invasive but [its] ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. [The species'] reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic" (Cal-IPC 2018). Wooly mullein is not listed on the LTBMU list. It is not listed on the LTBWCG list.

3.2.4.2 Infestations in the Project Area

There are four infestations of wooly mullein within the project area. None of these infestations occur on Forest Service land. All four infestations were discovered by NCE biologists and were not assigned USFS occurrence numbers. One infestation occurs 160 feet north of FS parcel APN 081-020-03 and is made up of four individuals in an eight square foot area. The second occurrence was observed 400 feet west of FS parcel 081-086-04 and is made up of one plant. The third and fourth occurrences were observed 800 feet west of FS parcel 081-086-04 and is made up of 10 individual plants in a 30 square foot area along the road shoulder on both sides of the road.

3.2.4.3 Management Actions

Established wooly mullein stands are extremely difficult to control due to their abundant, long-lived seed bank; however, in small populations, hand-pulling before seed set is an effective control method for mullein plants growing on loose soils. When digging, sever the root below the soil surface. Soil disturbance stimulates recruitment (DiTomaso 2013). Manual treatment is preferred for this small infestation. Hand pull, bag and dispose properly.

3.2.5 Perennial Pepperweed *(Lepidium latifolium)*

3.2.5.1 Species description and summary of management options

Perennial pepperweed is a perennial herbaceous plant averaging between 3 and 5 feet tall. The plant is multistemmed with upright stims that appear dull-gray-green and waxy. Rosettes have ovate to oblong leaves with entire to serrate margins on long petioles. Young leaves on the stems are sessile to lanceolate with smooth to jagged edges. Mature leaves are alternating and 1 to 2 inches wide, four to 12 inches long with a small stem connecting the leaf to the branch. White four-petalled flowers occur in dense, bunched panicles on each stem from May-June. Perennial pepperweed spreads either by seed or roots; however, seedlings are rarely seen in the field. Plants mostly originate from the creeping root system which may expand at a rate of 10 feet per year (USDA Forest Service 2014).

Perennial peperweed is ranked B on the CDFA list. CDFA list B plants require "eradication or containment at the discretion of the County Agricultural Commissioner" (California Department of Food and Agriculture 2009). It has a "high" rating on the Cal-IPC list, which implies that the species has "severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically." (Cal-IPC 2018). Perennial pepperweed is listed as a "high" priority weed on the LTBMU list and is listed as a "class 2" weed by the LTBWCG.

3.2.5.2 Infestations in the Project Area

There is one historical record of an infestation of perennial pepperweed (occurrence 116) that occurred on FS parcel APN 081-020-03. It contained 50 square feet of infestation and was treated three times in 2007 by the USFS.

3.2.5.3 Management Actions

The plant is rhizomatous and is difficult to control by manual methods. Chemical treatment with chlorsulfuron is preferred; secondary preference is for glyphosate. However, manual treatment should be attempted on newly discovered and small infestations. For large infestations, mowing or cutting weeks before chemical treatment to stimulate greater leaf area to absorb herbicide products is recommended. Clipping, mowing, and prescribed burning alone are not recommended as they can stimulate growth (LTBMU 2015).

3.2.6 *Assessment summary*

Weediness is most common along road side areas, disturbed areas due to parking and/or human use, and residential landscaping.

3.3 Habitat Vulnerability

The project area is characterized by predominantly urban development intermixed with fragmented Jeffrey Pine forest and perennial grasslands. No fires, cultivation, or grazing practices are in the recent history of this area.

3.3.1 *Assessment summary*

Overall habitat vulnerability is considered medium because: a) invasive plants were identified in the project area; B) there are established roads, foot and animal traffic, and large areas of cultivated landscape and/or turf in the area; and c) spread can be limited by proper treatment and eradication (if applicable) both pre and post construction.

3.4 Non-Project Dependent Vectors

Residential roads and informal trails exist in the project area. The analysis area is predominantly single-family residential with a lower degree of conservation and public land. Traffic and visitor use is moderate as the area borders a well-used open space comprised of informal trails. Livestock is not grazed in this area, but wildlife could pass through the neighborhood to gain access to natural surrounding area.

3.4.1 *Assessment summary*

Non-project vectors are considered medium because although these vectors are found in the area, such activities are not heavy on parcels considered for improvement.

4 Project-Dependent Factors

4.1 Habitat Alteration Expected as a Result of the Project

Proposed project activities will include ground disturbance, particularly near roadsides and in other disturbed areas. Revegetation of disturbed areas with native species will limit the potential for invasive plant species to re-colonize in the project area. No fuels reductions or fire use are proposed.

4.2 Increased Vectors as a Result of Project Implementation

Infestations will be removed prior to construction, and vegetation will be restored after construction activities are completed; therefore, vectors that can be expected as a result of the project are not likely to increase invasive plant establishment in the area.

Although there will be a short-term increase in traffic due to construction activities during implementation, this project is not expected to increase traffic or visitor use in the area. Sub-surface water quality systems require ongoing monitoring and could require utilities relocations during construction. Construction equipment will be used throughout implementation but will adhere to mitigation measures to minimize impacts in the area. Grazing is not a component of the project. The project does include the use of mulches, compost, wood chips, soil, and road base. All materials imported to the site are required to weed free as stated in the project specifications.

4.3 Management Measures

4.3.1 *Standard management measures for invasive plants*

The following measures are designed to minimize risk of new weed introductions, minimize the spread of weeds within units, and minimize the spread of weeds between units. These measures are consistent with Forest Service policy and manual direction and the LTBMU Land and Resource Management Plan as amended by the SNFPA.

1. **Inventory—**
   - ***a)*** *As part of site-specific planning, project areas and adjacent areas (particularly access roads) will be inventoried for invasive plants.*
   - ***b)*** *Any additional infestation discovered prior to or during project implementation should be flagged and avoided, then reported to the Forest Botanist or their designated appointee for prioritization and assessment for treatment.*
2. ***Equipment Cleaning—***
   - *a) All equipment and vehicles (Forest Service and contracted) used for project implementation must be free of invasive plant material before moving into the project area. Equipment will be considered clean when visual inspection does not reveal soil, seeds, plant material, or other such debris. Cleaning shall occur at a vehicle washing station or steam-cleaning facility before the equipment and vehicles enter the project area.*
   - *b) When working in known invasive plant infestations or designated weed units, equipment shall be cleaned before moving to other National Forest Service system lands. These areas will be identified on project maps.*
3. ***Staging areas—*** *Do not stage equipment, materials, or crews in invasive plant-infested areas.*
4. ***Control Areas—****Where feasible, invasive plant infestations will be designated as Control Areas—areas where equipment traffic and soil-disturbing project activities would be excluded. If Control Areas are designated, they will be identified on project maps and delineated in the field with flagging.*
5. ***Project-related disturbance—****Minimize the amount of ground and vegetation disturbance in staging and construction areas. Where feasible, reestablish vegetation on disturbed bare ground to reduce invasive species establishment; revegetation is especially important in staging areas.*
6. ***Early Detection****— Any additional infestation discovered prior to or during project implementation should be reported to the Forest Botanist or their designated appointee for prioritization and assessment for treatment.*
7. ***Post Project Monitoring–*** *After the project is completed the Forest Botanist should be notified so that (as funding allows) the project area can be monitored for invasive plants subsequent to project implementation.*
8. ***Gravel, fill, and other materials—*** *All gravel, fill, or other materials are required to be weed-free. Use onsite sand, gravel, rock, or organic matter when possible. Otherwise, obtain weed-free materials from sources that have been certified as weed-free. If an LTBMU inspector is not available*

to inspect material source, then the project proponent will provide a weed-free certificate for its material source.

9. ***Mulch and topsoil—*** *Use weed-free mulches and topsoil. Salvage topsoil from project area for use in onsite revegetation, unless contaminated with invasive species. Do not use material (or soil) from areas contaminated by cheatgrass.*
10. ***Livestock—*** *If supplemental fodder (e.g hay, silage) is required for livestock, including horses and other pack animals, it will be certified weed-free.*
11. ***Revegetation—***
    a) *Seed and plant mixes must be approved the Forest Botanist or their designated appointee who has knowledge of local flora.*
    b) *Invasive species will not be intentionally used in revegetation. Seed lots will be tested for weed seed and test results will be provided to Forest Botanist or their designated appointee.*
    c) *Persistent non-natives, such as such as timothy (**Phleum pretense**), orchardgrass (**Dactylis glomerata**), ryegrass (**Lolium** spp.), or crested wheatgrass (**Agropyron cristatum**) will not be used in revegetation.*
    d) *Seed and plant material will be from native, high-elevation sources as much as possible. Plant and seed material should be collected from as close to the project area as possible, from within the same watershed, and at a similar elevation whenever possible.*

4.3.2 *Project-specific management measures*

Table 3. Management Measures

Species	Common Name	Occurrence	Management Action
Bromus tectorum	cheatgrass	n/a	Manual removal of infestation
Bromus tectorum	cheatgrass	n/a	Manual removal of infestation
Bromus tectorum	cheatgrass	n/a	Manual removal of infestation
Bromus tectorum	cheatgrass	n/a	Manual removal of infestation
Bromus tectorum	cheatgrass	n/a	Manual removal of infestation
Bromus tectorum	cheatgrass	n/a	Manual removal of infestation
Bromus tectorum	cheatgrass	n/a	Manual removal of infestation
Cirsium vulgare	Bull thistle	n/a	Manual removal of infestation
Cirsium vulgare	Bull thistle	n/a	Manual removal of infestation
Hypericum perforatum	klamathweed	n/a	Manual removal of infestation
Lepidium latifolium	perennial pepperweed	116	This historic occurrence was treated in 2007 and not observed during the field visit. If observed at time of project implementation, then a combination of manual and chemical controls is recommended
Verbascum thapsis	Wooly mullein	n/a	Manual removal of infestation
Verbascum thapsis	Wooly mullein	n/a	Manual removal of infestation
Verbascum thapsis	Wooly mullein	n/a	Manual removal of infestation
Verbascum thapsis	Wooly mullein	n/a	Manual removal of infestation

4.3.3 *Assessment summary*

The populations of invasive plants, located within the county rights of way and parcels of interest within the project area where improvements are installed, will be removed prior to or during project construction or at any time when ground disturbing activities are taking place. By removing infestation prior to construction and revegetating the areas with native species after construction, the risk of spreading invasive plants as a result of the project will be minimized.

5 ANTICIPATED WEED RESPONSE TO PROPOSED ACTION

There is a Moderate overall risk of invasive plant establishment as a result of the project. This determination is based on the following:

1. A total of five noxious weed species and fifteen infested locations were identified in the project area. The surveys were conducted during an appropriate identification period in June 2018.
2. There are established roads in the project area, foot and animal traffic, and large areas of cultivated landscape and/or turf.
3. The majority of construction activity will take place in previously disturbed areas.
4. Construction will result in a short-term increase in traffic in the area.
5. A mitigation plan will be adopted as a part of the proposed action (Section 4.3) which will be incorporated into the contract specifications. The mitigation plan will decrease habitat vulnerability to or below pre-construction levels. The mitigation plan includes elements to address noxious weeds before, during, and after construction.

Table 3. Summary of Risk Factors

	Factor	Risk	Assessment summary
NON-PROJECT DEPENDENT FACTORS	Inventory	N/A	Adequate
	Known invasive plants	Moderate	There is 1 known infestation of LTBMU listed high management priority species (perennial pepperweed) present in the project area
	Habitat vulnerability	Moderate	Moderate level of historic and recent disturbance. Variable plant cover.
	Non-project dependent vectors	Moderate	Infestations are present along existing road shoulders and vacant lots. Overall, moderate level of non-project vectors.
PROJECT-DEPENDENT FACTORS	Habitat alteration expected as a result of project	Moderate	Moderate ground disturbance due to drainage improvements and associated construction activities
	Increased vectors as a result of project implementation	Moderate	Construction of drainage and erosion control improvements, soil disturbance
	Management measures	Greatly reduced risk	Standard management measures implemented
ANTICIPATED WEED RESPONSE		**Moderate**	Low risk of new introduction; moderate risk of spread as a result of the project.

6 References

Exec. Order No. 13112. Page 3 CFR 6183.

Bossard, C. C., J. M. Randall, and M. C. Hoshovsky. 2000. Invasive Plants of California's Wildlands. University of California Press, Berkeley, CA.

Bosworth, D. 2003. Invasive Species. Letter to all employees; July 16, 2003, USDA Forest Service.

California Department of Food and Agriculture. 2009. Pest Ratings of Noxious Weed Species and Noxious Weed Seed. List, State of California, Department of Food and Agriculture, Division of Plant Health and Pest Prevention Services.

California Department of Food and Agriculture (CDFA). 2016. "California Noxious Weed Species." Division of Plant Health & Pest Services, Last updated 7/15/16, Retrieved on 7/11/18 from http://www.cdfa.ca.gov/plant/ipc/encycloweedia/weedinfo/winfo_table-sciname.html.

California Invasive Plant Council (Cal-IPC). 2018. California Invasive Plant Inventory. Retrieved on 7/24/18 from: https://www.cal-ipc.org/plants/inventory/

D''Antonio, Carla M.; Berlow, Eric L.; Haubensak, Karen L. 2004. Invasive exotic plant species in Sierra Nevada ecosystems. Gen. Tech. Rep. PSW-GTR-193. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture: 175-184

DiTomaso, J.M., G.B. Kyser et al. 2013. *Weed Control in Natural Areas in the Western United States.* Weed Research and Information Center, University of California. 544pp.

Gucker, Corey L. 2008. Verbascum thapsus. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Retrieved on 8/9/18 from: https://www.fs.fed.us/database/feis/plants/forb/vertha/all.html

Lake Tahoe Basin Weeds Coordinating Group (LTBWCG). (2011). “Priority Invasive Weeds of the Lake Tahoe Basin, Revised April 2011.”

Lake Tahoe Basin Management Unit (LTBMU). 2015. Terrestrial Invasive Plant Management Program 2015 Annual Report. USDA Forest Service. January 26, 2015. Retrieved on 8/9/18 from https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd490609.pdf

Lake Tahoe Basin Management Unit (LTBMU). 2016. Lake Tahoe Basin Management Unit Preferred Invasive Plant Treatment Methods. South Lake Tahoe, CA.

Tahoe Regional Planning Agency (TRPA). 2002a. TRPA Plan Area Statements. 120 - Tahoe Paradise Meadowvale. Retrieved on 7/24/18 from: http://www.trpa.org/wp-content/uploads/120.pdf

Tahoe Regional Planning Agency (TRPA). 2002b. TRPA Plan Area Statements. 122 - Tahoe Paradise Mandin. Retrieved on 7/24/18 from: http://www.trpa.org/wp-content/uploads/122.pdf

Tahoe Regional Planning Agency (TRPA). 2002c. TRPA Plan Area Statements. 123 - Meyers Forest. Retrieved on 7/24/18 from: http://www.trpa.org/wp-content/uploads/123.pdf.

University of Nevada Cooperative Extension (UNCE). 2010. Weeds Identification and Management Series. Reno, NV.

USDA Forest Service. 1988. Lake Tahoe Basin Management Unit Land and Resource Management Plan. USDA Forest Service Pacific Southwest Region, Lake Tahoe Basin Management Unit, South Lake Tahoe, CA.

USDA Forest Service. 1995. Forest Service Manual, Chapter 2080, Noxious Weed Management. USDA Forest Service, National Headquarters (WO), Washington DC.

USDA Forest Service. 2000. Region 5 Noxious Weed Strategy. Page 14. USDA Forest Service, Pacific Southwest Region, Vallejo, CA.

USDA Forest Service. 2004a. National Strategy and Implementation Plan for Invasive Species Management. USDA Forest Service, Washington Office, Washington D.C.

USDA Forest Service. 2004b. Sierra Nevada Forest Plan Amendment Record of Decision. USDA Forest Service, Pacific Southwest Region, Vallejo, CA.

USDA Forest Service. 2008. Forest Service Manual, Chapter 2070, Vegetation Ecology. USDA Forest Service, National Headquaters (WO), Washington DC.

USDA Forest Service. 2009. "Forest Health Protection - Invasive Plants: Invasive Plants Fact Sheets." Northeastern Area, Retrieved on 7/11/2018 from http://na.fs.fed.us/fhp/invasive_plants/weeds/

USDA Forest Service. 2010. Terrestrial Invasive Plant Species Treatment Project, Finding of No Significant Impact. USDA Forest Service, Lake Tahoe Basin Management Unit, South Lake Tahoe.

USDA Forest Service. 2011a. Developmenf of a Management Ranking System for Terrestrial Noxious Weeds/Invasive Plant Species. USDA Forest Service, Lake Tahoe Basin Management Unit, South Lake Tahoe.

USDA Forest Service. 2011b. Forest Service Manual, Chapter 2900, Invasive Species Management. USDA Forest Service, National Headquarters (WO), Washington DC.

USDA Forest Service 2014. Field Guide for Managing Perennial Pepperweed in the Southwest. USDA Forest Service, Southwest Region. Retreived on 8/9/2018 from https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5410120.pdf

APPENDIX A. Invasive Species of Management Concern on the Lake Tahoe Basin Management Unit

Appendix A. Invasive Plants of Management Concern 2015

Scientific Name	Common Name	LTBMU Priority	NDA	CD FA	Cal-IPC	LTB WCG
Acroptilon repens	Russian knapweed	Medium	B	B	Moderate	Group 1
Ailanthus altissima	tree of heaven	High		C	Moderate	Group 1
Bromus tectorum	cheat grass	Low			High	
Carduus nutans	musk thistle	High	B	A	Moderate	Group 1
Centaurea calcitrapa	purple starthistle; red starthistle	Medium	A	B	Moderate	Group 1
Centaurea diffusa	diffuse knapweed	High	B	A	Moderate	Group 1
Centaurea solstitialis	yellow starthistle	Medium	A	C	High	Group 1
Centaurea stoebe spp. *micranthos*	spotted knapweed	High	A	A	High	Group 2
Centaurea virgata ssp. *squarrosa*	squarrose knapweed	High	A	A	Moderate	
Chondrilla juncea	rush skeletonweed	High	A	A	Moderate	Group 1
Cirsium arvense	Canada thistle	High	C	B	Moderate	Group 1
Cirsium vulgare	bull thistle	Low		C	Moderate	Group 2
Conium maculatum	poison hemlock	Low	C		Moderate	
Cytisus scoparius	Scotch broom	Medium		C	High	Group 2
Dipsacus fullonum	teasel; Fuller's teasel	Low			Moderate	Group 1
Dittrichia graveolens	stinkwort	Low			Moderate	Group 1
Elymus caput-medusae	medusahead	High	B	C	High	Group 1
Elymus repens	quackgrass	Low		B		
Hydrilla verticillata	hydrilla; waterthyme	N/A	A	A	High; Alert	
Hypericum perforatum	St. Johnswort; Klamathweed	Medium	A	C	Moderate	Group 2
Isatis tinctoria	Dyer's woad	High	A	B	Moderate	Group 1
Lepidium appelianum	hairy whitetop; globe-podded hoary cress	Medium		B	Limited	Group 1
Lepidium draba	whitetop; heart-podded hoary cress	Medium	C	B	Moderate	Group 1
Lepidium latifolium	tall whitetop; perennial pepperweed	High	C	B	High	Group 2
Leucanthemum vulgare	oxeye daisy	Low			Moderate	Group 2
Linaria dalmatica spp. *dalmatica*	Dalmatian toadflax	High	A	A	Moderate	Group 2
Linaria vulgaris	yellow toadflax; butter & eggs	High	A		Moderate	Group 2
Lythrum salicaria	purple loosestrife	High	A	B	High	Group 1
Myriophyllum spicatum	Eurasian watermilfoil	N/A	A		High	
Onopordum acanthium ssp. *acanthium*	Scotch thistle	High	B	A	High	Group 1
Potamogeton crispus	curlyleaf pondweed	N/A			Moderate	
Potentilla recta	sulfur cinquefoil	Medium	A	A		Group 1
Rubus armeniacus	Himalaya blackberry	Medium			High	
Tamarix chinensis, T. ramosissima, & T. parvifolia	tamarisk; saltcedar	High	C	B	High	Group 1

LTBMU: High—Species that have a large ecological impact or invasive potential; species that are easily controlled. Medium—Species that have a moderate ecological impact or invasive potential; species that may be difficult to control. Low—Species that have a low ecological impact or invasive potential; species that require substantial effort to control. N/A—species not evaluated.

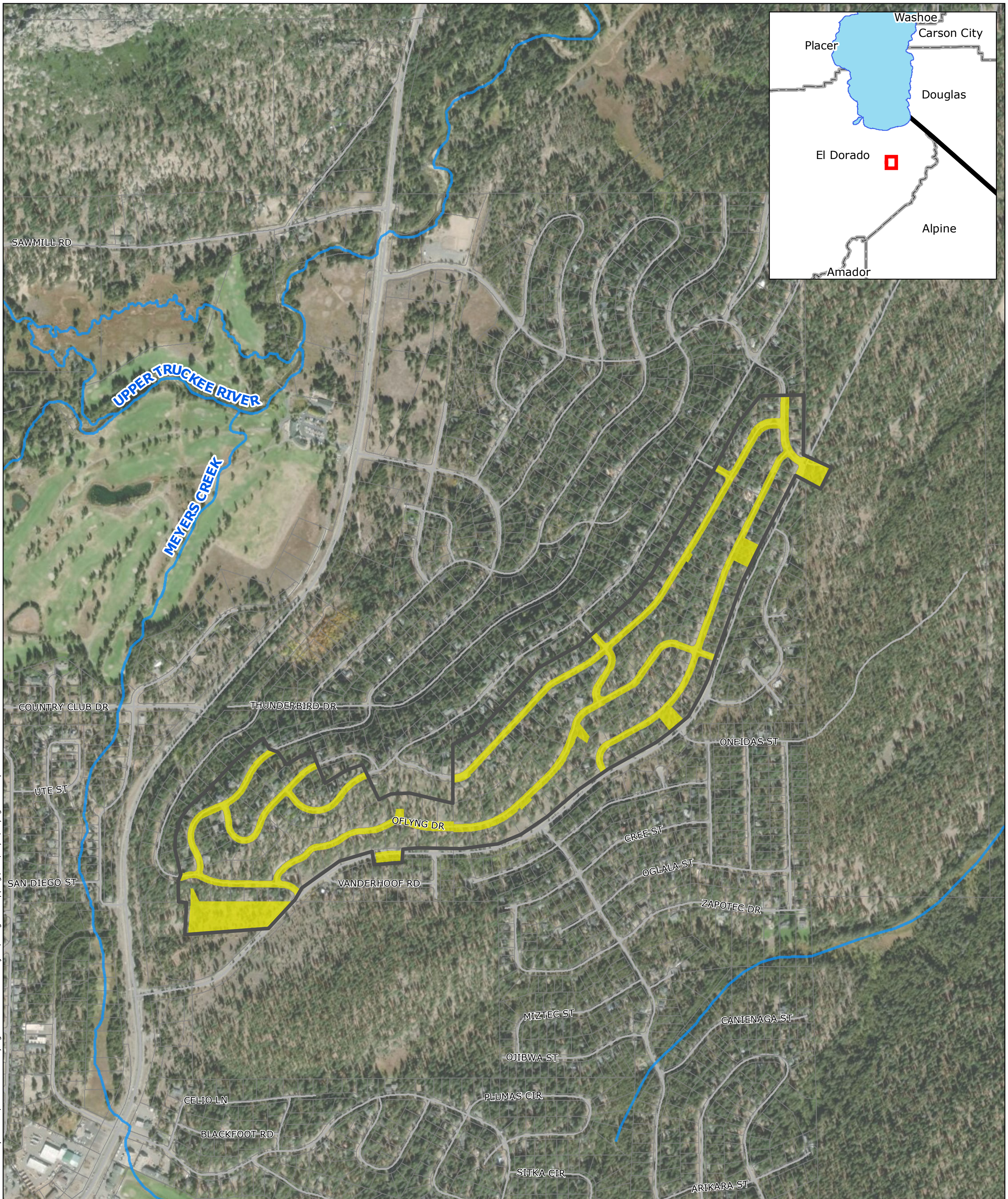
NDA: Nevada Department of Agriculture Noxious Weed List (http://agri.nv.gov/nwac/PLANT_NoxWeedList.htm) Category A—Weeds not found or limited in distribution throughout the state; actively excluded from the state and actively eradicated wherever found; actively eradicated from nursery stock dealer premises; control required by the state in all infestations. Category B—Weeds established in scattered populations in some counties of the state; actively excluded where possible, actively eradicated from nursery stock dealer premises; control required by the state in areas where populations are not well established or previously unknown to occur. Category C—Weeds currently established and generally widespread in many counties of the state; actively eradicated from nursery stock dealer premises; abatement at the discretion of the state quarantine officer.

CDFA: California Department of Food and Agriculture Noxious Weed List (http://www.cdfa.ca.gov/phpps/ipc/). A--Eradication or containment is required at the state or county level. B—Eradication or containment is at the discretion of the County Agricultural Commissioner. C--Require eradication or containment only when found in a nursery or at the discretion of the County Agricultural Commissioner. Q—Require temporary "A" action pending determination of a permanent rating.

Cal-IPC: California Invasive Plant Council Online Invasive Plant Inventory (2006) (http://www.cal-ipc.org/ip/inventory/weedlist.php). High—Species having severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Moderate—Species having substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Limited—Species that are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Alert—Species with significant potential for invading new ecosystems.

LTBWCG: Lake Tahoe Basin Weed Coordinating Group Weed Priority List (2010). Group 1--Watch for, report, and eradicate immediately. Group 2--Manage infestations with the goal of eradication.

APPENDIX B. Project Overview Map



Legend

Project Boundary

Survey Area

Parcels

Streams

NCE

Oflyng Water Quality Project

Project Area Basemap

N

1 in. = 1,000 ft.

0 1,000 ft.

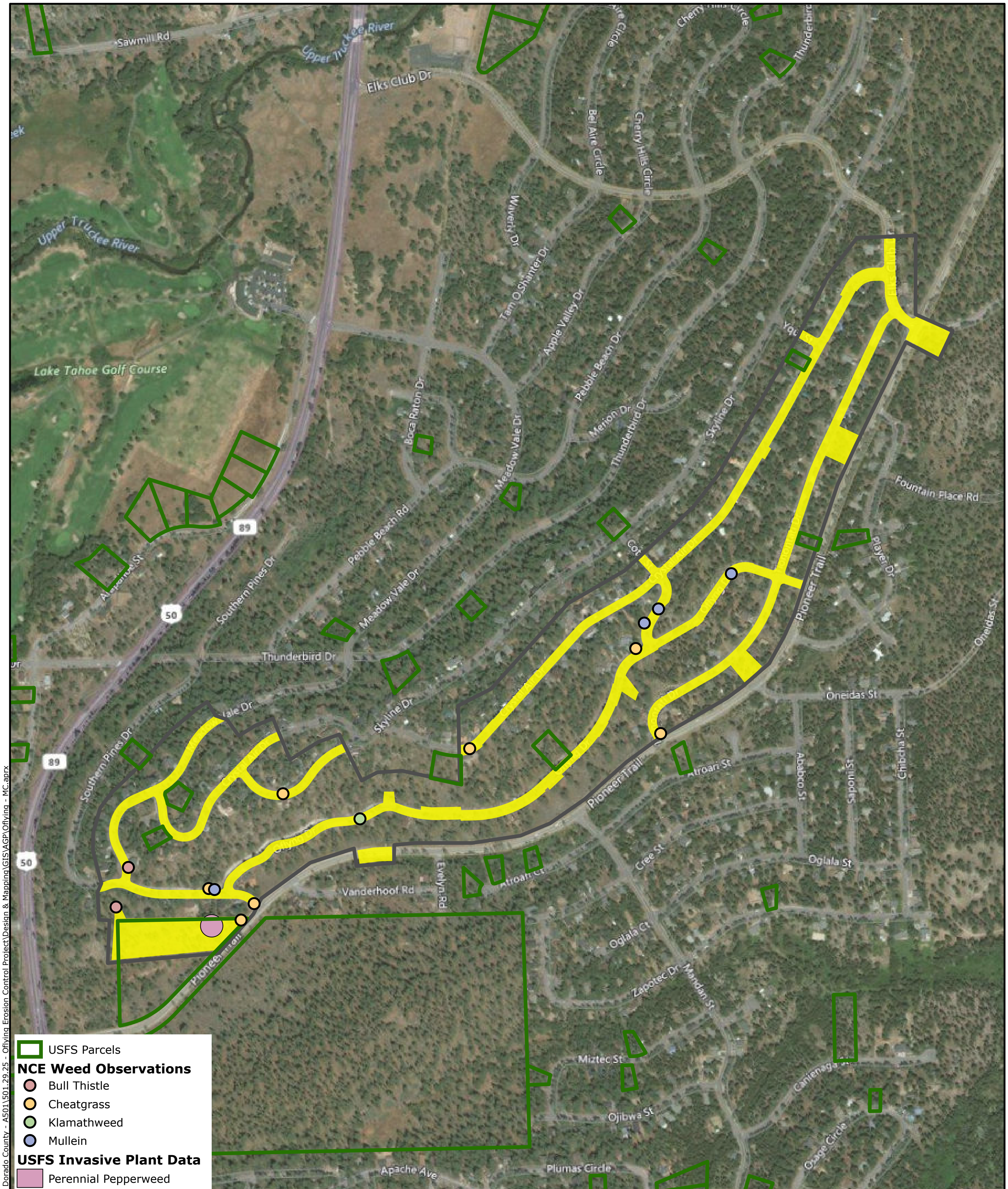
FIGURE

1

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
ESRI World Imagery basemap	501.29.25	mcasterman	6/5/2018	--	drios

Document Path: P:\Active Projects\El Dorado County - A501\501.29.25 - Oflying Erosion Control Project\Design & Mapping\GIS\Maps\Oflyng Basemap final.mxd

APPENDIX C: Invasive Plant Occurrences Within Project Area



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NCE

Oflyng Water Quality Project

Invasive Plant Occurrences Within Project Area

N

0 400 800 Feet

FIGURE 2

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
ESRI World Imagery basemap, USFS	501.29.25	mcasterman	08/22/18	--	drios

Appendix D

ARCHAEOLOGY SURVEY REPORT

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Collaboration. Commitment. Confidence.SM

HERITAGE RESOURCE INVENTORY REPORT

Oflyng Water Quality Project
El Dorado County, California

El Dorado County
Community Development Agency
Transportation Division
924B Emerald Bay Road
South Lake Tahoe, CA 96150

Prepared For:
USDA Forest Service
Lake Tahoe Basin
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ADMINISTRATIVE SUMMARY

In 1997, TRPA developed a Basin-wide Environmental Improvement Program (EIP) that defined various projects which, once implemented, would assist in attaining and maintaining TRPA Environmental Threshold Carrying Capacities (ETCC) as well as meet other federal and state environmental goals. TRPA has established thresholds for air quality, water quality, soil conservation, vegetation, noise, scenic resources, recreation, fisheries, and wildlife to address public health and safety of residents and visitors as well as the scenic, recreation, education, scientific, and natural values of the Lake Tahoe Basin. The Oflyng Water Quality Project (Oflyng WQP) is defined in the TRPA EIP as project #01.01.01.0074. The Oflyng WQP project area encompasses County rights-of-way (ROW) and parcels owned by the California Tahoe Conservancy (CTC), United States Forest Service – Lake Tahoe Basin Management Unit (USFS-LTBMU), El Dorado County (County), and private individuals.

The Oflyng WQP was initiated in 2017 to address impacts from urban development in the Oflyng residential area. The project area is characterized by predominantly urban development intermixed with fragmented Jeffrey pine forest. This area produces concentrated stormwater runoff that flows from County ROW to pervious naturally vegetated land and ultimately the Upper Truckee River. Because the project area is connected to Lake Tahoe through the Upper Truckee River and Trout Creek, there is potential for fine sediment produced in the residential area to deposit into Lake Tahoe. Current sediment sources within the project area include residential use and vehicular traffic; road sand/cinder accumulation from local and collector roadways; and eroding cut slopes, drainages, and roadside ditches.

The overall goal of the project is to design and implement erosion control and water quality improvement measures that will reduce the discharge of sediment and pollutants to Lake Tahoe from County administered ROW in the project area. Furthermore, it will assist the County with achieving goals associated with the EIP.

Project improvements may include infiltrating and/or treating of stormwater from County rights-of-way, stabilizing eroding cut slopes with vegetation and/or rock protection, stabilizing existing drainages with rock and/or bio-engineering techniques (where feasible), and disconnecting existing storm drain conveyance systems from directly discharging into the Upper Truckee River. Sediment trapping devices and infiltration basins (on publicly owned parcels) will be used to capture stormwater and road abrasives, as well as treat pollutants to reduce the overall stormwater volume discharging to the Upper Truckee River.

It is anticipated that federal funding will be used to implement part, or all, of the project. As a result, compliance with Section 106 of the National Historic Preservation Act (NHPA) is required. Involvement by El Dorado County also requires compliance with Public Resource Code (PRC) Section 21083.2 of the California Environmental Quality Act (CEQA) and Section 67 of the Tahoe Regional Planning Agency (TRPA) Code of Ordinances. This report describes an archaeological inventory of approximately 24.7 acres conducted by NCE as the initial step in that process. All work was designed to comply with current state, federal (USFS), and professional standards. Those standards state that the goals of an intensive archaeological inventory (maximum 15 m transect interval) are to:

- Establish an Area of Potential Effect (APE);
- Identify prehistoric and historic period archaeological resources in the study area;

- Evaluate identified resources as to their eligibility to the National Register of Historic Places (National Register) and California Register of Historical Resources (California Register);
- Provide management recommendations for those properties recommended eligible to the National Register and California Register

Work conducted as part of the Oflyng WQP consisted of geologic and historic background research, an archival review, Native American consultation, an intensive pedestrian survey, recordation of any identified resources, and evaluation of those resources. The present report addresses only archaeological resources that date to the prehistoric and historic periods. The APE includes County ROW and existing residential parcels identified by the County on which improvements may be constructed.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

1.0 PROJECT DESCRIPTION

1.1 PROJECT BACKGROUND

The project area is located in El Dorado County, California within the TRPA Priority Two Watersheds 44 (Upper Truckee River) and 43 (Trout Creek). It comprises a portion of existing residential development located in the community of Meyers in South Lake Tahoe (**Figure 1**; see **Appendix A** for report figures). The project is bounded by Skyline Drive to the north, Elks Club Drive to the east, Pioneer Trail to the south, and Southern Pines Drive to the west (**Figure 2**). Land ownership includes parcels owned by the California Tahoe Conservancy (CTC), USFS-LTBMU, the County, and private individuals.

Three plan area statements (PAS) present general land use zoning information within the project area. PAS are considered land use and zoning guidance documents for both the TRPA and the County. The majority of the project area is included within PAS 120 (Tahoe Paradise Meadowvale), while small portions of the southern section of the project area is part of PAS 123 (Meyers Forest), and PAS 122 (Tahoe Paradise Mandin) (TRPA 2002a, 2002b, 2002c). Land use for the majority of the project area is primarily characterized as single family residential. The area is 30 percent built out with 15 percent of the land covered and 25 percent disturbed. Additional planning considerations mentioned in the PAS documents note "steep and high cutbanks now protected by gunnite may start to erode within the next 20 years (TRPA 2002a)" in PAS 120. The erosion of gunnite-protected slopes was clearly observable during the field visit.

The County proposes to address erosion and water quality issues within the ROW of the project area. The primary goal is to identify and implement local erosion control and water quality measures that will reduce the discharge of sediment and pollutants into Lake Tahoe. Another goal is to maximize opportunities for source control and provide for treatment of surface flows where feasible within the existing storm drain system. Project improvements may include infiltrating and/or treating of stormwater from County ROW, stabilizing eroding cut slopes with vegetation and/or rock protection, stabilizing existing drainages with rock, and where feasible, with bio-engineering techniques, and disconnecting existing storm drain conveyance systems from directly discharging into the Upper Truckee River. Sediment trapping devices will be used to capture road sand, cinders, and sediment and infiltration basins on publicly owned parcels will be used to reduce the overall stormwater volume discharging to the Upper Truckee River.

1.2 LEGAL DESCRIPTION

The project is located in Sections 20, 21, 28, and 29 in Township 12 North and Range 18 East (Mt. Diablo Meridian).

1.3 MAP REFERENCE

The project area is depicted on the Echo Lake and Freel Peak, California (1992) 1:24,000 series U.S. Geological Survey 7.5-minute topographic quadrangle maps.

1.4 AREA OF POTENTIAL EFFECT DEFINITION

The APE includes the ROW (see **Figure 2**) identified by the County on which improvements may be constructed. The majority of the APE is located on previously disturbed, paved surfaces, but includes the unpaved road shoulders and portions of parcels containing relatively undisturbed land. These undisturbed portions were the focus of investigation. **Appendix B** contains overview photos of the APE. Streets surveyed include (from north to south): Elks Club, Crystal Air, Tionontati, Pioneer Trail, Coto, Oflyng, Meadow Vale, Skyline, and Southern Pines. Street ROW is typically 40 feet wide including approximately 26-feet of paved roadway and about seven feet of narrow, road shoulder on either side. Archaeological examination was limited to the County ROW along the streets adjacent to residential parcels. As a result, approximately 24.7 acres were surveyed.

2.0 ENVIRONMENTAL BACKGROUND

2.1 ENVIRONMENTAL SETTING

The project area is located just south of Lake Tahoe to the east of Washoe Meadows State Park, State Route 89/Emerald Bay Road/U.S. Highway 50, the Upper Truckee River, and Meyers Creek. Topography in the area consists of moderately dissected, stream cut, riverine terraces. The survey area slopes from the east to the west, with the east being 6,440 feet above mean sea level, and the west being 6,400 feet above mean sea level. The lowest elevation of the survey area is located in the northwest corner at 6,270 feet above mean sea level. The area has been substantially impacted over the last 150 years from logging, grazing, residential development, utility construction, and highway construction.

2.2 GEOLOGY

Information on local geology was derived from Bonham (1969), Stewart (1980), Fiero (1986), and Saucedo (2005). The Sierra batholith was formed during the late Jurassic and early Cretaceous periods due to the collision of tectonic plates. Materials from the subducting oceanic plate melted as it moved under the continental margin, forming volcanic or plutonic masses that slowly worked their way toward the surface. Intrusions and compressions caused a composite plutonic mass to form, that was some 75 miles wide running the entire length of California. The continental margin swelled upward, and large amounts of overlying rock were removed by erosion. In time, the uplifted roof of the batholith was exposed and subjected to erosion.

The Tahoe Basin is an intermountain basin formed by faulting within the Sierra batholith. In the Lake Tahoe Basin and nearby areas, major landforms developed due to faulting, warping, or a combination of both processes. Lake Tahoe occupies a down-dropped block bordered by steeply dipping faults. The major north-south fault zone which separates the eastern edge of the Sierra Nevada Mountains from the sequence of parallel fault block mountains of Nevada and Utah is located about six miles east of the Lake Tahoe Basin. The east front of the Carson Range is a large fault scarp more than 4,000 feet high. Faults along the lake margins have not been delineated in detail, but the presence of steep, near vertical drop-off areas along the shoreline clearly suggest that faults are present. Numerous other north and northeast-trending faults have been identified and are associated predominantly with Basin and Range tectonics and the emplacement of intrusive igneous rocks. Numerous fault lines are depicted in the vicinity of the project area and most are roughly north-south trending.

Pleistocene glaciation played a major role in shaping the landscape visible today. Birkeland (1963) recognized four glacial episodes, evidence of which is common in most portions of the basin. The most easily recognized features are moraines that formed along the edges of glacial lobes as they advanced away from the mountains.

The project area is comprised of a single geologic map unit (Saucedo 2005). Pleistocene till deposits (Qta), consisting of unconsolidated boulder till with a distinct yellow-brown weathered matrix, is found throughout the project area. These deposits are preserved as large moraines with rounded and broad crests.

2.3 SOILS

Soils found within the project area fall within five categories as defined by the Natural Resource Conservation Service (Soil Survey Staff 2018). Christopher loamy coarse sand (Map Unit categories 7441 and 7442) is a moderately deep soil that makes up over 60 percent of the survey area including the majority of the western half of the area, in between Crystal Air Drive and Oflyng Drive, and extending north along Crystal Air Drive. Typical vegetation on this soil consists of a Jeffrey pine woodland with an understory of manzanita, whitethorn ceanothus, lousewort, and milk kelloggia. Jabu coarse sandy loam (Map Unit categories 7461 and 7462) is a moderately deep soil typically vegetated by a Jeffrey pine woodland with a moderate understory of manzanita and whitethorn ceanothus. The soil classified on steeper slopes makes up less than twenty percent of the project area located on Oflyng Drive between Coto Street and Tionantati Street. Jabu classified on shallow slopes makes up less than seven percent of the southernmost tip of project area. Lastly, the Oneidas coarse sandy loam (Map Unit category 7491) is a shallow soil that extends the length of Pioneer Trail from its cross-section with Southern Pines Drives in the south to Elks Club Drive on the northern end of the project area. Typical vegetation on this soil consists of a Jeffrey pine woodland with an understory of manzanita, whitethorn ceanothus, lousewort, and milk kelloggia. **Table 1** outlines additional details for each of these soil types.

Table 1. Project Area Soils.

Soil Name	Slope Range	Landform	Drainage Class	Parent Material	% Coverage
Christopher loamy coarse sand	0-9%	Hillslopes, outwash terraces	Well drained	Granodiorite	13%
Christopher loamy coarse sand	9-30%	Hillslopes, outwash terraces	Well drained	Granodiorite	57%
Jabu coarse sandy loam	0-9%	Hillslopes, outwash terraces	Poorly drained	Granodiorite	2%
Jabu coarse sandy loam	9-30%	Hillslopes, outwash terraces	Poorly drained	Granodiorite	19%
Oneidas coarse sandy loam	0-5%	Hillslopes, outwash terraces	Poorly drained	Granodiorite	9%

2.4 FLORA

The project area is composed mainly of Jeffrey pine forest that is fragmented by urban land classification and pockets of perennial grasslands. Jeffrey pine was the dominant conifer with an occasional white fir. The shrub layer varied in density with the mountain big sagebrush appearing dominant. Other common shrub species encountered were antelope bitterbrush, greenleaf manzanita, and tobacco brush. Typical herbaceous plants observed in more open sites included wooly mule’s ears and bottlebrush squirreltail. Seeded grass species included California brome, fescue, creeping wild-rye, and slender wheatgrass.

The project area represents a typical residential environment found within the Lake Tahoe Basin with road shoulders colonized by plant species that tolerate disturbed conditions. Common species encountered in disturbed areas included white goosefoot and prostrate knotweed.

2.5 FAUNA

Black bear occur throughout habitat types found within the study area. Mule deer are known to occur in the Jeffrey pine habitat located within and adjacent to the study area. Wildlife species known to occupy undeveloped Jeffrey Pine habitats have adapted to the urban/interface areas. Some of those include the brown creeper, dark-eyed junco, mountain chickadee, pygmy nuthatch, red-breasted nuthatch, Douglas’ squirrel, and chipmunks. Numerous rodent species reside in the meadow and provide a prey base for wildlife species including the coyote. There is a low potential for special status species to appear in the project area, however they might occur due to existing suitable habitat. These include the willow flycatcher, California spotted owl, Sierra Nevada mountain beaver, American badger, Sierra Nevada snowshoe hare, fisher, and Sierra Nevada red fox.

Many of these plant and animal species were of economic importance to the prehistoric and historic inhabitants of the area. However, it is doubtful that modern plant and animal communities closely resemble conditions that existed prior to the onset of historic activities such as logging, road construction, and residential development.

3.0 HISTORIC CONTEXT

This section provides a brief historic context for the immediate project-related APE and a slightly more expansive archival study area, comprising the vicinity within one-half mile of the project area. Summaries of the prehistoric, ethnographic, and historic periods were compiled by Zeier (2012) and reiterated here. This context is based on readily available published historic and archaeological sources.

3.1 PREHISTORIC OVERVIEW

Elston (1982, 1986) and Lindström et al. (2000) provide recent summaries of western Great Basin and eastern Sierra prehistory. These studies focus on adaptive strategies consisting of technological, subsistence, settlement, and ideological elements that were expressed over broad regions. Four such strategies are recognized for the Western Great Basin, including eastern Sierra basins such as the Lake Tahoe Basin. Those strategies include the Pre-Archaic (prior to 7,000 years before present), the Early Archaic (4000 to 7000 B.P.), the Middle Archaic (1500 to 4000 B.P.), and the Late Archaic (time of historic contact to 1500 B.P.).

The Pre-Archaic strategy prevailed from about 7000 to 11,500 B.P., a period marked by cool, moist conditions which fostered an abundance of surface waters. Subsistence revolved around lakeshore-marsh resources and the taking of large game; the use of processed seeds and nuts was not prevalent. Population density was quite low, and groups were highly mobile. Originally thought to represent an adaptation to pluvial lakeshore environments, Pre-Archaic sites have increasingly been recognized in a variety of riverine and upland settings. Environmental conditions changed gradually toward the end of the Pre-Archaic period; temperatures increased, moisture patterns changed, and the amount of available surface water decreased. Eventually, these changes caused a shift in adaptive strategy. Early Archaic patterns are markedly different from those of the Pre-Archaic period. Seed processing tools make their first appearance, indicating that the resource base had become more diversified. Hunting remained a prevalent activity. The variety of site types increases during this period, suggesting again the diversity of the resource procurement strategy. Initially, the population density was less than during the Pre-Archaic, but gradually increased.

Within the Tahoe Basin, Sierran glaciers retreated between 8000 and 9000 B.P. making it possible for people to occupy the area. Pre-Archaic sites have been identified along the Truckee River. Early Archaic sites have been recorded near Spooner Lake and in other locations within the Lake Tahoe Basin. These data suggest only a limited use of the Sierra Nevada during early times. Lindström et al. (2000) suggests that during Pre-Archaic and Early Archaic times, the level of Lake Tahoe may have been considerably lower than at present; upper reaches of the Truckee River may have been dry for centuries at a time. If this was indeed the case, Pre-Archaic and Early Archaic sites would have been located adjacent to the lake then present but were subsequently submerged as the lake level increased.

At the onset of the Middle Archaic, about 4000 B.P., environmental conditions again changed. Increases in effective precipitation caused the expansion of resources associated with lakes and marshes. For example, Lake Tahoe presumably returned to its current configuration. Prehistoric populations increased, and pronounced cultural elaboration occurred, as evidenced by an abundance of textiles and other perishables, and more elaborate houses. Subsistence practices continued to emphasize large game hunting, but the use of seed expanded. Also, the use of upland resources increased notably. These trends are apparent in the archaeology of the Lake Tahoe Basin and the Sierra Nevada in general. The local manifestation of this adaptive strategy is the Martis Complex.

The transition from the Middle to the Late Archaic is marked by changes in technology, subsistence patterns, and settlement. Technologically, the Late Archaic saw the introduction of the bow and arrow, a diversification in ground stone implements, and a greater emphasis on the use of small flake tools. Subsistence and settlement changes appear to reflect increased local and regional population. This prompted an intensification and diversification in subsistence practices not noted previously. Low-ranked resources seldom used during earlier periods were added to the diet. The use of pinyon became pronounced during this period. The Kings Beach Complex is the local manifestation of this adaptive strategy. Sites associated with this complex are common in the basin, especially since the Late Archaic represents populations ancestral to the present day Washoe.

3.2 Ethnographic Overview

As of the mid-1800s, the Washoe inhabited the region of the study area. A Hokan-speaking hunting and gathering group, the Washoe inhabited the chain of valleys along the eastern slope of the Sierra Nevada, from Honey Lake to Antelope Valley. The Pine Nut Mountains and the Virginia Range formed the eastern boundary of Washoe territory, while the western boundary extended several miles beyond the Sierra crest. A plethora of information has been written about Washoe land-use in the Tahoe Basin and their use of the region's resources. Lake Tahoe is the center of the Washoe world, both geographically and socially. Legendary and mythological associations to places within the basin are common. Ethnographic data on the Washoe are contained in d'Azevedo (1956, 1963, and 1986), Barrett (1917), Dangberg (1968), Downs (1966), Fowler et al. (1981), Freed and Freed (1963), Lowie (1939), Nevers (1976), Price (1962, 1980), and Siskin (1941).

While they were an informal and flexible political collectivity, Washoe ethnography hints at a level of technological specialization and social complexity for Washoe groups uncharacteristic of their neighbors in the Great Basin. Semi-sedentism and higher population densities, concepts of private property, and communal labor and ownership are reported and may have developed in conjunction with their residential and subsistence resource stability.

There was a tendency for Washoe groups to move from lower to higher elevations during the summers and then return to lower elevations the remainder of the year (Downs 1966). With the coming of spring, small bands or individual families left their winter base camps to take advantage of ripening plant foods in low-lying valleys. As soon as travel became possible in the spring, several, but not all group members, began leaving winter villages for the lake. White fish and early plants sustained these early arrivals. Extended kin groups returned to established camps located along streams from which they fished, harvest plants, and hunted game. Winter camps were not abandoned. Families at the lake would walk back and forth several times over the summer, bringing fish and other provisions to those that had stayed behind.

By early June, many Washoe were encamped around the shores of Lake Tahoe. Camps of five or six windbreaks (gadu), each gadu housing a family, appeared adjacent to the lake's tributaries. From these encampments, the Washoe took trout, sucker, and white fish that spawned in the streams. Stores of dried fish were developed for later use.

In the late summer and early fall, Washoe began leaving Lake Tahoe and dispersed in small groups to valleys east of the Sierra. Antelope and rabbit were hunted in early fall, both by individuals and in communal drives. Rabbits were dried for winter use. In late fall, collecting pine nuts and deer hunting were important activities along the eastern Sierra and the Pine Nut Mountains to the east. With the coming of winter, Washoe families returned to their favored base camps at lower elevations, where there stores of pine nuts, seeds, and dried meat sustained them.

This general seasonal round was not rigidly adhered to by all Washoe (d'Azevedo 1986). Some trekked to distant places for desired resources, while most circulated in the vicinity of their traditional habitation sites. They were not compelled to cover large expanses of land in their subsistence pursuits, a pattern common to other Great Basin groups. This was due to the large variety of predictable resources that were close at hand. Their relatively rich environment afforded the Washoe a degree of independence and may account for their long tenure in their known area of historic occupancy.

Washoe use of the Lake Tahoe Basin changed radically after the 1850s. The development of transportation corridors, intensive logging, recreational uses, and commercial fishing all affected the resource base on which the Washoe had depended. Traditional lifeways changed. With the decline or demise of their traditional food sources, the Washoe became increasingly dependent upon European resources and means of procurement. Many Washoe individuals and family groups retained links to their ancestral lands around Lake Tahoe by working for loggers, dairymen, fishermen, ranchers, and resort owners. These enterprises made extensive use of Indian labor and, in exchange, the Washoe were paid wages or were given food. Washoe men worked on roads and cut and hauled firewood and Christmas trees for ranchers and lumbermen. Women performed domestic chores and made baskets to sell to tourists. Over time, some Washoe developed close relationships with their employers.

3.3 HISTORIC OVERVIEW

Several general references are available that address the history of the Lake Tahoe Basin and the Comstock. Those used to develop the history that follows included Lord (1883), Knowles (1942), Galloway (1947), Myrick (1962), Scott (1957 and 1973), Goodwin (1971), Lindström and Hall (1998), and Shapiro et al. (2004). Historic themes determined most relevant to the current study area include Early Development and Transportation, Settlement and Agriculture, Logging, the Early Twentieth Century, and the Post War Years.

3.3.1 Early Development and Transportation

During his second expedition, explorer John C. Fremont and his party passed near Carson Pass and above the headwaters of the Upper Truckee River. On Valentine’s Day in 1844 Fremont first sighted Lake Tahoe from Red Lake Peak.

For the next 15 years, Lake Tahoe was undisturbed by the great westward migration. This was because routes through the Lake Tahoe basin required a double crossing of mountains - over the Carson Range east of the Lake Tahoe basin and over the main Sierra crest to the west. With the discovery of gold in California in 1848, mining and community development created an instant demand for trans-Sierra freight routes across the Sierra Range. A system of roads soon became established linking eastern portions of the country to California. Major trails passed through the south end of the Lake Tahoe Basin and over Donner Summit to the north.

The study area is located along the southern route. Early in 1848, while searching for a more direct route over the central Sierra, John Calhoun “Cock-Eye” Johnson of Placerville encountered a large valley (Lake Valley) along the southern shore of Lake Tahoe. A main transportation corridor was established through here, first known as “Johnson’s cut-off” and later called the “Placerville Road”. This corridor connected California and the Comstock Lode area between the late 1850s and the early 1870s. As shown on the 1866 GLO plat map, the Placerville Road cut across the mountain face from Johnson Pass, and then across the southern end of Lake Valley to Meyers. From Meyers, the road headed northeast along what is today Pioneer Trail. Today, much of the alignment of the Old Placerville Road through Lake Valley is now part of US Highway 50. A major variant of the Placerville Road saw heavy use during the late 1850s and early 1860s. After entering Lake Valley, this route turned south, extended up and over Luther Pass, and then down the Carson River to Carson Valley and on to the Comstock.

Development of the Meyers area began soon after the Placerville Road was opened. Martin Smith and his partner, Jim Muir, rebuilt the Martin Station, which had burnt in the summer of 1855. The new station consisted of several buildings, a corral, and a stable. In 1858, Muir sold his interest to George Douglass and in 1859, Smith and Douglass sold out to Ephraim "Yank" Clement. George Meyers, for whom the area is now known, bought Yank's Station from Clement in 1873. At that time, Clement moved his business from present-day Meyers eight miles north to Lake Tahoe (Scott 1957). The station house at Meyers was a two and one half story building with 13 rooms. Also present at the station were livery stables, corrals, a cooperage, a general store, saloons, barns, and out buildings. Most of those structures were leveled by fire in 1938 (Scott 1973). A 1944 highway map shows a Forest Service ranger station, post office, meat market, hotel and store, garage, service station, warehouse, barn, blacksmith shop, and nine houses situated on both sides of the road.

The establishment of the Lincoln Highway in 1913-1914, the nation's first transcontinental auto road, ushered in the expanding state and national highway system. The southern route followed the segment of Highway 50/89 that traverses east of the project area. The Pioneer Trail was also designated as the Lincoln Highway for a short period of time between 1913-1914 and 1917. Beginning in 1911, portions of the Old Placerville Road were paved and became the Old Alpine State Highway, then subsequently renamed State Route 23. Eventually, portions of the route were subsumed by State Route 89.

In the early 1900s, a roadway was constructed along the west shore of Lake Tahoe connecting Tahoe City with the Old Placerville Road. The new road went north from Meyers along an old wagon road, crossed the Upper Truckee River, and extended through Tahoe Valley before reaching Camp Richardson and points north. This road was eventually designated as State Route 89. Construction of SR 89 occurred at a time when automobiles were making their first appearance in the Lake Tahoe Basin. Automobiles could travel at substantially higher speeds than earlier horse-drawn wagons and heavier, power-driven equipment was now available to assist in construction. As a result, SR 89 was constructed based on a design speed that required broader, more sweeping curves than the earlier trail. This resulted in a roadway that exhibited a greater level of engineering. To some extent the roadway still followed the lay of the land. By the late 1920s, SR 89 was a moderately engineered roadway that was paved to a typical width of 20 feet.

In 1944-46 plans were completed to reconstruct US 50 through the South Lake Tahoe area. The new route for US 50 did not make use of the Pioneer Trail corridor. Rather, it stayed closer to the Lake, connecting with SR 89 in Tahoe Valley at what is today known as the "Y". From there, the new US 50 extended south along the old SR 89 corridor. By the 1940s, the design speed was higher than had been used during development of SR 89. Some of the shorter radius curves once present along SR 89 were cut off or isolated when US 50 was constructed. The right of way had been obtained in 1937 and construction was completed by 1948. During this time, a new bridge was constructed across the Upper Truckee River near Sawmill Road which replaced the old SR 89 bridge located about 0.2 miles to the west.

3.3.2 Settlement and Agriculture

Martin Smith built a trading post in Upper Lake Valley in 1851. Several other cabins were constructed in 1853, after an article appeared in the Placerville newspaper saying that gold had been discovered in the area. In 1854, Asa Hawley settled in Lake Valley and established a trading post. He owned 160 acres immediately south of Martin Smith. Hawley built what he called “2nd Elkhorn House” some 1,000 feet south of the site where a wooden bridge would later span the Upper Truckee River (Scott 1957). The 1866 GLO plat map shows the Haley House as being located in the northwest quarter of Section 17, Township 11 North, Range 18 East, directly across from where Grass Lake Creek flows into the Upper Truckee.

Carlo Celio, a native of Switzerland, was listed as a milkman in Lake Valley in 1866, although he allegedly did not settle in the valley until 1873 (Scott 1957, 1973). Celio was a dairyman in the Placerville area as early as the 1850s and evidently used Lake Valley for summer pasture. In 1873, Celio bought property from Charles Winstanley. Over the remainder of the century he continued to acquire property, eventually holding title to some 2,600 acres. Agricultural data show that 228 tons of hay was baled in Lake Valley during 1870, while 800 tons of hay was cut in 1880. Butter production in 1870 reached 100,600 pounds. Raising livestock and dairy cattle continued to be primary activities in Lake Valley through the middle of the twentieth century. The Whinstanley house and dairy are shown on the 1866 GLO plat map in the northeast quarter of Section 6, Township 11 North, Range 18 East. The same general location is noted as the Celio Ranch on the 1955 USGS quadrangle map.

Scott (1957) notes that Hiram Barton owned and ran a dairy ranch located in the meadow north of Yank’s Station. This ranch was likely located in the area of Meyer’s Lake Tahoe Golf Course. A dairy building dating to the 1910s to 1920s stood at the present maintenance yard for the golf course. This building, likely related to the later dairy operations of J. Chester Scott, was torn down for construction of the modern facility. Prior to its demolition, the building was recorded, but the documentation has yet to be submitted to the Information Center (Peak 1995:8).

3.3.3 Logging

Rich ore deposits were discovered in the Comstock area of western Nevada in 1859, causing the westward flow of emigrants to California to be reversed. With mining on the decline in California, news of the Comstock discovery caused a "rush to Washoe”. Consequences of that rush were to have a profound effect on the Lake Tahoe Basin. Development of the Comstock Lode prompted the need for a variety of wood products. During the early 1860s, this need was met by small operations located within the Virginia Range and along the east front of the Sierra Range. By the mid-1860s, forests in the Tahoe Basin became the primary source of lumber and cordwood for the mines. Cutting began on the east side of the basin, continued to the north and south shores, and finally along the west shore. The timber harvest continued through 1897 when mine production waned and the last major sawmill closed. By the end of the Comstock period, wood products totaling 600 million board feet of lumber and two million cords of firewood had been consumed. The harvest from the Tahoe and Truckee Basins was worth in excess of 80 million dollars.

Lindström and Hall (1998) provide a detailed discussion of logging in Lake Valley. The first lumber mill in Lake Valley was constructed in 1860 as Robert Woodburn's water-powered sawmill. It was located about two miles northeast of Meyers on the Old Placerville Road (Pioneer Trail). Woodburn supplied lumber for many of the local hostelries, barns, and stables that were built along the Old Placerville Road. During those early years, Lake Valley was home to several dairy and hay operations that provisioned the hotels and stables with supplementary feed.

During the late 1870s, ranching was replaced by lumbering as the primary industry in the valley; however, the timber business proved prosperous for Lake Valley ranchers.

The Carson & Tahoe Lumber & Fluming Company (CTLFC), formed by Bliss and Yerington in l873, operated along the east, south, and west shores of Lake Tahoe. During the 1870s and 1880s, timber rights in Lake Valley were sold to the CTLFC and the Eldorado Wood and Flume Company (Galloway 1947). The CTLFC built two railroads into Lake Valley. The first was a standard gauge line from Camp Richardson. This line was abandoned and replaced by the narrow gauge Lake Valley Railroad (LVRR) that extended along the east and south edges of the valley, to Meyers, and then into the upper watershed of the Upper Truckee River. The mainline, spurs, and sidings covered about 13 miles and ran along portions of the Trout Creek drainage and southwest to Meyers. By the 1890s the CTLFC had obtained timber rights totaling over 6,000 acres throughout the south shore of the lake, acquiring rights on Meyers and Barton family holdings, among others. Much of Lake Valley was stripped of its marketable timber by the late 1890s and large scale logging in this region was over. The LVRR was torn up during the summer of 1898, and all salvageable materials and equipment were pooled with those from the Glenbrook railroad operation and taken by barge to Tahoe City for incorporation in the Lake Tahoe Railway and Transportation Company's passenger and freight line to Truckee.

Trees were selectively harvested to suit varying wood markets. Jeffrey, sugar, and ponderosa pines were favored. As a result, timber tracts were not clear-cut at once; rather, stands were re-entered over time for different purposes. The pine-mixed conifer belt (between 6,000 and 6,500 feet) was probably logged first while the red fir conifer belt (6,500 to 9,000 feet) was logged last. Much of the cutting occurred during the winter months. The transport of harvested logs from their extraction point to their final destination was achieved using a variety of methods. Systems of primary, secondary, and tertiary haul roads for wagon transport were constructed. Skid trails and corduroy roads also were constructed for dragging logs with teams of animals. Rapid down slope transport over short distances was accomplished with the construction of gravity chutes. Water transport of material was accomplished with the construction of flumes, ditches, reservoirs, and splash ponds.

During the peak of Comstock era logging, the Celio family opted to retain their timber interest and resisted selling land or timber rights to the CTLFC. Deciding to cut timber on their own holdings in Upper Lake Valley, the Celios incorporated as a lumber company in 1905. In 1910, C.G. Celio and Sons established the first of two sawmills in upper Lake Valley. As was common practice, the initial mill was dismantled with the depletion of marketable timber and in 1927-1928, the Celios built a second and larger sawmill near the junction of present-day Lake Tahoe Boulevard and Sawmill Road. Celio and Sons sold out to the Placerville Lumber Company in 1942, ending 47 years in the lumber business. Operations at the old Celio Sawmill ceased in 1952 when it burned down.

3.3.4 The Early Twentieth Century

Land-use patterns during this period were a pale reflection of Comstock period developments. By the turn of the century, unregulated use of the Lake Tahoe Basin largely came to an end (Beesley 1995). A forest reserve, which included lands within the present Tahoe and El Dorado national forests, was created between 1893 and 1900 (Markley and Meisenbach 1995). Effective management did not exist until creation of the national forest system in 1907, when the Tahoe Basin was segmented under the jurisdictions of the Tahoe, the Toiyabe, and the El Dorado national forests. Agency control dramatically changed land-use patterns, especially with regard to fire suppression and increased recreation through the promotion of camping, hunting/fishing, winter sports activities, and the construction of summer homes (Beesley 1995).

Another major factor tied to the early twentieth century was introduction of the automobile. The first automobiles traveled to the Lake Tahoe Basin in the mid-1910s. Their increased popularity prompted the improvement of local and regional roadways. Within the study area region, the old "Scott's Route" saw increased use. Access to Reno was enhanced in 1891 when the road over Mount Rose Pass was graded. From 1928 to 1935, the U.S. Bureau of Public Roads maintained federal highways. During that time, improvements were made to most roads in the Lake Tahoe Basin.

Road improvements caused a fundamental shift in the nature of roadways and their use. With greatly improved access, the Tahoe Basin saw more recreational use by the traveling public. The Post-World War I era saw a marked increase in traffic during the summer months. This spawned a new type of development. Private communities of summer homes started to appear in the mid-1920s, such as those at Lakeside Park, Tahoe Meadows, Zephyr Cove, Lincoln Park, Secret Harbor, and Kings Beach. These localized, residential developments appeared through the 1920s and 1930s. With increased accessibility by automobiles and with the increased emphasis on public recreation, the old luxury hotels declined and were replaced by rustic summer cabins, auto court motels, cafes, and service stations.

3.3.5 The Post War Years

The presence of improved roadways, increased availability of automobiles, and local enticements such as the legalization of gambling in Nevada all contributed to the dawning of a new era of tourism at Lake Tahoe. Chilled by traumas associated with the depression and World War II, the lure of Lake Tahoe would not be denied. People visited the lake during the summer, staying at one of many new hotels and motels. Larger gaming establishments were constructed after World War II, thereby prompting an increase in the volume of tourists. To retain more of the tourist's dollars on the Nevada side, the gaming establishments constructed large hotels and elegant restaurants that fronted the lake. Downhill skiing developed as an adjunct to gaming. Increasingly, Nevada's casinos and downhill ski areas became major recreational destinations. The movement towards year-round use of the Tahoe Basin brought more building and development to Tahoe's shores, with the accompanying need to house not only vacationers but employees as well. People moved to the Lake Tahoe Basin in large numbers and several communities came into existence. Tahoe saw the growth of permanent residency and facilities to serve tourists and service workers.

4.0 ARCHIVAL REVIEW

Prior to conducting the field survey, a records search was conducted and received on June 8, 2018 through the NCIC using a quarter-mile (0.25) search buffer around the project area boundary. Emphasis was placed on determining which portions of the archival study area have been inventoried previously and the location of previously recorded archaeological sites within or adjacent to the project area. Historic aerial, USGS topographic, and General Land Office survey plat maps were examined for the presence of cultural features near the project area. Search results and consulted historic maps are summarized below.

4.1 NCIC Records Search

As a result of the records search, 19 inventories and 10 sites have been recorded within 0.25 miles of the project area. Two sites have been mapped inside the project area (discussed in more detail below).

The results of the NCIC records search are provided in **Appendix C**.

4.1.1 Previous Inventories

Table 2 provides the previous inventories that have been conducted within 0.25 miles of the project area.

Table 2. Previous Inventories within 0.25 Miles of the Project Area.

Report Number	Title	Author	Year
002724	Archaeological Survey and Site Recording for the Pioneer Timber Sale, with a Contextual History of the Lake Valley Railroad	Lindstrom, Susan and Jeffrey Hall	1998
006930	New Tower Submission Packet FCC Form 620 Project Name: Meyers Project Number: 36301464.01464	Hatoff, Brian W.	2005
007136	Addendum: Cultural Resource Report CRR No. 05-19-170 B Project Name: Heavenly Valley 8&9 Forest Health Project	O'Brien, Sheryl	1993
007210	A Cultural Resources Evaluation of the Meyers Bike Trail, South Lake Tahoe, CA El Dorado County	Lindström, Susan	1991
007216	Lake Tahoe Basin Management Unit Hertiage Resource Report ------URBAN FRINGE MANAGEMENTPROJECT------- (California Portion)	Dexter, Sean David	1995
007217	Short Form Archaeological Reconnaissance Report ARR NO. 05-19-178 PROJECT NAME: SANTE FE ROAD EROSION CONTROL PROJECT	Hardy, Kathy	1988
007578	Lands Department Urban Lot Management Project	Davis, Herschel	1997
009388	Heritage Resource Inventory South Tahoe Public Utilities District A-Line Export Pipeline Relocation Project	Susan Lindstrom	1994
009411	South Tahoe Public Utility District A-Line Pipeline Relocation Extention Project	Jody L. Brown	1995
009412	Cellular Communications Skyline Drive Site Heritage Resource Inventory Meyers, California, El Dorado County	Susan Lindstrom	2001
009413	Negative Archaeological Survey Report For The Proposed Erosion Control Project Along State Route 50 in El Dorado County	Sarah J. Moran	1999
009426	Lake Country Estates Land Exchange	Kathy Hardy	1987
009647	Survey of the lake Tahoe Community College: 05-19-237	Herschel Davis	1992

Report Number	Title	Author	Year
009881	Final Historical Resources Evaluation Report for Proposed Water Quality Improvements on U.S. 50, El Dorado County, California	Mark Bowen	2008
009881	Final Archaeological Survey Report for Proposed Water Quality Improvements on U.S. Highway 50	Gabriel Roark	2008
011679	Archaeological Survey Study of the Skyline Drive & Crystal Air Drive Project AT&T Mobility Site No. CNU6214 1697 Skyline Drive South Lake Tahoe El Dorado County, California 96150	Dana E. Supernowicz	2014
011878	South Tahoe Public Utility District Fire Hydrant Service Expansion Project Cultural Resource Inventory	Susan Lindstrom	2015
012188	South Tahoe Public Utility District Water Meter Installations Project Cultural Resource Inventory	Susan Lindstrom	2016
012424	Heritage Resource Inventory Report, Meyers Erosion Control Project-Expanded Area, El Dorado County, California (JN 95179)	Jeremy Hall, Jason Drew, and Dave Rios	2015

4.1.2 Previously Recorded Resources

Table 3 provides the previously recorded sites that have been identified within 0.25 miles of the project area. Highlighted rows indicate resources that are depicted within the project area.

Table 3. Previously Recorded Sites within 0.25 Miles of the Project Area.

Site Number	Age	Description	Last Recorded	NRHP	Proximity to Project Area
P-09-000809	Historic	Lincoln Highway (roads, trails, railroad grades, engineering structure, bridge)	2014	Ineligible	Outside
P-09-001917	Historic	Lake Valley Railroad (privies, dumps, trash scatters, water conveyance system, roads, trails, railroad grades, walls, fences)	2007	Unevaluated	Outside
P-09-003398	Prehistoric	Bedrock milling feature	2007	Unevaluated	Outside
P-09-003473	Historic	Accident Cabin (logging camp site)	1992	Unevaluated	Outside
P-09-003477	Historic	Suitchute Site (roads, trails, railroad grades)	1992	Unevaluated	Outside
P-09-003528	Historic	Privies, dumps, trash scatters	1991	Unevaluated	Outside
P-09-003532	Historic	Privies, dumps, trash scatters	1996	Unevaluated	Outside
P-09-003805	Historic	Lake Valley Utility Line (foundations, structure pads, privies, dumps, trash scatters, utility lines)	2015	Unevaluated	Inside
P-09-003898	Historic	Old State Highway 89 (foundations, structure pads, roads, trails, railroad grades)	2015	Unevaluated	Outside
P-09-005228	Historic	Pine Grove House Way Station (ancillary building)	1972	Unevaluated	Inside

The 2018 NCIC records search identified one site, P-09-000809, listed as ineligible to the National Register. No other sites or districts found within the project area were listed on the National Register or California Register. Similarly, nothing was listed on the California Office of

Historic Preservation Historic Property Directory, the California list of State Historic Landmarks, the California Points of Local Interest, or the California Department of Transportation's bridge inventory.

Two sites were mapped within the project area, Site P-09-003805 and Site P-09-005228. Only a small segment of Site P-09-003805, the Lake Valley Utility Line, is mapped through the southwest corner of the project area. However, there is some discrepancy with the exact mapped location of the historic utility corridor. The site was described as two historic overhead utility lines running close to one another. One utility line was a telegraph line and the other line was used for either telephone or power transmission (Zeier 2003). Their combined mapped location follows close to the modern alignment of US 50 through the Meyers area and continuing along Pioneer Trail and Lincoln Highway to the northeast. Evidence of the site found includes portions of brace wires, ceramic insulators, eyebolts, and telephone wire. Site P-09-005228 is the historic site of Pine Grove House Way Station on the Emigrant Trail. There is not much written about the site except that it is the location of an early way station (Graham 1972) that presumably contained an ancillary building for use by those travelling along Emigrant Trail. The current NRHP status of both sites is unevaluated.

4.2 Historic Maps Consulted

Historic maps reviewed as part of the present study included the following:

- A General Land Office (GLO) survey plat map (dated 1866) on file at the Bureau of Land Management's General Land Office Records for Township 12 North, Range 18 East.
- A 1889 USGS 30 minute Pyramid Peak quadrangle map on file at the USGS Historical Topographic Map Explorer.
- A 1889 USGS 30 minute Markleeville quadrangle map on file at the USGS Historical Topographic Map Explorer.
- A 1955 USGS 15 minute Freel Peak quadrangle map on file at the USGS Historical Topographic Map Explorer.
- A 1956 USGS 15 minute Fallen Leaf Lake Peak quadrangle map on file at the USGS Historical Topographic Map Explorer.
- 1955 versions of the Echo Lake and Freel Peak 7.5 minute USGS quadrangle maps on file at the North Central Information Center.

5.0 NATIVE AMERICAN CONSULTATION

On June 6, 2018 a letter was sent to the Native American Heritage Commission (NAHC) requesting a search of their Sacred Lands database and a list of contacts that may have knowledge of cultural or tribal resources within or immediately adjacent to the project area. A response was received June 13, 2018 indicating that the Sacred Lands database search did not reveal the presence of Native American cultural resources within or immediately adjacent to the project area. The NAHC requested that several Native American cultural resource representatives be contacted (**Table 4**). As requested by the County, tribal representative inquiry letters were mailed on June 20, 2018 using the County letterhead. Receipt confirmation of the letters was received from every individual, except Grayson Coney and Don Ryberg of the Tsi Akim Maidu Tribe.

Table 4. Tribal Representatives Identified by the NAHC.

Individual	**Tribe Affiliation**	**Receipt Confirmation (Y/N)**	**Tribal Response**	**Agency Response**
Grayson Coney, Cultural Director	Tsi Akim Maidu	No - Letter returned to sender; NAHC notified	None	n/a
Darrell Cruz, Director	Washoe Tribe of Nevada and California	Yes	Yes	No consultation requested
Pamela Cubbler, Treasurer	Colfax-Todds Valley Consolidated Tribe	Yes	None	n/a
Regina Cuellar, Chairperson	Shingle Springs Band of Miwok Indians	Yes	None	n/a
Clyde Prout, Chairman	Colfax-Todds Valley Consolidated Tribe	Yes	None	n/a
Don Ryberg, Chairperson	Tsi Akim Maidu	No - Letter returned to sender; NAHC notified	None	n/a
Sara Dutschke Setchwaelo, Chairperson	Ione Band of Miwok Indians	Yes	None	n/a
Cosme Valdez, Chairperson	Nashville-El Dorado Miwok	Yes	None	n/a
Gene Whitehouse, Chairperson	United Auburn Indian Community of the Auburn Rancheria	Yes	Yes	No consultation requested

As of June 25, 2018, two of the identified Native American tribes have replied to NCE's inquiry letters. The United Auburn Indian Community (UAIC) has deferred to the Washoe Tribe of Nevada and California for any additional follow up or request to monitor for the project. The Washoe Tribe's response stated that they are not aware of cultural resources located in the project area that could be affected by the project. Should any cultural resources be discovered during the intensive survey or in the event inadvertent cultural resources are discovered as a result of project activities, the Washoe Tribe has asked to be informed of findings and continue consultation. Pursuant of California Public Resource Code Section 21080.3.1(b)(2) of the CEQA, the 30-day response timeframe for Native American inquiry for the project by the tribal representatives listed outside of UAIC and the Washoe Tribe has expired.

Correspondence related to Native American consultation can be found in **Appendix D**.

6.0 INVENTORY METHODS

6.1 EXPECTATIONS

Archival research conducted for the project area suggests that historic period cultural resources appear to be quite common throughout the archival study area. As might be expected, sites associated with agriculture and dairying are concentrated in meadows and on flatter land associated with stream sheds. Logging sites are concentrated in the hills, along meadow margins, and along transportation corridors (roads and railroads). Given the location of the project area, it is anticipated that historic sites associated with transportation (early roadways) and logging are the most likely to be encountered.

Additionally, it is noted that the project area consists of a residential area comprised of paved roadways and numerous small, developed parcels. Much of the area is comparatively flat, so most parcels in the subdivision have seen some level of development.

6.2 FIELD METHODS

The objective of the investigation was to locate, describe, and evaluate cultural resources present within the project area. Fieldwork within the APE was performed in accordance with generally accepted federal and State of California standards. As such, the pedestrian survey was conducted using 15-meter transect spacing. Much of the project area has experienced some level of previous disturbance. The most predominant types include disturbance associated with the existing streets, disturbance associated with access roads and driveways, landscaping, casual use, and utility construction. Emphasis was placed on the examination of undisturbed or relatively undisturbed ground.

If cultural resources were encountered, field personnel more thoroughly examined the immediate area to determine the type and extent of cultural material. Archaeological components including diagnostic artifacts, artifact concentrations, and features were described in field notebooks, photographed using a high-quality camera, and plotted using Collector with a sub-meter Trimble R1 GPS receiver. If necessary, at least two overview photographs were taken per site to capture the general surroundings with attention paid to capturing the horizon (if possible) to aid in potential future relocation. If applicable, photos of artifacts contain a scale and all photographs were GPS-plotted. Upon completion of the inventory, Trimble field data was differentially corrected using the nearest local base station and then converted to GIS shapefiles projected to California State Plane Zone 2 (NAD 83). If necessary, a California Department of Parks and Recreation (DPR) site form was prepared for each site identified during the inventory, its location plotted on a USGS 7.5 minute map, and photographs of site overviews and diagnostic artifacts included. Isolates were mapped and photographed (if diagnostic) as well. No artifacts were collected during the field survey.

DPR site forms for the project area are provided in **Appendix E.** However, policy set forth by the CHRIS specifies that DPR site forms are not to be appended to archaeological reports provided to public or private agencies; therefore, the forms have been redacted for public distribution. Forms updated for this project will be sent to NCIC, located at the California State University, Sacramento.

Surface visibility varied considerably across the project area. Previously disturbed areas and cut and fill slopes were often essentially void of vegetation. In undisturbed areas, vegetation and needle litter was present and restricted ground visibility somewhat. Sufficient clear ground was present to ensure survey adequacy.

A detailed photo log for the project is located in **Appendix B**.

6.3 Project Personnel and Dates of Field Examination

Jeremy Hall, NCE Cultural Resources Specialist, conducted the archaeological inventory of the project area and oversaw project activities. Molly Laitinen, NCE Staff Scientist, assisted in compiling the project's technical report. Mr. Hall has 15 years of experience and Ms. Laitinen has 3 years of experience in historic preservation, archaeological investigation and cultural resource evaluation as part of State, Federal, and professional standards in compliance with Section 106 of the NHPA and National Historic Preservation Act and PRC Section 21083.2 of the CEQA.

Fieldwork was conducted July 26, 2018.

7.0 INVENTORY RESULTS

Intensive inventory of proposed improvement locations associated with the Oflyng WQP area resulted in two previously recorded historic resources, the Pine Grove House Way Station (P-09-003805) and the Lake Valley Utility Line (P-09-005228), not being relocated.

7.1 Site P-09-005228: Pine Grove House Way Station (not relocated)

The historic Pine Grove House Way Station was previously recorded in 1972 by USFS, Region 5. The site was described as the approximately 3-acre site of an early ancillary way station on the Emigrant Trail. The site boundary was likely digitized from a 15-minute map and therefore, the spatial accuracy is unknown. Attempts to relocate the site were unsuccessful.

A DPR site form continuation sheet for Pine Grove House Way Station attesting to the inability to relocate the site within the project area is provided in **Appendix E**.

7.2 Site P-09-003805: Lake Valley Utility Line (not relocated)

The historic Lake Valley Utility Line is mapped through the project area; however, no evidence of a telephone line (e.g., posts, wire, insulators) was identified within the confines of the APE. From discussions with the FS archaeologist during an NCE inventory in 2015 (adjacent to the present project area), and confirmed from the 2007 site form, the current alignment as depicted in GIS was digitized from a 1922 Forest Service map (Turner et al. 2007). As such, the linear resource may not be spatially accurate in some places. It is unknown whether the telephone line is inaccurately mapped or if its constituents are simply absent within the project area.

A DPR site form continuation sheet for Lake Valley Utility Line attesting to the inability to relocate the site within the project area is provided in **Appendix E**.

8.0 ELIGIBILITY RECOMMENDATIONS

An important component of an intensive inventory is the development of recommendations as to whether or not identified cultural resources are eligible for listing on various registers of historic places. Eligibility is based on a consideration of two site characteristics – significance and integrity. The significance of a cultural resource is evaluated in accordance with set by federal, state, and local entities. Federal standards are defined in the NRHP, specifically in 36 CFR 60.4. California standards are prescribed as part of the CEQA, while local standards are prescribed in Chapter 67 of the TRPA Code of Ordinances. Essentially the same significance criteria apply under all three programs.

8.1 NATIONAL REGISTER CRITERIA OVERVIEW

The National Register of Historic Places Criteria for Eligibility state that properties must be at least 50 years old (45 years for California), remained fairly unaltered, and meets one or more of the following National Register Criteria for Significance.

- **A) Event:** Property is associated with events that have made a significant contribution to the broad patterns of our history.
- **B) Person:** Property is associated with the lives of persons significant in our past.
- **C) Design/Construction:** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- **D) Information Potential:** Property has yielded, or is likely to yield, information important in prehistory or history.

To be considered eligible under Criterion A, a property must be associated with events that are important within a defined context. Several distinct cultural periods are described in the cultural overview above. A prehistoric site that exemplifies an adaptive trend associated with a distinctive cultural period might be considered eligible under Criterion A. An ethnographic period site that is an outstanding example of changing lifeways and Native adaptation might also be considered as significant. Likewise, an historic period site that is considered eligible should represent an important contribution to an event within the associated context.

Criterion B applies to properties associated with individuals whose specific contributions to history can be identified and documented. As such, Criterion B usually applies to ethnohistoric and historic period sites because prehistoric sites generally lack associations with known individuals.

Criterion C applies to properties that embody distinctive characteristics of a type, period, or method of construction; represent the work of a master; possess high artistic value; or represent a significant and distinguishable entity within a larger "district". Prehistoric site types that meet Criterion C are generally distinctive site types that reflect elements of community design, or contribute to larger districts as key elements within a regional land use context.

Criterion D pertains to the information potential a property may contribute toward our understanding of prehistory or history. Research topics or themes presented in a historic context are the mechanism by which properties are evaluated against this Criterion D.

8.1.1 Integrity

For a resource to be listed in the NRHP, it must not only demonstrate its significance under the National Register Criteria, but also must have integrity to convey such significance. Site integrity, or the extent to which potential information is preserved in contexts that are sufficiently intact, represents another consideration for NRHP eligibility. The evaluation of integrity must always be grounded in an understanding of a resource's physical features and how they relate to its significance. To retain integrity, a resource will possess at least several aspects of integrity including location, design, setting, materials, workmanship, feeling, and association.

1) **Location:** The place where the historic property was constructed or the place where the historic event occurred.
2) **Design:** The combination of elements that create the form, plan, space, structure, and style of a property.
3) **Setting:** The physical environment of a historic property.
4) **Materials:** The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.
5) **Workmanship:** The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
6) **Feeling:** A property's expression of the aesthetic or historic sense of a particular period of time.
7) **Association:** The direct link between an important historic event or person and a historic property.

8.1.2 Linear Resources
Many historic period resources represent fragments of larger linear resources such as roads and utility lines. There are two issues here. The first is whether the site as a whole is significant under any federal or state criteria. The second issue only relates to sites that are either evaluated as significant or are managed as if they are significant. This issue is whether or not segments recorded within the study area contribute to the eligibility of the larger site. Guidelines have been devised specific to the evaluation of individual segments of linear features. Citing Mikesell (1990), Owen (1991), and Supernowicz (1991), Lindström and Hall (1994) combined historic context with property type requirements to create a framework for the comparative evaluation of "discrete segments of a linear feature." This same framework was subsequently included in a contextual history and evaluation methodology established by the USFS for roads and trails in the Lake Tahoe Basin (U.S. Forest Service 1999). Those evaluation guidelines rely on the review of four specific criteria. Each criterion is described below.

- **Length:** Linear features were intended to connect distant points. The ability to understand the connective role of an individual segment is reflected, in part, by that segment's length. The segment should be of sufficient length to convey the functionality of the linear feature at large, and the segment's relationship to that larger feature. The more the segment conveys that sense of function and relation, the more likely it is to contribute to the overall feature's integrity of association with events or patterns important in history.
- **Distinctive Engineering Features and Associated Properties:** Examples of engineering features include bridges, rock retaining walls, and drainage structures. The presence of such features increases the richness of the resource and contributes to the overall feature's significance as a type or method of construction. Examples of associated properties include way stations, fences, and construction related features or sites. The presence of associated properties also enriches the resource and contributes to their integrity of feeling.

- **Structural Integrity:** The ability to understand the original character and purpose of the segment is reflected, in part, by the feature's integrity of design, material and workmanship. This criterion assesses the extent to which the segment retains those types of integrity. Subsequent natural and man-induced factors such as erosion and abandonment may conspire to diminish these types of structural integrity.
- **Setting:** The final criterion attempts to measure the integrity of the immediate context in which the segment exists. The segment should retain sufficient integrity of setting to convey a sense of place specific to the time when the segment and linear feature at large were in use. Integrity of setting is reduced by the presence of non-related sites or linear features, or alterations in the general landscape.

These criteria were used to assign segments of linear features into one of four integrity levels:

I. Primary feature (grade, flume, ditch, earthwork, etc.) is ***substantially intact***, as are the contour and bed; no major impacts, recent alterations, or significant erosion/deterioration.

II. ***Lightly impacted*** but morphology is intact, with less than 25% altered or significantly eroded; at least half of structural elements, earthworks, or other elements are present.

III. ***Morphology is compromised***, but route/contour still discernable; 25-50% altered, impacted, or significantly eroded; structural or other elements are missing or rare.

IV. ***Route/segment difficult to discern***; over 50% altered, impacted, or significantly eroded; no remaining structural elements, earthworks, or other elements. Grade may be unrecognizable as historic feature, but convincing archival or contextual evidence exists.

In general, levels I or II have sufficient integrity to warrant considering the segment contributing to the significance of a linear site. Levels III and IV are generally judged to be lacking in such integrity and are not judged as contributing. Exceptions to this general rule are possible due to the possible presence of rare and significant elements within segments that have generally poor preservation. Even if a segment is not part of a significant site, characterization using these integrity levels provides a comparative framework for descriptive purposes.

8.2 Site P-09-005228: Pine Grove House Way Station (not relocated)

The historic Pine Grove House Way Station was previously recorded in 1972 by the USFS. The site was described as the approximately 3-acre site of an early ancillary way station on the Emigrant Trail. However, attempts to relocate the site were unsuccessful and no evidence of a way station was identified within the project area. Within the context of the current project, there is no need to assess National or State Register eligibility of the resource.

8.3 Site P-09-003805: Lake Valley Utility Line (not relocated)

The last recording of the Lake Valley Utility Line was in 2007 after the Angora Fire. The site record indicates that the mapped corridor is derived from a 1922 Forest Service map. As part of the present effort, the mapped corridor was walked but evidence of a telephone line (e.g., posts, wire, insulators) was not identified within the project area. It is unknown whether the linear resource exists in the vicinity of the project area but is mis-plotted, or if the constituents of the telephone line are simply absent within the project area. In either case, within the context of the current project, there is no need to assess National or State Register eligibility of the resource.

9.0 SUMMARY

An APE was defined for the proposed project which includes the survey parcels and ROW adjacent to the survey parcels (see **Figure 2**) identified by the County on which improvements may be constructed. Streets adjacent to survey parcels include (from north to south): Elks Club, Crystal Air, Tionontati, Pioneer Trail, Coto, Oflyng, Meadow Vale, Skyline, and Southern Pines. Street ROW is typically 40 feet wide. In general, a 26-foot wide roadway dominates each ROW, leaving a narrow ribbon of road shoulder approximately seven feet wide on either side. Archaeological examination was limited to survey parcels and to the County ROW along the streets adjacent to the survey parcels. As a result, approximately 24.7 acres were surveyed. This inventory resulted in the following:

- The historic archaeological resource Pine Grove House Way Station, site P-09-005228, is mapped in the project area; however, evidence of such a resource was not identified. As such, it was not evaluated. A DPR continuation sheet with an updated map has been prepared.
- A segment of the Lake Valley Utility Line, site P-09-003805, is mapped through the project area; however, evidence of such a resource was not identified. As such, it was not evaluated. A DPR continuation sheet with an updated map has been prepared.

It is recommended that significant cultural resources are not present within the project's APE. Thus, the project proposed by the County will not impact properties listed on or eligible to the National Register or California Register, nor will it impact historic resources that meet criteria outlined in Section 5024.1 of the California PRC or Section 67 of the TRPA Code of Ordinances. It is recommended that "no historic properties will be affected," as that phrase is viewed within the context of compliance with Advisory Council on Historic Preservation regulations (36 CFR part 800).

Although improbable, it is possible that prehistoric burials might be found in the study area (none were apparent based on an examination of the ground surface). Should human remains be encountered while engaged in construction activities, work must cease in the immediate area and the contractor must immediately report the finding to the State Historic Preservation Office (and USFS representatives, if the find is located on USFS administered lands) and other designated officials. That office will contact the appropriate tribal representatives and consult on disposition of the remains and any associated artifacts.

NCE prepared this report for use by the County as the intended beneficiary of this work. Interpretations, conclusions, and recommendations contained within the report are based in part on information presented in other reports that are cited in the text and listed in the references. This report is subject to limitations and qualifications inherent to the referenced documents.

Techniques and methods used during this investigation were such that existing resources of a prescribed size (15 meters across, and a sample of smaller resources) in the study area that were visible to surface examination have been identified. Every reasonable effort was made to identify cultural resources in the study area. If, however, prehistoric or historic period resources are subsequently discovered that could be adversely affected by project-related activities, all such activities should cease immediately. The State Historic Preservation Office and USFS representatives should be contacted immediately.

REFERENCES CITED

Barrett, S. A.
1917 The Washoe Indians. *Bulletin of the Public Museum of the City of Milwaukee* 2(1):1-52.

Beesley, David.
1995 *Reconstructing the Sierra Nevada Landscape: an Environmental History, 1820-1960*. Report on file, Sierra Nevada Ecosystems Project.

Birkeland, Peter W.
1963 Pleistocene Volcanism and Deformation of the Truckee Area North of Lake Tahoe, California. *Geological Society of America Bulletin* 74:1452-1464.

Bonham, Harold F.
1969 Geology and Mineral Deposits of Washoe and Storey Counties, Nevada. *Nevada Bureau of Mines and Geology Bulletin* 70-18.

Dangberg, Grace
1968 Washoe Tales: Three Original Washoe Legends. *Nevada State Museum Occasional Paper*, Carson City, Nevada.

D'Azevedo, Warren L.
1956 Washoe Place Names. Manuscript on file at the Department of Anthropology, University of Nevada. Reno, Nevada.
1963 The Washoe Indians of California and Nevada. *University of Utah Anthropological Paper* 67, Salt Lake City, Utah.
1986 Washoe. In, *Great Basin*, edited by W. d'Azevedo, pp. 466-498. Handbook of North American Indians, Volume 11. W. Sturtevant, general editor. Smithsonian Institution, Washington, D. C.

Downs, James F.
1966 *The Two Worlds of the Washoe*. Holt, Rhinehart and Winston, New York.

Elston, Robert G.
1982 Good Times, Hard Times: Prehistoric Culture Change in the Western Great Basin. In, Man and Environment in the Great Basin, edited by J. O'Connell and D. Madsen. *Society for American Archaeology Paper* 2.
1986 Prehistory of the Western Area. In, *Great Basin*, edited by W. d'Azevedo, pp. 135-148. Handbook of North American Indians, Volume 11. W. Sturtevant, general editor. Smithsonian Institution, Washington, D. C.

Fiero, B.
1986 *Geology of the Great Basin*. University of Nevada Press. Reno, Nevada.

Fowler, Catherine S., Robert G. Elston, M. Hamby, and JoAnn Nevers
1981 An Ethnographic and Ethno-archaeological Study of a Washoe Cemetery at Camp Richardson, Lake Tahoe. Prepared for the El Dorado National Forest, U. S. Forest Service, by Intermountain Research, Silver City, Nevada.

Freed, S. and R. Freed
1963 A Configuration of Aboriginal Washoe Culture. In, The Washoe Indians of California and Nevada. *University of Utah Anthropological Paper* 67, Salt Lake City, Utah.

Galloway, John D.
1947 Early Engineering Works Contributory to the Comstock. *University of Nevada Bulletin* 5, *Geology and Mining Series* 45. Nevada State Bureau of Mines and the Mackay School of Mines. Reno, Nevada.

Goodwin, Victor.
1971 Historic Land and Resource Use Patterns in the Lake Tahoe Basin and their Effect Upon its Present Milieu. Manuscript on file at the U.S. Forest Service, Lake Tahoe Basin Management Unit, South Lake Tahoe, California.

Graham, Elliot L.
1972 USDA – Forest Service (Region 5) Primary Record for the Pine Grove House Way Station (site P-09-5228). On file at the Forest Service Lake Tahoe Basin Management Unit office, South Lake Tahoe, California.

Knowles, Constance D.
1942 *A History of Lumbering in the Truckee Basin from 1856 to 1936.* Works Progress Administration Project 9512373.

Lindström, Susan G., and Jeffery T. Hall
1994 Cultural Resources Inventory and Evaluation Report for the Proposed Spooner Summit and East Shore Project (Big Gulp) Timber Sales. Prepared by Biosystems Analysis, Santa Cruz, California. Forest Service report (TY-93-775, and 05-19-321). Carson Ranger District, Carson City, Nevada (NSM report 3-157 and 18-315).
1998 Archaeological Survey and Site Recording for the Pioneer Timber Sale with a Contextual History of the Lake Valley Railroad. Report prepared by Garcia & Associates, San Anselmo, California. NCIC report 2724. Forest Service report number TB-1996-005.

Lindström, Susan G., Penny Rucks, and P. Wigand
2000 Chapter 2: A Contextual Overview of Human Land use and Environmental Conditions. In, *The Lake Tahoe Watershed Assessment* Vol. 1. USDA Forest Service, Lake Tahoe Basin Management Unit. South Lake Tahoe, California.

Lord, Eliot.
1883 Comstock Mining and Miners. *U.S. Geological Survey Monograph* 4. U.S. Printing Office, Washington D.C.

Lowie, Robert H.
1939 Ethnographic Notes on the Washoe. *University of California Publications in American Archaeology and Ethnology* 36(5):301-352, Berkeley, California.

Markley, R. and C. Meisenbach
1995 *Historical Summary: Tahoe National Forest Environmental History*. Report on file Tahoe National Forest, Nevada City, California.

Mikesell, S.
1990 Historical Overview of Old US 50, 1895-1940. Manuscript on file at Caltrans. 3-EDJ-50, P.M. 39.7/67.8, 03-910076. Sacramento, California.

Nevers, JoAnn.
1976 *Wa She Shu: A Washoe Tribal History*. Inter-tribal Council of Nevada, Reno.

Owen, K.
1991 *Historical Trails and Roads in California: A Cultural Resources Planning Study, Volume 1, Historical Context and Typology*. Manuscript on file at Caltrans, Sacramento, California.

Peak, M.
1995 A Determination of Eligibility and Effect on Cultural Resources within the Angora Creek and Washoe Meadows Wildlife Habitat Enhancement Project. Prepared by Peak & Associates, Sacramento, California.

Price, John A.
1962 Washoe Economy. *Nevada State Museum Anthropological Paper* 6, Carson City, Nevada.
1980 The Washoe Indians: History, Life Cycle, Religion, Technology, Ecology, and Modern Life. *Nevada State Museum Occasional Paper* 4, Carson City, Nevada.

Shapiro, L., R. Jackson, and T. Fernandez
2004 Cultural Resources Survey, Inventory, and Site Evaluations, Washoe Meadows State Park, El Dorado County, California. Prepared by Pacific Legacy, Cameron Park, California. NCIC report 6633.

Siskin, Edgar E.
1941 Washoe Territory. *American Anthropologist* 40:626-627.

Soil Survey Staff
2018 United States Department of Agriculture, Natural Resources Conservation Service Web Soil Survey. Electronic document, http://websoilsurvey.nrcs.usda.gov/, accessed September 2018.

Stewart, J.
1980 Geology of Nevada. *Nevada Bureau of Mines and Geology Special Publication* 4. University of Nevada, Reno, Nevada.

Supernowicz, D.
1991 California Archaeological Resource Identification and Data Acquisition Program: Historic Trails and Roads, A Contextual History, Management Plan and Procedures for Evaluating Historic Roads and Trails on the Lake Tahoe Basin Management Unit. Manuscript on file, El Dorado National Forest, Placerville, California.

Turner, Randall, Sean Dexter, and Gay Berrien
2007 USDA – Forest Service (Region 5) Primary Record for the Lake Valley Telephone Line (site 05-19-481). On file at the Forest Service Lake Tahoe Basin Management Unit office, South Lake Tahoe, California.

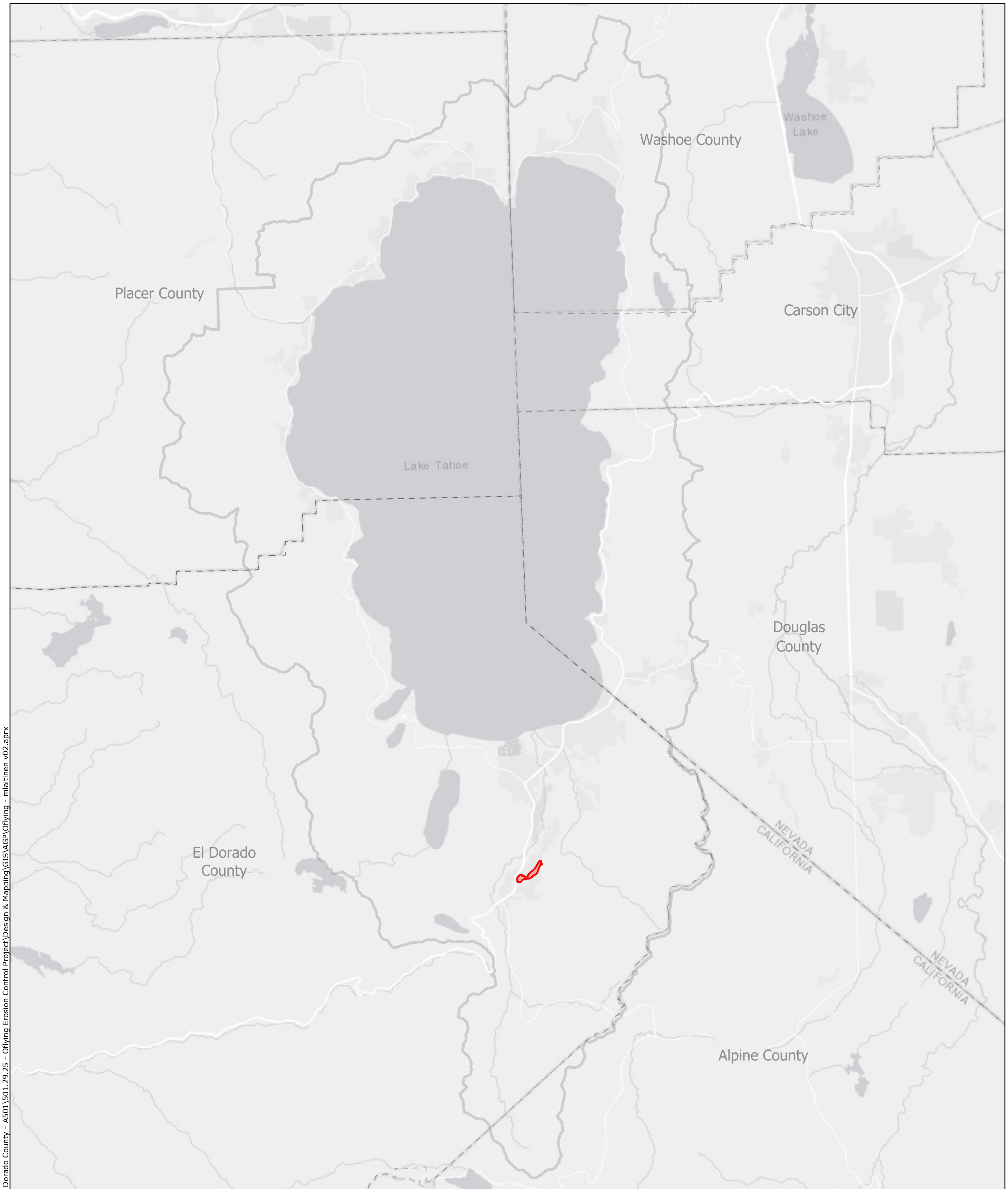
U.S. Forest Service
1999 Draft Contextual History, Evaluation Methodology, and Management Plan for Prehistoric and Historic Roads and Trails within the Lake Tahoe Basin Management Unit. Manuscript on file at the U.S. Forest Service, Lake Tahoe Basin Management Unit, South Lake Tahoe, California.

Zeier, Charles
2012 Meyers Erosion Control Project, EIP Project #191, El Dorado County, California (JN 95179). Prepared for Forest Service, Lake Tahoe Basin Management Unit (FS Report R2012051900004), South Lake Tahoe, California.

Zeier, Charles and Ronald L. Reno
2003 Cultural Resources Inventory Report: Sawmill Bicycle Path Corridor, Meyers, California. Prepared by MACTEC Inc. Carson City, Nevada.

Appendix A

Figures



Legend

- Project Boundary
- County Boundary
- Tahoe Basin

NCE

Oflyng Water Quality Project

Project Vicinity Map

N

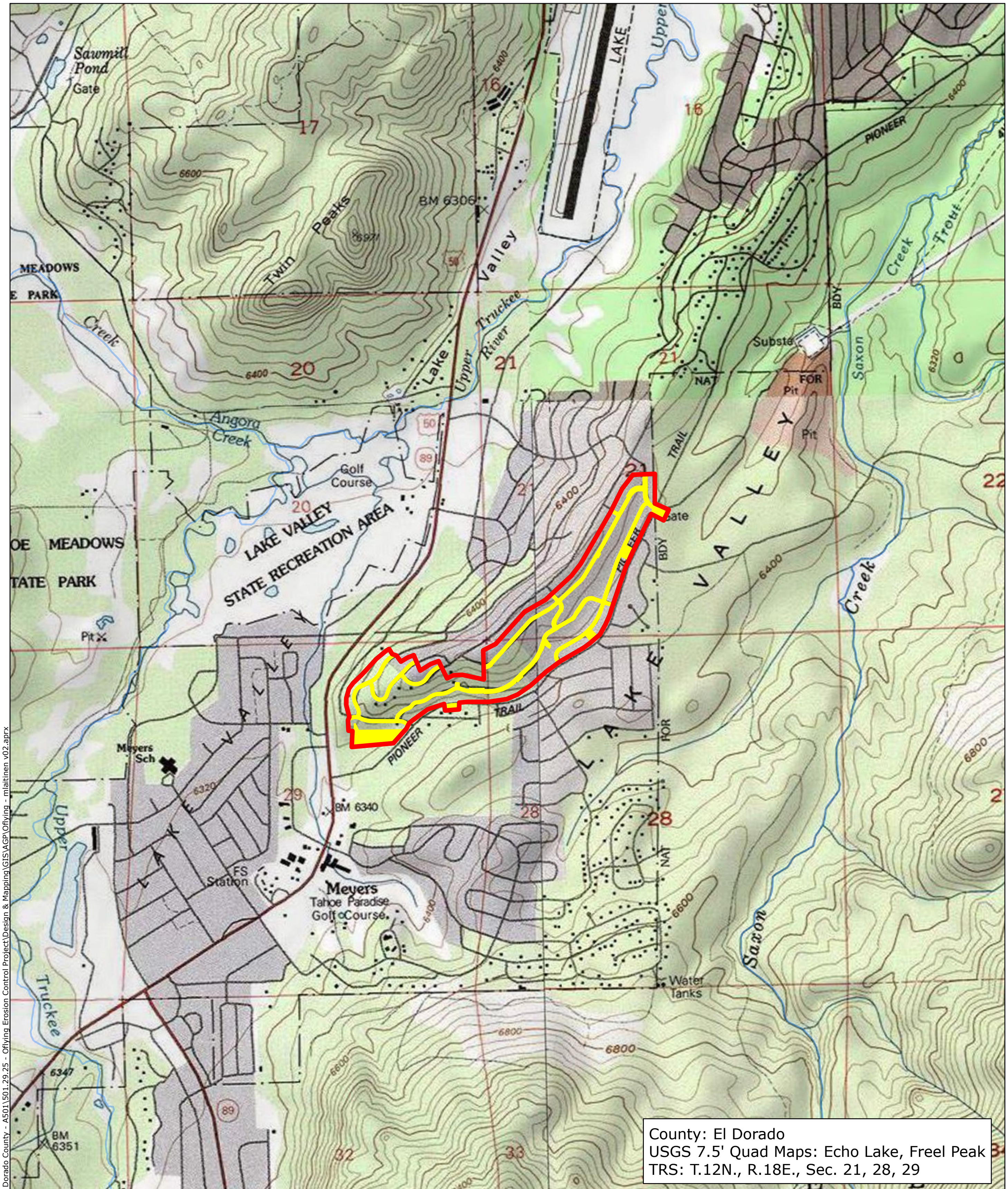
1 in. = 5 mi.

0 5 mi.

FIGURE 1

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Basemaps: ESRI, HERE, Garmin, © OpenStreetMap	501.29.25	mlaitinen	8/30/2018	9/27/2018	jhall

Document Path: P:\Active Projects\El Dorado County - A501\501.29.25 - Oflying Erosion Control Project\Design & Mapping\GIS\AGP\Oflying - mlaitinen v02.aprx



Legend

- Project Boundary
- APE

NCE

EL DORADO COUNTY CALIFORNIA

Oflyng Water Quality Project

Project Location Map

N

1:24,000

0 1,000 2,000 ft.

FIGURE

2

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Basemaps: ESRI USA Topo	501.29.25	mlaitinen	8/31/2018	9/27/2018	jhall

Document Path: P:\Active Projects\El Dorado County - A501\501.29.25 - Oflying Erosion Control Project\Design & Mapping\GIS\AGP\Oflying - mlaitinen v02.aprx

Appendix B

Photo Log

CULTURAL RESOURCES PHOTOGRAPH RECORD

Project Name: Oflyng Erosion Control Project
Project Number: 501.29.25

Date	Taken By	Frame Number	Description	View
7/26/2018	jhall	20180726_111349.jpg	Looking down Crystal Air Drive close to intersection with Elks Club Drive	SW
7/26/2018	jhall	20180726_111353.jpg	Looking down Crystal Air Drive towards intersection with Elks Club Drive	E
7/26/2018	jhall	20180726_112304.jpg	Along Crystal Air Drive facing towards Coto Street	SW
7/26/2018	jhall	20180726_112310.jpg	Along Crystal Air Drive facing towards Elks Club Drive	E
7/26/2018	jhall	20180726_112601.jpg	Crystal Air Drive at intersection with Coto Street	SW
7/26/2018	jhall	20180726_112611.jpg	Crystal Air Drive at intersection with Coto Street	NE
7/26/2018	jhall	20180726_112620.jpg	Coto Street at intersection with Crystal Air Drive looking towards Oflyng Drive	SE
7/26/2018	jhall	20180726_113231.jpg	Crystal Air Drive at western edge of project boundary looking towards Coto Street	NE
7/26/2018	jhall	20180726_114009.jpg	Approximate location of P-9-5228	NE
7/26/2018	jhall	20180726_114014.jpg	Approximate location of P-9-5228	SW
7/26/2018	jhall	20180726_115017.jpg	Looking down Tionontati Drive close to intersection with Elks Club Drive	SW
7/26/2018	jhall	20180726_115022.jpg	Looking down Tionontati Drive towards intersection with Elks Club Drive	NE
7/26/2018	jhall	20180726_115605.jpg	Tionontati Drive and Oflyng Drive intersection looking down Oflyng Drive towards Pioneer Trail	SE
7/26/2018	jhall	20180726_115608.jpg	Tionontati Drive and Oflyng Drive intersection looking down Tionontati Drive towards Pioneer Trail	SW
7/26/2018	jhall	20180726_115617.jpg	Tionontati Drive and Oflyng Drive intersection looking towards Coto Street	NW
7/26/2018	jhall	20180726_115620.jpg	Tionontati Drive and Oflyng Drive intersection looking towards Elks Club Drive	NE
7/26/2018	jhall	20180726_120123.jpg	Tionontati Drive at southern edge of project boundary looking towards Oflyng Drive	NE
7/26/2018	jhall	20180726_121248.jpg	Intersection of Oflyng Drive and Coto Street looking towards Southern Pines Drive	SW
7/26/2018	jhall	20180726_121252.jpg	Intersection of Oflyng Drive and Coto Street looking towards Crystal Air Drive	NNE
7/26/2018	jhall	20180726_121256.jpg	Intersection of Oflyng Drive and Coto Street looking towards Tionontati Drive	NE
7/26/2018	jhall	20180726_121607.jpg	Along Oflyng Drive looking towards Southern Pines Drive	W
7/26/2018	jhall	20180726_121613.jpg	Along Oflyng Drive looking towards Coto Street	E
7/26/2018	jhall	20180726_121839.jpg	Intersection of Oflyng Drive and Southern Pines Drive looking at Southern Pines Drive intersection with Pioneer Trail	SE
7/26/2018	jhall	20180726_121844.jpg	Intersection of Oflyng Drive and Southern Pines Drive looking towards Meadow Vale Drive	W
7/26/2018	jhall	20180726_121850.jpg	Intersection of Oflyng Drive and Southern Pines Drive looking towards Coto Street	NE
7/26/2018	jhall	20180726_122226.jpg	Intersection of Southern Pines Drive and Meadow Vale Drive looking towards Crystal Air Drive	N
7/26/2018	jhall	20180726_122231.jpg	Intersection of Southern Pines Drive and Meadow Vale Drive looking towards Pioneer Trail	E
7/26/2018	jhall	20180726_122424.jpg	Intersection of Meadow Vale Drive and Crystal Air Drive looking up Crystal Air Drive towards Skyline Drive	SE
7/26/2018	jhall	20180726_122517.jpg	Meadow Vale Drive at eastern edge of project boundary looking towards Crystal Air Drive	SW
7/26/2018	jhall	20180726_122938.jpg	T-intersection of Crystal Air Drive and Skyline Drive looking down Skyline Drive	SE
7/26/2018	jhall	20180726_123018.jpg	Crystal Air Drive at eastern edge of project boundary looking towards Meadow Vale Drive	SW

CULTURAL RESOURCES PHOTOGRAPH RECORD

Project Name: Oflyng Erosion Control Project
Project Number: 501.29.25

Date	Taken By	Frame Number	Description	View
7/26/2018	jhall	20180726_123438.jpg	Skyline Drive at eastern edge of project boundary looking towards Crystal Air Drive where 20180726_122938.jpg was taken	SW
7/26/2018	jhall	20180726_124757.jpg	Approximate location of P-9-3805 entering the survey area from the south (not relocated)	N


20180726_111349.jpg


20180726_111353.jpg


20180726_112304.jpg

20180726_112310.jpg

20180726_112601.jpg

20180726_112611.jpg

20180726_112620.jpg

20180726_113231.jpg

20180726_114009.jpg

20180726_114014.jpg

20180726_115017.jpg

20180726_115022.jpg

20180726_115605.jpg

20180726_115608.jpg

20180726_115617.jpg

20180726_115620.jpg

20180726_120123.jpg

20180726_121248.jpg

20180726_121252.jpg

20180726_121256.jpg

20180726_121607.jpg

20180726_121613.jpg

20180726_121839.jpg

20180726_121844.jpg


20180726_121850.jpg


20180726_122226.jpg


20180726_122231.jpg

20180726_122424.jpg

20180726_122517.jpg

20180726_122938.jpg

20180726_123018.jpg

20180726_123438.jpg

20180726_124757.jpg

Appendix C

RECORDS SEARCH RESULTS

Sensitive material redacted for public distribution

California Historical Resources Information System

NORTH CENTRAL INFORMATION CENTER

AMADOR
EL DORADO
NEVADA
PLACER
SACRAMENTO
YUBA

California State University, Sacramento
6000 J Street, Folsom Hall, Suite 2042
Sacramento, California 95819-6100
phone: (916) 278-6217
fax: (916) 278-5162
email: ncic@csus.edu

6/8/2018 NCIC File No.: ELD-18-54

Jeremy Hall
NCE
P.O. Box 1760
Zephyr Cove, NV 89448

Re: Oflyng Erosion Control Project

The North Central Information Center received your record search request for the project area referenced above, located on the Echo Lake and Freel Peak USGS 7.5' quads. The following reflects the results of the records search for the project area and a ¼-mi radius.

As indicated on the data request form, the locations of resources and reports are provided in the following format: ☒ custom GIS maps ☒ shapefiles

Resources within project area:	P-9-809 P-9-3805 P-9-5228
Resources outside project area, within radius:	P-9-1917 P-9-3398 P-9-3473 P-9-3477 P-9-3528 P-9-3532 P-9-3898
Reports within project area:	6930 7136 7216 7578 9412 9647 11679 12188 12424
Reports outside project area, within radius:	2724 7210 7217 9388 9411 9413 9426 9881 11878

<u>Resource Database Printout (list):</u> ☒ enclosed ☐ not requested ☐ nothing listed/NA

<u>Resource Database Printout (details):</u> ☒ enclosed ☐ not requested ☐ nothing listed/NA

<u>Resource Digital Database Records:</u> ☒ enclosed ☐ not requested ☐ nothing listed/NA

<u>Report Database Printout (list):</u> ☒ enclosed ☐ not requested ☐ nothing listed/NA

<u>Report Database Printout (details):</u> ☒ enclosed ☐ not requested ☐ nothing listed/NA

<u>Report Digital Database Records:</u> ☒ enclosed ☐ not requested ☐ nothing listed/NA

<u>Resource Record Copies:</u> ☒ enclosed ☐ not requested ☐ nothing listed/NA

<u>Report Copies:</u> ☒ enclosed ☐ not requested ☐ nothing listed/NA

<u>OHP Historic Properties Directory</u>:	☒ enclosed	☐ not requested	☐ nothing listed/NA
<u>Archaeological Determinations of Eligibility</u>:	☒ enclosed	☐ not requested	☐ nothing listed/NA
<u>CA Inventory of Historic Resources (1976):</u>	☒ enclosed	☐ not requested	☐ nothing listed/NA
<u>Caltrans Bridge Survey:</u>	☐ enclosed	☒ not requested	☐ nothing listed/NA
<u>Ethnographic Information:</u>	☐ enclosed	☒ not requested	☐ nothing listed/NA
<u>Historical Literature:</u>	☐ enclosed	☒ not requested	☐ nothing listed/NA
<u>Historical Maps:</u>	☐ enclosed	☒ not requested	☐ nothing listed/NA
<u>Local Inventories:</u>	☐ enclosed	☒ not requested	☐ nothing listed/NA
<u>GLO and/or Rancho Plat Maps:</u>	☐ enclosed	☒ not requested	☐ nothing listed/NA
<u>Shipwreck Inventory:</u>	☐ enclosed	☒ not requested	☐ nothing listed/NA
<u>Soil Survey Maps:</u>	☐ enclosed	☒ not requested	☐ nothing listed/NA

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

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.

Should you require any additional information for the above referenced project, reference the record search number listed above when making inquiries. Requests made after initial invoicing will result in the preparation of a separate invoice.

Sincerely,

Paul Rendes, Assistant Coordinator
North Central Information Center

Appendix D

NATIVE AMERICAN COORDINATION

Date:	June 7, 2018
To:	California Native American Heritage Commission
From:	NCE
Subject:	Request for Native American Contact List and Sacred File Search for the Oflyng Water Quality Project, El Dorado County

Ms. Cynthia Gomez, Executive Secretary
California Native American Heritage Commission
1550 Harbor Boulevard, Suite 100
West Sacramento, California 95691

Dear Ms. Gomez:

The Oflyng Water Quality Project (Project) has been initiated to address impacts from urban development in the Oflyng residential area. These impacts have resulted in a concentrated flow of storm water from the County of El Dorado (County) rights-of-way (ROW) to drainages that are connected to the Upper Truckee River and Trout Creek, both of which are tributary to Lake Tahoe. The hydrologic connectivity between Lake Tahoe and the Oflyng area results in a high to moderate potential to deliver fine sediment to Lake Tahoe. The completion of this water quality project will help reduce the delivery of fine sediment to the Upper Truckee River and Trout Creek, and in turn Lake Tahoe.

The Project site is within an existing residential development located in the community of Meyers in South Lake Tahoe, bordered by Skyline Drive to the north, Elks Club Drive to the east, Pioneer Trail to the south, and Southern Pines Drive to the west. The legal description of the project area is T.12N., R.18E., Sections 21, 28, and 29. Two maps are enclosed for your review. Figure 1 is an overview map of the project area at a 1:24,000 scale with a USGS 7.5' quadrangle background (Echo Lake and Freel Peak). Figure 2 provides more detail of the project area using an aerial basemap.

The Project is identified in TRPA's Environmental Improvement Project (EIP) list as project number 01.01.01.0074 (formerly EIP 189) and is located within the TRPA designated Priority 2 Watersheds 44 (Upper Truckee River) and 43 (Trout Creek).

The Project proposes to provide water quality improvements to the project area. Infiltration improvements are proposed within the County ROW and on publicly owned parcels throughout the project area. Storm water runoff from the Project will be directed into infiltration improvements providing a direct reduction in the transport of fine sediment to Lake Tahoe. It is also anticipated that urban stormwater infrastructure will be upgraded to current design specifications with conveyances improved to allow for proper flow sizing and routing. The effects of climate change will also be taken into consideration to ensure that flow sizing, routing, and treatment are addressed for future conditions. The Project will not change the use of the project area or surrounding area.

NCE has been retained to conduct technical studies, including a cultural resources assessment of the project area in support of the California Environmental Quality Act (CEQA). A records search using a quarter mile buffer has been submitted to the North Central Information Center (NCIC) to gather information pertaining to previous cultural resource inventories and previously recorded archaeological and architectural resources within and adjacent to the project area.

After receipt of the records search results, a field visit is planned to conduct a pedestrian survey and photo document the project area, the results of which will be drafted in a cultural resources technical report in support of the CEQA document.

We request that you provide us a contact list for the portion of El Dorado County in the vicinity of the project area. We also request that you conduct a search of your Sacred Lands database for any places of concern that may be located within or adjacent to the proposed project area.

If you have any questions, please feel free to contact me via email at jhall@ncenet.com or by telephone (775-588-2505). I appreciate your assistance and look forward to hearing from you soon.

Sincerely,

Jeremy Hall
NCE | Cultural Resource Specialist
PO Box 1760
Zephyr Cove, NV 89448
(775) 588-2505
jhall@ncenet.com

Enclosed: Figure 1 – Overview Map; Figure 2 – Detail Map

Local Government Tribal Consultation List Request

Native American Heritage Commission

1550 Harbor Blvd, Suite 100
West Sacramento, CA 95691
916-373-3710
916-373-5471 – Fax
nahc@nahc.ca.gov

Type of List Requested

☑ **CEQA Tribal Consultation List (AB 52)** – ***Per Public Resources Code § 21080.3.1, subs. (b), (d), (e) and 21080.3.2***

☑ **General Plan (SB 18)** - ***Per Government Code § 65352.3.***

Local Action Type:

✓ **General Plan** ___ **General Plan Element** ___ **General Plan Amendment**

___ **Specific Plan** ___ **Specific Plan Amendment** ___ **Pre-planning Outreach Activity**

Required Information

Project Title: Oflyng Erosion Control Project

Local Government/Lead Agency: El Dorado County

Contact Person: Jeremy Hall, Cultural Resources Specialist, NCE

Street Address: P.O. Box 1760

City: Zephyr Cove, NV **Zip:** 89448

Phone: 775-885-2305 **Fax:** 775-885-2607

Email: jhall@ncenet.com

Specific Area Subject to Proposed Action

County: El Dorado County **City/Community:** Meyers

Project Description:

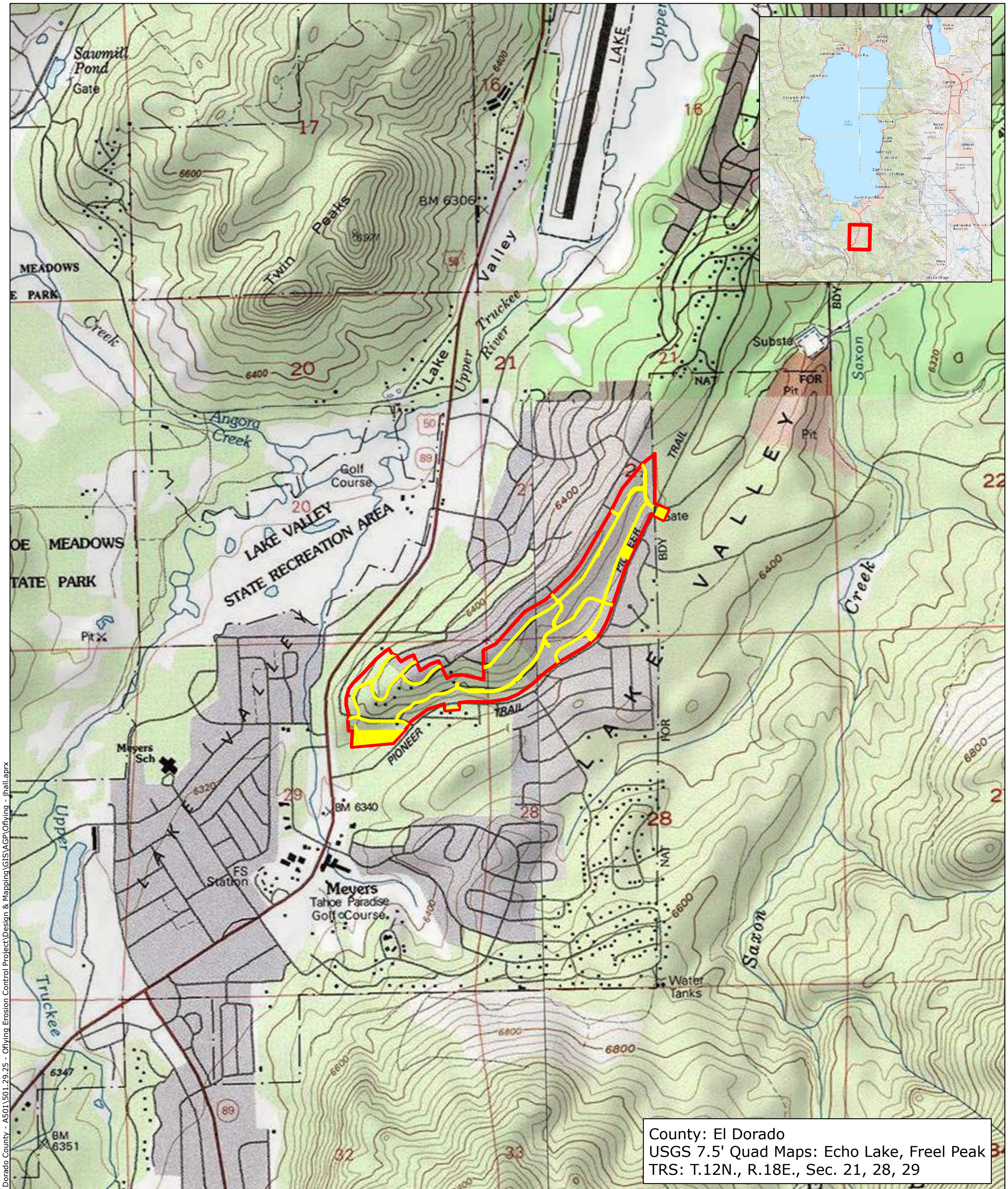
The Oflyng Water Quality Project has been initiated to address impacts from urban development in the Oflyng residential area. These impacts have resulted in a concentrated flow of storm water from the County of El Dorado (County) rights-of-way (ROW) to drainages that are connected to the Upper Truckee River and Trout Creek, both of which are tributary to Lake Tahoe. The hydrologic connectivity between Lake Tahoe and the Oflyng area results in a high to moderate potential to deliver fine sediment to Lake Tahoe. The completion of this water quality project will help reduce the delivery of fine sediment to the Upper Truckee River and Trout Creek, and in turn Lake Tahoe. The Project site is within an existing residential development located in the community of Meyers in South Lake Tahoe, bordered by Skyline Drive to the north, Elks Club Drive to the east, Pioneer Trail to the south, and Southern Pines Drive to the west. The Project is identified in TRPA's Environmental Improvement Project (EIP) list as project number 01.01.01.0074 (formerly EIP 189) and is located within the TRPA designated Priority 2 Watersheds 44 (Upper Truckee River) and 43 (Trout Creek). This Project proposes to provide water quality improvements to the project area. Infiltration improvements are proposed within the County ROW and on publicly owned parcels throughout the project area. Storm water runoff from the Project will be directed into infiltration improvements providing a direct reduction in the transport of fine sediment to Lake Tahoe. It is also anticipated that urban stormwater infrastructure will be upgraded to current design specifications with conveyances improved to allow for proper flow sizing and routing. The effects of climate change will also be taken into consideration to ensure that flow sizing, routing, and treatment are addressed for future conditions. The Project will not change the use of the site or surrounding area.

Additional Request

☑ **Sacred Lands File Search** - ***Required Information:***

USGS Quadrangle Name(s): Echo Lake, Freel Peak

Township: T.12N. **Range:** R.18E. **Section(s):** 21, 28, 29



Legend

Project Boundary

Survey Area

Oflyng Water Quality Project

Overview Map

N

1 in. = 2,000 ft.

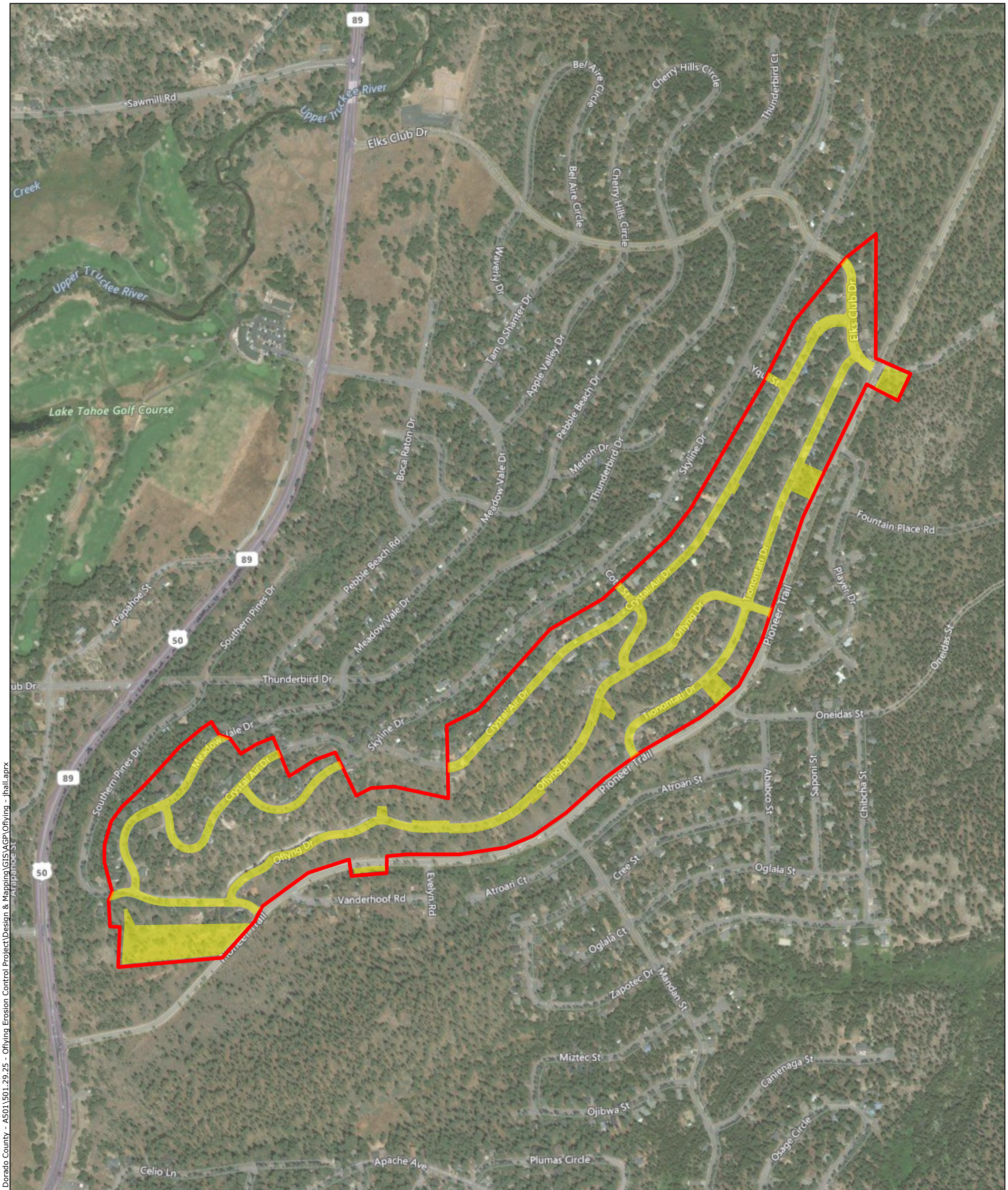
0 1,000 2,000 ft.

FIGURE

1

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Basemaps: ESRI USA Topo, USGS National Map	501.29.25	jhall	6/6/2018	-	mcasterman

Document Path: P:\Active Projects\El Dorado County - A501\501.29.25 - Oflying Erosion Control Project\Design & Mapping\GIS\AGP\Oflying - jhall.aprx



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Legend

Project Boundary

Survey Area

Oflyng Water Quality Project

Detail Map

N

1 in. = 800 ft.

0 400 800 ft.

FIGURE

2

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Hybrid Basemap	501.29.25	jhall	6/6/2018	-	mcasterman

NATIVE AMERICAN HERITAGE COMMISSION
Environmental and Cultural Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
(916) 373-3710

June 13, 2018

Jeremy Hall
NCE

Sent by Email: jhall@ncenet.com
Number of Pages: 2

RE: Oflyng Erosion Control Project, Echo Lake and Freel Peak, El Dorado County

Dear Mr. Hall:

A record search of the Native American Heritage Commission (NAHC) *Sacred Lands File* was completed for the area of potential project effect (APE) referenced above with negative results. **Please note that the absence of specific site information in the *Sacred Lands File* does not indicate the absence of Native American cultural resources in any APE.**

I suggest you contact all of those listed, if they cannot supply information, they might recommend others with specific knowledge. The list should provide a starting place to locate areas of potential adverse impact within the APE. **By contacting all those on the list, your organization will be better able to respond to claims of failure to consult**. If a response has not been received within two weeks of notification, the NAHC requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact via email: Sharaya.Souza@nahc.ca.gov.

Sincerely,

Sharaya Souza
Staff Services Analyst
(916) 573-0168

Native American Heritage Commission
Native American Consultation List
6/13/2018

Colfax-Todds Valley Consolidated Tribe
Pamela Cubbler, Treasurer
P.O. Box 4884 — Miwok
Auburn , CA 95604 — Maidu
PCubbler@colfaxrancheria.com
(530) 320-3943

Colfax-Todds Valley Consolidated Tribe
Clyde Prout, Chairman
P.O. Box 4884 — Miwok
Auburn , CA 95604 — Maidu
miwokmaidu@yahoo.com
(916) 577-3558

Ione Band of Miwok Indians
Sara Dutschke Setchwaelo, Chairperson
P.O. Box 699 — Miwok
Plymouth , CA 95669
Sara@ionemiwok.net
(209) 245-5800 Office
(209) 245-6377 Fax

Nashville Enterprise Miwok-Maidu-Nishinam Tribe
Cosme A. Valdez, Chairperson
P.O. Box 580986 — Miwok
Elk Grove , CA 95758-00
valdezcome@comcast.net
(916) 429-8047 Voice/Fax
(916) 396-1173 Cell

Shingle Springs Band of Miwok Indians
Regina Cuellar, Chairperson
P.O. Box 1340 — Miwok
Shingle Springs , CA 95682 — Maidu
rcuellar@ssband.org
(530) 387-4970
(530) 387-8067 Fax

Tsi Akim Maidu
Grayson Coney, Cultural Director
P.O. Box 510 — Maidu
Browns Valley , CA 95918
tsi-akim-maidu@att.net
(530) 274-7497

Tsi Akim Maidu
Don Ryberg, Chairperson
P.O. Box 510 — Maidu
Browns Valley , CA 95918
tsi-akim-maidu@att.net
(530) 274-7497
(530) 559-8595

United Auburn Indian Community of the Auburn Rancheria
Gene Whitehouse, Chairperson
10720 Indian Hill Road — Maidu
Auburn , CA 95603 — Miwok
(530) 883-2390 Office
(530) 883-2380 Fax

Washoe Tribe of Nevada and California
Darrel Cruz, Cult Res Dept. THPO
919 Highway 395 South — Washoe
Gardnerville , NV 89410
darrel.cruz@washoetribe.us
(775) 265-8600 x10714
(775) 546-3421 Cell

This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Code, or Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed: Oflyng Erosion Control Project, Echo Lake and Freel Peak, El Dorado County.

NATIVE AMERICAN COORDINATION LOG
DUNSMUIR HEIGHTS TO CHABOT REGIONAL TRAIL

Individual	Tribe Affiliation	Date Letter Sent	Receipt Confirmation (Y/N)	Tribal Response	Agency Response
Grayson Coney, Cultural Director	Tsi Akim Maidu	June 20, 2018	No - Letter returned to sender; NAHC notified	None	n/a
Darrell Cruz, Director	Washoe Tribe of Nevada and California	June 20, 2018	Yes	Yes	No consultation requested
Pamela Cubbler, Treasurer	Colfax-Todds Valley Consolidated Tribe	June 20, 2018	Yes	None	n/a
Regina Cuellar, Chairperson	Shingle Springs Band of Miwok Indians	June 20, 2018	Yes	None	n/a
Clyde Prout, Chairman	Colfax-Todds Valley Consolidated Tribe	June 20, 2018	Yes	None	n/a
Don Ryberg, Chairperson	Tsi Akim Maidu	June 20, 2018	No - Letter returned to sender; NAHC notified	None	n/a
Sara Dutschke Setchwaelo, Chairperson	Ione Band of Miwok Indians	June 20, 2018	Yes	None	n/a
Cosme Valdez, Chairperson	Nashville-El Dorado Miwok	June 20, 2018	Yes	None	n/a
Gene Whitehouse, Chairperson	United Auburn Indian Community of the Auburn Rancheria	June 20, 2018	Yes	Yes	No consultation requested

The following letter was sent to each individual identified above.

COMMUNITY DEVELOPMENT SERVICES
DEPARTMENT OF TRANSPORTATION
http://www.edcgov.us/Government/DOT/

PLACERVILLE OFFICES:
MAIN OFFICE:
2850 Fairlane Court, Placerville, CA 95667
(530) 621-5900 / (530) 626-0387 Fax

MAINTENANCE:
2441 Headington Road, Placerville, CA 95667
(530) 642-4909 / (530) 642-0508 Fax

LAKE TAHOE OFFICES:
ENGINEERING:
924 B Emerald Bay Road, South Lake Tahoe, CA 96150
(530) 573-7900 / (530) 541-7049 Fax

MAINTENANCE:
1121 Shakori Drive, South Lake Tahoe, CA 96150
(530) 573-3180 / (530) 577-8402 Fax

June 20, 2018

Grayson Coney
Cultural Director
Tsi Akim Maidu
P.O. Box 510
Browns Valley, CA 95918

Dear Mr. Coney:

Re: Invitation to Provide Consultation for the Oflyng Water Quality Project, El Dorado County

The Oflyng Water Quality Project (Project) has been initiated to address impacts from urban development in the Oflyng residential area. These impacts have resulted in a concentrated flow of storm water from the County of El Dorado (County) rights-of-way (ROW) to drainages that are connected to the Upper Truckee River and Trout Creek, both of which are tributary to Lake Tahoe. The hydrologic connectivity between Lake Tahoe and the Oflyng area results in a high to moderate potential to deliver fine sediment to Lake Tahoe. The completion of this water quality project will help reduce the delivery of fine sediment to the Upper Truckee River and Trout Creek, and in turn Lake Tahoe.

The Project site is within an existing residential development located in the community of Meyers in South Lake Tahoe, bordered by Skyline Drive to the north, Elks Club Drive to the east, Pioneer Trail to the south, and Southern Pines Drive to the west. The legal description of the project area is T.12N., R.18E., Sections 21, 28, and 29. Two maps are enclosed for your review. Figure 1 is an overview map of the project area at a 1:24,000 scale with a USGS 7.5′ quadrangle background (Echo Lake and Freel Peak). Figure 2 provides more detail of the project area using an aerial basemap.

The Project is identified in TRPA's Environmental Improvement Project (EIP) list as project number 01.01.01.0074 (formerly EIP 189) and is located within the TRPA designated Priority 2 Watersheds 44 (Upper Truckee River) and 43 (Trout Creek).

The Project proposes to provide water quality improvements to the project area. Infiltration improvements are proposed within the County ROW and on publicly owned parcels throughout the project area. Storm water runoff from the Project will be directed into infiltration improvements providing a direct reduction in the transport of fine sediment to Lake Tahoe. It is also anticipated that urban stormwater infrastructure will be upgraded to current design specifications with conveyances improved to allow for proper flow sizing and routing. The effects of climate change will also be taken into consideration to ensure that flow sizing, routing, and treatment are addressed for future conditions. The Project will not change the use of the project area or surrounding area.

NCE has been retained to conduct technical studies, including a cultural resources assessment of the project area in support of the California Environmental Quality Act (CEQA). A records search using a quarter mile buffer has been submitted to the North Central Information Center (NCIC) to gather information pertaining to previous cultural resource inventories and previously recorded archaeological and architectural resources within and adjacent to the project area. After receipt of the records search results, a field visit is planned to conduct a pedestrian survey and photo document the project area, the results of which will be drafted in a cultural resources technical report in support of the CEQA document.

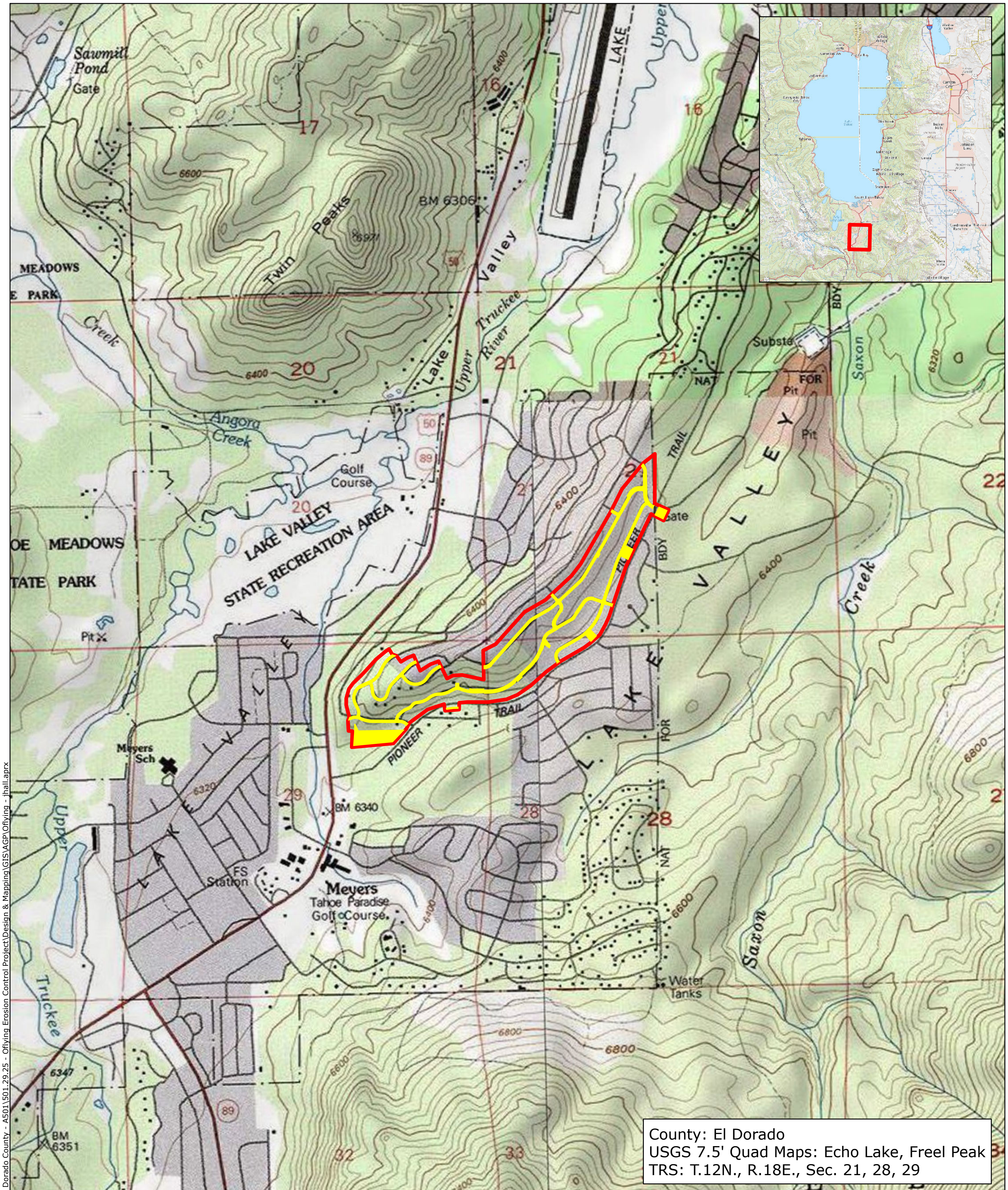
Please consider this letter and preliminary project information as the formal notification of a proposed project as required under CEQA, specifically Public Resources Code (PRC) 21080.3.1 and Chapter 532 Statutes of 2014 (i.e., AB 52). Please respond within 30 days, pursuant to PRC 21080.3.1(d) if you would like to consult on this project. Please provide a designated lead contact person if you have not provided that information to us already.

If you have any questions, please feel free to contact me via email at jhall@ncenet.com or by telephone (775-588-2505). I appreciate your assistance and look forward to hearing from you soon.

Sincerely,

Jeremy Hall
NCE | Cultural Resource Specialist
PO Box 1760
Zephyr Cove, NV 89448
(775) 588-2505
jhall@ncenet.com

Enclosed: Figure 1 – Overview Map; Figure 2 – Detail Map



Legend

- Project Boundary
- Survey Area

NCE

Oflyng Water Quality Project

Overview Map

N

1 in. = 2,000 ft.

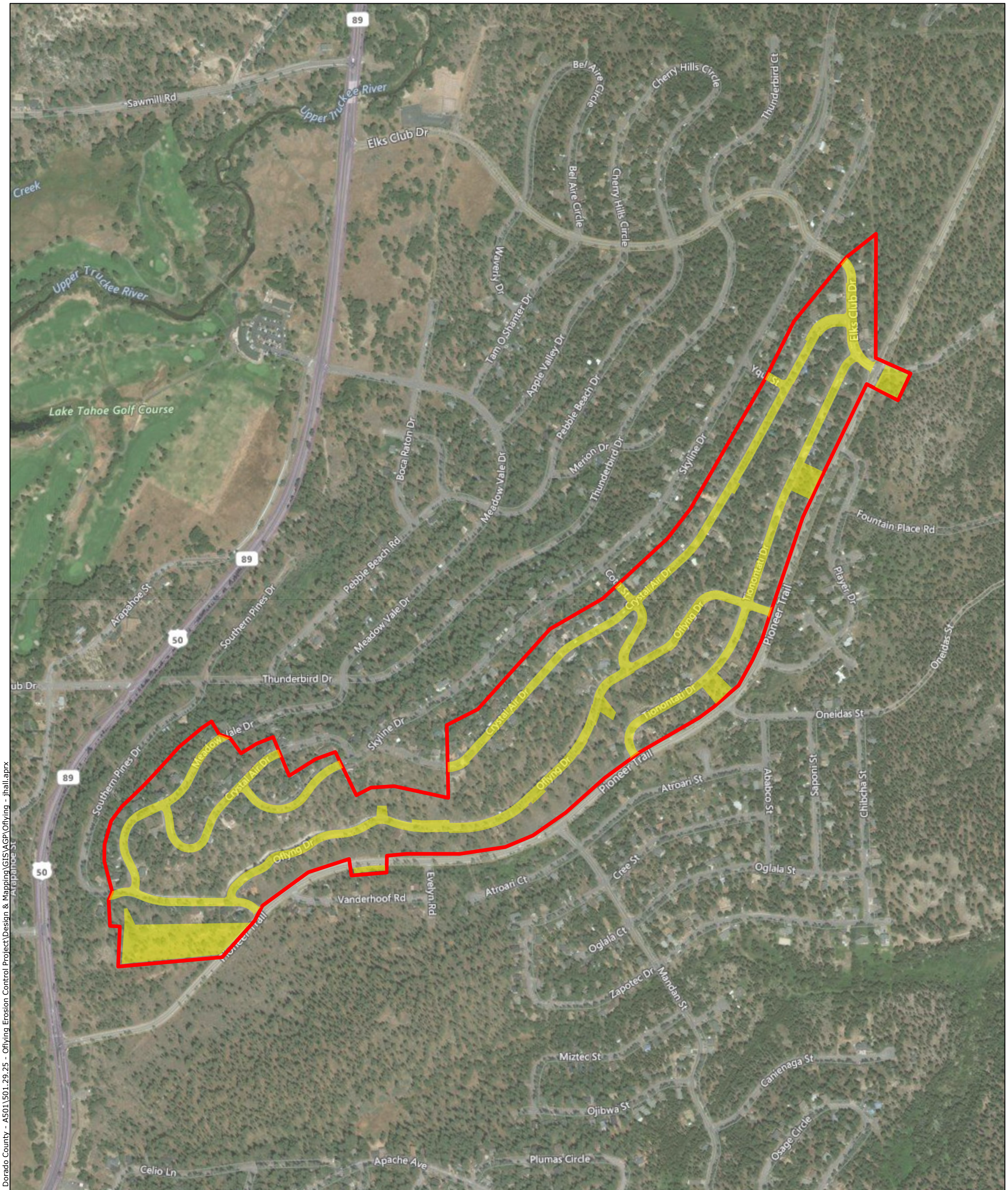
0 1,000 2,000 ft.

FIGURE

1

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Basemaps: ESRI USA Topo, USGS National Map	501.29.25	jhall	6/6/2018	-	mcasterman

Document Path: P:\Active Projects\El Dorado County - A501\501.29.25 - Oflying Erosion Control Project\Design & Mapping\GIS\AGP\Oflying - jhall.aprx



Legend

Project Boundary

Survey Area

NCE

Oflyng Water Quality Project

Detail Map

N

1 in. = 800 ft.

0 400 800 ft.

FIGURE

2

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Hybrid Basemap	501.29.25	jhall	6/6/2018	-	mcasterman

Document Path: P:\Active Projects\El Dorado County - A501\501.29.25 - Oflying Erosion Control Project\Design & Mapping\GIS\AGP\Oflying - jhall.aprx

Jeremy Hall

From:	Marcos Guerrero <mguerrero@auburnrancheria.com>
Sent:	Wednesday, July 25, 2018 8:39 AM
To:	Jeremy Hall
Cc:	Cherilyn Neider; Dave Rios
Subject:	RE: AB 52 Consultation for the Oflying Water Quality Project
Follow Up Flag:	Follow up
Flag Status:	Flagged

Hello Jeremy,
After reviewing the project. UAIC defers to the Washoe Tribe for any additional follow up or request to monitor.
Best,
Marcos

From: Jeremy Hall [mailto:JHall@ncenet.com]
Sent: Friday, July 6, 2018 8:48 AM
To: Marcos Guerrero <mguerrero@auburnrancheria.com>
Cc: Cherilyn Neider <cneider@auburnrancheria.com>; Dave Rios <DRios@ncenet.com>
Subject: RE: AB 52 Consultation for the Oflying Water Quality Project

Marcos,

Thank you for your interest in the project. I’ve uploaded the NCIC records search results and project shapefiles to NCE’s Sharefile site. You can download these items by following this link: https://nce.sharefile.com/d-scfcaa0241e24b4d8

Once you’ve had a chance to review the material, can you please provide me a cost estimate for a UAIC THRIS records search?

Thank you,

Jeremy Hall, GISP, RPA
GIS Administrator
Cultural Resources Specialist

NCE

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Collaboration. Commitment. Confidence.[SM]

From: Cherilyn Neider [mailto:cneider@auburnrancheria.com]
Sent: Monday, July 2, 2018 10:47 AM
To: Jeremy Hall; Donna Keeler

Cc: Matthew Moore; Marcos Guerrero; Melodi McAdams
Subject: AB 52 Consultation for the Oflying Water Quality Project

Dear Jeremy Hall,

Thank you for your letter received on 06/22/2018 (Oflying Water Quality). I am contacting you in order to request:

- Consultation for this project;
- All existing cultural resource assessments, as well as requests for and results of, any records searches that may have been conducted;
- GIS SHP files for the proposed project's APE.

There are Tribal Cultural Resources, which are also historic resources, within the vicinity of the project area. Please be advised that UAIC's strong preference is to preserve Tribal Cultural Resources in place and avoid them when possible. In order to protect these resources, following recommendations should be incorporated into any mitigation measures that are developed for the project:

- UAIC tribal representatives should be allowed to observe and participate in all cultural resource surveys, including initial pedestrian surveys for the project.
- If tribal cultural resources are identified within the project area, tribal monitors must be present for all ground disturbing activities.
- Subsurface testing and data recovery must not occur without first consulting with UAIC and receiving UAIC's written consent.

Additional information about the nature and location of the Tribal Cultural Resources can be obtained via a Records Search Request of the UAIC Tribal Historical Resources Information System (THRIS). If you are interested in this record search, please let us know and we will provide a copy of the program description and fee schedule.

Attached you will find mitigation measures recommended for the project.

Thank you for involving UAIC in the planning process at an early stage. We ask that you make this correspondence a part of the project record and we look forward to working with you to ensure that tribal cultural resources are protected. Marcos Guerrero, UAIC Cultural Resources Manager, will be UAIC's point of contact for this consultation. Please contact Mr. Guerrero by phone at (530) 883-2364 or email at mguerrero@auburnrancheria.com to begin the consultation process.

Sincerely,
Cherilyn

Cherilyn Neider
Administrative Assistant
Tribal Historic Preservation
United Auburn Indian Community
530.883.2394

Nothing in this e-mail is intended to constitute an electronic signature for purposes of the Electronic Signatures in Global and National Commerce Act (E-Sign Act), 15, U.S.C. §§ 7001 to 7006 or the Uniform Electronic Transactions Act of any state or the federal government unless a specific statement to the contrary is included in this e-mail.

Washoe Tribe of Nevada and California
Tribal Historic Preservation Office
Protect, Preserve and Promote Washoe Heritage and Culture

Jeremy Hall, Cultural Resource Specialist
Nichols Consulting (NCE)
PO BOX 1760
Zephyr Cove, NV. 89448

July 23, 2018

RE: Oflyng Water Quality Project

Dear Mr. Hall,

Thank you for consulting with the Tribal Historic Preservation Office of the Washoe Tribe of Nevada and California on the proposed project and providing supporting documentation.

I am not aware of cultural resources within the project area that may be affected by the proposed project. However, if an archaeological survey is conducted for the Oflyng Water Quality Project, we wish to be kept informed of the findings and continue consultation.

In the event of inadvertent discoveries as a result of project activities, we ask to be kept informed of the findings and continued consultation

Thank you and please call me if you have any questions at (775) 265-8600.

Respectfully,

Darrel Cruz, Director
Tribal Historic Preservation Office

Appendix E

DPR SITE FORMS

Sensitive material redacted for public distribution

Appendix E

WATERS OF THE U.S. DELINEATION REPORT

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Aquatic Resources Delineation Report

Oflyng Water Quality Project

August 2018

NCE

Lake Tahoe, NV

P.O. Box 1760

Zephyr Cove, NV 89448

El Dorado County CDS, Transportation Department

924 B Emerald Bay Road

South Lake Tahoe, CA 96150

Aquatic Resources Delineation Report for:

Oflyng Water Quality Project

Prepared For:
Daniel Kikkert, P.E., Senior Civil Engineer
County of El Dorado, Community Development Services, Transportation Department
924 B Emerald Bay Road, South Lake Tahoe, California 96150
(530) 573-7914
dan.kikkert@edcgov.us

Prepared by:

Debra Lemke, PWS, CPESC
Senior Scientist

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Executive Summary

NCE performed a field investigation on June 13, 2018 evaluating the potential jurisdictional status of waters of the United States for the Oflyng Water Quality Project in El Dorado County, California.

Within the survey area, no streams or intermittent drainages were mapped by the United States Geological Survey and no waters of the United States were recognized by the United States Fish and Wildlife Service National Wetlands Inventory.

NCE surveyed a total of approximately 24.74 acres. NCE delineated two unnamed drainages and that are potentially jurisdictional waters of the United States due to the presence of ordinary high water mark indicators and a connection to the Upper Truckee River, which is a tributary to Lake Tahoe, a navigable waterway.

- The unnamed drainage 1 (**Appendix A, Figure 6**) contained portions that were dry and portions that were flowing during the survey. This drainage is Cowardin classified as Upper Perennial, Riverine, and is approximately 1.04 acres in size.
- The unnamed drainage 2 – (**Appendix A, Figure 6**) was dry during the survey. This drainage is Cowardin classified as Streambed, Intermittent, Riverine, and is approximately 0.05 acres in size.

NCE delineated one unnamed isolated drainage that contained the presence of ordinary high water mark indicators for a portion of the drainage, then the drainage terminated into uplands. There was no connection to the Upper Truckee River.

- Isolated Unnamed Drainage 3– (**Appendix A, Figure 6**) was dry during the survey. This drainage contained ordinary high water mark indicators for a portion of the drainage, then the indicators terminated and the drainage terminated into uplands. This drainage is Cowardin classified as Intermittent Riverine if the drainage did not terminate and was hydrologically connected to Lake Tahoe. This drainage is approximately 0.02 acres in size.

The delineation was conducted in accordance with "A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States" published August 2008.

These findings should be considered preliminary until the United States Army Corps of Engineers makes a final approved jurisdictional determination in coordination with the United States Environmental Protection Agency.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

CALVEG	Classification and Assessment with Landsat of Visible Ecological Groupings
EIP	Environmental Improvement Project
NHD	National Hydrologic Dataset
NWI	National Wetlands Inventory
NRCS	Natural Resource Conservation Service
OHWM	Ordinary High Water Mark
RPW	Relatively Permanent Water
TNW	Traditional Navigable Waterway
TRPA	Tahoe Regional Planning Agency
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USFS	United States Forest Service
USGS	United States Geological Survey
WOUS	waters of the United States, including wetlands

1.0 INTRODUCTION

The purpose of this report is to identify and describe aquatic resources and to identify sensitive plant, fish, wildlife species, and cultural/historic resources in the project area. This report facilitates efforts to:

1. Avoid or minimize impacts to aquatic resources during the erosion control design process.

2. Document aquatic resource boundary determinations for review by the United States Army Corps of Engineers (USACE).

3. Provide early indications of known sensitive species and historic/cultural properties within the project area.

4. Provide background information.

Dan Kikkert of County of El Dorado, Community Development Services, Transportation Department, contracted NCE to conduct a formal USACE aquatic resources delineation of waters of the United States, including wetlands (WOUS) at the Oflyng Water Quality Project.

Mr. Kikkert's contact information is:

Daniel Kikkert, P.E., Senior Civil Engineer
County of El Dorado, Community Development Services, Transportation Department
924 B Emerald Bay Road, South Lake Tahoe, California 96150
(530) 573-7914
dan.kikkert@edcgov.us

The Oflyng Water Quality Project is located in the County of El Dorado, California, east of U.S. Highway 50 and northwest of Pioneer Trail. The Lake Tahoe Airport is north of the project survey area (**Appendix 1, Figure 1**).

The survey area consisted of approximately 24.74 acres of roads right-of-ways and multiple undeveloped parcels.

The survey area may be found on United States Geological Survey (USGS) Echo Lake, Freel Peak, and South Lake Tahoe 7.5-minute series topographic quadrangle maps (**Appendix 1, Figure 2**).

The area surrounding and including the survey area is characterized by predominantly urban development intermixed with fragmented Jeffrey Pine forest. The mapped Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) Alliances were found to be consistent with the project location, density, and size; however, the area was predominantly residential and does not reflect characteristics associated with these vegetation alliances in most locations in the area. The area surrounding and including the survey area is composed mainly of Jeffrey Pine and also contains isolated pockets of non-native/ornamental grass, mixed conifer, lodgepole pine, perennial grasses, and urban (**Appendix 1, Figure 3**).

2.0 BACKGROUND

The Oflyng Water Quality Project is located in the County of El Dorado, California, east of U.S. Highway 50 and northwest of Pioneer Trail. The Lake Tahoe Airport is north of the survey area (**Appendix 1, Figure 1**). The survey area is located in Sections 20, 21, 28, and 29 in Township 12 North and Range 18 East of the Mt. Diablo Meridian which may be found on the following USGS 7.5 minute quadrangle maps: Echo Lake; Freel Peak; and South Lake Tahoe in El Dorado County, California. The town of Meyers is south of the survey area and the City of South Lake Tahoe is north of the survey area.

At the northwest corner of the survey are on Meadow Vale Drive the latitude is: 38.86461 and the longitude is: -120.008607. At the intersection of Oflyng Drive and Pioneer Trail the latitude is: 38.866525 and the longitude is: -119.996844.

Driving directions from South Lake Tahoe to the survey area are as follows:

> From South Lake Tahoe, continue south on U.S. Highway 50/Lake Tahoe Boulevard to the intersection of U.S. Highway 50/State Route 89/Emerald Bay Road and Lake Tahoe Boulevard. At this intersection, turn south onto U.S. Highway 50/State Route 89/Emerald Bay Road. Travel for approximately 6.8 miles to Pioneer Trail, then turn left (east) onto Pioneer Trail. Then take the first left onto Southern Pines Drive, this is the southern access into the survey area.

This project will involve constructing water quality improvements in the survey area. Infiltration improvements are proposed within the County right-of-way and on publicly-owned parcels throughout the survey area. Storm water runoff from the project will be directed into infiltration improvements providing a direct reduction in the transport of fine sediment to Lake Tahoe. It is also anticipated that urban stormwater infrastructure will be upgraded to current design specifications with conveyances improved to allow for proper flow sizing and routing. The effects of climate change will also be taken into consideration to ensure that flow sizing, routing, and treatment are addressed for future conditions. The project is identified in Tahoe Regional Planning Agency's Environmental Improvement Project (EIP) list as project number 01.01.01.0074 (formerly EIP 189) and is located within the TRPA designated Priority 2 Watersheds 44 (Upper Truckee River) and 43 (Trout Creek).

A signed statement from the property owner allowing access is not needed because the project area is on public property.

3.0 METHODS

3.1 Literature Review

Available information pertaining to the natural resources of the region was reviewed. References reviewed for this delineation are listed in Section 6.0. Pertinent site-specific reports and general references utilized for the delineation include the following:

- United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping.
- USGS National Hydrologic Dataset (NHD) mapping.
- Google Earth.
- United States Department of the Interior, USGS. Echo Lake, Freel Peak, and South Lake Tahoe California 7.5-minute series topographic quadrangles.
- United States Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS). 2017a. Soils survey data for the project site accessed online at: http://websoilsurvey.nrcs.usda.gov/app/
- USDA, NRCS. 2017b. National and State of California hydric soils for the project study area accessed online at: http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/
- Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual*. U.S. Army Corps of Engineers Waterways Experiment Station. Vicksburg, MS.
- USACE. 2008. *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States.*
- USACE U.S. Environmental Protection Agency. 2007. *Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States and Carabell v. United States.*
- Hickman, James C. 1993. *The Jepson Manual: Higher Plants of California*. University of California Press, Berkeley, CA.
- USACE. 2017. *National Wetland Plant List, version 3.3.* Accessed online at: http://wetland_plants.usace.army.mil/
- Sawyer, John O. and Todd Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society (CNPS), Sacramento, CA.
- Cowardin, *et al*. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Fish and Wildlife Service, Washington D.C.

3.2 Research and Field Methodology

Prior to the field investigation, USGS topographic maps and NHD mapping, aerial photographs, USFWS NWI mapping, and a NRCS custom soil report of the survey area were reviewed for indications of ephemeral, intermittent, and perennial drainages as well as mapped wetlands and spring locations.

NCE visited the survey area on June 13, 2018 and conducted a formal field investigation to identify possible jurisdictional WOUS (including wetlands). NCE personnel walked all areas with potential wetlands and drainages, as well as drove all roads in the survey area and identified two unnamed drainages, and one isolated unnamed drainage within the survey area.

Roadside Ditches and Man-Made Swales
Debra Lemke surveyed the entire road system to determine if roadside ditches and/or man-made swales were constructed within jurisdictional drainages.

Unnamed Drainages
The Unnamed Drainages within the survey area was assessed for the presence of OHWM indicators, evidence of frequent surface water flows, and a connection to a navigable waterway. These characteristics were considered to be indicative of a jurisdictional WOUS. Arid West Ephemeral and Intermittent Stream OHWM Data Sheets were completed for each drainage with the presence of OHWM indicators. If the drainage had OHWM indicators present, the drainage was followed to determine if the drainage flowed into another drainage with OHWM indicators or if these indicators terminated. Where the drainage exhibited OHWM indicators, width measurements were taken to be used in determining an average width of the drainage and height measurements from the OHWM to the drainage bottom were taken. When drainages with OHWM indicators left the area, an attempt was made to follow the drainage to determine if OHWM indicators terminated or a connection to a navigable waterway. Ordinary high water mark indicator locations were recorded with a Trimble Geo7x GPS unit and representative photographs were taken.

3.3 Survey Data Integration

Boundaries of the potential WOUS within the survey area were mapped using a Trimble Geo7x GPS unit and digitized in ESRI ArcGIS Pro 2.2.0 software and by mapping features on aerial photographs as well as topographic basemap.

4.0 RESULTS

4.1 Landscape Setting

The survey area is approximately 24.74 acres. The entire survey area was field delineated by NCE. The survey area includes County of El Dorado road rights of way and undeveloped parcels. The survey area slopes from the east to the west, with the east being 6440 ft. above mean sea level, and the west being 6400 ft. above mean sea level. The lowest elevation of the survey area is located in the northwest corner at 6270 ft. above mean sea level.

The project is on the east side of State Route 89/Emerald Bay Road/U.S. Highway 50. To the west of the project area (west of State Route 89/Emerald Bay Road), is Meyers Creek and the Upper Truckee River.

There are no major water bodies, NWI mapped wetlands (**Appendix A, Figure 4**), or USGS 'blue line' drainages within the survey area (**Appendix A, Figure 2**). Outside of the survey area, to the west are two USGS 'blue line' drainages: Meyers Creek and the Upper Truckee River. There are no NWI mapped wetlands and drainages in the survey area.

USGS NHD indicated the presence of two drainage segments within the survey area; these features were identified in the field. Two unnamed drainages were identified near the USGS NHD lines (discussed below in Section 4.2).

Vegetation types were initially identified with the CALVEG GIS data (USDA 2009), and then verified based on a NCE reconnaissance botanical field survey. Vegetation types found in and/or adjacent to the survey area are typical of those found in the Lake Tahoe Basin. The survey area is composed mainly of Jeffrey Pine. The survey area also contains isolated pockets of non-native/ornamental grass, mixed conifer, lodgepole pine, basin sagebrush, perennial grasses, and urban (**Appendix 1, Figure 3**). A list of plants identified is below (**Table 1**).

Table 1. Plants identified within the Survey Area

Scientific Name	Common Name	WIS*
Pinus contorta	lodgepole pine	FAC
Pinus jeffreyi	Jeffrey pine	UPL
Abies concolor	white fir	UPL
Populus tremuloides	quaking aspen	FACU
Salix lemmonii	Lemmon's willow	FACW
Ribes nevadense	sierra currant	FAC
Amelanchier arborea	downy serviceberry	UPL
Purshia tridentata	antelope bitterbrush	UPL
Juncus spp.	unknown rush	FACW
Agrostis pallens	bentgrass	UPL
Deschampsia elongata	slender hairgrass	FACW
Lupinus breweri	brewer's lupine	UPL
Elymus glaucus	blue wild rye	FACU
Ceanothus cordulatus	snow bush	NL
Wyethia mollis	mule's ears	NL
Chamaenerion angustifolium	fireweed	FACU
Triteleia ixioides	pretty face	FAC
Castilleja tenuis	Hairy Indian paintbrush	FACU
Senecio integerrimus	Lamb-tongue ragwort	FACU
Poa bulbosa	bulbous bluegrass	FACU
Rosa woodsii	Wood's rose	FACU
Arctostaphylos patula	green leaf manzanita	NL
Calyptridium Rosea	pussy toes	FACU
Bromus tectorum	cheatgrass	NL
Melilotus albus	white sweet clover	FACU

* Wetland Indicator Status (WIS):

OBL	=	Obligate Wetland; occurs in aquatic resources > 99% of time
FACW	=	Facultative Wetland; occurs in aquatic resources 67-99% of time
FAC	=	Facultative; occurs in aquatic resources 34-66% of time
FACU	=	Facultative Upland; occurs in aquatic resources 1-33% of time
UPL	=	Obligate Upland; occurs in uplands > 99% of time
NL	=	Not Listed

Soils within the survey area have been mapped by the NRCS (NRCS 2017a) (**Appendix A, Figure 5)**. **Appendix D** contains the Custom Soils Report with the soil descriptions. A total of five types of soil are present; all five soil types are on the national hydric soils list (NRCS 2017b). The soil types are shown on **Table 2**.

Table 2. Soils within the Survey Area

Map Unit Symbol	Name	Acres in Project Area	Percent of Project Area*	National Hydric List
7441	Christopher loamy coarse sand, 0 to 9 percent slopes	2.5	10.2%	Yes
7442	Christopher loamy coarse sand, 9 to 30 percent slopes	13.9	56.4%	Yes
7461	Jabu coarse sandy loam, 0 to 9 percent slopes	1.6	6.5%	Yes
7462	Jabu coarse sandy loam, 9 to 30 percent slopes	4.8	19.4%	Yes
7491	Oneidas coarse sandy loam, 0 to 5 percent slopes	1.9	7.5%	Yes
Totals for Project Area		**24.7**	**100.0%**	

4.2 Aquatic Resources

4.2.1 Roadside Ditches and Man-Made Swales

No roadside ditches or man-made swales were identified within the survey area. The survey area contained asphalt curb and gutters.

4.2.2 Unnamed Drainages

Unnamed Drainage 1

One unnamed drainage was identified in the southwest corner of the survey area. Within the survey area, this unnamed drainage starts at a culvert under Pioneer Trail just south of the intersection with Southern Pines Drive. This culvert is corrugated metal pipe about 36 inches across and the bottom of the culvert contains a few inches of sediment. Data Points OHWM 1, 1a, 1b, 1c were collected for the unnamed drainage. Upstream of these data points, data point (OHWM 3) was collected. All of these data points contained OHWM indicators.

The drainage was dry at data points 1, 1a, 1b, 1c and the drainage was flowing upstream at data point OHWM 3.

There is a NHD mapped drainage near this drainage, and this drainage is most likely that NHD drainage.

The drainage was not walked to determine if the drainage is hydrologically connected to the Upper Truckee River, however, a culvert was identified under State Route 89/Emerald Bay Road/U.S. Highway 50. Per Google Earth imagery, this culvert appears to connect the unnamed drainage to the west side of the highway, and this drainage eventually discharges into the Upper Truckee River. NCE believes that Unnamed Drainage 1 is federally jurisdictional.

Representative photographs are provided in **Appendix B**. The collected data points are shown on **Appendix A, Figure 6**, and photo-point locations and directions are shown on **Appendix A, Figure 7**.

The Arid West OHWM datasheets are provided in **Appendix C**.

Unnamed Drainage 2

One unnamed dry drainage was identified in the southwest corner of the survey area, just north of Unnamed Drainage 1. Within the survey area, this unnamed drainage starts at a culvert under Southern Pines Drive just west of the intersection with Meadow Vale Drive. The flow path at the bottom of the culvert was lined with concrete for about 40 feet, and then the drainage bottom is a mix of sediment, decomposed granite, and pebbles. This drainage traveled outside of the survey area and converged with Unnamed Drainage 1 near State Route 89/Emerald Bay Road/U.S. Highway 50. The drainage then traveled under the highway through a culvert. Per Google Earth imagery, this culvert appears to connect the unnamed drainage to the west side of the highway, and this drainage eventually discharges into the Upper Truckee River. NCE believes that Unnamed Drainage 2 is federally jurisdictional.

Data Point OHWM 2 was collected for this drainage; this data point contained OHWM indicators.

There is a NHD mapped drainage near this drainage, and this drainage is most likely that NHD drainage.

Representative photographs are provided in **Appendix B**. The collected data point is shown on **Appendix A, Figure 6**, and photo-point locations and directions are shown on **Appendix A, Figure 7**.

The Arid West OHWM datasheet is provided in **Appendix C**.

Isolated Unnamed Drainage 3

An unnamed drainage was identified in the northeastern corner of the survey area. Within the survey area, this unnamed drainage starts at a culvert under Pioneer Trail just south of the intersection with Elks Club Drive. This culvert is corrugated metal pipe about 24 inches across and the bottom of the culvert contains a few inches of sediment. Data Point ISO 3 was collected for this drainage; this data point contained OHWM indicators. However, further downstream, the drainage lost OHWM indicators and terminated into the uplands. Since this drainage loses its OHWM indicators, terminates into the uplands, and does not connect to a navigable waterway, NCE believes that Isolated Unnamed Drainage 3 is isolated and not federally jurisdictional.

There are no NHD mapped drainages in this area.

Representative photographs are provided in **Appendix B**. The collected data points are shown on **Appendix A, Figure 6**, and photo-point locations and compass directions are shown on **Appendix A, Figure 7**.

The Arid West OHWM datasheet is provided in **Appendix C**.

The following information is presented in the tables below: data collected at the drainages as well as the drainage data summary (**Table 3**), drainages ground photograph summary (**Table 4**), and acreage per waters type and summarizes the total acreage of waters in the survey area (**Table 5**).

Table 3. Drainages Data Summary

Location	Data Sheet Point	OHWM Indicators Present	Length of Drainage with OHWM Indicators[1] (feet)	Width of OHWM at Data Point (inches)	Height of OHWM from bottom of channel (inches)	Acre-age	Jurisdictional / Connection to a TNW
Unnamed Drainage 1[2]	OHWM1	Yes		16	3		
Unnamed Drainage 1[2]	OHWM1a	Yes		93	4		
Unnamed Drainage 1[2]	OHWM1b	Yes	1,101	28	2	1.04	Yes to Meyers Creek, then the Upper Truckee River
Unnamed Drainage 1[2]	OHWM1c	Yes		44	2		
Unnamed Drainage 1[2]	OHWM3	Yes		26	2		
Unnamed Drainage 2[3]	OHWM2	Yes	110	18	6	0.046	Yes to Meyers Creek, then the Upper Truckee River
Isolated Unnamed Drainage 3[4]	ISO 3	Yes, until termination of drainage into uplands	61	16	4	0.02	No, isolated

[1] This is the length of the drainage within the survey area.
[2] Used 41 inches as the average width to determine acres.
[3] Used 18 inches as the average width to determine acres.
[4] Used 16 inches as the average width to determine acres.

Table 4. Drainages Ground Photograph Summary

Location	Data Sheet Point	Photo-graph Number	Coordinates (Latitude and Longitude)	Photo Direction / Description
Unnamed Drainage 1	OHWM 1	1	120.0081640W 38.8614397N	Looking upstream at culvert; see Appendix B
Unnamed Drainage 1	OHWM 1a	2	120.0086527W 38.8613608N	Looking upstream; see Appendix B
Unnamed Drainage 1	OHWM 1c	3	120.0110777W 38.8609272N	Looking downstream; see Appendix B
Unnamed Drainage 1	OHWM 3	4	120.0052384W 38.8623171N	Looking upstream; see Appendix B
Unnamed Drainage 1	OHWM 3	5		Looking downstream; see Appendix B
Unnamed Drainage 2	OHWM 2	6	120.0106039W 38.8615412N	Looking downstream at culvert; see Appendix B
Unnamed Drainage 2	OHWM 2	7		Looking upstream; see Appendix B
Unnamed Drainage 2	OHWM 2	8		Looking downstream; see Appendix B
Isolated Unnamed Drainage 3	ISO 3	9	119.9943743W 38.8700633N	Looking upstream at culvert; see Appendix B
Isolated Unnamed Drainage 3	ISO 3	10		Looking downstream; see Appendix B
Isolated Unnamed Drainage 3	ISO 3	11		Looking downstream towards drainage termination; see Appendix B
Isolated Unnamed Drainage 3	ISO 3	12		Looking at termination; see Appendix B

Table 5. Proposed Jurisdictional Waters of the U.S

Waters Type	Total Acres	Proposed Jurisdictional	Proposed Non-Jurisdictional
Tributary consisting of both a relatively permanent waters and non-relatively permanent waters – Unnamed Drainage 1	1.04	1.04	0.00
Non-relatively permanent waters that flow directly or indirectly into a traditional navigable waterways - Unnamed Drainage 2	0.05	0.05	0.00
Isolated waters - Isolated Unnamed Drainage 3	0.02	0.00	0.02
TOTAL	**1.11**	**1.09**	**0.02**

Appendix A, Figure 8, Jurisdictional Determination Analysis depicts the NHD data with respect to the survey area and the downstream Upper Truckee River.

4.3 Significant Nexus

The U.S Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook (USACE 2007) was consulted to aid the preliminary determination whether an area would be subject to USACE jurisdiction under Section 404 of the Clean Water Act. The significant nexus test, outlined in a memorandum jointly authored by the U.S. Environmental Protection Agency and USACE, was applied to each potentially jurisdictional habitat type (Grumbles and Woodley 2008). To facilitate jurisdictional determination consistent with the guidance, each water body delineated was evaluated as a Traditional Navigable Waterway (TNW), Relatively Permanent Water (RPW), or non-RPW, based on the following definitions:

- TNWs include all waters subject to the ebb and flow the tide, or waters that are presently used, have been used in the past, or may be used in the future to transport interstate or foreign commerce, and all waters that are navigable in fact under federal law for any purpose.
- RPWs are waters that flow continuously at least seasonally (typically at least 3 months of the year) and are not TNWs.
- Non-RPWs are waters that do not have continuous flow at least seasonally.

The following types of water bodies are subject to Clean Water Act jurisdiction:

- All TNWs and adjacent wetlands;
- Relatively permanent tributaries of TNWs and wetlands with a continuous surface connection to such tributaries; and
- Non-relatively permanent tributaries of TNWs and adjacent wetlands if they have a significant nexus to a TNW. Non-RPWs and adjacent wetlands are determined to have a significant nexus to a TNW if they significantly affect the chemical, physical, or biological integrity of a downstream TNW.

NCE's professional opinion is that the Unnamed Drainage 1 is a tributary consisting of both a relatively permanent and non-relatively permanent tributary of the Upper Truckee River which is a tributary to Lake Tahoe, a navigable waterway. NCE also believes that Unnamed Drainage 2 is a non-relatively permanent tributary of the Upper Truckee River which is a tributary to Lake Tahoe, a navigable waterway. The Unnamed Drainages have the ability to affect the chemical, physical, and/or biological integrity of Lake Tahoe, resulting in a significant nexus to Lake Tahoe.

NCE's professional opinion is that the Isolated Unnamed Drainage 3 loses its OHWM indicators, terminates into uplands, and does not hydrologically connect to the Upper Truckee River. Isolated Unnamed Drainage 3 does not have the ability to affect the chemical, physical, and/or biological integrity of Lake Tahoe since it terminates into uplands.

Appendix E contains a digital copy of the Aquatic Resource Excel Sheet, the GIS metadata, and a compact disc of Final Aquatic Resources Delineation Report.

The above findings should be considered preliminary until the USACE makes a final approved jurisdictional determination in coordination with the United States Environmental Protection Agency. Areas deemed jurisdictional will then be subject to the regulatory requirements of the federal Clean Water Act.

5.0 OTHER STUDIES

On June 13, 2018, NCE conducted an initial baseline assessment for botanical resources that satisfies the U.S. Fish and Wildlife Service, TRPA, California Department of Fish and Wildlife, and the California Native Plant Society requirements to determine potential project effects on botanical special status species. This report is still being prepared, and will be available upon request.

NCE is also completing the biological, invasive plant risk assessment and cultural resources report.

6.0 REFERENCES

Cowardin, et al. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Fish and Wildlife Service, Washington D.C.

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual.* U.S. Army Corps of Engineers Waterways Experiment Station. Vicksburg, MS.

Grumbles, B. H., and J. P. Woodley, Jr. 2008 (December 2). *Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in* Rapanos v. United States *and* Carabell v. United States. Memorandum to U.S. Environmental Protection Agency regions and U.S. Army Corps of Engineers districts. Washington, DC.

Holland, R.F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California.* Unpublished report. California Department of Fish and Game: Sacramento, CA.

United States Army Corps of Engineers. 2007. *Jurisdictional Determination Form Instructional Guidebook*, Washington, DC.

United States Army Corps of Engineers, U.S. Environmental Protection Agency. 2007. Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States and Carabell v. United States.

United States Department of Agriculture. 2009. *Existing Vegetation Data (CALVEG) by Tiles (EvegTile17B_05_24k_v1) in Albers for Lake Tahoe Basin Management Unit* USDA Forest Service Remote Sensing Lab, Ecosystem Planning, http://www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/?cid=stelprdb5347192

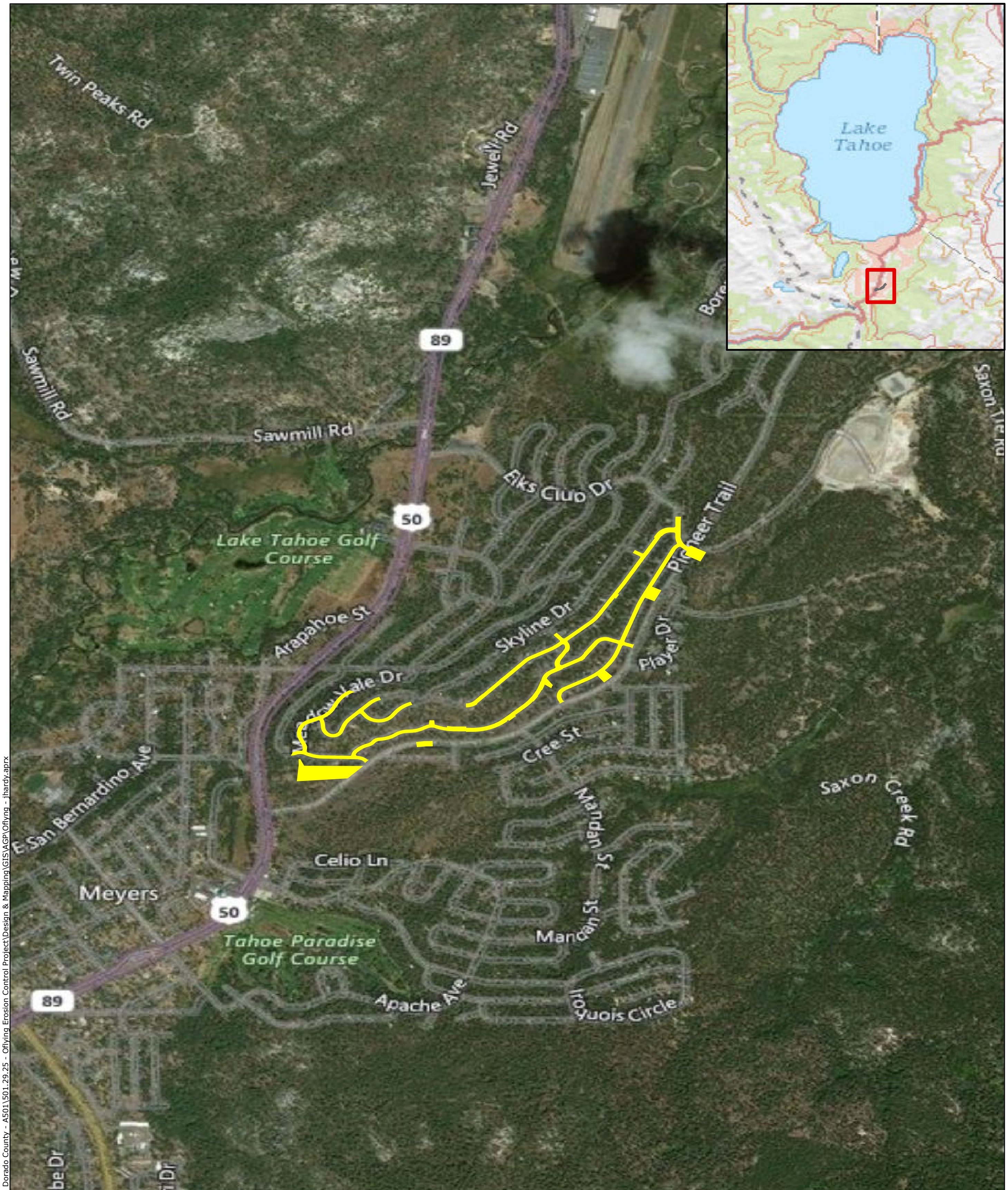
United States Department of Agriculture, NRCS. 2017a. Soils survey data for the project sarea. http://websoilsurvey.nrcs.usda.gov/app/

United States Department of Agriculture. NRCS. 2017b. National and State of California hydric soils for the project area. http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/

United States Geological Survey. Echo Lake, Freel Peak, and South Lake Tahoe 7.5-minute series topographic quadrangles. U.S. Department of the Interior.

Appendix A

SUPPORTING MAPS



Legend

Survey Area

Oflyng Water Quality Project

Site and Vicinity Map

N

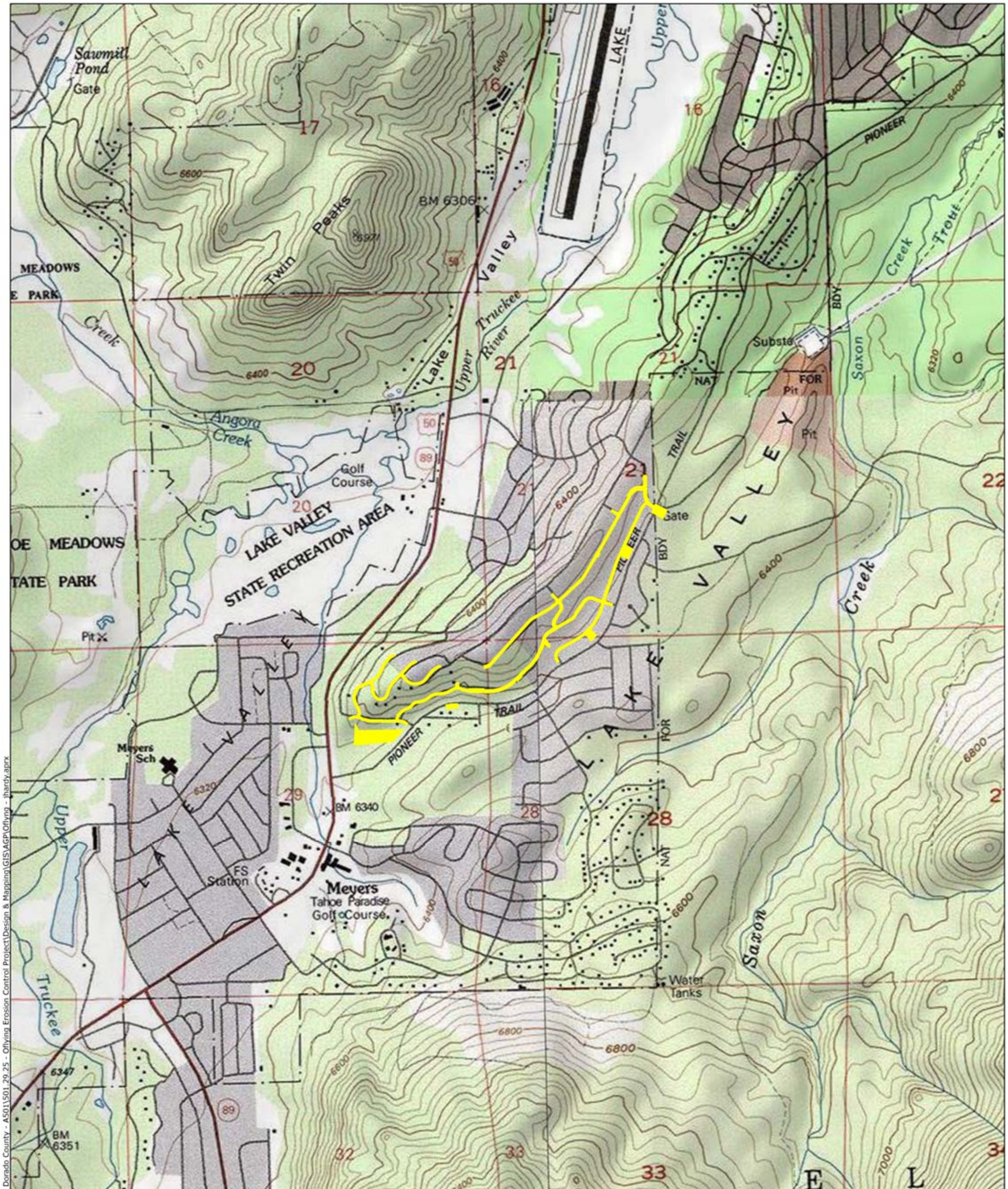
1 in. = 2,000 ft.

0 1,000 2,000 Feet

FIGURE 1

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Hybrid Basemap, ESRI USGS Topo Basemap, NCE 2018	501.29.25	jhardy	7/26/2018	-	-

Document Path: P:\Active Projects\El Dorado County - A501\501.29.25 - Oflying Erosion Control Project\Design & Mapping\GIS\AGP\Oflyng - jhardy.aprx



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Legend

Survey Area (24.74 acres)

NCE

Oflyng Water Quality Project

Survey Area with USGS Quadrangle Basemap

N

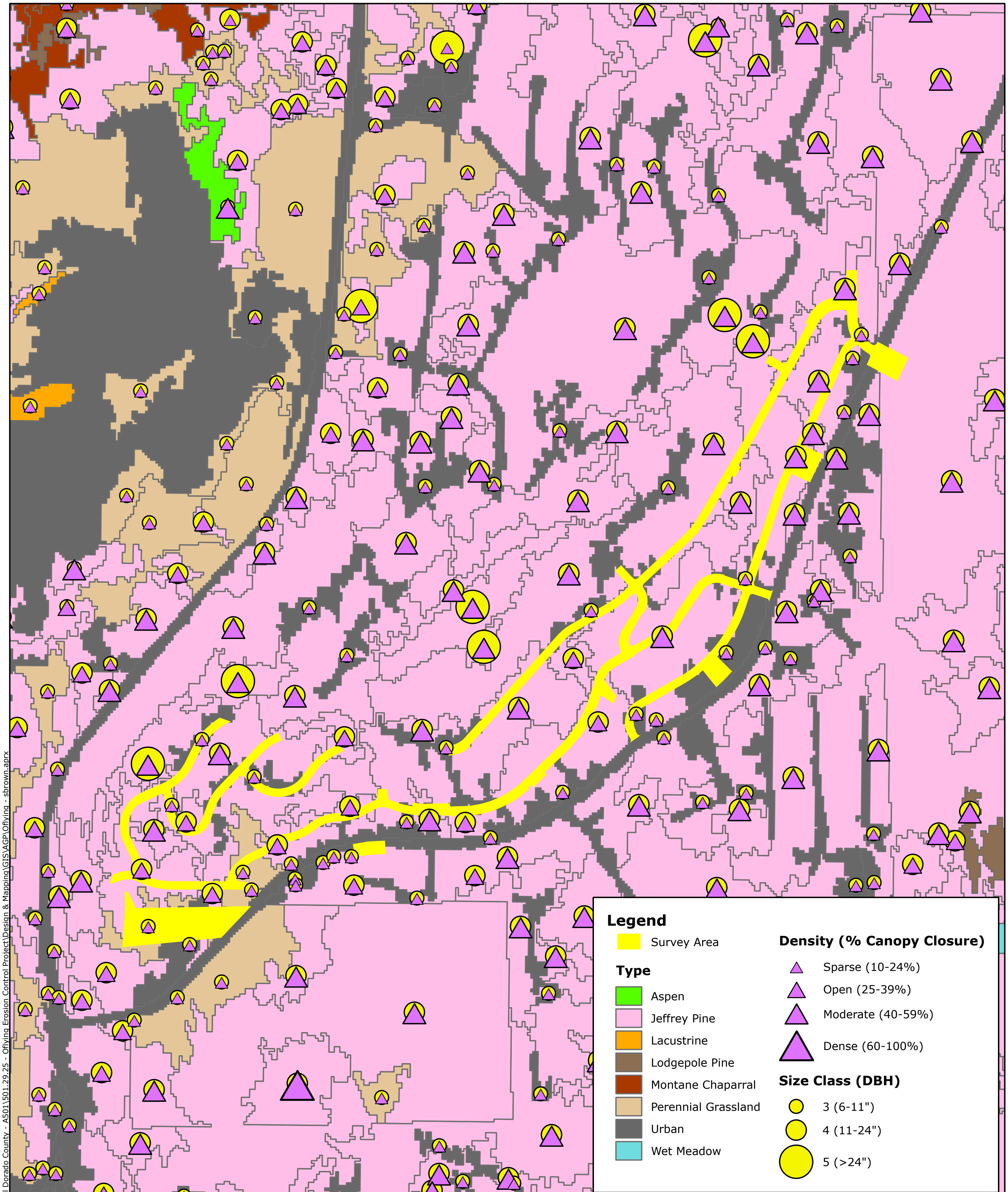
1 in. = 2,000 ft.

0 1,000 2,000 ft.

FIGURE

2

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
ESRI USA Topo, USGS National Map, NCE 2018	501.29.25	jhardy	7/26/2018	-	-



NCE

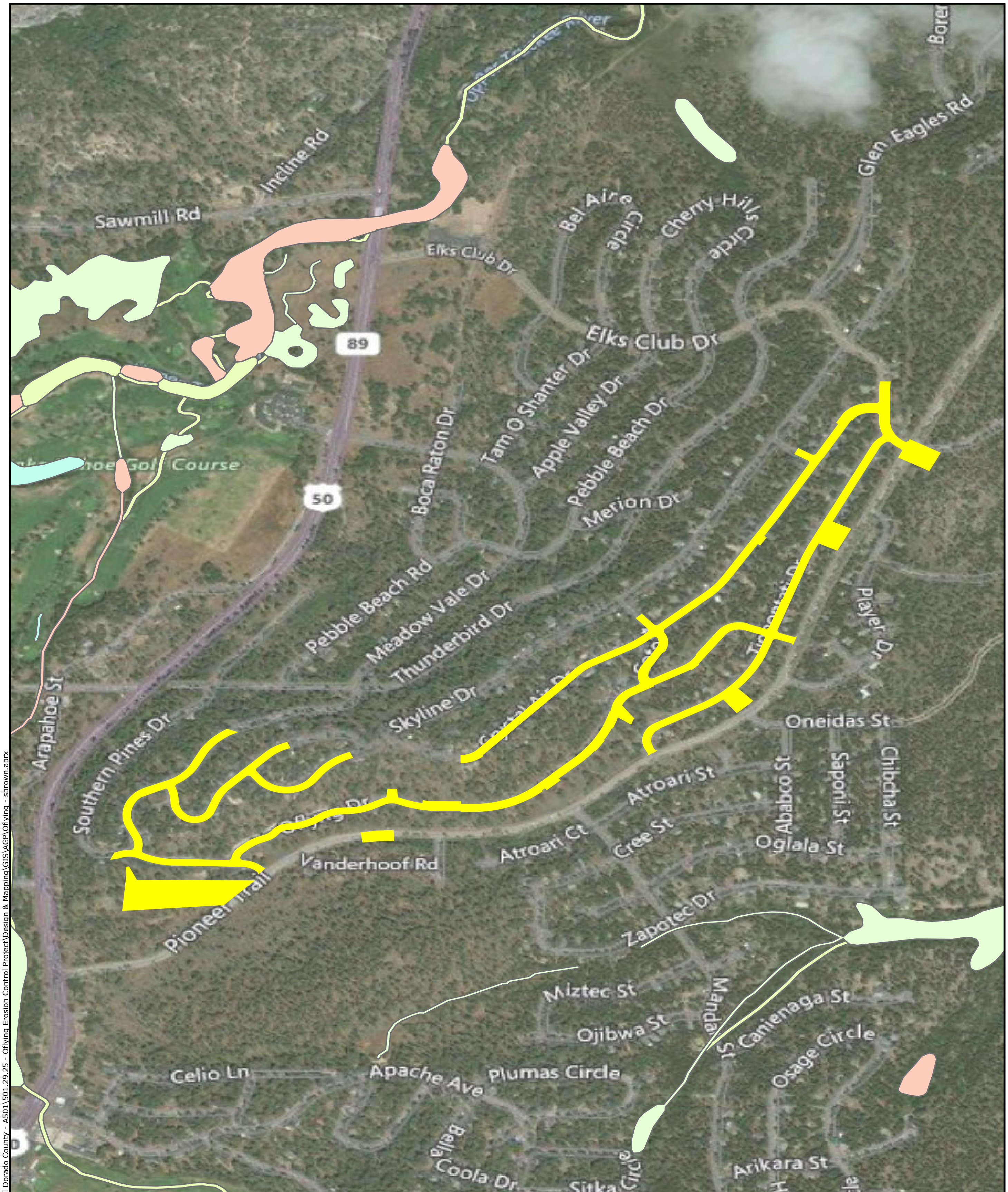
Oflyng Water Quality Project

CWHR Type, Size, and Density
(Vegetation Communities)

N
1 in. = 800 ft.
0 400 800 Feet

FIGURE
3

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
USDA 2009, NCE 2018	501.29.25	sbrown	8/16/18	-	-



Legend

- Survey Area
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

NCE

Oflyng Water Quality Project

National Wetlands Inventory

N

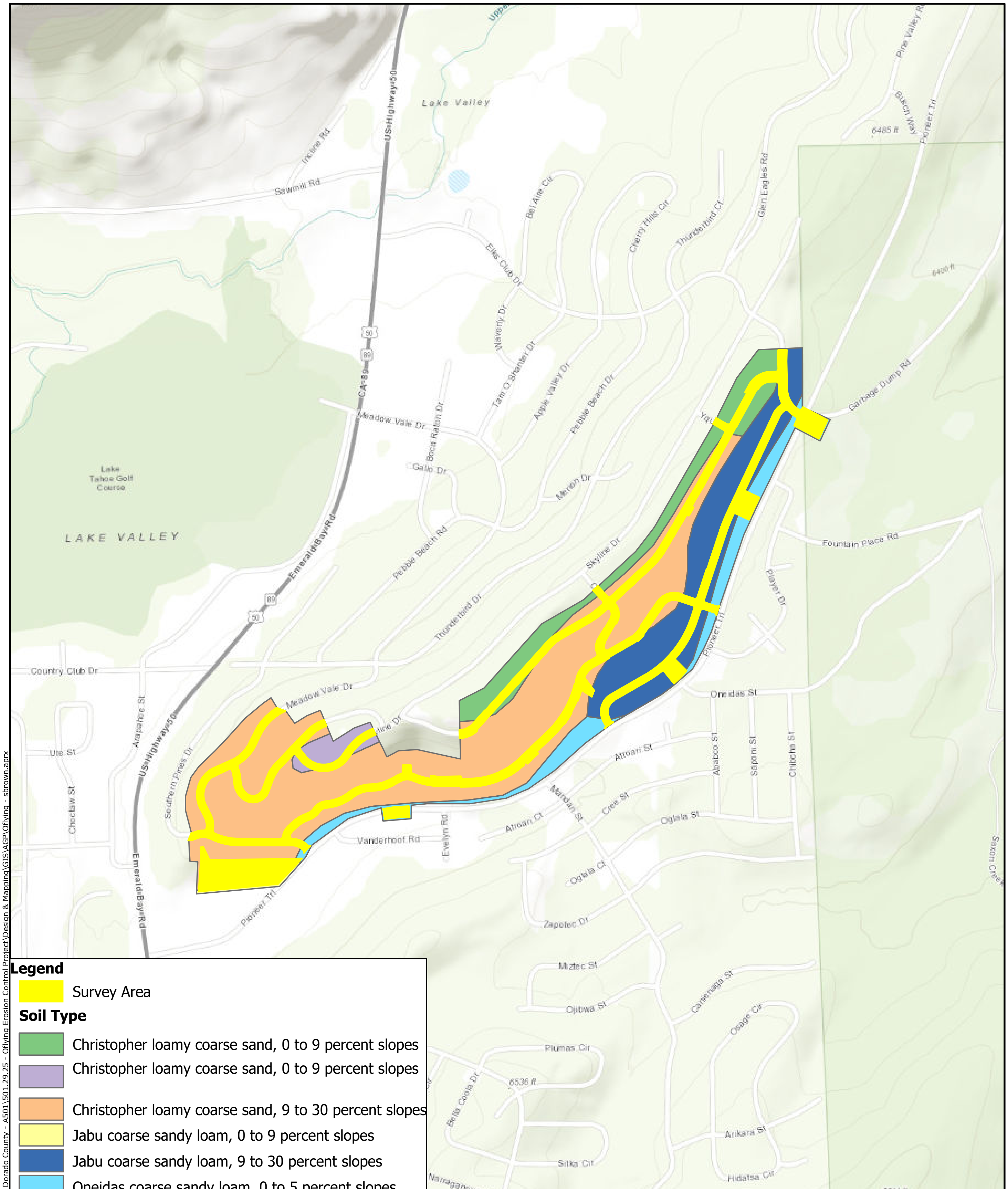
1 in. = 1,000 ft.

0 100 200 ft.

FIGURE 4

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Maps Hybrid Basemap, NWI May 2018, NCE 2018	501.29.25	jhardy	7/11/2018	-	-

Document Path: P:\Active Projects\El Dorado County - A501\501.29.25 - Oflying Erosion Control Project\Design & Mapping\GIS\AGP\Oflying - sbrown.aprx



NCE

Oflyng Water Quality Project

Soils in Survey Area

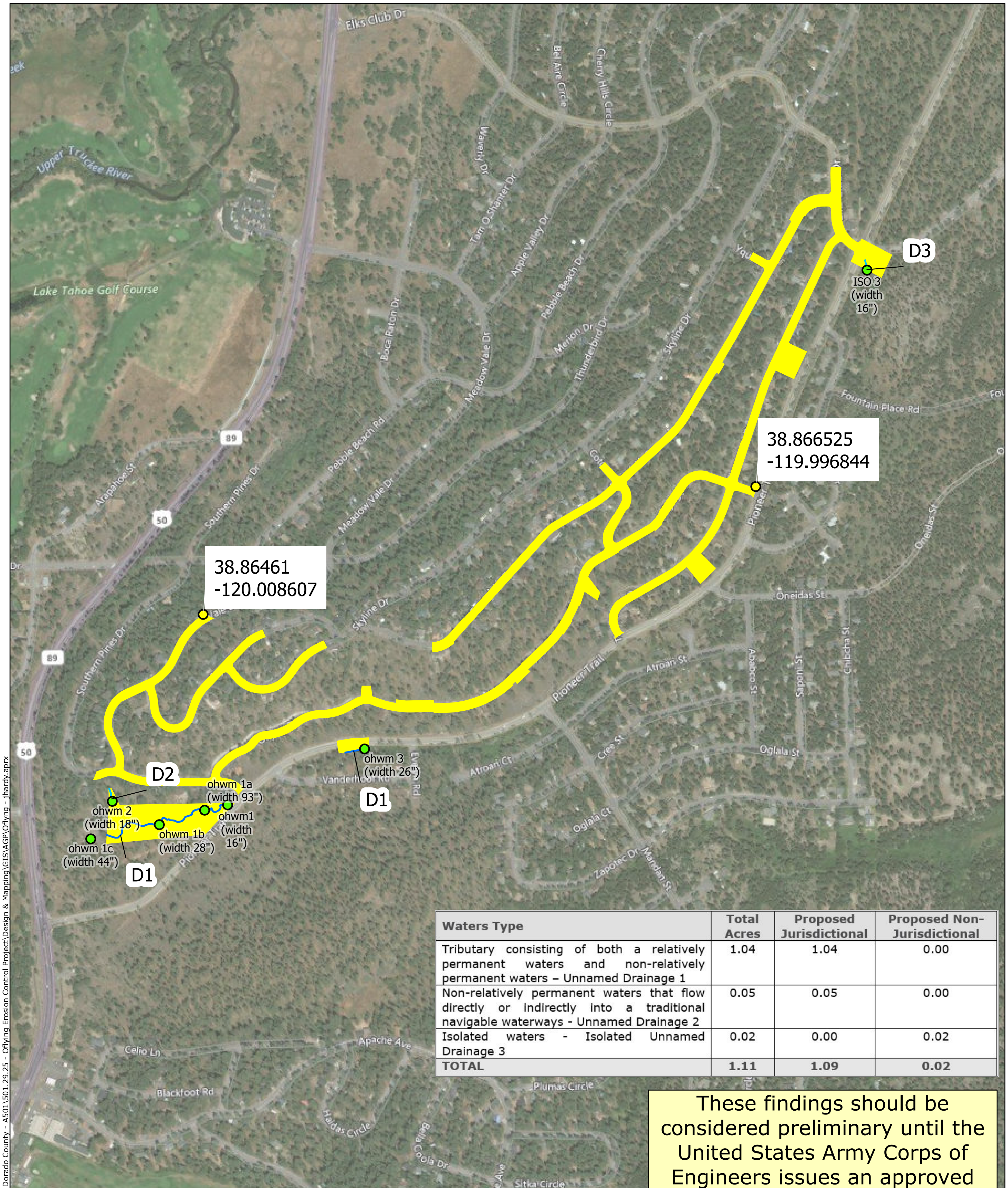
N

1 in. = 1,000 ft.

0 100 200 ft.

FIGURE 5

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
ESRI World Topographic Map, NRCS Soil Survey, NCE 2018	501.29.25	jhardy	7/11/2018	-	-



Waters Type	Total Acres	Proposed Jurisdictional	Proposed Non-Jurisdictional
Tributary consisting of both a relatively permanent waters and non-relatively permanent waters – Unnamed Drainage 1	1.04	1.04	0.00
Non-relatively permanent waters that flow directly or indirectly into a traditional navigable waterways - Unnamed Drainage 2	0.05	0.05	0.00
Isolated waters - Isolated Unnamed Drainage 3	0.02	0.00	0.02
TOTAL	**1.11**	**1.09**	**0.02**

These findings should be considered preliminary until the United States Army Corps of Engineers issues an approved

Legend

- Survey Area
- Map Reference Point

WOUS

- Intermittent Drainage
- Perennial Drainage
- OHWM Data Points

NCE

EL DORADO COUNTY CALIFORNIA

Oflyng Water Quality Project

Proposed Delineation Map

N

1 in. = 800 ft.

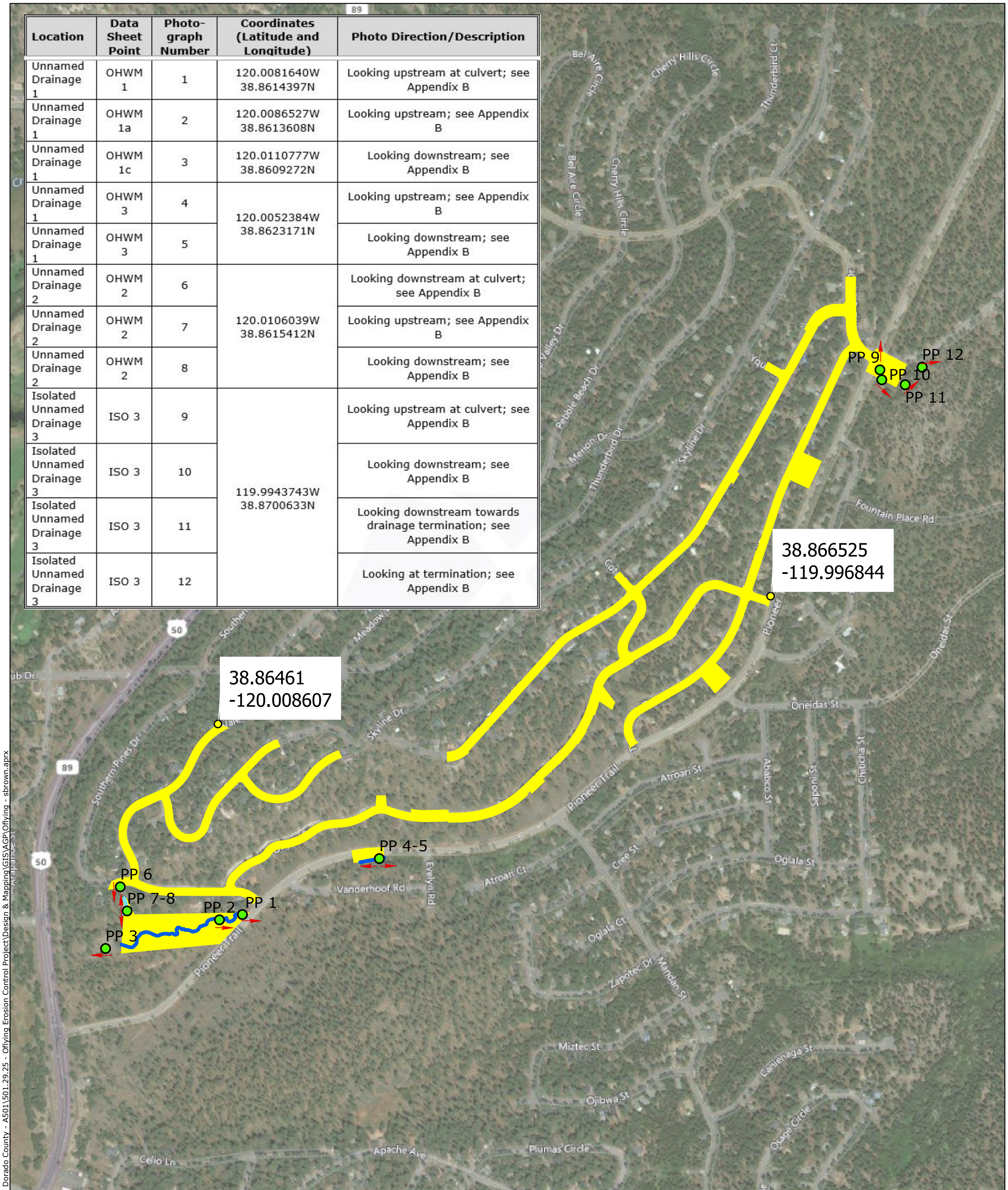
0 400 800 ft.

FIGURE 6

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Maps Hybrid Basemap, NCE 2018	501.29.25	jhardy	7/26/2018	-	-

Document Path: P:\Active Projects\El Dorado County - A501\501.29.25 - Oflyng Erosion Control Project\Design & Mapping\GIS\AGP\Oflyng - jhardy.aprx

Location	Data Sheet Point	Photo-graph Number	Coordinates (Latitude and Longitude)	Photo Direction/Description
Unnamed Drainage 1	OHWM 1	1	120.0081640W 38.8614397N	Looking upstream at culvert; see Appendix B
Unnamed Drainage 1	OHWM 1a	2	120.0086527W 38.8613608N	Looking upstream; see Appendix B
Unnamed Drainage 1	OHWM 1c	3	120.0110777W 38.8609272N	Looking downstream; see Appendix B
Unnamed Drainage 1	OHWM 3	4	120.0052384W 38.8623171N	Looking upstream; see Appendix B
Unnamed Drainage 1	OHWM 3	5		Looking downstream; see Appendix B
Unnamed Drainage 2	OHWM 2	6	120.0106039W 38.8615412N	Looking downstream at culvert; see Appendix B
Unnamed Drainage 2	OHWM 2	7		Looking upstream; see Appendix B
Unnamed Drainage 2	OHWM 2	8		Looking downstream; see Appendix B
Isolated Unnamed Drainage 3	ISO 3	9	119.9943743W 38.8700633N	Looking upstream at culvert; see Appendix B
Isolated Unnamed Drainage 3	ISO 3	10		Looking downstream; see Appendix B
Isolated Unnamed Drainage 3	ISO 3	11		Looking downstream towards drainage termination; see Appendix B
Isolated Unnamed Drainage 3	ISO 3	12		Looking at termination; see Appendix B



Legend

- Survey Area
- Map Reference Point

WOUS

- Intermittent Drainage
- Perennial Drainage
- Photo Point (PP)

NCE

Oflyng Water Quality Project

Ground Level Photograph Locations and Directions

N

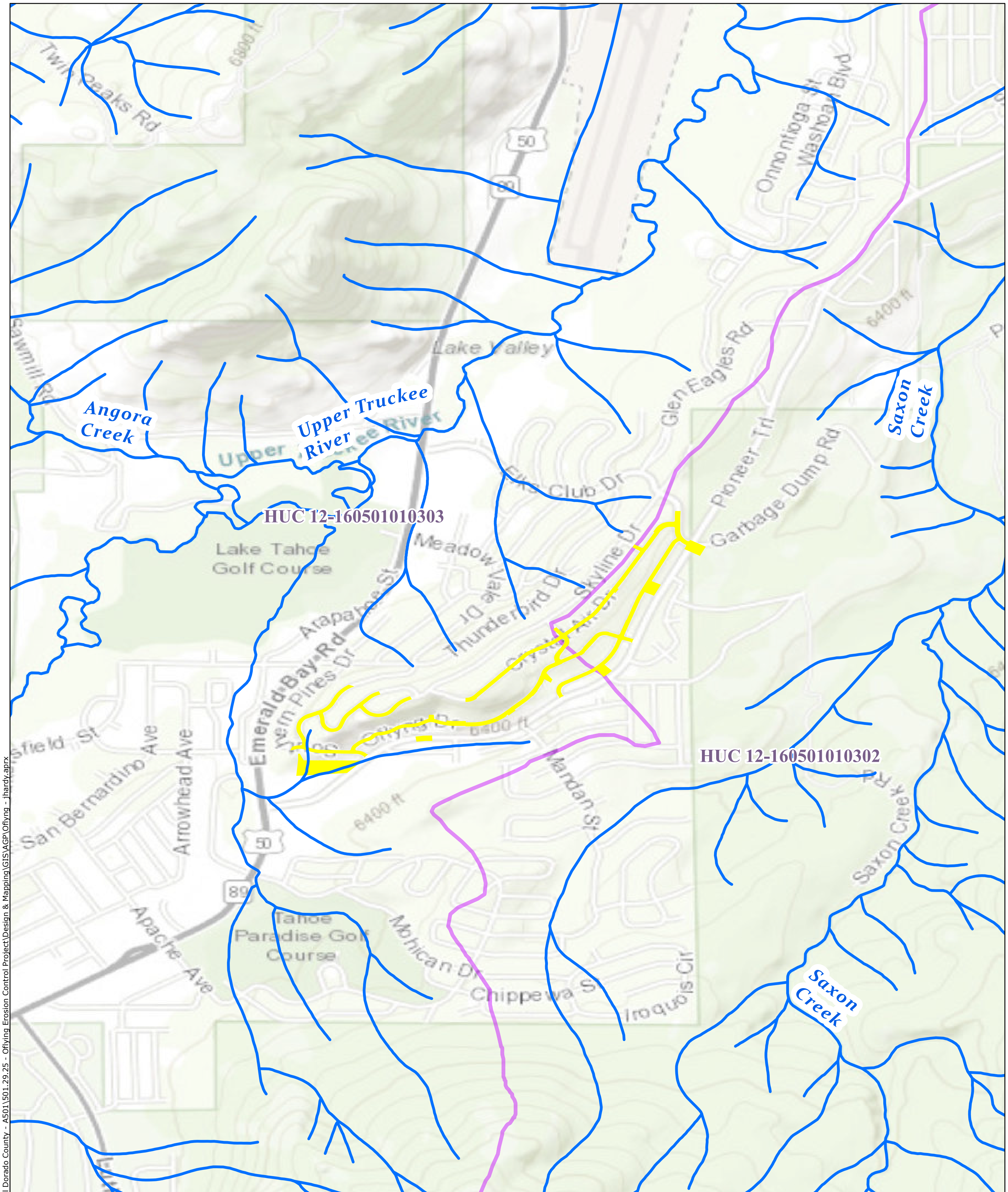
1 in. = 800 ft.

0 400 800 ft.

FIGURE 7

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Maps Hybrid Basemap, NCE 2018	501.29.25	jhardy	7/26/2018	-	-

Document Path: P:\Active Projects\El Dorado County - A501\501.29.25 - Oflying Erosion Control Project\Design & Mapping\GIS\AGP\Oflying - sbrown.aprx



Legend

- Survey Area
- National Hydrography Dataset
- National Watershed Boundary Dataset

NCE

EL DORADO COUNTY CALIFORNIA

Oflyng Water Quality Project

Jurisdictional Determination Analysis

N

1 in. = 2,000 ft.

0 1,000 2,000 ft.

FIGURE 8

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
ESRI World Topo Map, NHD 2012, WBD 2018, NCE 2018	501.29.25	jhardy	7/26/2018	-	drios

Document Path: P:\Active Projects\El Dorado County - A501\501.29.25 - Oflying Erosion Control Project\Design & Mapping\GIS\AGP\Oflyng - jhardy.aprx

Appendix B

REPRESENTATIVE PHOTOGRAPHS

Photo 1: Unnamed Drainage 1, Data Point OHWM 1, looking upstream at culvert.

Photo 2: Unnamed Drainage 1, Data Point OHWM 1a, looking upstream.

Photo 3: Unnamed Drainage 1, Data Point OHWM 1c, looking downstream.

Photo 4: Unnamed Drainage 1, Data Point OHWM 3, looking upstream.

Photo 5: Unnamed Drainage 1, Data Point OHWM 3, looking downstream.

Photo 6: Unnamed Drainage 2, Data Point OHWM 2, looking downstream at culvert.

Photo 7: Unnamed Drainage 2, Data Point OHWM 2, looking upstream.

Photo 8: Unnamed Drainage 2, Data Point OHWM 2, looking downstream.

Photo 9: Isolated Unnamed Drainage 3, upstream of Data Point ISO 3, looking upstream at culvert.

Photo 10: Isolated Unnamed Drainage 3, Data Point ISO 3, looking downstream.

Photo 11: Isolated Unnamed Drainage 3, downstream of Data Point ISO 3, looking downstream towards drainage termination.

Photo 12: Isolated Unnamed Drainage 3, downstream of Data Point ISO 3, looking downstream at drainage termination.

Appendix C

OHWM DATA SHEETS

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: OFlying Erosion Control project
Project Number:
Stream: Unnamed Drainage 1
Investigator(s): Debra Lemke

Date: 6-13-18 **Time:** 8:50
Town: South Lake Tahoe **State:** CA
Photo begin file#: 1 **Photo end file#:** 6

Y ☒ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☒ Is the site significantly disturbed?

Location Details:

Projection: **Datum:** WGS 1984
Coordinates: 120.0081640W, 38.8614397N

Potential anthropogenic influences on the channel system:
Pioneer Trail, housing developments.

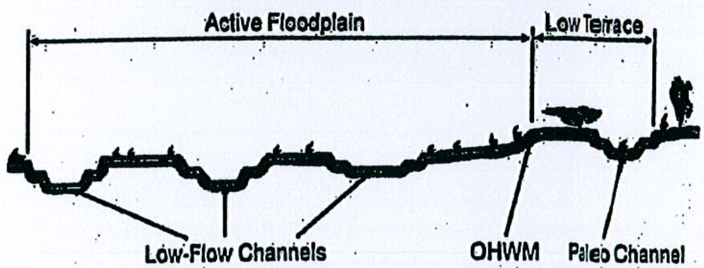
Brief site description:
Culvert under Pioneer Trail.

Checklist of resources (if available):

- ☒ Aerial photography
  Dates:
- ☐ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☐ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☐ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☐ GPS
   - ☐ Other:

Unnamed Drainage 1

Project ID: **Cross section ID:** OHWM 1 A,B,C **Date:** 6-13-18 **Time:** 8:50

Cross section drawing:

culvert = 30" tall
36" Across

OHWM 1 width 16"
Height 3"

Drainage is a sandy bottom w/ a low flow channel.

OHWM

GPS point: Culvert 1 data point
OHWM 1 data point

OHWM 1A = 93" wide
4" height

1B = 28" wide
2" height

1C = 44" wide
2" height

Indicators:

- ☒ Change in average sediment texture
- ☒ Change in vegetation species
- ☐ Change in vegetation cover
- ☒ Break in bank slope
- ☐ Other: ______
- ☐ Other: ______

Comments:

OHWM 1 photo 1 upstream. looking at culvert
2 looking downstream

OHWM 1A
photo 3 upstream
4 downst.

Floodplain unit: ☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

OHWM 1C photo 5 up
6 down

GPS point: OHWM 1

Characteristics of the floodplain unit:

Average sediment texture: ______
Total veg cover: ___% Tree: ___% Shrub: ___% Herb: ___%
Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: ______
- ☐ Other: ______
- ☐ Other: ______

Comments:

OHWM 1 drainage is incised, it eventually ~~[illegible]~~ follows the [illegible] along Rt 50, then into a ditch that parallels Rt 50.
To the [illegible] of OHWM 1 is a [illegible] drainage w/ checkdams that eventually discharges into a man-made sediment basin.

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: OFlying Erosion Control Project **Project Number:** **Stream:** Unnamed Drainage 1 **Investigator(s):** D. Lemke OHWM3	**Date:** 6-13-18 **Time:** 12:55 **Town:** South Lake **State:** CA **Photo begin file#:** 7 **Photo end file#:** 8
Y ☒ / N ☐ Do normal circumstances exist on the site?	**Location Details:**
Y ☐ / N ☒ Is the site significantly disturbed?	**Projection:** **Datum:** DWGS 84 **Coordinates:** 120.0052514°W 38.8623222°N

Potential anthropogenic influences on the channel system:
Pioneer Trail Road Adjacent to drainage, + nearby housing developments.

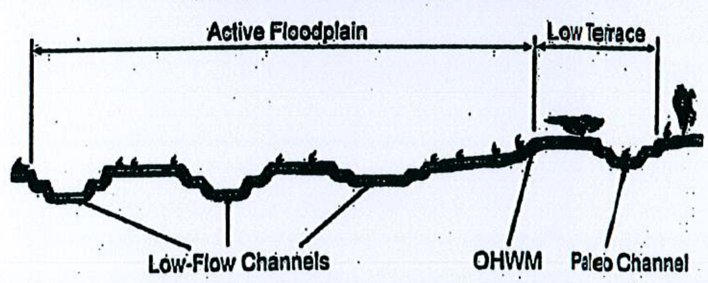
Brief site description:
drainage, flowing, mature trees

Checklist of resources (if available):

- ☒ Aerial photography
  Dates:
- ☐ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☐ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☐ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☐ GPS
   - ☐ Other:

Unnamed Drainage 1

Project ID: **Cross section ID:** OHWM3 **Date:** 6-13-18 **Time:** 12:55

Cross section drawing:

OHWM

GPS point: OHWM3

26' wide
2" deep

Indicators:

- ☐ Change in average sediment texture
- ☒ Change in vegetation species
- ☐ Change in vegetation cover
- ☒ Break in bank slope
- ☐ Other: ______
- ☐ Other: ______

Comments:

Aspen

photos-
7 - looking upstream
8 " downstream

Floodplain unit: ☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: OHWM3

Characteristics of the floodplain unit:

Average sediment texture: ______

Total veg cover: ____% Tree: ____% Shrub: ____% Herb: ____%

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: ______
- ☐ Other: ______
- ☐ Other: ______

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Offlying Erosion Control Project **Project Number:** **Stream:** Unnamed Drainage 2 **Investigator(s):**	**Date:** 6-13-18 **Time:** 10:30 **Town:** South Lake Tahoe **State:** CA **Photo begin file#:** 9 **Photo end file#:** ~~10~~ 11
Y ☒ / N ☐ Do normal circumstances exist on the site? Y ☐ / N ☒ Is the site significantly disturbed?	**Location Details:** **Projection:** **Datum:** WGS 84 **Coordinates:** 120.010680°W, 38.86154640°N

Potential anthropogenic influences on the channel system:
At the intersection of Meadow Vale Dr. + Southern Pines Dr. on the south side of Southern Pines is a culvert

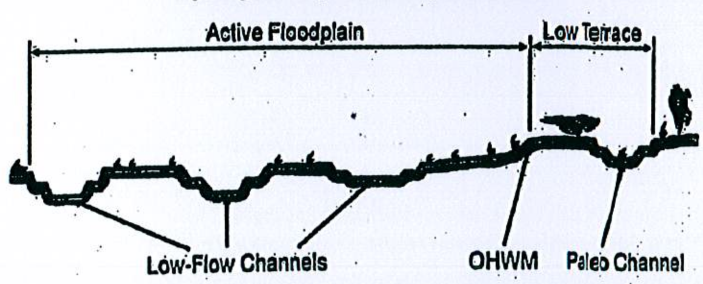
Brief site description:
drainage has a concrete lined bottom for about 40 feet, then sediment, decomposed granite + pebble lined channel

Checklist of resources (if available):

- ☒ Aerial photography
  Dates:
- ☐ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☐ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☐ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☐ GPS
   - ☐ Other:

Unnamed Drainage 2

Project ID: **Cross section ID:** OHWm2 **Date:** 6-13-18 **Time:** 10:30

Cross section drawing:

Culvert 2 data point. Culvert is 17" across
~~photo looking downstream - south~~

Sediment flows
to culvert

OHWM

GPS point: OHWm2

photo 9 looking ~~upstream~~ at culvert
10 " upstream
11 " downstream

Indicators:

- [x] Change in average sediment texture
- [x] Change in vegetation species
- [ ] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: ______
- [ ] Other: ______

Comments:

dry Drainage until pt 50, then parallels 50 & converges w/ OHWm1 drainage.

OHWm2 = 18" wide
6" deep/height

Floodplain unit: [x] Low-Flow Channel [ ] Active Floodplain [ ] Low Terrace

GPS point: ______

Characteristics of the floodplain unit:

Average sediment texture: ______

Total veg cover: ___% Tree: ___% Shrub: ___% Herb: ___%

Community successional stage:

- [ ] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [ ] Drift and/or debris
- [ ] Presence of bed and bank
- [ ] Benches
- [ ] Soil development
- [ ] Surface relief
- [ ] Other: ______
- [ ] Other: ______
- [ ] Other: ______

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Oflying Erosion Control Project
Project Number:
Stream: Isolated Unnamed Drainage 3
Investigator(s): Debra Lemke

Date: 6-13-18 **Time:** 1:30
Town: South Lake Tahoe **State:** CA
Photo begin file#: 12 **Photo end file#:** 15

Y ☒ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☒ Is the site significantly disturbed?

Location Details:

Projection: 119.9943743W **Datum:** D WGS 1984
Coordinates: 38.8700633N

Potential anthropogenic influences on the channel system:
Culvert under Pioneer Trail road. Channel appears man-made for there's no upstream features of the culvert.

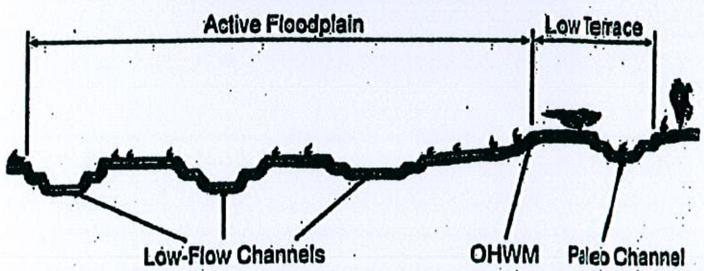
Brief site description:
Channel ends into uplands. No hydrologic connection to a jurisdictional waters. This is a Wo. State of CA.

Checklist of resources (if available):

- ☒ Aerial photography
  Dates:
- ☐ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☐ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☐ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☐ GPS
   - ☐ Other:

Project ID: **Cross section ID:** Iso 3 **Date:** 6-13-18 **Time:** 1:30

Cross section drawing:

mature pine forest

culvert 4 = CMP - 24" across. photo of culvert - place

OHWM

GPS point: Iso 3

Indicators:

- [ ] Change in average sediment texture
- [x] Change in vegetation species
- [ ] Change in vegetation cover
- [x] Break in bank slope
- [ ] Other: ______
- [ ] Other: ______

Comments:

Annual grass present

photo - upstream
" " downstream

16" wide; 4" deep

Floodplain unit: [x] Low-Flow Channel [ ] Active Floodplain [ ] Low Terrace

GPS point: culvert 4 channel

Characteristics of the floodplain unit:

Average sediment texture: ______

Total veg cover: ____% Tree: ____% Shrub: ____% Herb: ____%

Community successional stage:

- [ ] NA
- [ ] Early (herbaceous & seedlings)
- [ ] Mid (herbaceous, shrubs, saplings)
- [ ] Late (herbaceous, shrubs, mature trees)

Indicators:

- [ ] Mudcracks
- [ ] Ripples
- [ ] Drift and/or debris
- [ ] Presence of bed and bank
- [ ] Benches
- [ ] Soil development
- [ ] Surface relief
- [ ] Other: ______
- [ ] Other: ______
- [ ] Other: ______

Comments:

photo upstream w/ ? ... + downstream.

Culvert 4 channel ends.

ends ... deep

Appendix D

CUSTOM NRCS SOILS REPORT

United States Department of Agriculture

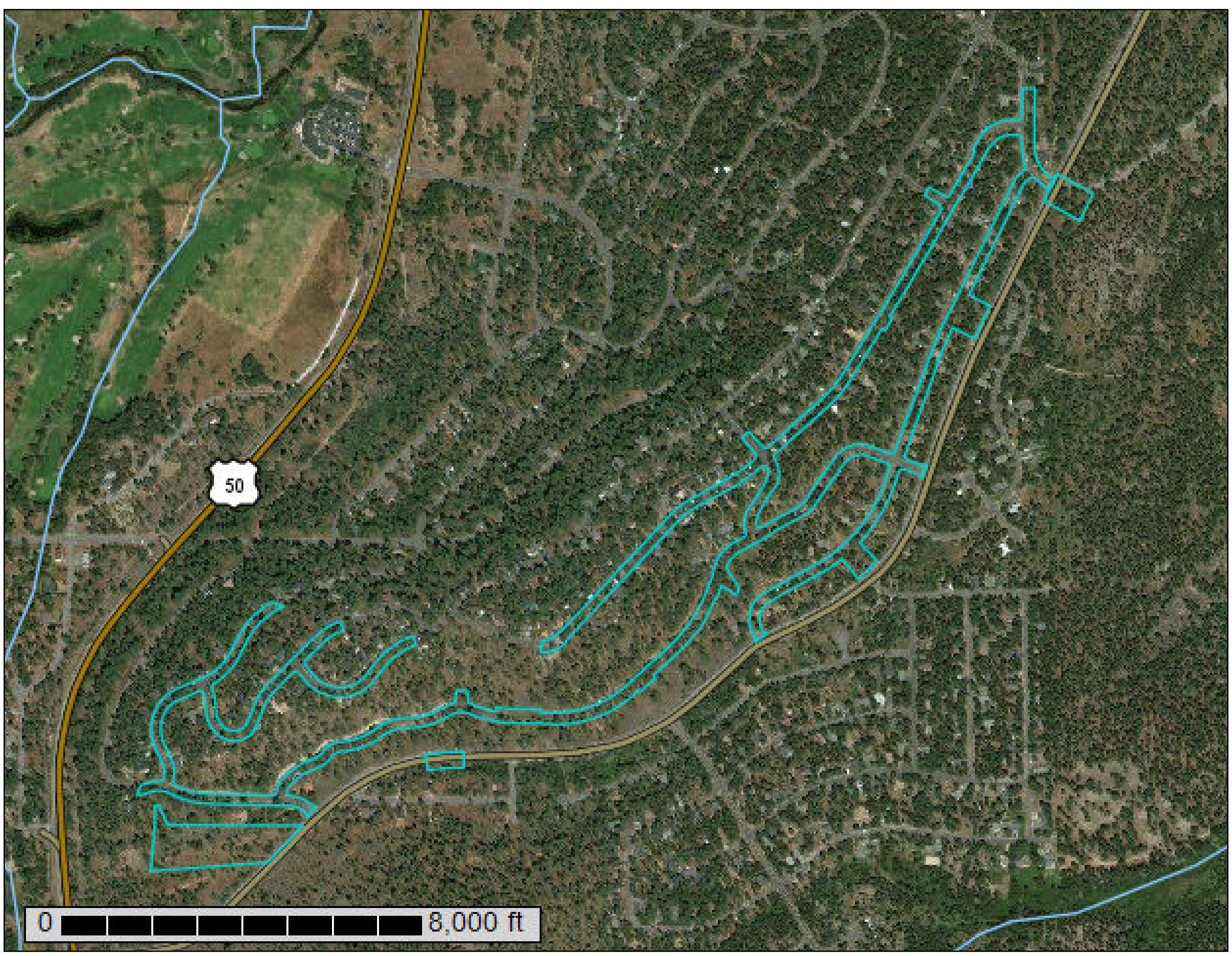
NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for
Tahoe Basin Area, California and Nevada

Oflying Erosion Control Project



July 11, 2018

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

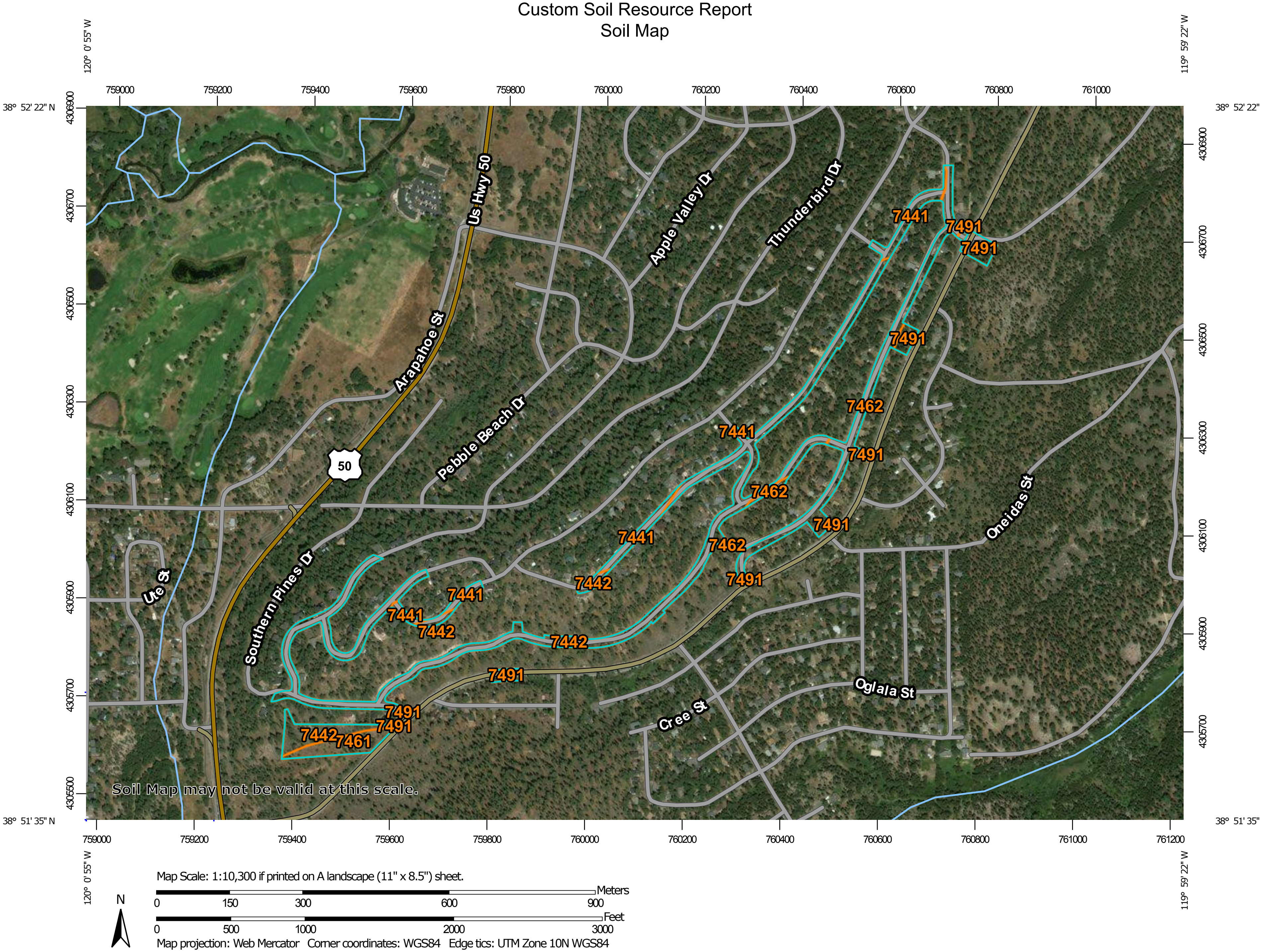
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Soil Map


120° 0' 55" W
119° 59' 22" W
38° 52' 22" N
38° 51' 35" N
759000
759200
759400
759600
759800
760000
760200
760400
760600
760800
761000
761200
4306900
4306700
4306500
4306300
4306100
4305900
4305700
4305500
Us Hwy 50
50
Arapahoe St
Pebble Beach Dr
Apple Valley Dr
Thunderbird Dr
Southern Pines Dr
Ute St
Oneidas St
Oglala St
Cree St
7441
7442
7461
7462
7491
Soil Map may not be valid at this scale.
Map Scale: 1:10,300 if printed on A landscape (11" x 8.5") sheet.
Meters
0
150
300
600
900
Feet
0
500
1000
2000
3000
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Tahoe Basin Area, California and Nevada
Survey Area Data: Version 12, Sep 11, 2017

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

Date(s) aerial images were photographed: Jul 28, 2012—Dec 6, 2016

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
7441	Christopher loamy coarse sand, 0 to 9 percent slopes	2.5	10.2%
7442	Christopher loamy coarse sand, 9 to 30 percent slopes	13.9	56.4%
7461	Jabu coarse sandy loam, 0 to 9 percent slopes	1.6	6.5%
7462	Jabu coarse sandy loam, 9 to 30 percent slopes	4.8	19.4%
7491	Oneidas coarse sandy loam, 0 to 5 percent slopes	1.9	7.5%
Totals for Area of Interest		**24.7**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

Tahoe Basin Area, California and Nevada

7441—Christopher loamy coarse sand, 0 to 9 percent slopes

Map Unit Setting

National map unit symbol: 1sg35
Elevation: 6,250 to 6,610 feet
Mean annual precipitation: 23 to 33 inches
Mean annual air temperature: 41 to 46 degrees F
Frost-free period: 40 to 90 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Christopher, loamy coarse sand, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Christopher, Loamy Coarse Sand

Setting

Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash derived from granodiorite

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 8 inches: loamy coarse sand
Bw1 - 8 to 26 inches: loamy coarse sand
Bw2 - 26 to 42 inches: loamy coarse sand
Bw3 - 42 to 61 inches: loamy coarse sand

Properties and qualities

Slope: 0 to 9 percent
Percent of area covered with surface fragments: 0.0 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: Frigid, Sandy, Or Loamy Outwash (F022AF002CA)
Hydric soil rating: No

Minor Components

Gefo, gravelly loamy coarse sand

Percent of map unit: 10 percent
Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Or Loamy Outwash (F022AF002CA)
Hydric soil rating: No

Jabu

Percent of map unit: 5 percent
Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Or Loamy Outwash (F022AF002CA)
Hydric soil rating: No

Oneidas

Percent of map unit: 3 percent
Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Loamy, Fragipan, Outwash (F022AF003CA)
Hydric soil rating: No

Marla

Percent of map unit: 2 percent
Landform: Outwash terraces, valley flats
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Moist, Outwash Fan (F022AX100CA)
Hydric soil rating: Yes

7442—Christopher loamy coarse sand, 9 to 30 percent slopes

Map Unit Setting

National map unit symbol: 1sg36
Elevation: 6,230 to 6,540 feet
Mean annual precipitation: 23 to 31 inches
Mean annual air temperature: 41 to 46 degrees F
Frost-free period: 40 to 90 days

Farmland classification: Not prime farmland

Map Unit Composition

Christopher, loamy coarse sand, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Christopher, Loamy Coarse Sand

Setting

Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash derived from granodiorite

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 8 inches: loamy coarse sand
Bw1 - 8 to 26 inches: loamy coarse sand
Bw2 - 26 to 42 inches: loamy coarse sand
Bw3 - 42 to 61 inches: loamy coarse sand

Properties and qualities

Slope: 9 to 30 percent
Percent of area covered with surface fragments: 0.0 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Frigid, Sandy, Or Loamy Outwash (F022AF002CA)
Hydric soil rating: No

Minor Components

Gefo, gravelly loamy coarse sand

Percent of map unit: 10 percent
Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Or Loamy Outwash (F022AF002CA)
Hydric soil rating: No

Jabu

Percent of map unit: 5 percent
Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Or Loamy Outwash (F022AF002CA)
Hydric soil rating: No

Oneidas

Percent of map unit: 3 percent
Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Loamy, Fragipan, Outwash (F022AF003CA)
Hydric soil rating: No

Marla

Percent of map unit: 2 percent
Landform: Valley flats, outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Moist, Outwash Fan (F022AX100CA)
Hydric soil rating: Yes

7461—Jabu coarse sandy loam, 0 to 9 percent slopes

Map Unit Setting

National map unit symbol: 1sg41
Elevation: 6,230 to 6,810 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 41 to 46 degrees F
Frost-free period: 40 to 90 days
Farmland classification: Not prime farmland

Map Unit Composition

Jabu and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Jabu

Setting

Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash derived from granodiorite

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 7 inches: coarse sandy loam
Bt1 - 7 to 21 inches: coarse sandy loam
Bt2 - 21 to 46 inches: gravelly coarse sandy loam
Bx - 46 to 67 inches: coarse sandy loam
C - 67 to 73 inches: stratified fine sandy loam to silty clay
Cd - 73 to 101 inches: coarse sandy loam

Properties and qualities

Slope: 0 to 9 percent
Depth to restrictive feature: 39 to 79 inches to fragipan; 59 to 79 inches to densic material
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 39 to 79 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: Frigid, Sandy, Or Loamy Outwash (F022AF002CA)
Hydric soil rating: No

Minor Components

Christopher, loamy coarse sand

Percent of map unit: 10 percent
Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Or Loamy Outwash (F022AF002CA)
Hydric soil rating: No

Oneidas

Percent of map unit: 5 percent
Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Loamy, Fragipan, Outwash (F022AF003CA)
Hydric soil rating: No

Gefo, gravelly loamy coarse sand

Percent of map unit: 3 percent
Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Or Loamy Outwash (F022AF002CA)
Hydric soil rating: No

Marla

Percent of map unit: 2 percent
Landform: Outwash terraces, valley flats
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Moist, Outwash Fan (F022AX100CA)
Hydric soil rating: Yes

7462—Jabu coarse sandy loam, 9 to 30 percent slopes

Map Unit Setting

National map unit symbol: 1sg42
Elevation: 6,230 to 7,410 feet
Mean annual precipitation: 23 to 41 inches
Mean annual air temperature: 41 to 46 degrees F
Frost-free period: 40 to 90 days
Farmland classification: Not prime farmland

Map Unit Composition

Jabu and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Jabu

Setting

Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash derived from granodiorite

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 7 inches: coarse sandy loam
Bt1 - 7 to 21 inches: coarse sandy loam
Bt2 - 21 to 46 inches: gravelly coarse sandy loam

Bx - 46 to 67 inches: coarse sandy loam
C - 67 to 73 inches: stratified fine sandy loam to silty clay
Cd - 73 to 101 inches: coarse sandy loam

Properties and qualities

Slope: 9 to 30 percent
Depth to restrictive feature: 39 to 79 inches to fragipan; 59 to 79 inches to densic material
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 39 to 79 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Frigid, Sandy, Or Loamy Outwash (F022AF002CA)
Hydric soil rating: No

Minor Components

Christopher, loamy coarse sand

Percent of map unit: 10 percent
Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Or Loamy Outwash (F022AF002CA)
Hydric soil rating: No

Oneidas

Percent of map unit: 5 percent
Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Loamy, Fragipan, Outwash (F022AF003CA)
Hydric soil rating: No

Gefo, gravelly loamy coarse sand

Percent of map unit: 3 percent
Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Or Loamy Outwash (F022AF002CA)
Hydric soil rating: No

Marla

Percent of map unit: 2 percent
Landform: Outwash terraces, valley flats
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Moist, Outwash Fan (F022AX100CA)
Hydric soil rating: Yes

7491—Oneidas coarse sandy loam, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1sg43
Elevation: 6,250 to 6,710 feet
Mean annual precipitation: 23 to 33 inches
Mean annual air temperature: 41 to 46 degrees F
Frost-free period: 40 to 90 days
Farmland classification: Not prime farmland

Map Unit Composition

Oneidas and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Oneidas

Setting

Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash and/or till derived from granodiorite

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 9 inches: coarse sandy loam
Bt - 9 to 12 inches: coarse sandy loam
Btx - 12 to 65 inches: coarse sandy loam
C - 65 to 79 inches: loamy coarse sand

Properties and qualities

Slope: 0 to 5 percent
Percent of area covered with surface fragments: 0.0 percent
Depth to restrictive feature: 10 to 20 inches to fragipan
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.06 to 0.14 in/hr)

Depth to water table: About 8 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: Frigid, Loamy, Fragipan, Outwash (F022AF003CA)
Hydric soil rating: No

Minor Components

Jabu

Percent of map unit: 10 percent
Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Or Loamy Outwash (F022AF002CA)
Hydric soil rating: No

Christopher, loamy coarse sand

Percent of map unit: 3 percent
Landform: Hillslopes on outwash terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Or Loamy Outwash (F022AF002CA)
Hydric soil rating: No

Meeks, stony

Percent of map unit: 3 percent
Landform: Moraines
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Moraines And Hill Slopes (F022AE007CA)
Hydric soil rating: No

Marla

Percent of map unit: 2 percent
Landform: Outwash terraces, valley flats
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Moist, Outwash Fan (F022AX100CA)
Hydric soil rating: Yes

Gefo, gravelly loamy coarse sand

Percent of map unit: 2 percent
Landform: Hillslopes on outwash terraces

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Frigid, Sandy, Or Loamy Outwash (F022AF002CA)
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the following National Soil Survey Handbook link: "National Soil Survey Handbook."

ABC soil

A soil having an A, a B, and a C horizon.

Ablation till

Loose, relatively permeable earthy material deposited during the downwasting of nearly static glacial ice, either contained within or accumulated on the surface of the glacier.

AC soil

A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil

The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil

Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil

A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial cone

A semiconical type of alluvial fan having very steep slopes. It is higher, narrower, and steeper than a fan and is composed of coarser and thicker layers of material deposited by a combination of alluvial episodes and (to a much lesser degree) landslides (debris flow). The coarsest materials tend to be concentrated at the apex of the cone.

Alluvial fan

A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

Alluvium

Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

Alpha,alpha-dipyridyl

A compound that when dissolved in ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction implies reducing conditions and the likely presence of redoximorphic features.

Animal unit month (AUM)

The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions

Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon

A subsoil horizon characterized by an accumulation of illuvial clay.

Arroyo

The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in unconsolidated material. It is usually dry but can be transformed into a temporary watercourse or short-lived torrent after heavy rain within the watershed.

Aspect

The direction toward which a slope faces. Also called slope aspect.

Association, soil

A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity)

The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low: 0 to 3
Low: 3 to 6
Moderate: 6 to 9
High: 9 to 12
Very high: More than 12

Backslope

The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Backswamp

A flood-plain landform. Extensive, marshy or swampy, depressed areas of flood plains between natural levees and valley sides or terraces.

Badland

A landscape that is intricately dissected and characterized by a very fine drainage network with high drainage densities and short, steep slopes and narrow interfluves. Badlands develop on surfaces that have little or no vegetative cover overlying unconsolidated or poorly cemented materials (clays, silts, or sandstones) with, in some cases, soluble minerals, such as gypsum or halite.

Bajada

A broad, gently inclined alluvial piedmont slope extending from the base of a mountain range out into a basin and formed by the lateral coalescence of a series of alluvial fans. Typically, it has a broadly undulating transverse profile, parallel to the mountain front, resulting from the convexities of component fans. The term is generally restricted to constructional slopes of intermontane basins.

Basal area

The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation

The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope (geomorphology)

A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding plane

A planar or nearly planar bedding surface that visibly separates each successive layer of stratified sediment or rock (of the same or different lithology) from the preceding or following layer; a plane of deposition. It commonly marks a change in the circumstances of deposition and may show a parting, a color difference, a change in particle size, or various combinations of these. The term is commonly applied to any bedding surface, even one that is conspicuously bent or deformed by folding.

Bedding system

A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock

The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography

A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace

A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum

Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout (map symbol)

A saucer-, cup-, or trough-shaped depression formed by wind erosion on a preexisting dune or other sand deposit, especially in an area of shifting sand or loose soil or where protective vegetation is disturbed or destroyed. The adjoining accumulation of sand derived from the depression, where recognizable, is commonly included. Blowouts are commonly small.

Borrow pit (map symbol)

An open excavation from which soil and underlying material have been removed, usually for construction purposes.

Bottom land

An informal term loosely applied to various portions of a flood plain.

Boulders

Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks

A landscape or tract of steep, rough or broken land dissected by ravines and gullies and marking a sudden change in topography.

Breast height

An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management

Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte

An isolated, generally flat-topped hill or mountain with relatively steep slopes and talus or precipitous cliffs and characterized by summit width that is less than the height of bounding escarpments; commonly topped by a caprock of resistant material and representing an erosion remnant carved from flat-lying rocks.

Cable yarding

A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil

A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche

A general term for a prominent zone of secondary carbonate accumulation in surficial materials in warm, subhumid to arid areas. Caliche is formed by both geologic and pedologic processes. Finely crystalline calcium carbonate forms a nearly continuous surface-coating and void-filling medium in geologic (parent) materials. Cementation ranges from weak in nonindurated forms to very strong in indurated forms. Other minerals (e.g., carbonates, silicate, and sulfate) may occur as accessory cements. Most petrocalcic horizons and some calcic horizons are caliche.

California bearing ratio (CBR)

The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy

The leafy crown of trees or shrubs. (See Crown.)

Canyon

A long, deep, narrow valley with high, precipitous walls in an area of high local relief.

Capillary water

Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena

A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material and under similar climatic conditions but that have different characteristics as a result of differences in relief and drainage.

Cation

An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity

The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps

See Terracettes.

Cement rock

Shaly limestone used in the manufacture of cement.

Channery soil material

Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment

Control of unwanted vegetation through the use of chemicals.

Chiseling

Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Cirque

A steep-walled, semicircular or crescent-shaped, half-bowl-like recess or hollow, commonly situated at the head of a glaciated mountain valley or high on the side of a mountain. It was produced by the erosive activity of a mountain glacier. It commonly contains a small round lake (tarn).

Clay

As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions

See Redoximorphic features.

Clay film

A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Clay spot (map symbol)

A spot where the surface texture is silty clay or clay in areas where the surface layer of the soils in the surrounding map unit is sandy loam, loam, silt loam, or coarser.

Claypan

A dense, compact subsoil layer that contains much more clay than the overlying materials, from which it is separated by a sharply defined boundary. The layer restricts the downward movement of water through the soil. A claypan is commonly hard when dry and plastic and sticky when wet.

Climax plant community

The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil

Sand or loamy sand.

Cobble (or cobblestone)

A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material

Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility)

See Linear extensibility.

Colluvium

Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.

Complex slope

Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil

A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions

See Redoximorphic features.

Conglomerate

A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system

Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage

A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil

Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping

Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section

The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat)

A type of limnic layer composed predominantly of fecal material derived from aquatic animals.

Corrosion (geomorphology)

A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.

Corrosion (soil survey interpretations)

Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop

A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management

Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system

Growing crops according to a planned system of rotation and management practices.

Cross-slope farming

Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown

The upper part of a tree or shrub, including the living branches and their foliage.

Cryoturbate

A mass of soil or other unconsolidated earthy material moved or disturbed by frost action. It is typically coarser than the underlying material.

Cuesta

An asymmetric ridge capped by resistant rock layers of slight or moderate dip (commonly less than 15 percent slopes); a type of homocline produced by differential erosion of interbedded resistant and weak rocks. A cuesta has a long, gentle slope on one side (dip slope) that roughly parallels the inclined beds; on the other side, it has a relatively short and steep or clifflike slope (scarp) that cuts through the tilted rocks.

Culmination of the mean annual increment (CMAI)

The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave

The walls of excavations tend to cave in or slough.

Decreasers

The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing

Postponing grazing or resting grazing land for a prescribed period.

Delta

A body of alluvium having a surface that is fan shaped and nearly flat; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Dense layer

A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depression, closed (map symbol)

A shallow, saucer-shaped area that is slightly lower on the landscape than the surrounding area and that does not have a natural outlet for surface drainage.

Depth, soil

Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Desert pavement

A natural, residual concentration or layer of wind-polished, closely packed gravel, boulders, and other rock fragments mantling a desert surface. It forms where wind action and sheetwash have removed all smaller particles or where rock fragments have migrated upward through sediments to the surface. It typically protects the finer grained underlying material from further erosion.

Diatomaceous earth

A geologic deposit of fine, grayish siliceous material composed chiefly or entirely of the remains of diatoms.

Dip slope

A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace)

A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming

A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural)

Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface

Runoff, or surface flow of water, from an area.

Drainageway

A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

Draw

A small stream valley that generally is shallower and more open than a ravine or gulch and that has a broader bottom. The present stream channel may appear inadequate to have cut the drainageway that it occupies.

Drift

A general term applied to all mineral material (clay, silt, sand, gravel, and boulders) transported by a glacier and deposited directly by or from the ice or transported by running water emanating from a glacier. Drift includes unstratified material (till) that forms moraines and stratified deposits that form outwash plains, eskers, kames, varves, and glaciofluvial sediments. The term is generally applied to Pleistocene glacial deposits in areas that no longer contain glaciers.

Drumlin

A low, smooth, elongated oval hill, mound, or ridge of compact till that has a core of bedrock or drift. It commonly has a blunt nose facing the direction from which the ice approached and a gentler slope tapering in the other direction. The longer axis is parallel to the general direction of glacier flow. Drumlins are products of streamline (laminar) flow of glaciers, which molded the subglacial floor through a combination of erosion and deposition.

Duff

A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune

A low mound, ridge, bank, or hill of loose, windblown granular material (generally sand), either barren and capable of movement from place to place or covered and stabilized with vegetation but retaining its characteristic shape.

Earthy fill

See Mine spoil.

Ecological site

An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation

The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation

A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian deposit

Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.

Ephemeral stream

A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation

A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion

The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (accelerated)

Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion (geologic)

Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion pavement

A surficial lag concentration or layer of gravel and other rock fragments that remains on the soil surface after sheet or rill erosion or wind has removed the finer soil particles and that tends to protect the underlying soil from further erosion.

Erosion surface

A land surface shaped by the action of erosion, especially by running water.

Escarpment

A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

Escarpment, bedrock (map symbol)

A relatively continuous and steep slope or cliff, produced by erosion or faulting, that breaks the general continuity of more gently sloping land surfaces. Exposed material is hard or soft bedrock.

Escarpment, nonbedrock (map symbol)

A relatively continuous and steep slope or cliff, generally produced by erosion but in some places produced by faulting, that breaks the continuity of more gently sloping land surfaces. Exposed earthy material is nonsoil or very shallow soil.

Esker

A long, narrow, sinuous, steep-sided ridge of stratified sand and gravel deposited as the bed of a stream flowing in an ice tunnel within or below the ice (subglacial) or between ice walls on top of the ice of a wasting glacier and left behind as high ground when the ice melted. Eskers range in length from less than a kilometer to more than 160 kilometers and in height from 3 to 30 meters.

Extrusive rock

Igneous rock derived from deep-seated molten matter (magma) deposited and cooled on the earth's surface.

Fallow

Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan remnant

A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, that have been either dissected or partially buried.

Fertility, soil

The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat)

The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity

The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope

A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil

Sandy clay, silty clay, or clay.

Firebreak

An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom

An obsolete, informal term loosely applied to the lowest flood-plain steps that are subject to regular flooding.

Flaggy soil material

Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone

A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain

The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

Flood-plain landforms

A variety of constructional and erosional features produced by stream channel migration and flooding. Examples include backswamps, flood-plain splays, meanders, meander belts, meander scrolls, oxbow lakes, and natural levees.

Flood-plain splay

A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.

Flood-plain step

An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.

Fluvial

Of or pertaining to rivers or streams; produced by stream or river action.

Foothills

A region of steeply sloping hills that fringes a mountain range or high-plateau escarpment. The hills have relief of as much as 1,000 feet (300 meters).

Footslope

The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb

Any herbaceous plant not a grass or a sedge.

Forest cover

All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type

A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan

A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil

The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai

Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Glaciofluvial deposits

Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur in the form of outwash plains, valley trains, deltas, kames, eskers, and kame terraces.

Glaciolacustrine deposits

Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are bedded or laminated.

Gleyed soil

Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping

Growing crops in strips that grade toward a protected waterway.

Grassed waterway

A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel

Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravel pit (map symbol)

An open excavation from which soil and underlying material have been removed and used, without crushing, as a source of sand or gravel.

Gravelly soil material

Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Gravelly spot (map symbol)

A spot where the surface layer has more than 35 percent, by volume, rock fragments that are mostly less than 3 inches in diameter in an area that has less than 15 percent rock fragments.

Green manure crop (agronomy)

A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water

Water filling all the unblocked pores of the material below the water table.

Gully (map symbol)

A small, steep-sided channel caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage whereas a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock

Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hard to reclaim

Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Hardpan

A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope (geomorphology)

A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hemic soil material (mucky peat)

Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops

Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill

A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

Hillslope

A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

Horizon, soil

A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon: An organic layer of fresh and decaying plant residue.

L horizon: A layer of organic and mineral limnic materials, including coprogenous earth (sedimentary peat), diatomaceous earth, and marl.

A horizon: The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon: The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon: The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon: The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon: Soft, consolidated bedrock beneath the soil.

R layer: Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

M layer: A root-limiting subsoil layer consisting of nearly continuous, horizontally oriented, human-manufactured materials.

W layer: A layer of water within or beneath the soil.

Humus

The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups

Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties include depth to a seasonal high water table, the infiltration rate, and depth to a layer that significantly restricts the downward movement of water. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock

Rock that was formed by cooling and solidification of magma and that has not been changed appreciably by weathering since its formation. Major varieties include plutonic and volcanic rock (e.g., andesite, basalt, and granite).

Illuviation

The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil

A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers

Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration

The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity

The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate

The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate

The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Very low: Less than 0.2
Low: 0.2 to 0.4
Moderately low: 0.4 to 0.75
Moderate: 0.75 to 1.25
Moderately high: 1.25 to 1.75
High: 1.75 to 2.5
Very high: More than 2.5

Interfluve

A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

Interfluve (geomorphology)

A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill; shoulders of backwearing hillslopes can narrow the upland or can merge, resulting in a strongly convex shape.

Intermittent stream

A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders

On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions

See Redoximorphic features.

Irrigation

Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin: Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border: Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding: Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation: Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle): Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow: Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler: Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation: Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding: Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame

A low mound, knob, hummock, or short irregular ridge composed of stratified sand and gravel deposited by a subglacial stream as a fan or delta at the margin of a melting glacier; by a supraglacial stream in a low place or hole on the surface of the glacier; or as a ponded deposit on the surface or at the margin of stagnant ice.

Karst (topography)

A kind of topography that formed in limestone, gypsum, or other soluble rocks by dissolution and that is characterized by closed depressions, sinkholes, caves, and underground drainage.

Knoll

A small, low, rounded hill rising above adjacent landforms.

Ksat

See Saturated hydraulic conductivity.

Lacustrine deposit

Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain

A nearly level surface marking the floor of an extinct lake filled by well sorted, generally fine textured, stratified deposits, commonly containing varves.

Lake terrace

A narrow shelf, partly cut and partly built, produced along a lakeshore in front of a scarp line of low cliffs and later exposed when the water level falls.

Landfill (map symbol)

An area of accumulated waste products of human habitation, either above or below natural ground level.

Landslide

A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones

Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lava flow (map symbol)

A solidified, commonly lobate body of rock formed through lateral, surface outpouring of molten lava from a vent or fissure.

Leaching

The removal of soluble material from soil or other material by percolating water.

Levee (map symbol)

An embankment that confines or controls water, especially one built along the banks of a river to prevent overflow onto lowlands.

Linear extensibility

Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^{1}/_{3}$- or $^{1}/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit

The moisture content at which the soil passes from a plastic to a liquid state.

Loam

Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess

Material transported and deposited by wind and consisting dominantly of silt-sized particles.

Low strength

The soil is not strong enough to support loads.

Low-residue crops

Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Marl

An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions but also formed in more saline environments.

Marsh or swamp (map symbol)

A water-saturated, very poorly drained area that is intermittently or permanently covered by water. Sedges, cattails, and rushes are the dominant vegetation in marshes, and trees or shrubs are the dominant vegetation in swamps. Not used in map units where the named soils are poorly drained or very poorly drained.

Mass movement

A generic term for the dislodgment and downslope transport of soil and rock material as a unit under direct gravitational stress.

Masses

See Redoximorphic features.

Meander belt

The zone within which migration of a meandering channel occurs; the flood-plain area included between two imaginary lines drawn tangential to the outer bends of active channel loops.

Meander scar

A crescent-shaped, concave or linear mark on the face of a bluff or valley wall, produced by the lateral erosion of a meandering stream that impinged upon and undercut the bluff.

Meander scroll

One of a series of long, parallel, close-fitting, crescent-shaped ridges and troughs formed along the inner bank of a stream meander as the channel migrated laterally down-valley and toward the outer bank.

Mechanical treatment

Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil

Very fine sandy loam, loam, silt loam, or silt.

Mesa

A broad, nearly flat topped and commonly isolated landmass bounded by steep slopes or precipitous cliffs and capped by layers of resistant, nearly horizontal rocky material. The summit width is characteristically greater than the height of the bounding escarpments.

Metamorphic rock

Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth’s crust. Nearly all such rocks are crystalline.

Mine or quarry (map symbol)

An open excavation from which soil and underlying material have been removed and in which bedrock is exposed. Also denotes surface openings to underground mines.

Mine spoil

An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.

Mineral soil

Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage

Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area

A kind of map unit that has little or no natural soil and supports little or no vegetation.

Miscellaneous water (map symbol)

Small, constructed bodies of water that are used for industrial, sanitary, or mining applications and that contain water most of the year.

Moderately coarse textured soil

Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil

Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon

A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine

In terms of glacial geology, a mound, ridge, or other topographically distinct accumulation of unsorted, unstratified drift, predominantly till, deposited primarily by the direct action of glacial ice in a variety of landforms. Also, a general term for a landform composed mainly of till (except for kame moraines, which are composed mainly of stratified outwash) that has been deposited by a glacier. Some types of moraines are disintegration, end, ground, kame, lateral, recessional, and terminal.

Morphology, soil

The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil

Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain

A generic term for an elevated area of the land surface, rising more than 1,000 feet (300 meters) above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

Muck

Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mucky peat

See Hemic soil material.

Mudstone

A blocky or massive, fine grained sedimentary rock in which the proportions of clay and silt are approximately equal. Also, a general term for such material as clay, silt, claystone, siltstone, shale, and argillite and that should be used only when the amounts of clay and silt are not known or cannot be precisely identified.

Munsell notation

A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon

A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil

A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules

See Redoximorphic features.

Nose slope (geomorphology)

A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).

Nutrient, plant

Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter

Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low: Less than 0.5 percent
Low: 0.5 to 1.0 percent
Moderately low: 1.0 to 2.0 percent
Moderate: 2.0 to 4.0 percent
High: 4.0 to 8.0 percent
Very high: More than 8.0 percent

Outwash

Stratified and sorted sediments (chiefly sand and gravel) removed or “washed out” from a glacier by meltwater streams and deposited in front of or beyond the end moraine or the margin of a glacier. The coarser material is deposited nearer to the ice.

Outwash plain

An extensive lowland area of coarse textured glaciofluvial material. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Paleoterrace

An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

Pan

A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material

The unconsolidated organic and mineral material in which soil forms.

Peat

Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped

An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment

A layer of sediment, eroded from the shoulder and backslope of an erosional slope, that lies on and is being (or was) transported across a gently sloping erosional surface at the foot of a receding hill or mountain slope.

Pedon

The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation

The movement of water through the soil.

Perennial water (map symbol)

Small, natural or constructed lakes, ponds, or pits that contain water most of the year.

Permafrost

Ground, soil, or rock that remains at or below 0 degrees C for at least 2 years. It is defined on the basis of temperature and is not necessarily frozen.

pH value

A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil

A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping

Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting

Pits caused by melting around ice. They form on the soil after plant cover is removed.

Plastic limit

The moisture content at which a soil changes from semisolid to plastic.

Plasticity index

The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plateau (geomorphology)

A comparatively flat area of great extent and elevation; specifically, an extensive land region that is considerably elevated (more than 100 meters) above the adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

Playa

The generally dry and nearly level lake plain that occupies the lowest parts of closed depressions, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff. Playa deposits are fine grained and may or may not have a high water table and saline conditions.

Plinthite

The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan

A compacted layer formed in the soil directly below the plowed layer.

Ponding

Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded

Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Pore linings

See Redoximorphic features.

Potential native plant community

See Climax plant community.

Potential rooting depth (effective rooting depth)

Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning

Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil

The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil

A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use

Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland

Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil

A measure of acidity or alkalinity of a soil, expressed as pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid: Less than 3.5
Extremely acid: 3.5 to 4.4
Very strongly acid: 4.5 to 5.0
Strongly acid: 5.1 to 5.5
Moderately acid: 5.6 to 6.0
Slightly acid: 6.1 to 6.5
Neutral: 6.6 to 7.3
Slightly alkaline: 7.4 to 7.8
Moderately alkaline: 7.9 to 8.4
Strongly alkaline: 8.5 to 9.0
Very strongly alkaline: 9.1 and higher

Red beds

Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations

See Redoximorphic features.

Redoximorphic depletions

See Redoximorphic features.

Redoximorphic features

Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
   A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*
   B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*
   C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
   A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; *and*
   B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).
3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Reduced matrix

See Redoximorphic features.

Regolith

All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

Relief

The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

Residuum (residual soil material)

Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

Rill

A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.

Riser

The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

Road cut

A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments

Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop (map symbol)

An exposure of bedrock at the surface of the earth. Not used where the named soils of the surrounding map unit are shallow over bedrock or where "Rock outcrop" is a named component of the map unit.

Root zone

The part of the soil that can be penetrated by plant roots.

Runoff

The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil

A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Saline spot (map symbol)

An area where the surface layer has an electrical conductivity of 8 mmhos/cm more than the surface layer of the named soils in the surrounding map unit. The surface layer of the surrounding soils has an electrical conductivity of 2 mmhos/cm or less.

Sand

As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone

Sedimentary rock containing dominantly sand-sized particles.

Sandy spot (map symbol)

A spot where the surface layer is loamy fine sand or coarser in areas where the surface layer of the named soils in the surrounding map unit is very fine sandy loam or finer.

Sapric soil material (muck)

The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturated hydraulic conductivity (Ksat)

The ease with which pores of a saturated soil transmit water. Formally, the proportionality coefficient that expresses the relationship of the rate of water movement to hydraulic gradient in Darcy's Law, a law that describes the rate of water movement through porous media. Commonly abbreviated as "Ksat." Terms describing saturated hydraulic conductivity are:

Very high: 100 or more micrometers per second (14.17 or more inches per hour)

High: 10 to 100 micrometers per second (1.417 to 14.17 inches per hour)

Moderately high: 1 to 10 micrometers per second (0.1417 inch to 1.417 inches per hour)

Moderately low: 0.1 to 1 micrometer per second (0.01417 to 0.1417 inch per hour)

Low: 0.01 to 0.1 micrometer per second (0.001417 to 0.01417 inch per hour)

Very low: Less than 0.01 micrometer per second (less than 0.001417 inch per hour).

To convert inches per hour to micrometers per second, multiply inches per hour by 7.0572. To convert micrometers per second to inches per hour, multiply micrometers per second by 0.1417.

Saturation

Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification

The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Sedimentary rock

A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

Sequum

A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil

A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Severely eroded spot (map symbol)

An area where, on the average, 75 percent or more of the original surface layer has been lost because of accelerated erosion. Not used in map units in which “severely eroded,” “very severely eroded,” or “gullied” is part of the map unit name.

Shale

Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

Sheet erosion

The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Short, steep slope (map symbol)

A narrow area of soil having slopes that are at least two slope classes steeper than the slope class of the surrounding map unit.

Shoulder

The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.

Shrink-swell

The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Shrub-coppice dune

A small, streamlined dune that forms around brush and clump vegetation.

Side slope (geomorphology)

A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

Silica

A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio

The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt

As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone

An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

Similar soils

Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole (map symbol)

A closed, circular or elliptical depression, commonly funnel shaped, characterized by subsurface drainage and formed either by dissolution of the surface of underlying bedrock (e.g., limestone, gypsum, or salt) or by collapse of underlying caves within bedrock. Complexes of sinkholes in carbonate-rock terrain are the main components of karst topography.

Site index

A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides (pedogenic)

Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.

Slide or slip (map symbol)

A prominent landform scar or ridge caused by fairly recent mass movement or descent of earthy material resulting from failure of earth or rock under shear stress along one or several surfaces.

Slope

The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope alluvium

Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

Slow refill

The slow filling of ponds, resulting from restricted water transmission in the soil.

Slow water movement

Restricted downward movement of water through the soil. See Saturated hydraulic conductivity.

Sodic (alkali) soil

A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodic spot (map symbol)

An area where the surface layer has a sodium adsorption ratio that is at least 10 more than that of the surface layer of the named soils in the surrounding map unit. The surface layer of the surrounding soils has a sodium adsorption ratio of 5 or less.

Sodicity

The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to Ca^{++} + Mg^{++}. The degrees of sodicity and their respective ratios are:

Slight: Less than 13:1

Moderate: 13-30:1

Strong: More than 30:1

Sodium adsorption ratio (SAR)

A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock

Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil

A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

Soil separates

Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand: 2.0 to 1.0

Coarse sand: 1.0 to 0.5

Medium sand: 0.5 to 0.25

Fine sand: 0.25 to 0.10

Very fine sand: 0.10 to 0.05

Silt: 0.05 to 0.002

Clay: Less than 0.002

Solum

The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Spoil area (map symbol)

A pile of earthy materials, either smoothed or uneven, resulting from human activity.

Stone line

In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel- or cobble-sized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial. Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

Stones

Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony

Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stony spot (map symbol)

A spot where 0.01 to 0.1 percent of the soil surface is covered by rock fragments that are more than 10 inches in diameter in areas where the surrounding soil has no surface stones.

Strath terrace

A type of stream terrace; formed as an erosional surface cut on bedrock and thinly mantled with stream deposits (alluvium).

Stream terrace

One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

Stripcropping

Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil

The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are:

Platy: Flat and laminated
Prismatic: Vertically elongated and having flat tops
Columnar: Vertically elongated and having rounded tops
Angular blocky: Having faces that intersect at sharp angles (planes)
Subangular blocky: Having subrounded and planar faces (no sharp angles)
Granular: Small structural units with curved or very irregular faces

Structureless soil horizons are defined as follows:

Single grained: Entirely noncoherent (each grain by itself), as in loose sand
Massive: Occurring as a coherent mass

Stubble mulch

Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil

Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling

Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum

The part of the soil below the solum.

Subsurface layer

Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow

The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit

The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer

The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil

The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Talus

Rock fragments of any size or shape (commonly coarse and angular) derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts

Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terminal moraine

An end moraine that marks the farthest advance of a glacier. It typically has the form of a massive arcuate or concentric ridge, or complex of ridges, and is underlain by till and other types of drift.

Terrace (conservation)

An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geomorphology)

A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

Terracettes

Small, irregular steplike forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may be induced or enhanced by trampling of livestock, such as sheep or cattle.

Texture, soil

The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer

Otherwise suitable soil material that is too thin for the specified use.

Till

Dominantly unsorted and nonstratified drift, generally unconsolidated and deposited directly by a glacier without subsequent reworking by meltwater, and consisting of a heterogeneous mixture of clay, silt, sand, gravel, stones, and boulders; rock fragments of various lithologies are embedded within a finer matrix that can range from clay to sandy loam.

Till plain

An extensive area of level to gently undulating soils underlain predominantly by till and bounded at the distal end by subordinate recessional or end moraines.

Tilth, soil

The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope

The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil

The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements

Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tread

The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

Tuff

A generic term for any consolidated or cemented deposit that is 50 percent or more volcanic ash.

Upland

An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

Valley fill

The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) so as to fill or partly fill a valley.

Variegation

Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve

A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very stony spot (map symbol)

A spot where 0.1 to 3.0 percent of the soil surface is covered by rock fragments that are more than 10 inches in diameter in areas where the surface of the surrounding soil is covered by less than 0.01 percent stones.

Water bars

Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering

All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

Well graded

Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wet spot (map symbol)

A somewhat poorly drained to very poorly drained area that is at least two drainage classes wetter than the named soils in the surrounding map unit.

Wilting point (or permanent wilting point)

The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow

The uprooting and tipping over of trees by the wind.

Appendix F

GREENHOUSE GAS CALCULATION SPREADSHEET

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Oflyng Water Quality Project - Green House Gas Estimate

30 **working days** 1 kg = 2.20462 pounds

GAS

15	workers per day
5	vehicles
20	miles per gallon
40	miles round trip
20	pounds of CO_2/gallon

DIESEL-Onsite

12	pieces of machinery
4	hours per day (machinery)
8	hours per day
2	gallons of diesel per hour
22.5	pounds of CO_2/gallon

DIESEL-Hauling

2	Hauling Trucks
60	miles round trip
3	hours per day
6	gallons of diesel per hour - hauling
22.5	pounds of CO_2/gallon

GAS

6000	pounds
2721.557	kg
2.7	**metric tons**

TOTAL CO2

43.1 Metric Tons

Total Diesel Fuel

96 gallons per day

36 gallons per day

132 Gallons per day

3960 gallons per Project

DIESEL - Onsite

64800	pounds
29392.82	kg
29.4	**metric tons**

DIESEL - Hauling

24300	pounds
11022.31	kg
11.0	**metric tons**