Kilarc-Cow Creek Hydroelectric Project License Surrender

Draft
Environmental Impact Report

April 2019

State Clearinghouse #2013032029

Cardno

Document Information

Prepared for	State Water Resources Control Board
Project Name	Kilarc-Cow Creek Hydroelectric Project License Surrender Draft Environmental Impact Report
State Clearinghouse	#2013032029
Date	April 2019

Prepared for:

State Water Resources Control Board, Division of Water Rights
P.O. Box 2000, Sacramento, CA 95812-2000

Prepared by:

Cardno®

Cardno, Inc.
2890 Gateway Oaks Drive, Suite 200, Sacramento, CA 95833

This Page Intentionally Left Blank

Table of Contents

Appendices

Tables

Figures

Acronyms

AB	Assembly Bill
ADU	Abbott Ditch Users
af	acre-feet
Agreement	Memorandum of Agreement
A-P Act	Alquist-Priolo Earthquake Fault Zoning Act
AP	Agricultural Preserve
AQMD	Air Quality Management District
ARB	California Air Resources Board
ATCM	Air Toxics Control Measures
BACT	Best Available Control Technology
BAMM	Best Available Mitigation Measures
BIA	United States Bureau of Indian Affairs
BMP	Best Management Practices
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAL FIRE	California Department of Forestry and Fire Protection
Cal/OSHA	California Occupational Safety and Health Administration
CalEEMod	California Emissions Estimator Model
CAT	Climate Action Team
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife (formerly California Department of Fish and Game, DFG, or CDFG)
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Survey
CNDDB	California Natural Diversity Database
CNEL	Noise Level Equivalent
CNPS	California Native Plant Society
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CRHR	California Register of Historical Resources
CUPA	Certified Unified Program Agency
CVRWQCB	Central Valley Regional Water Quality Control Board

CWA	Federal Clean Water Act
dB	Decibel
dBA	A-weighted decibel
DEIR	Draft Environmental Impact Report
DFG	California Department of Fish and Game
DOI	United States Department of the Interior
DPM	Diesel Particulate Matter
DTSC	California Department of Toxic Substances Control
EA	Exclusive Agricultural
EFZ	Earthquake Fault Zones
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ETE	Elk Trail East
ETW	Elk Trail West
FEIR	Final Environmental Impact Report
FERC	Federal Energy Regulatory Commission
FESA	Federal Endangered Species Act
FHWA	Federal Highway Administration
FMMP	Farmland Mapping and Monitoring Program
FPA	Federal Power Act
FR	Federal Register
FRAP	Fire and Resource Assessment Program
ft	foot, feet
FWCA	Fish and Wildlife Coordination Act
GHG	Greenhouse Gases
GWH	Gigawatt hours
GWP	Global Warming Potential
H&SC	California Health and Safety Code
HFC	Hydrofluorocarbons
HNLs	hourly noise levels
HRW	Hatchet Ridge Wind Project
I	Industrial
IPCC	Intergovernmental Panel on Climate Change
IR	Interim Rural
km	kilometer
KWH	Kilowatt Hours

LCC	Land Conservation Commitment
LCCP	Land Conservation and Conveyance Plan
LCP	Land Conservation Plan
LSA	License Surrender Application
MBTA	Migratory Bird Treaty Act
MEI	Maximally Exposed Individual
Mg	Megagram
MLCS	Mineral Land Classification Study
MMP	Mitigation and Monitoring Plan
MMRP	Mitigation Monitoring and Reporting Program
MMT	Million Metric Tons
MOA	Memorandum of Agreement
MR	Mineral Resource
msl	mean sea level
MT	Metric Ton
MW	Megawatts
MWh	megawatts hours
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAHC	Native American Heritage Commission
NCCP	Natural Communities Conservation Plan
NCPC	Northern California Power Company
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIMS	National Incident Management System
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
NO	Nitrogen Oxides
NO_2	Nitrogen Dioxide
NOA	Notice of Availability
NOD	Notice of Determination
NOI	Notice of Intent
NOP	Notice of Preparation
NOx	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service

NTU	Nephelometric Turbidity Unit
NVUM	National Visitor Use Monitoring
O_3	Ozone
OHP	Office of Historic Preservation
OV	Observer Viewpoint
PAOT	People at One Time
Pb	Lead
PD	Planned Development
PDP	Proposed Decommissioning Plan
PEL	Probable effects level
PERP	Portable Equipment Registration Program
PFC	perfluorocarbon
PG&E	Pacific Gas and Electric Company
PM	Particulate Matter
PM&E	Protection, mitigation, and enhancement
PM_{10}	Respirable Particulate Matter
$PM_{2.5}$	Fine Particulate Matter
PPDP	Preliminary Proposed Decommissioning Plan
PPV	peak particle velocity
PRC	Public Resources Code
PSD	Prevention of Significant Deterioration
RA	Rural Residential
RACMs	Reasonably Available Control Measures
RCRA	Resource Conservation and Recovery Act
RD	Recreation Day
RES	Renewable Energy Systems
ROCs	Reactive Organic Compounds
RPS	Renewable Portfolio Standard
RR-BA-3	Rural Residential 3-acre minimum
RR-BA-5	Rural Residential 5-acre minimum
RWQCB	Regional Water Quality Control Boards
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SCH	State Clearinghouse
SHPO	State Historic Preservation Officer/Office
SMM	Standard Mitigation Measures
SO_2	Sulfur Dioxide

SPCP	Spill Prevention and Control Program
SR	State Route
SR	Suburban Residential
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resource Control Board
TEL	Threshold effects level
TP	Timber Production
TPZ	Timber Preserve Zones
TU	Trout Unlimited
U	Unclassified
USACE	United States Army Corps of Engineers
USC	United States Government Code
USDA-FS	United States Department of Agriculture Forest Service
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VAOT	Vehicles At One Time
VIA	Visual Impact Assessment
VOCs	Volatile Organic Compounds
WDR	Waste Discharge Requirements
WVCFC	Whitmore Volunteer Community Fire Company

Executive Summary

Introduction

The State Water Resources Control Board (State Water Board) has prepared this Draft Environmental Impact Report (Draft EIR) for the Kilarc-Cow Creek Hydroelectric Project License Surrender (Proposed Project). Pursuant to the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.) and the CEQA Guidelines (Cal. Code Regs. [CCR], tit. 14, § 15000 et seq.), the State Water Board is the lead agency for the Proposed Project. The State Water Board has the discretionary authority to issue a water quality certification under section 401 of the federal Clean Water Act (CWA) (33 U.S.C. § 1341) (Section 401). The Proposed Project is located in the Cow Creek Watershed in Shasta County, California. The Kilarc-Cow Creek Hydroelectric Project (Project) is owned by the Pacific Gas and Electric Company (PG&E) and is licensed by the Federal Energy Regulatory Commission (FERC), designated as FERC Project No. 606. The existing license expired on March 27, 2007, and the Project continues to operate under an annual license. On March 13, 2009, PG&E filed a License Surrender Application (LSA) to surrender its license for the Project. On August 18, 2009, PG&E originally applied to the State Water Board for a CWA section 401 water quality certification for the Proposed Project. The State Water Board must comply with CEQA prior to issuing any certification for the Proposed Project. The State Water Board has prepared this Draft EIR for PG&E's Proposed Project.

Project Background

Section 401 requires every applicant for a federal license or permit that may result in any discharge into waters of the United States to provide the federal licensing or permitting agency with certification from the State in which the discharge may originate that the project would be in compliance with specified provisions of the CWA. Section 401 provides that conditions of certification shall become conditions of any federal license or permit for the project. The State Water Board is the California agency responsible for issuing a water quality certification pursuant to Section 401.

Under the provisions of the CWA, a Section 401 certification for the Proposed Project may be issued if the State Water Board determines that the decommissioning of the Project would comply with specified provisions of the CWA, including water quality standards and implementation plans. The State Water Board will determine whether the Proposed Project adequately protects the beneficial uses and meets the water quality objectives for water bodies in the project area, as defined in the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan).

FERC issued a draft Environmental Impact Statement (EIS) on June 22, 2010, that described and evaluated the probable effects under the provisions of the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 et seq.), including site-specific and cumulative effects of PG&E's Proposed Action (the EIS's term for the Proposed Project), and identified its reasonable alternatives to the Proposed Action. FERC issued the final EIS on August 16, 2011,

recommending the license be surrendered as proposed with the addition of a few FERC staff alternatives.

Project Goals and CEQA Objectives

PG&E's project purpose is to surrender the license for operation of the Project and to decommission and remove or modify several project features and facilities. The State Water Board has prepared this EIR analyzing the environmental impacts of the Proposed Project in the context of the following objectives:

- Surrender the license for operation of the Project in conformity with the March 2005 Memorandum of Agreement (Agreement) executed by PG&E, the State Water Board, and others. The Agreement contains a list of subjects to be addressed through the decommissioning process (e.g., the disposition of canals); and
- Decommission and remove or modify several Project features and facilities in compliance with California water quality standards.

Project Description

The following description of decommissioning activities has been excerpted from PG&E's Proposed Decommissioning Plan (PDP) which was submitted with the LSA (PG&E 2009). PG&E proposes to surrender the license for operation of the Project and to decommission and remove or modify several Project features, including:

- remove diversion dams and allow for free passage of fish and sediment;
- leave in place some diversion dam abutments and foundations to protect stream banks and provide grade control;
- leave in place and secure powerhouse structures during decommissioning with an option for preservation of powerhouse structures for future reuse;
- remove electric generators, turbines, and other equipment;
- grade and fill forebays;
- in consultation with affected landowners, leave in place, breach, or fill canal segments and remove metal and wood flume structures; and
- retire access roads to the project where possible.

Upon receipt of State Water Board certification and other required permits, including FERC's final approval, PG&E intends to commence phased decommissioning activities in accordance with its detailed plans.

Implementation and Oversight

The intent of this EIR is to enable the State Water Board and other responsible agencies and interested parties to understand the potential environmental effects of the Proposed Project. The Draft EIR is expected to be used for the following purposes:

- To disclose to the public, decision-makers, elected officials and other stakeholders the potential environmental effects associated with implementation of the Proposed Project, and to solicit input on the potential environmental effects;

- To identify ways to avoid or minimize potential environmental effects of the Proposed Project, including alternatives;
- To provide the State Water Board with a technically and legally adequate environmental document to be used as one basis for its decision-making process for the proposed water quality certification; and
- To provide responsible and trustee regulatory agencies with information necessary to evaluate Proposed Project permitting requirements or other discretionary actions.

Public Involvement

The State Water Board circulated a Notice of Preparation (NOP) for the Proposed Project on March 12, 2013. The NOP was distributed to the State Clearinghouse, agencies and individuals. The NOP provided a description of the Proposed Project, the location of Proposed Project activities, and the resources and environmental concerns to be analyzed in the EIR. The NOP also requested that comments on the content of the EIR and potential project alternatives be submitted by April 22, 2013.

The State Water Board conducted a CEQA scoping meeting to provide the public with the opportunity to provide input prior to the preparation of the EIR. Public notices of the NOP and scoping meeting were published in the East Valley Times (March 7th and 21st issues) and Redding Searchlight (March 12, 13, 16, 17, 23, 24, 30, 31 and April 6). The meeting took place on April 10, 2013 from 6:00 p.m. to 8:00 p.m. at the Millville Grange in Palo Cedro, California. A scoping report was prepared to summarize the written and oral comments received during the scoping period (March 12, 2013 through April 22, 2013). The State Water Board considered comments received during the NOP public review period in determining the scope and content of this Draft EIR.

Key Issues and Significant Impacts

For the Proposed Project, an impact was considered significant if the analysis sets forth that there could be a substantial or potentially substantial adverse effect on the environment. Key issues identified in the EIR include impacts on agricultural resources and recreation.

The analysis impact determined that the Proposed Project:

- Would conflict with existing zoning for agricultural use, or a Williamson Act contract.
- Would involve other changes in the existing environment which could result in conversion of farmland to non-agricultural use or conversion of forest land to non-forest use.
- Would physically degrade or diminish existing recreational resources.

Alternatives Considered

The Proposed Project is PG&E's proposal to surrender the license for operation of the currently operating Project and to decommission and remove or modify several of the existing Project features. The FERC EIS evaluated four alternatives: the No Action Alternative, the Proposed Action, Alternative 1 – Retaining Kilarc Forebay, and Alternative 2 – Retaining Flow to Abbott Ditch Users Existing Point of Diversion. The State Water Board determined that the EIR would evaluate the Proposed Project as approved in the FERC EIS, Alternative 1, Alternative 2, and

the No Project Alternative[1]. The EIR also evaluates several optional methods of implementing Alternative 2.

Areas of Controversy

CEQA Guidelines, section 15123 requires disclosure of the controversial project issues known to the Lead Agency, including those raised by agencies and the public. Table ES-1 highlights controversies raised by agencies and the public during the scoping period and in other forms. Opinions and issues raised by agencies and members of the public do not necessarily represent the position of the State Water Board. Additionally, information concerning these areas of controversy can be found in comment letters provided during the scoping period on the State Water Board's Kilarc-Cow Creek Hydroelectric Project License Surrender:

https://www.waterboards.ca.gov/waterrights/water_issues/programs/water_quality_cert/kilarc_cow/

Table ES-1 Areas of Controversy / Issues of Concern Identified During Project Scoping

Topics	Area of Controversy / Issues of Concern
Fisheries and Aquatic Resources	Proposed Project measures at South Cow Creek Division being inadequate for fish passage.
Recreation	Effects of the Proposed Project on local recreational fishing associate with the removal of Kilarc Forebay.
Agriculture	Effects of the Proposed Project on agriculture from lack of continued year-round water supply to Hooten Gulch.
Water Resources	Proposed Project would adversely affect regional groundwater levels around Kilarc Forebay.

Summary of Impacts and Levels of Significance

Table ES-2 provides a summary of all potential impacts analyzed in the EIR, along with the level of significance before mitigation, applicable mitigation measures, and the level of significance after mitigation. It is also noted if implementation of an alternative could reduce or avoid a significant impact of the Proposed Project which could otherwise not be mitigated (CEQA Guidelines, § 15126.2 (b)).

[1] The No Project Alternative is based on FERC's No Action Alternative.

Table ES-2 Impacts of the Proposed Project and Mitigation Measures to Avoid or Reduce Significant Impacts

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Aesthetics and Visual Resources			
IMPACT 4.3-1 (Kilarc): The Proposed Project would not have a substantial adverse effect on a scenic vista.	Less than Significant	None required.	n/a
IMPACT 4.3-2 (Kilarc): The Proposed Project would not substantially damage scenic resources.	No Impact	None required.	n/a
IMPACT 4.3-3 (Kilarc): The Proposed Project would not substantially degrade the existing visual character or quality of the site and its surroundings.	Less than Significant	None required.	n/a
IMPACT 4.3-4 (Kilarc): The Proposed Project would not introduce a substantial source of light or glare into the viewshed.	No Impact	None required.	n/a
IMPACT 4.3-5 (Kilarc): The Proposed Project would not conflict with adopted visual resource policies.	No Impact	None required.	n/a
IMPACT 4.3-6 (Cow Creek): The Proposed Project would not have a substantial adverse effect on a scenic vista.	No Impact	None required.	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.3-7 (Cow Creek): The Proposed Project would not substantially damage scenic resources.	No Impact	None required.	n/a
IMPACT 4.3-8 (Cow Creek): The Proposed Project would not substantially degrade the existing visual character or quality of the site and its surroundings.	Less than Significant	None required.	n/a
IMPACT 4.3-9 (Cow Creek): The Proposed Project would not introduce a substantial source of light or glare into the viewshed.	No Impact	None required.	n/a
IMPACT 4.3-10 (Cow Creek): The Proposed Project would not conflict with adopted visual resource policies.	No Impact	None required.	n/a
Agriculture and Forestry Resources			
IMPACT 4.4-1 (Kilarc): The Proposed Project would not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use.	No Impact	None required.	n/a
IMPACT 4.4-2 (Kilarc): The Proposed Project would not conflict with existing zoning for agricultural use, or a Williamson Act contract.	No Impact	None required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.4-3 (Kilarc): The Proposed Project would not conflict with existing zoning for, or cause rezoning of, forest land or timberland.	No Impact	None required	n/a
IMPACT 4.4-4 (Kilarc): The Proposed Project could result in the loss of forest land or conversion of forest land to non-forest use.	Less than Significant	No additional mitigation is required	n/a
IMPACT 4.4-5 (Kilarc): The Proposed Project would not involve other changes in the existing environment which could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use.	No Impact	None required	n/a
IMPACT 4.4-6 (Cow Creek): The Proposed Project would convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use.	Significant and Unavoidable	None available	Significant[2]
IMPACT 4.4-7 (Cow Creek): The Proposed Project would conflict with existing zoning	Significant and Unavoidable	None available	Significant[3]

[2] Implementation of Alternatives 2A, 2B, 2C, or 2D would avoid the loss of farmlands owned or operated by the ADU, and therefore would not indirectly convert farmland to non-agricultural use. As compared to the Proposed Project, the significant impact would be lessened to no impact under these alternatives.

[3] Implementation of Alternatives 2A, 2B, 2C, or 2D would avoid the loss of farmlands owned or operated by the ADU, and therefore would not indirectly convert farmland to non-agricultural use. As compared to the Proposed Project, the significant impact would be lessened to no impact under these alternatives.

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
for agricultural use, or a Williamson Act contract.			
IMPACT 4.4-8 (Cow Creek): The Proposed Project would not conflict with existing zoning for, or cause rezoning of, forest land or timberland.	No Impact	None required	n/a
IMPACT 4.4-9 (Cow Creek): The Proposed Project would not result in the loss of forest land or conversion of forest land to non-forest use.	No Impact	None required	n/a
IMPACT 4.4-10 (Cow Creek): The Proposed Project would involve other changes in the existing environment which could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use.	Significant and Unavoidable	None available	Significant[4]
Air Quality			
IMPACT 4.5-1 (Kilarc): The Proposed Project would not conflict with or obstruct implementation of the applicable air quality plan.	No Impact	None required	n/a

[4] Implementation of Alternatives 2A, 2B, 2C, or 2D would avoid the loss of farmlands owned or operated by the ADU, and therefore would not convert farmland to non-agricultural use. As compared to the Proposed Project, the significant impact would be lessened to no impact under these alternatives.

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.5-2 (Kilarc): The Proposed Project could violate an air quality standard or contribute substantially to an existing or projected air quality violation.	Less than Significant	None required	n/a
IMPACT 4.5-3 (Kilarc): The Proposed Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).	Less than Significant	None required	n/a
IMPACT 4.5-4 (Kilarc): The Proposed Project would not expose sensitive receptors to substantial pollutant concentrations.	Less than Significant	None required	n/a
IMPACT 4.5-5 (Kilarc): The Proposed Project would not create objectionable odors affecting a substantial number of people.	No Impact	None required	n/a
IMPACT 4.5-6 (Cow Creek): The Proposed Project would not conflict with or obstruct implementation of the applicable air quality plan.	No Impact	None required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.5-7 (Cow Creek): The Proposed Project could violate an air quality standard or contribute substantially to an existing or projected air quality violation.	Less than Significant	None required	n/a
IMPACT 4.5-8 (Cow Creek): The Proposed Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).	Less than Significant	None required	n/a
IMPACT 4.5-9 (Cow Creek): The Proposed Project would not expose sensitive receptors to substantial pollutant concentrations.	Less than Significant	None required	n/a
IMPACT 4.5-10 (Cow Creek): The Proposed Project would not create objectionable odors affecting a substantial number of people.	No Impact	None required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Aquatic and Fisheries Resources			
IMPACT 4.6-1 (Kilarc): The Proposed Project would improve spawning habitat for native fish species.	No Impact (Beneficial)	None required	n/a
IMPACT 4.6-2 (Kilarc): The Proposed Project would improve migration conditions for native fish species.	No Impact (Beneficial)	None required	n/a
IMPACT 4.6-3 (Kilarc): The Proposed Project would improve rearing conditions for native fish species.	No Impact (Beneficial)	None required	n/a
IMPACT 4.6-4 (Kilarc): Construction-related water quality impacts would not result in adverse effects on fisheries resources.	Less than Significant	No additional mitigation is required	n/a
IMPACT 4.6-5 (Kilarc): The Proposed Project would not conflict with local policies protecting fisheries resources.	No Impact	No additional mitigation is required	n/a
IMPACT 4.6-6 (Cow Creek): The Proposed Project would not result in adverse effects on spawning habitat for native fish species.	Less than Significant	No additional mitigation is required	n/a
IMPACT 4.6-7 (Cow Creek): The Proposed Project would improve migration conditions for native fish species.	No Impact (Beneficial)	None required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.6-8 (Cow Creek): The Proposed Project would improve rearing conditions for native fish species.	No Impact (Beneficial)	None required	n/a
IMPACT 4.6-9 (Cow Creek): Construction-related water quality impacts would not result in adverse effects on native fish in the Cow Creek Development.	Less than Significant	No additional mitigation is required	n/a
IMPACT 4.6-10 (Cow Creek): The Proposed Project would not conflict with local policies protecting fisheries resources.	Less than Significant	No additional mitigation is required	n/a
Terrestrial Biological Resources			
IMPACT 4.7-1 (Kilarc): The Proposed Project would result in impacts on upland habitats.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.7-2 (Kilarc): The Proposed Project would result in impacts on wetlands and riparian habitats.	Less than Significant	No additional mitigation is required	n/a
IMPACT 4.7-3 (Kilarc): The Proposed Project would result in impacts on special-status plant species.	Less than Significant	No additional mitigation is required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.7-4 (Kilarc): The Proposed Project would influence the spread of invasive/noxious plants.	Significant	**Mitigation Measure 4.7-4:** The following shall be included in Protection, Mitigation and Enhancement Measure BOTA-1: Clean Equipment and Establish Weed Wash Stations. ▪ All contractor equipment previously used on non-paved surfaces outside of the watershed will be thoroughly cleaned before entering the Project area. The Licensee will ensure that heavy equipment is free of material that may contain seeds of noxious weeds prior to leaving an area infested with weeds. All heavy equipment will be inspected for weed seeds stuck in tire treads or mud on the vehicle. The Licensee will designate appropriate cleaning sites, and all such equipment will be cleaned (power or high-pressure cleaning) before entering weed-free areas.	Less than Significant
IMPACT 4.7-5 (Kilarc): The Proposed Project would result in impacts on birds and mammals.	Less than Significant	No additional mitigation is required	n/a
IMPACT 4.7-6 (Kilarc): The Proposed Project, specifically dewatering of canals, forebays, and related watercourses would result in impacts on amphibians and pond turtles.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.7-7 (Kilarc): The Proposed Project would result in impacts on rare, threatened, and endangered terrestrial species.	Less than Significant	No additional mitigation is required	n/a
IMPACT 4.7-8 (Cow Creek): The Proposed Project would result in impacts on upland habitats.	Less than Significant	No additional mitigation required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.7-9 (Cow Creek): The Proposed Project would result in impacts on wetlands and riparian habitats.	Significant	**Mitigation Measure 4.7-9:** Prior to commencing activities that will reduce augmented flows in Hooten Gulch, PG&E shall complete a delineation of all potentially jurisdictional aquatic features in areas to be directly impacted by changes to the amount of water flowing in the Abbott Ditch. The delineation shall address all features potentially jurisdictional to waters of the United States or waters of the state, including wetlands or riparian areas. PG&E shall, as early as possible, identify and communicate its process to the affected private land owners. To ensure "no-net-loss" of wetlands, PG&E shall prepare, in accordance with applicable agency guidelines and requirements, compensation/mitigation measures for the preservation and/or creation of wetlands and/or purchase of credits at an approved mitigation bank or payment into an in lieu fee program with the final wetland mitigation ratios approved by the applicable resource agencies. An approved monitoring program will be implemented by PG&E to ensure the success of compensation/mitigation areas.	Less than Significant
IMPACT 4.7-10 (Cow Creek): The Proposed Project would result in impacts on special-status plant species.	Significant	**Mitigation Measure 4.7-10:** Prior to commencing activities that will reduce augmented flows in Hooten Gulch, PG&E shall complete a survey for special-status species in areas to be directly impacted by changes to the amount of water flowing in the Abbott Ditch. PG&E shall capture and relocate to suitable habitat any individuals of these species observed in the surveyed area. PG&E shall consult with USFWS and CDFW as appropriate for capture and relocation efforts. PG&E shall, as early as possible, identify and communicate its process to the affected private land owners.	Less than Significant
IMPACT 4.7-11 (Cow Creek): The Proposed Project would influence the spread of invasive/noxious plants.	Significant	**Mitigation Measure 4.7-11:** Implement Mitigation Measure 4.7-4. Clean Equipment and Establish Weed Wash Stations.	Less than Significant
IMPACT 4.7-12 (Cow Creek): The Proposed Project would result in impacts on birds and mammals.	Significant	**Mitigation Measure 4.7-12:** Implement Mitigation Measures 4.7-9 and 4.7-10.	Less than Significant
IMPACT 4.7-13 (Cow): The Proposed Project, specifically dewatering of canals, forebays, and	Significant	**Mitigation Measure 4.7-12:** Implement Mitigation Measures 4.7-9 and 4.7-10.	Less than Significant

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
related watercourses would result in impacts on amphibians and pond turtles.			
IMPACT 4.7-14 (Cow Creek): The Proposed Project would result in impacts on rare, threatened, and endangered terrestrial species.	Significant	**Mitigation Measure 4.7-12:** Implement Mitigation Measures 4.7-9 and 4.7-10.	Less than Significant
Cultural Resources			
IMPACT 4.8-1 (Kilarc): The Proposed Project could result in adverse effects to unidentified cultural and paleontological resources due to ground disturbing activities.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.8-2 (Kilarc): The Proposed Project could result in impacts to known cultural resources.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.8-3 (Kilarc): The Proposed Project could result in impacts to known cultural resources considered eligible for the NRHP and/or CRHR.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.8-4 (Cow Creek): The Proposed Project could impact unidentified cultural and paleontological resources due to ground disturbing activities.	Less than Significant	No additional mitigation required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.8-5 (Cow Creek): The Proposed Project could impact known cultural resources.	Less than Significant	No additional mitigation is required	n/a
IMPACT 4.8-6 (Cow Creek): The Proposed Project could impact known cultural resources considered eligible for the NRHP and/or CRHR.	Less than Significant	No additional mitigation is required	n/a
Geology and Soils			
IMPACT 4.9-1 (Kilarc): The Proposed Project would not expose people and structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, strong seismic ground shaking, ground failure, or landslides.	Less than Significant	No additional mitigation is required	n/a
IMPACT 4.9-2 (Kilarc): The Proposed Project would not result in substantial soil erosion or the loss of topsoil.	Less than Significant	No additional mitigation is required	n/a
IMPACT 4.9-3 (Kilarc): The Proposed Project would not result in potential hazards due to construction on expansive or otherwise unstable soils.	Less than Significant	No additional mitigation is required	n/a
IMPACT 4.9-4 (Cow Creek): The Proposed Project would	Less than Significant	No additional mitigation is required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
not expose people and structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, strong seismic ground shaking, ground failure, or landslides.			
IMPACT 4.9-5 (Cow Creek): The Proposed Project would not result in substantial soil erosion or the loss of topsoil.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.9-6 (Cow Creek): The Proposed Project would not result in potential hazards due to construction on expansive or otherwise unstable soils.	Less than Significant	No additional mitigation is required	n/a
Greenhouse Gas Emissions			
IMPACT 4.10-1 (Kilarc): The Proposed Project would result in short-term direct GHG Emissions.	Less than Significant	None required	n/a
IMPACT 4.10-2 (Kilarc): The Proposed Project would result in a short-term reduction of renewable energy production.	Less than Significant	None required	n/a
IMPACT 4.10-3 (Kilarc): Proposed Project would not conflict with Shasta County goals for reducing GHG emissions.	No Impact	None required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.10-4 (Kilarc): The Proposed Project would not result in changes to long-term direct GHG Emissions.	No Impact (Beneficial)	None required	n/a
IMPACT 4.10-5 (Cow Creek): The Proposed Project would result in changes in short-term direct GHG Emissions.	Less than Significant	None required	n/a
IMPACT 4.10-6 (Cow Creek): The Proposed Project would result in a short-term reduction of renewable energy production.	Less than Significant	Non required	n/a
IMPACT 4.10-7 (Cow Creek): The Proposed Project would not conflict with Shasta County goals for reducing GHG emissions.	No Impact	None required	n/a
IMPACT 4.10-8 (Cow Creek): The Proposed Project would result in changes to long-term direct GHG Emissions	No Impact (Beneficial)	None required	n/a
Hazards and Hazardous Materials			
IMPACT 4.11-1 (Kilarc): The Proposed Project would not create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the	Less than Significant	No additional mitigation is required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
release of hazardous materials into the environment.			
IMPACT 4.11-2 (Kilarc): The Proposed Project would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.11-3 (Kilarc): The Proposed Project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.11-4 (Kilarc): The Proposed Project would not expose people or structures to a significant risk of loss, injury or death involving wildland fires.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.11-5 (Cow Creek): The Proposed Project would not 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.	Less than Significant	No additional mitigation required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.11-6 (Cow Creek): The Proposed Project would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.11-7 (Cow Creek): The Proposed Project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.11-8 (Cow Creek): The Proposed Project would not expose people or structures to a significant risk of loss, injury or death involving wildland fires.	Less than Significant	No additional mitigation required	n/a
Hydrology and Geomorphology			
IMPACT 4.12-1 (Kilarc): The Proposed Project would re-establish a natural streamflow regime in the bypassed reach of Old Cow Creek.	No Impact (Beneficial)	None required	n/a
IMPACT 4.12-2 (Kilarc): The Proposed Project would result in channel adjustments to removal of	Less than Significant	No additional mitigation required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
diversion dams and changes in streamflow.			
IMPACT 4.12-3 (Kilarc): The Proposed Project would modify surface hydrology and drainage patterns along decommissioned canal routes and retired road segments.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.12-4 (Kilarc): The Proposed Project would result in the dewatering of the Kilarc Forebay.	Less than Significant	None required	n/a
IMPACT 4.12-5 (Kilarc): The Proposed Project would result in beneficial changes in groundwater recharge.	No Impact (Beneficial)	None required	n/a
IMPACT 4.12-6 (Kilarc): The Proposed Project would result in temporary dewatering and bypassing of surface flows during decommissioning activities.	Less than Significant	None required	n/a
IMPACT 4.12-7 (Cow Creek): The Proposed Project would re-establish a natural streamflow regime in bypassed reach of South Cow Creek.	Less than Significant	None required	n/a
IMPACT 4.12-8 (Cow Creek): The Proposed Project would re-establish a natural streamflow regime in	Less than Significant	None required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
the augmented segment of Hooten Gulch.			
IMPACT 4.12-9 (Cow Creek): The Proposed Project would result in channel adjustments to removal of diversion dams and changes in streamflow.	Less than Significant	No additional mitigation is required	n/a
IMPACT 4.12-10 (Cow Creek): The Proposed Project would result in modified surface hydrology and drainage patterns along decommissioned canal routes and retired road segments.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.12-11 (Cow Creek): The Proposed Project would result in dewatering of the Cow Creek Forebay.	Less than Significant	None required	n/a
IMPACT 4.12-12 (Cow Creek): The Proposed Project would result in beneficial changes in groundwater recharge.	No Impact (Beneficial)	None required	n/a
IMPACT 4.12-13 (Cow Creek): The Proposed Project would result in temporary dewatering and bypassing of surface flows during decommissioning activities.	Less than Significant	No additional mitigation required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Water Quality			
IMPACT 4.13-1 (Kilarc): Excavation and decommissioning of the Kilarc Development canals and tailraces could degrade the quality of receiving water bodies.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.13-2 (Kilarc): The Proposed Project would not substantially degrade water quality during decommissioning related to dam diversion structures.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.13-3 (Kilarc): The Proposed Project would not substantially degrade water quality during decommissioning activities from fuel releases.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.13-4 (Kilarc): The Proposed Project would not alter the existing drainage pattern of the site or area in a manner which would result in substantial erosion or siltation on- or off-site.	Less than Significant	None required	n/a
IMPACT 4.13-5 (Kilarc): The Proposed Project would not create or contribute runoff water would exceed the capacity of existing or planned storm water drainage systems.	No Impact	None required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.13-6 (Cow Creek): Excavation and decommissioning of the Cow Creek Development canals and tailraces could degrade the quality of receiving water bodies.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.13-7 (Cow Creek): Proposed Project would not substantially degrade water quality during decommissioning related to dam diversion structures.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.13-8 (Cow Creek): The Proposed Project would not substantially degrade water quality during decommissioning activities from fuel releases.	Less than Significant	No additional mitigation required	n/a
IMPACT 4.13-9 (Cow Creek): The Proposed Project would not alter the existing drainage pattern of the site or area in a manner which would result in substantial erosion or siltation on- or off-site.	Less than Significant	None required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.13-10 (Cow Creek): The Proposed Project would not create or contribute runoff water would exceed the capacity of existing or planned storm water drainage systems or provided substantial addition sources of polluted runoff.	No Impact	None required	n/a
Land Use and Planning			
IMPACT 4.14-1 (Kilarc): The Proposed Project would not physically divide an established community.	No Impact	None required	n/a
IMPACT 4.14-2 (Kilarc): The Proposed Project would not conflict with any applicable land use plan, policy, or regulation, including conflicts resulting from changes in land ownership and/or existing land uses.	Less than Significant	None required	n/a
IMPACT 4.14-3 (Kilarc): The Proposed Project would not conflict with any applicable habitat conservation plan or natural community conservation plan.	No Impact	None required	n/a
IMPACT 4.14-4 (Cow Creek): The Proposed Project would not physically divide an established community.	No Impact	None required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.14-5 (Cow Creek): The Proposed Project would not conflict with any applicable land use plan, policy, or regulation, including conflicts resulting from changes in land ownership and/or existing land uses.	Less than Significant	None required	n/a
IMPACT 4.14-6 (Cow Creek): The Proposed Project would not conflict with any applicable habitat conservation plan or natural community conservation plan.	No Impact	None required	n/a
Noise			
IMPACT 4.15-1 (Kilarc): The Proposed Project would not expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.	Less than Significant	None required	n/a
IMPACT 4.15-2 (Kilarc): The Proposed Project would not expose persons to or generate excessive ground borne vibration or ground borne noise levels.	No Impact	None required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.15-3 (Kilarc): The Proposed Project would not result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.	No Impact	None required	n/a
IMPACT 4.15-4 (Kilarc): The Proposed Project would not result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.	Less than Significant	None required	n/a
IMPACT 4.15-5 (Cow Creek): The Proposed Project would not expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.	Less than Significant	None required	n/a
IMPACT 4.15-6 (Cow Creek): The Proposed Project would not expose persons to or generate excessive ground borne vibration or ground borne noise levels.	No Impact	None required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.15-7 (Cow Creek): The Proposed Project would not result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.	No Impact	None required	n/a
IMPACT 4.15-8 (Cow Creek): The Proposed Project would not result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.	Less than Significant	None required	n/a
Recreation			
IMPACT 4.16-1 (Kilarc): The Proposed Project would physically degrade or diminish existing recreational resources.	Significant and Unavoidable	None available. Given the unique characteristics of the Kilarc Forebay and associated recreational facilities, implementation of Proposed Project would result in a significant and unavoidable impact on recreational resources.	Significant and Unavoidable
IMPACT 4.16-2 (Kilarc): The Proposed Project would not increase use at existing regional recreational facilities such that substantial physical deterioration would occur or be accelerated.	Less than Significant	None required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.16-3 (Kilarc): The Proposed Project would not require the construction or expansion of recreational facilities.	No Impact	None required	n/a
Transportation and Traffic			
IMPACT 4.17-1 (Kilarc): The Proposed Project would not create a substantial increase in traffic along major roadways in the area during decommissioning activities.	Less than Significant	None required	n/a
IMPACT 4.17-2 (Kilarc): The Proposed Project would not impede traffic access to the area and residences during decommissioning.	Less than Significant	None required	n/a
IMPACT 4.17-3 (Kilarc): The Proposed Project would not result in inadequate emergency access.	Less than Significant	None required	n/a
IMPACT 4.17-4 (Kilarc): The Proposed Project would not conflict with any applicable plans or policies related to transportation and alternative transportation facilities.	Less than Significant	None required	n/a

Impact	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
IMPACT 4.17-5 (Cow Creek): The Proposed Project would not create a substantial increase in traffic along major roadways in the area during decommissioning activities.	Less than Significant	None required	n/a
IMPACT 4.17-6 Project would not impede traffic access to the area and residences during decommissioning.	Less than Significant	None required	n/a
IMPACT 4.17-7 (Cow Creek): The Proposed Project would not result inadequate emergency access.	Less than Significant	None required	n/a
IMPACT 4.17-8 (Cow Creek): The Proposed Project would not conflict with any applicable plans or policies related to transportation and alternative transportation facilities.	Less than Significant	None required	n/a

This Page Intentionally Left Blank

Chapter 1 Introduction

This chapter discusses the legal authority and purpose of the Environmental Impact Report (EIR), explains the intended uses of the EIR, provides an overview of the California Environmental Quality Act (CEQA)[5] process, defines terminology used in the analysis, and outlines the organization of the EIR. This chapter also includes a summary of the scoping process and identifies key issues of concern.

The State Water Resources Control Board (State Water Board or SWRCB) has prepared this Draft EIR for the Kilarc-Cow Creek Hydroelectric Project License Surrender (Proposed Project). The State Water Board is exercising its discretionary Clean Water Act (CWA)[6] Section 401[7] water quality certification authority and is the CEQA lead agency for the Proposed Project. Section 401 requires every applicant for a federal license or permit that may result in a discharge into navigable waters provide the federal licensing or permitting agency with certification that the project would be in compliance with specified provisions of the CWA. Section 401 provides that conditions of certification shall become conditions of any federal license or permit for the project. A federal agency cannot issue a permit or license for an activity that may result in a discharge to waters of the United States until the state where the discharge would originate has granted or waived certification.

The Proposed Project is located in the Cow Creek Watershed in Shasta County, California (Figures 1-1 and 1-2). The State Water Board has a website for documents related to this Proposed Project at:

- https://www.waterboards.ca.gov/waterrights/water_issues/programs/water_quality_cert/kilarc_cow/.

The Kilarc-Cow Creek Hydroelectric Project (Project) is owned by the Pacific Gas and Electric Company (PG&E) and is licensed by the Federal Energy Regulatory Commission (FERC), designated as FERC Project No. 606. The existing license expired on March 27, 2007, and the Project continues to operate under an annual license. On March 13, 2009, PG&E filed a License Surrender Application (LSA) to surrender its license for the Project. In compliance with the National Environmental Policy Act (NEPA)[8], FERC prepared an Environmental Impact Statement (EIS). PG&E's LSA and FERC's EIS can be accessed at the respective web sites below:

- http://www.kilarc-cowcreek.com
- http://www.ferc.gov/industries/hydropower/enviro/eis/2011/08-16-11.asp

On August 18, 2009, PG&E originally applied to the State Water Board for a Section 401 water quality certification for the Proposed Project. The State Water Board must comply with CEQA

5 CEQA is codified at California Public Resources Code, Section 21000 et seq. See also CEQA Guidelines codified at California Code of Regulations, Title 14, Section 15000 et seq.

6 The CWA is codified at 33 United States Code (U.S.C.) Section 1251 et seq.

7 Section 401 of the CWA is codified at 33 U.S.C. Section 1341.

8 NEPA is codified at 42 U.S.C. Section 4321 et seq.

prior to issuing any certification for the Proposed Project. The State Water Board has prepared this Draft EIR.

1.1 Background

The State Water Board is the California agency responsible for water quality certification of any potential discharge from an activity that requires a FERC license or amendment (Wat. Code, § 13160; Cal. Code Regs., tit. 23, § 3855, subd. (b)). The issuance of a Section 401 certification is a discretionary action. On March 12, 2013, the State Water Board issued a Notice of Preparation (NOP) stating that an EIR would be prepared for the Proposed Project. A copy of the NOP is included in Appendix A of this Draft EIR.

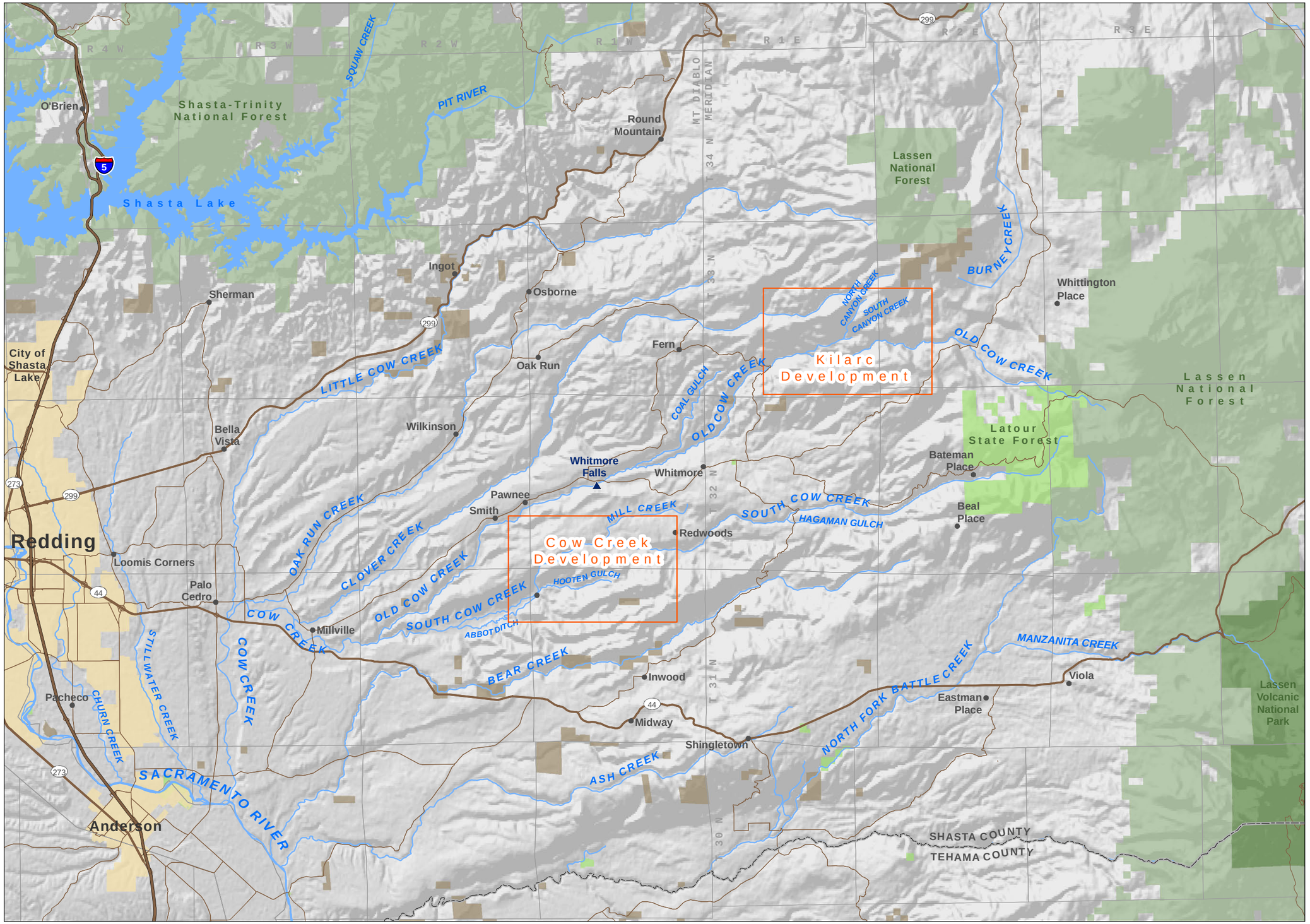
Under the provisions of the CWA, a Section 401 certification for the Proposed Project may be issued if the State Water Board determines that the decommissioning of the Project would comply with specified provisions of the CWA, including water quality standards and implementation plans. The State Water Board will determine whether the Proposed Project adequately protects the beneficial uses and meets the water quality objectives for water bodies in the Project Area, as defined in the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan). Additional information concerning the Basin Plan and designated beneficial uses for these two water bodies and their tributaries is available at the following web site:

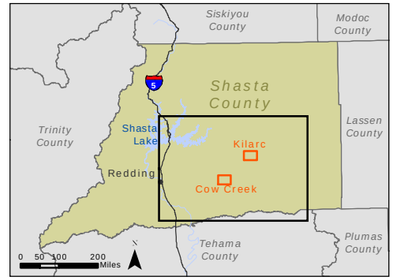
- https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/#basinplans.

On September 16, 2009, FERC issued a public notice of scoping meetings and environmental site reviews to assist it in identifying the scope of the environmental issues that should be analyzed in the NEPA document. FERC held the scoping meetings and environmental site reviews from October 19 to 22, 2009. FERC staff issued a Notice of Intent (NOI) to prepare an EIS on February 19, 2010. FERC issued a draft EIS on June 22, 2010 that described and evaluated the probable effects, including site-specific and cumulative effects, of PG&E's Proposed Action and identified its reasonable alternatives to the Proposed Action. FERC issued the final EIS on August 16, 2011, recommending the license be surrendered as proposed with the addition of a few FERC staff alternatives.

1.1.1 Use of FERC's EIS

CEQA Guidelines state that when federal review of a project is also required, state agencies are encouraged to integrate the two processes to the fullest extent possible, which may include a joint EIS/EIR. While the FERC EIS was not a joint EIS/EIR, the State Water Board may use this document, as appropriate, to satisfy its responsibilities under CEQA. According to section 15225(a) of the CEQA Guidelines, where the federal agency circulated the EIS as broadly as state or local law requires and gave notice that meets California requirements, the CEQA lead agency may use the EIS without recirculation. The State Water Board is not using FERC's 2011 EIS in the place of an EIR but has incorporated and referenced the EIS throughout this EIR.





▲ Whitmore Falls
Stream
Major Road
Interstate Highway
State Highway
BLM Lands
National Park
National Forest
State Lands
Incorporated City
County Boundary
Township Boundary

N

0 0.5 1 2 3 4 Mi
0 1 2 4 6 Km

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure 1-1
Kilarc-Cow Creek
Hydroelectric
Project Vicinity

Date: 7/1/2013 Document Path: T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\Fig1_KC_ProjectVicinity.mxd

This Page Intentionally Left Blank

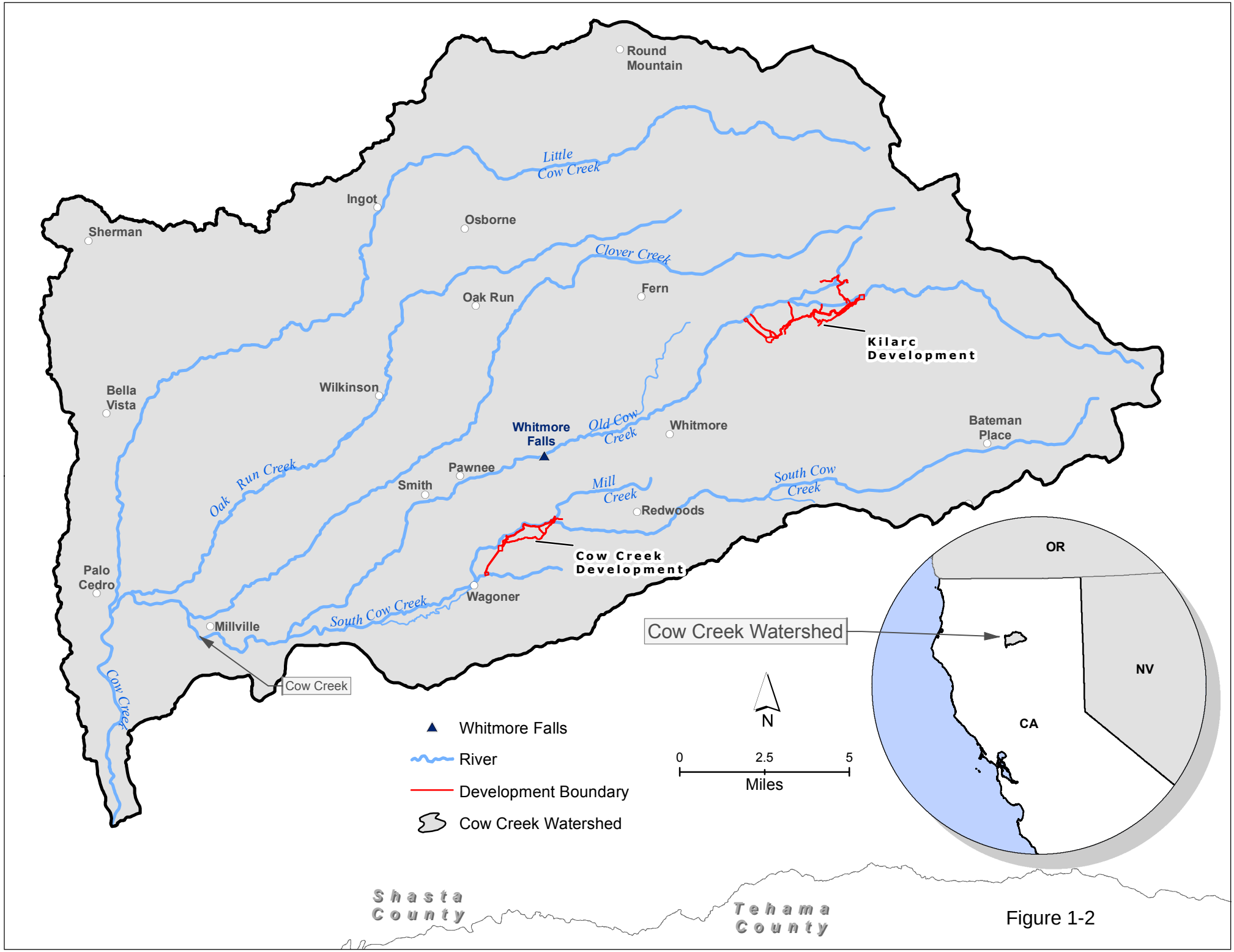

Round Mountain
Little Cow Creek
Ingot
Osborne
Sherman
Clover Creek
Oak Run
Fern
Kilarc Development
Bella Vista
Wilkinson
Whitmore Falls
Old Cow Creek
Whitmore
Bateman Place
Oak Run Creek
Pawnee
Smith
Mill Creek
South Cow Creek
Redwoods
Cow Creek Development
Palo Cedro
Wagoner
South Cow Creek
Millville
Cow Creek
Cow Creek
Cow Creek Watershed
OR
NV
CA
N
0
2.5
5
Miles
Whitmore Falls
River
Development Boundary
Cow Creek Watershed
Shasta County
Tehama County

Figure 1-2

This Page Intentionally Left Blank

1.2 Existing Kilarc-Cow Creek Hydroelectric Project Facilities

As part of the license surrender process, PG&E proposes to decommission and generally remove the Project facilities as described in PG&E's 2009 Proposed Decommissioning Plan (PDP), which is part of the LSA and is included in its entirety in Appendix B-2 of this EIR.

As described by PG&E, the Project consists of two developments (Figure 1-3) constructed between 1904 and 1907: the Kilarc Development on Old Cow Creek and the Cow Creek Development on South Cow Creek, which are described in further detail below. Old Cow Creek and South Cow Creek are part of the Cow Creek Watershed. Old Cow Creek is a tributary to South Cow Creek and South Cow Creek is a tributary Cow Creek. Cow Creek drains to the Sacramento River. The Kilarc Development diverts water from North and South Canyon Creeks and Old Cow Creek. The Cow Creek Development diverts water from Mill Creek and South Cow Creek. The water is diverted for generating power through a canal system to the Kilarc and Cow Creek Forebays, where penstocks direct the water to the Kilarc and Cow Creek powerhouses.

The Kilarc Development consist of the following features, described in further detail in Section 2.5, Existing Project Facilities and Operations: North Canyon Creek Diversion Dam and Canal; South Canyon Creek Diversion Dam and Canal; South Canyon Creek Siphon; Kilarc Main Canal Diversion Dam and Kilarc Main Canal (including tunnel, elevated flumes and spillways); Kilarc Forebay and Forebay Dam; Kilarc Penstock; Kilarc Powerhouse and Switchyard; and Kilarc Access Roads.

The Cow Creek Development consists of the following features, described in further detail in Section 2.5, Existing Project Facilities and Operations: Mill Creek Diversion; Mill Creek-South Cow Creek Canal; South Cow Creek Diversion Dam and appurtenant structures; South Cow Creek Main Canal (including tunnel and spillways); Cow Creek Forebay Dam and Forebay; Cow Creek Penstock; Cow Creek Powerhouse and Switchyard; and Cow Creek Access Roads.

1.2.1 Project Area

The Proposed Project is located in Shasta County, California, about 30 miles east of the city of Redding, near the community of Whitmore (see Figure 1-1). The Project occupies property owned by PG&E, or property for which PG&E holds easements on private lands. A total of 184.32 acres of land are within the FERC project boundary, referred to herein as the Project Area. Of this total, approximately 109.69 acres are owned by PG&E, approximately 72.76 acres are owned by private landowners, and 1.87 acres are held in trust by the United States under the jurisdiction of the Bureau of Indian Affairs (BIA) for which PG&E holds an easement for project purposes. Land adjacent to the Project is privately owned, and access to many of the Project features is gained via easements over private roads and property. Much of the Kilarc Development is surrounded by property owned by Sierra Pacific Industries. Property adjacent to the Cow Creek Development has a number of private owners, including several large ranches.

1.2.2 Water Rights

According to PG&E (2009, LSA Volume 1, Exhibit E) and Shasta County Superior Court records, PG&E holds four pre-1914 water rights in the Old Cow Creek watershed. Three primary water rights are for non-consumptive use for power generation at the Kilarc Powerhouse: a right to divert 2.5 cubic feet per second (cfs) from North Canyon Creek into the North Canyon Creek Canal; a right to divert 7.5 cfs from South Canyon Creek into the South Canyon Creek Canal;

and a right to divert 58 cfs from Old Cow Creek into the Kilarc Main Canal. However, the North Canyon Creek and South Canyon Creek diversions have reportedly not been operated in over 15 years, in part, because of the requirement to meet others' senior downstream water rights on South Canyon Creek. An additional remaining water right (.01 cfs) is for domestic use at the Kilarc Powerhouse.

According to PG&E and Shasta County Superior Court records, PG&E also holds two pre-1914 water rights in the South Cow Creek watershed, for the Cow Creek Development. Both rights are for the non-consumptive use for power generation at the Cow Creek Powerhouse: a right to divert 12.10 cfs from Mill Creek into the Mill Creek Canal and a right to divert 45.9 cfs from South Cow Creek into the South Cow Creek Main Canal.

PG&E is also an individual shareholder in the South Cow Creek Ditch Association and is thereby entitled to divert 1.44 cfs from South Cow Creek via the German Ditch, for discharge into Mill Creek and rediversion into the Mill Creek Canal, and to divert an additional 2 cfs from South Cow Creek into the South Cow Creek Main Canal.

The water rights for both Old Cow Creek and South Cow Creek were adjudicated in 1969. (*In the Matter of the Determination of the Rights of the Various Claimaints to the Water of Cow Creek Stream System, Excepting Clover Creek, Oak Run Creek, and North Cow Creek, in Shasta County, California* [Super. Ct. Shasta County, 1969, Decree No. 38577] [Decree].) The Shasta County Superior Court has ongoing jurisdiction to administer the water rights under the Decree. There currently is no watermaster service for the adjudication. PG&E currently proposes to dispose of its water rights in the Old Cow Creek and South Cow Creek watersheds by abandoning them upon receipt of FERC's final order approving decommissioning of the Project. PG&E has also stated its intent to divest its shares in, and its proportional ownership of South Cow Creek water rights held by, the South Cow Creek Ditch Association.

1.3 Overview of CEQA Requirements

CEQA requires all state and local government agencies to consider the environmental consequences of projects over which they have discretionary authority before taking action on those projects. The lead agency, the public agency with principal decision-making responsibility and authority for carrying out or approving a project, must first assess whether the proposed project would result in significant environmental impacts. If the project could result in significant environmental impacts, CEQA requires that the agency prepare an EIR, analyzing both the proposed project and a range of feasible alternatives.

As described in the CEQA Guidelines, section 15121(a), an EIR is a public information document that assesses potential environmental effects of a proposed project as well as identifies mitigation measures and alternatives to the project that could reduce or avoid adverse environmental impacts. Other key requirements include developing a plan for implementing and monitoring the success of the identified mitigation measures, and carrying out specific noticing and distribution steps to facilitate public involvement in the environmental review process.

1.3.1 Scope and Intent of the Document

The intent of this Draft EIR is to enable the State Water Board and other responsible agencies and interested parties to understand the potential environmental effects of the Proposed Project. The Draft EIR is expected to be used for the following purposes:

- To disclose to the public, decision-makers, elected officials and other stakeholders the potential environmental effects associated with implementation of the Proposed Project, and to solicit input on the potential environmental effects
- To identify ways to avoid or minimize potential environmental effects of the Proposed Project, including alternatives
- To provide the State Water Board with a technically and legally adequate environmental document to be used as one basis for their decision-making process for the proposed water quality certification
- To provide responsible and trustee regulatory agencies with information necessary to evaluate Proposed Project permitting requirements

South Cow Creek Main Canal

Forebay

Penstock

Cow Creek Powerhouse

Kilarc Development

Whitmore Falls

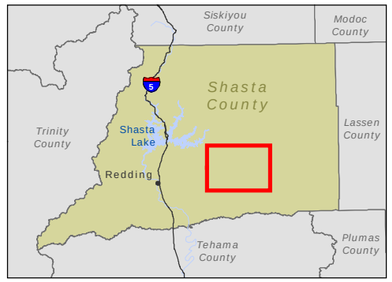
Cow Creek Development

Kilarc Powerhouse

Kilarc Main Canal

Penstock

Forebay



- Miscellaneous Feature
- PG&E Facility
- Unimproved Road (in FERC boundary)
- Canal
- Penstock
- Siphon
- Spillway
- FERC Boundary

N

0 0.25 0.5 1 1.5 2 Mi

0 0.5 1 2 3 Km

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure 1-3
Kilarc-Cow Creek
Hydroelectric
Project Area

Date: 7/1/2013 Document Path: T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\Fig2_KC_ProjectArea.mxd

This Page Intentionally Left Blank

A detailed project description, schedule, and list of agencies expected to use this Draft EIR for subsequent permits and approvals for the Proposed Project are presented in Chapter 2, Project Description.

1.3.2 Type of EIR: Project EIR

This Draft EIR is a project EIR prepared in accordance with section 15161 of the CEQA Guidelines. The project EIR provides a project-specific analysis of the physical changes in the environment that would result from implementation of the project. An EIR must examine all phases of the project including planning, construction, and operation.

1.4 Public Involvement

CEQA mandates two periods during the EIR process when public and agency input on the environmental impacts of the Proposed Project are solicited: during the circulation of the NOP for an EIR and during the review period for the Draft EIR itself. Brief descriptions of these milestones are provided below, as they apply to this document.

1.4.1 Scoping and NOP Comments

In accordance with section 15082 of the CEQA Guidelines, the State Water Board circulated a NOP for the Proposed Project on March 12, 2013. The NOP was distributed to the State Clearinghouse, agencies, and individuals. The NOP, included in Appendix A of this Draft EIR, provided a description of the Proposed Project, the location of Proposed Project activities, and the resources and environmental concerns to be analyzed in the EIR. The NOP also requested that comments on the content of the EIR and potential Proposed Project alternatives be submitted by April 22, 2013.

The State Water Board also conducted a CEQA scoping meeting to provide the public with the opportunity to provide input prior to the preparation of the Draft EIR, pursuant to CEQA Guidelines section 15083. Public notices of the NOP and scoping meeting were published in the East Valley Times (March 7th and 21st issues) and Redding Searchlight (March 12, 13, 16, 17, 23, 24, 30, 31, and April 6). The meeting took place on April 10, 2013 from 6:00 p.m. to 8:00 p.m. at the Millville Grange in Palo Cedro, California. Appendix A includes copies of the newspaper notices.

A scoping report, included in Appendix A, was prepared to summarize the written and oral comments received during the scoping period (March 12, 2013, through April 22, 2013). It provides a list of the commenting agencies and organizations, summarizes all the comments received on the NOP, and includes a matrix of comments received during the scoping period. The report also includes written responses to the NOP; other written comments submitted at the scoping meeting (full text) by public agencies, organizations, and individuals; and a full transcript of the oral comments received during the scoping meeting.

The State Water Board considered comments received during the NOP public review period in determining the scope and content of this Draft EIR.

1.4.2 Draft EIR Comment Period

Once a Draft EIR is ready for public circulation and review, the lead agency must issue a Notice of Availability (NOA) of the Draft EIR, providing agencies and the public formal notification that

the document is available for review. The notice is sent to all responsible and trustee agencies, any person or organization requesting a copy, and the county clerk's office for posting. The notice must also be published in a general-circulation newspaper, posted on and off the project site, or directly mailed to residents of properties adjacent to the project site. CEQA then requires a minimum 45-day public review period for Draft EIRs submitted to the State Clearinghouse, during which the lead agency receives and collates public and agency comments on the project and the document.

The State Water Board is now circulating this Draft EIR for a 45-day public review and comment period. The purpose of public circulation is to provide agencies and interested individuals with the opportunity to comment on the contents of the Draft EIR. For those interested, written comments or questions concerning this Draft EIR should be submitted no later than 12:00 pm (noon) on May 24, 2019 and directed to the name and address listed below. Submittal of written comments via e-mail is also acceptable and appreciated to save paper.

Ms. Michelle Siebal
State Water Resources Control Board
Water Quality Certification Unit
P.O. Box 2000
Sacramento, CA 95812-2000
Phone: (916) 322-8465
Fax: (916) 341-5400
Email: WR401Program@waterboards.ca.gov

1.4.3 Preparation of the Final EIR

The lead agency must consider comments it receives on the Draft EIR, "if those comments are received within the public review period." (Pub. Resources Code, § 21091, subd. (d)(1).) The lead agency must also provide a written response describing the disposition of each significant environmental issue that is raised by commenters. (Pub. Resources Code, § 21091, subd. (d)(2)(B).) The Final EIR must include a list of all persons, organizations, and public agencies that provided comments on the Draft EIR and must contain the comments and recommendations received on the Draft EIR, either verbatim or in summary, along with the lead agency's response to significant environmental points raised in the review and consultation process.

If significant impacts are identified by the EIR that cannot be mitigated, a statement of overriding considerations must be included in the record of approval and mentioned in the notice of determination (CEQA Guidelines, § 15093, subd. (c)).

1.5 Organization of the EIR

In accordance with sections 15120 to 15132 (article 9) of the CEQA Guidelines, the Draft EIR contains the following components:

- *Executive Summary* - provides a summary of the Proposed Project, a description of the issues of concern, Proposed Project alternatives, and a summary of environmental impacts.
- *Chapter 1, Introduction* - describes the background and purpose of the Project, as well as the organization of the EIR and its preparation, review and certification process.

- *Chapter 2, Project Description* - provides a more detailed description of the Proposed Project including: purpose and objectives; a brief description of the Project Area and facilities where the Proposed Project would be implemented; the proposed approach and activities; implementation and oversight; PG&E's proposed Protection, Mitigation and Enhancement (PM&E); and related permits and approvals.
- *Chapter 3, Alternatives Analysis* - describes the process through which alternatives to the Proposed Project were developed and screened; and evaluates their likely environmental impacts.
- *Chapter 4, Environmental Setting and Impact Analysis* - provides the existing conditions and environmental effects of the Proposed Project. This chapter begins with an introductory section which identifies resource areas determined not to be affected by the Proposed Project. Chapter 3 also includes subsections which describe existing environmental conditions and the Proposed Project's anticipated environmental impacts on environmental resources. The following resource topics are addressed in Chapter 4:
  - 4.1 Introduction to the Analysis
  - 4.2 Resource Areas Eliminated from Further Analysis
  - 4.3 Aesthetics and Visual Resources
  - 4.4 Agriculture and Forestry Resources
  - 4.5 Air Quality
  - 4.6 Aquatic and Fisheries Resources
  - 4.7 Terrestrial Biological Resources
  - 4.8 Cultural Resources
  - 4.9 Geology and Soils
  - 4.10 Greenhouse Gas Emissions
  - 4.11 Hazards and Hazardous Materials
  - 4.12 Hydrology and Geomorphology
  - 4.13 Water Quality
  - 4.14 Land Use and Planning
  - 4.15 Noise
  - 4.16 Recreation
  - 4.17 Transportation/Traffic

The above resource sections also identify mitigation strategies and measures to address (where feasible) all impacts evaluated as significant.

- *Chapter 5, Additional Discussion of Environmental Impacts* - addresses the Proposed Project's potential to contribute to cumulative impacts in the region. Chapter 5 outlines the Proposed Project's potential to induce growth, and identifies significant, irreversible environmental changes resulting from the Proposed Project. It also includes a

comparison of the impacts of Proposed Project to Alternatives and identifies the environmentally superior alternative.

- *Chapter 6, List of Preparers* - lists the individuals involved in preparing this EIR and their responsibilities.
- Appendix A Scoping Report
- Appendix B Background Materials
- Appendix C Visual Impact Report
- Appendix D Air Quality and Noise
- Appendix E Biological Species Lists
- Appendix F Accessibility/Recreational Assessment

1.6 Terminology

This Draft EIR uses the following terminology to describe environmental effects of the Proposed Project.

A finding of *no impact* is made when the analysis concludes that the Proposed Project would not affect the particular environmental resource or issue. A finding of *no impact* can also indicate there would be a *beneficial* effect of the Proposed Project if the analysis concludes that there would be a positive change in the environment. This conclusion would read as *No Impact (Beneficial)*.

An impact is considered *less than significant* if the analysis concludes that there would be no substantial adverse change in the environment.

An impact is considered *less than significant with mitigation* if the analysis concludes that there would be no substantial adverse change in the environment with the inclusion of the mitigation measures described.

An impact is considered *significant* if the analysis concludes that there could be a substantial adverse effect on the environment.

An impact is considered *significant and unavoidable* if the analysis concludes that there could be a substantial adverse effect on the environment and no feasible mitigation measures are available to reduce the impact to a less-than-significant level.

Mitigation refers to specific measures or activities adopted to avoid an impact, reduce its severity, or compensate for it.

A *cumulative* impact can result when a change in the environment results from the incremental impact of a project when added to other related past, present, or reasonably foreseeable future projects. Significant cumulative impacts may result from individually minor but collectively significant impacts.

This Page Intentionally Left Blank

Chapter 2 Project Description

This chapter presents the description of the proposed Kilarc-Cow Creek Hydroelectric Project License Surrender (Proposed Project), including California Environmental Quality Act (CEQA) objectives, location and boundaries of the Project site, existing facilities and Proposed Project activities. It also includes a list of the agencies that are expected to use the EIR in their decision making, and a list of permits, other approvals and consultation requirements required to implement the Proposed Project.

2.1 Background

The Kilarc-Cow Creek Hydroelectric Project (Project) is licensed by FERC, and is designated FERC Project No. 606. The existing license expired on March 27, 2007, and the Project continues to operate under an annual license. PG&E initially sought a new license for the Project, filing a Notice of Intent (NOI) to relicense with FERC in 2002. However, PG&E ultimately opted not to proceed with relicensing and instead filed a License Surrender Application (LSA) with FERC.

According to FERC documentation regarding the existing Project, the deadline to file applications to relicense the project was March 27, 2005. On March 31, 2005, PG&E notified FERC that it would not seek a new license for the project based on its determination that decommissioning the project was a viable and cost-effective alternative to relicensing. On April 7, 2005, FERC solicited applications from potential applicants other than PG&E, and there were no timely license applications filed.

2.2 March 2005 Agreement

In March 2005, PG&E entered into the Kilarc-Cow Creek Project Agreement (Agreement), signed by eight resource agencies and interested parties (included as Appendix B-1). Pursuant to the Agreement, PG&E agreed not to file an application for a new license by the statutory deadline of March 27, 2005, and instead agreed to support decommissioning of the Project (PG&E 2009, see Appendix B-2). The Agreement "identifies what the signatory parties believe are the subjects that would need to be addressed and the desired condition of each of these subjects after decommissioning." The Agreement identified 17 subject areas and included desired conditions for each subject area (PG&E 2005, see Appendix B-1).

According to PG&E, these desired conditions were considered in developing its Proposed Decommissioning Plan (PDP) (Appendix B-2), included in the LSA (Appendix B-3). PG&E also identified potential resource issues associated with decommissioning Project features. The desired conditions for decommissioning Project features are discussed below (PG&E 2009):

- Diversion Structures. With respect to the disposition of diversion structures, PG&E considered the following conditions: (1) safe, timely, and effective fish passage both upstream and downstream of the diversion; (2) a geomorphically stable stream channel above, below, and at the diversions; (3) retention of as much spawning gravel as possible in active channels during deconstruction activities; and (4) address safety issues for both the public and wildlife.

- Canals and Spillways. With respect to the disposition of canals and spillways (including waterways, tunnels, and flumes), PG&E considered the following conditions: (1) stable drainage of runoff to natural waterways, including safe, timely and effective fish passage; maintaining good water quality, and preventing contributions of sediment to drainages and streams; (2) preservation of riparian habitat during and after deconstruction wherever possible; (3) maintaining floodplain connectivity; and (4) addressing safety issues for both the public and wildlife.
- Forebays. With respect to the disposition of forebays, PG&E considered the following conditions: (1) maintain geomorphically stable sediment conditions; and (2) conduct appropriate fish and wildlife rescue and/or salvage prior to deconstruction activities.
- Penstocks. With respect to penstocks, PG&E considered the following condition: to address safety issues for both the public and wildlife.
- Powerhouses. With respect to the powerhouses, PG&E considered the following conditions: (1) address safety issues for both the public and wildlife; (2) preserve historical and/or cultural values; and (3) preserve options for future reuse of structures.
- Deconstruction Activities. More generally with respect to general decommissioning activities, PG&E considered the following conditions: (1) where practicable, prevent net loss in the health of riparian and aquatic habitat areas; (2) allow for natural revegetation; (3) schedule decommissioning activities to avoid adverse effects on fish and wildlife; (4) ensure minimal water quality impairment during deconstruction and immediately thereafter, including minimizing turbidity and deposition of settleable and suspended solids; and (5) conduct appropriate fish and wildlife rescue and/or salvage prior to deconstruction activities.

Once the statutory deadline passed for PG&E to file an application for a new license, FERC issued a public notice (March 7, 2005) inviting other entities to file NOIs to seek a new license for the Project. One entity[9] did so but failed to file an application for a new license by the December 27, 2006 deadline established by FERC. PG&E, as directed by FERC, began the process of preparing an LSA for the Project.

2.3 2014 Memorandum of Agreement With FERC and the State Historic Preservation Officer

As stated in FERC's EIS, PG&E requested concurrence from State Historic Preservation Officer (SHPO) on the evaluations and recommendations associated with the Proposed Project, by letter dated September 17, 2008, regarding the following: (1) the Kilarc and Cow Creek powerhouses are eligible for the National Register of Historic Places (National Register or NRHP); (2) the Kilarc and Cow Creek hydroelectric systems (canals, bridges, dams, flumes, siphons, tunnels, spillways, berms, forebays, and penstocks) are not eligible individually or as components of historic districts due to their lack of integrity; and (3) avoidance of the five unevaluated prehistoric sites is appropriate for the purposes of decommissioning the systems.

[9] Synergics Energy Development, Inc. (Synergics) filed an NOI on June 7, 2005. Synergics, however, failed to file an application for new license by the December 27, 2006 deadline established by FERC, and FERC denied Synergics' request to extend the deadline.

Concurrence with the evaluations, recommendations, and intent to develop a Memorandum of Agreement (MOA) for mitigation purposes was received from the SHPO by letter dated November 4, 2008. Additionally, FERC notified and solicited comments from the Advisory Council on Historic Preservation (ACHP), SHPO, and interested Indian tribes on PG&E's proposed measures contained in its filed application for surrender of the Project license and proposed MOA by letter dated March 22, 2010. In July 2011, the MOA was signed by FERC and sent to SHPO for concurrence. SHPO and PG&E signed the MOA in April 2014 (FERC 2014).

The 2014 MOA states the following:

Treatment of Historic Properties

1. *Take large-format Historic American Engineering Record (HAER) black and white photographs of the historic properties identified as the Kilarc and Cow Creek powerhouses, as mitigation for surrender. The photographs are to include general contextual views in their respective settings; close-up views of each elevation of both powerhouses; and detailed views of the powerhouses' historic architectural and engineering features, including their interior power generating equipment.*
2. *Process the above photographs using fine-grain black and white film for archival permanence. One 35-mm roll of film is to be developed into 5" x 7" prints on acid-free paper.*
3. *Prepare a report consisting of: (a) a written historical and descriptive account of the powerhouses, in accordance with the narrative format of the National Park Service's (NPS) guidelines for HAEIR documentation; (b) a site plan, drawn to a scale that fits on 81/2 x 11-inche paper, showing the powerhouses in relation to the other principal features of the project; (c) detailed copies of the original construction drawings of the powerhouses; and (d) one set of negatives and prints of the above powerhouse photographs and an index identifying each photograph by subject.*
4. *File with the Commission documentation that the SHPO has accepted the above final report.*
5. *Implement the plan in Appendix (A) of this MOA for the treatment of identified archaeological resources and for the treatment of any unanticipated discoveries.*

The following is excerpted from Appendix A of the MOA:

Training and Identification

Prior to the start of surrender activities, an archaeologist will train contractor supervisors on proper procedures for the protection of previously identified as well as those archaeological resources and human remains that may be unexpectedly discovered during surrender activities. The primary goals of the briefing are to familiarize key contractor personnel with the procedures to follow in the event of unanticipated discovery of cultural material or human remains and to provide contact protocol.

Unanticipated Discovery of Archaeological Resources or Human Remains

The following steps will be followed in the event that archaeological resources or human remains are discovered during construction.

1. *The contractor will stop work immediately in the vicinity of the find. The contractor will not resume work in the area of the find until Pacific Gas &Electric Company (PG&E) has complied with the provisions of this plan.*
2. *The contractor will immediately notify PG&E's on-site supervisor of the find*
3. *The PG&E supervisor will immediately notify PG&E's cultural resource specialist of the find.*
4. *The PG&E cultural resources specialist will determine if the find consists of archaeological resources or human remains, and will immediately notify the California SHPO and Native American Heritage Commission (NAHC) of the discovery.*

If the Find Consists of Archaeological Resources

The following procedures will be followed if the find is determined eligible or non-eligible for listing in the NRHP.

1. *If PG&E determines, in consultation with the SHPO, that the find is ineligible for listing in the NRHP, PG&E's cultural resource specialist will SHPO and will request the SHPO's approval to resume surrender activities in the discovery area.*
2. *If PG&E determines the find to be potentially eligible for listing in the NRHP, the following procedures will be followed:*

    a. *PG&E's cultural resource specialist will flag or fence off the site.*

    b. *PG&E's cultural resource specialist will assess the significance of the find and the potential effect(s) of construction on the find.*

    c. *PG&E's cultural resource specialist will consult with the SHPO, and any Native American Tribes that might attach religious or cultural importance to the find, to determine what steps need to be taken to assess the significance of the find and any potential effect(s) of surrender activities.*
3. *For any find that is determined to be eligible for listing in the NRHP, and would be adversely effected by surrender activities, PG&E's cultural resource specialist will develop a mitigation plan in consultation with the SHPO and Tribes, including appropriate mitigation measures for site treatment.*
4. *Once the provisions of this plan have been fulfilled, and the SHPO has concurred with PG&E on necessary treatment measures for the discovery, work may resume.*

    PG&E will file with the Commission a report for any discovery determined to be NRHP eligible and adversely affected, including the proposed mitigation plan and documentation of concurrence from the SHPO and any interested Tribes.

If the Find Consists of Human Remains

The following procedures will be followed if the find consists of human remains:

1. *PG&E's cultural resource specialist will flag or fence off the site to protect it from damage or vandalism.*
2. *PG&E's cultural resource specialist will immediately notify the coroner's office, the SHPO, and any interested Tribes. If the remains are found to not be archaeological in nature or Native American in origin, the cultural resource specialist will ask that the coroner contact the legal authorities (i.e., the local police department).*
3. *If the remains are determined to be Native American, PG&E will consult with the SHPO, NAHC and any interested Tribes to develop appropriate mitigation measures and a site treatment plan. PG&E would instruct the County Coroner to contact the NAHC within 24 hours of the discovery.*

Once the provisions of this plan have been fulfilled, and the SHPO has concurred with PG&E on necessary treatment measures for the discovery, work may resume. PG&E will commission a report for any discovery determined to be NRHP eligible and adversely affected, including the proposed mitigation plan and documentation of concurrence from the SHPO and any interested Tribes.

2.4 Proposed Project Objectives

PG&E's project purpose is to surrender the license for operation of the Project and to decommission and remove or modify several project features and facilities.

The basic Proposed Project Objectives are:

- Surrender the license for operation of the Project in conformity with the March 2005 Memorandum of Agreement (Agreement) executed by PG&E, the State Water Board, and others. The Agreement contains a list of subjects to be addressed through the decommissioning process (e.g., the disposition of canals),
- Decommission and remove or modify several Project features and facilities in compliance with California water quality standards.

2.5 Existing Project Facilities and Operations

The Project consists of two developments (see Figure 1-3) constructed between 1904 and 1907: the Kilarc Development on Old Cow Creek and the Cow Creek Development on South Cow Creek.

The following is a description of the Kilarc and Cow Creek Developments (PG&E 2009). Table 2-1 also provides a comparative list of each development's primary facilities and operating characteristics.

Table 2-1 Existing Facilities and Characteristics of the Kilarc and Cow Creek Developments

Kilarc Development		Cow Creek Development	
Features			
North Canyon Creek Diversion Dam and Canal	Timber dam (9.9ft wide, 1ft high) and unlined canal (3ft by 1.5ft by 0.35 mile)	Mill Creek Diversion	Concrete dam (40.3ft wide, 2.5ft high)
South Canyon Creek Diversion Dam and Canal	Concrete dam (37.8ft wide, 3ft high), 0.71 mile of unlined canal (4ft by 2ft) and 0.03 mile of flume (2ft by 1.8ft)	Mill Creek-South Cow Creek Canal	Unlined canal (5ft by 3.3ft and 0.17-mile long)
South Canyon Creek Siphon	0.17 mile, 12-inch diameter pipe	South Cow Creek Diversion Dam and appurtenant structures	Concrete capped steel bin wall and rock fill dam (86.5ft long, 12.3ft wide and 8.5ft high) with concrete cutoff walls embedded in streambed; concrete intake, trash rack, control gate, fish screen and fish ladder
Kilarc Main Canal Diversion Dam and Kilarc Main Canal (including tunnel, elevated flumes and spillways)	Concrete dam (83ft by 8 ft); 2.03 miles of earthen, concrete and shotcrete-lined canal; 1.44 miles of metal and wood flume, and 0.18 mile of wood-lined tunnel (6ft by 7ft)	South Cow Creek Main Canal (including tunnel and spillways)	13ft by 4.8ft canal (0.12 mile lined, 1.9 miles unlined); tunnel (6ft by 6.8ft, 200ft long); cross-over flume and Cat Bridge
Kilarc Forebay and Forebay Dam	Earth-filled dam (maximum 13ft high, 43ft base width, 1,419ft crest length), spillway (10ft wide, 3ft deep), intake structure with a 48-inch slide gate, manual lift and trash rack; forebay maximum storage 30.4af	Cow Creek Forebay Dam and Forebay	Earth-filled berm dam with a maximum height of 16ft, base of 54ft; spillway 49.7ft wide, 1.7ft deep; intake structure with 42-inch hydraulically-operated slide gate with trash rack; 42-inch pipe outlet; metal catwalk; CMP telemetry shafts
Kilarc Penstock	4,801ft long buried, riveted steel pipe, 36 to 48-inch varied diameter	Cow Creek Penstock	Buried, 4,487ft long pipe, diameter varies from 42 to 30 inches
Kilarc Powerhouse and Switchyard	65ft by 40ft steel frame and rubble masonry structure, two turbines and other mechanical equipment; switchyard	Cow Creek Powerhouse and Switchyard	53.5ft by 35ft steel truss and rock-cut walled structure, two generators and other mechanical equipment; switchyard
Characteristics			
Old Cow Creek subwatershed	80 square-miles	South Cow Creek Watershed	78 square-miles
Watershed above the dam	25 square-miles	Watershed above dam	53 square-miles

Kilarc Development		Cow Creek Development	
Average yearly runoff	48,900 acre-feet	Average yearly runoff	79,500 acre-feet
Annual runoff diverted to Powerhouse	26,895 acre-feet (55%)	Annual runoff diverted to Powerhouse	29,415 acre-feet (37%)
Estimated dependable generating capacity	1.2 MW	Estimated dependable generating capacity	400 kilowatts
Estimated average annual energy generated	19.1 million kilowatt-hours	Estimated average annual energy generated	12 million kilowatt hours

2.5.1.1 Kilarc Development

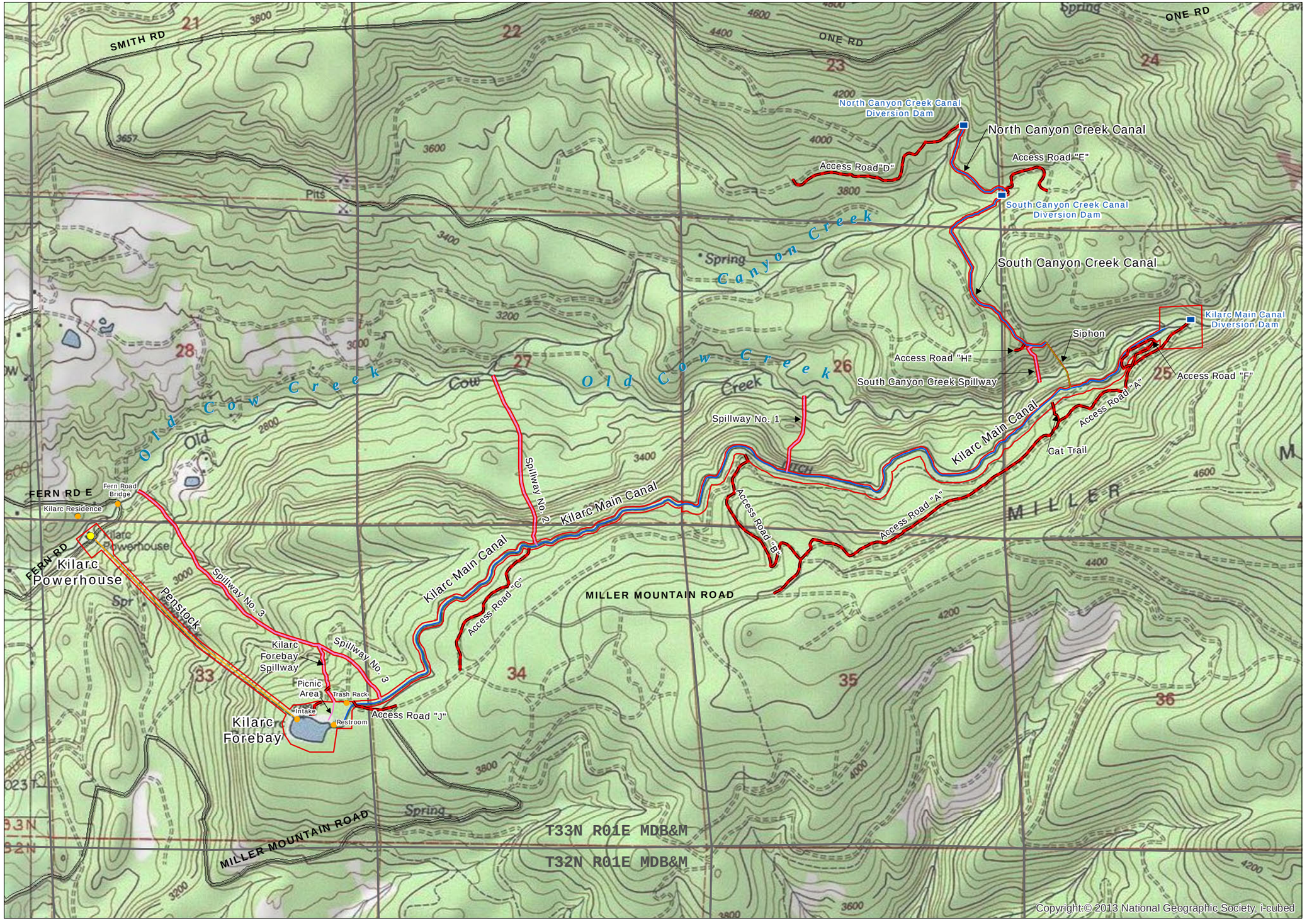
The Kilarc Development (Figure 2-1) operates as a run-of-river facility, which uses the natural flow and elevation drop of Old Cow Creek to generate electricity. The Old Cow Creek watershed encompasses about 80 square miles, including 25 square miles located upstream of the Kilarc diversion dam. Average yearly runoff at the dam is 48,900 acre-feet (af), about 55 percent of which is diverted to the Kilarc powerhouse.

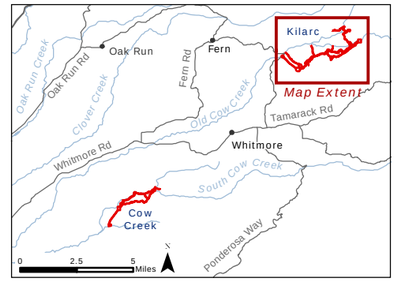
Water is supplied to the Kilarc powerhouse from the Kilarc Main Canal. Water is supplied to the Kilarc Main Canal from various sources, via canals and siphons, including: Old Cow Creek, South Canyon Creek, and North Canyon Creek. The flow of water through the Kilarc Development and into the Kilarc Main Canal is outlined below.

- Water is diverted from North Canyon Creek into the North Canyon Creek canal at the North Canyon Creek diversion dam and is conveyed to South Canyon Creek.
- Water is diverted from South Canyon Creek into the South Canyon Creek canal at the South Canyon Creek diversion dam.
- Water from South Canyon Creek canal flows into the South Canyon Creek siphon, which conveys water into the Kilarc Main Canal.
- Water is diverted from Old Cow Creek into the Kilarc Main Canal at the Kilarc diversion dam.

Water from the Kilarc Main Canal flows to the Kilarc Forebay and through the penstock to the Kilarc powerhouse. Water is returned to Old Cow Creek near the Kilarc powerhouse about 4 miles downstream from the Kilarc diversion dam. The current minimum flow requirement at the Kilarc diversion dam is 3.0 cubic feet per second (cfs).

The dam at the Kilarc Forebay is earth-filled and has a maximum height of 13 feet (ft). The Kilarc penstock is 4,801 ft long and has a maximum flow capacity of 43 cfs. The spillway at the Kilarc Forebay is rated for 50 cfs, which is the Kilarc Main Canal's approximate capacity. The elevation of the Kilarc Forebay is about 3,779 feet above mean sea level (ft msl). The forebay has a gross and useable storage capacity of 30.4 af and has a surface area of 4.5 acres. Water level fluctuation in the forebay during normal operation is about one foot. The Kilarc powerhouse is located at 2,580 ft msl and is designed for semi-automatic operation with forebay level control. The powerhouse operates unattended with alarms connected to PG&E's Pit 3 powerhouse (which is part of FERC Project No. 233). The Kilarc powerhouse is a 65-ft-wide by 40-ft-long steel frame structure composed of rubble masonry walls and a corrugated iron roof.





- Diversion
- Miscellaneous Feature
- PG&E Facility
- Unimproved Road (in FERC boundary)

Roads *Defined per USGS topographic base map*

- Trail
- Light Duty Road
- Unimproved Road
- Canal
- Penstock
- Siphon
- Spillway
- FERC Boundary
- Section Boundary

N

0 0.125 0.25 0.375 0.5 Mi
0 0.1 0.2 0.4 Km

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure 2-1
Features of the
Kilarc Development

Date: 7/1/2013 Document Path: T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\Fig3_KC_Kilarc.mxd

This Page Intentionally Left Blank

2.5.1.2 Cow Creek Development

The Cow Creek Development (Figure 2-2) operates as a run-of-river facility. The South Cow Creek watershed encompasses about 78 square miles, including 53 square miles located upstream of the south Cow Creek diversion dam. Average annual runoff at the dam is 79,500 af, about 37 percent of which is diverted to the Cow Creek powerhouse.

Water is supplied to the Cow Creek powerhouse from the south Cow Creek main canal. Water is supplied to the south Cow Creek main canal from Mill and South Cow Creeks as described below.

- Water is diverted from Mill Creek into the Mill Creek-South Cow Creek canal at the Mill Creek diversion dam.
- Water is diverted from South Cow Creek and from the Mill Creek-South Cow Creek canal into the South Cow Creek main canal at the South Cow Creek diversion dam and flows to the Cow Creek Forebay.

From the forebay, water flows through the penstock to Cow Creek powerhouse and is discharged into Hooten Gulch, and then back into South Cow Creek about 4 miles downstream of the South Cow Creek diversion dam. The current minimum flow requirements at the South Cow Creek diversion dam are 4.0 cfs in normal water years and 2.0 cfs in dry water years.

The Cow Creek Forebay dam is earth-filled and has a maximum height of 16 ft. The Cow Creek Forebay has a surface area of one acre and a gross and useable storage capacity of 5.4 af. The forebay elevation is about 1,555 ft msl, and water surface elevation varies by about one foot during normal operations. The Cow Creek penstock is 4,487 ft long. The spillway at Cow Creek Forebay is rated for 50 cfs, which is the South Cow Creek main canal's approximate capacity. The Cow Creek powerhouse is located at 856 ft msl and is a steel truss structure that is about 53.5 ft long by 35 ft wide. The Cow Creek powerhouse is designed for semi-automatic operation, with forebay level control. The Cow Creek powerhouse operates unattended, with alarms connected to the Pit 3 powerhouse.

2.6 Proposed Project

The Proposed Project as proposed by PG&E has been described in its LSA (PG&E 2009) and has also been described in FERC's EIS (FERC 2011). The following description of decommissioning activities has been excerpted from PG&E's PDP, included in Appendix B-2 of this EIR.

PG&E proposes to surrender the license for operation of the Project and to decommission and remove or modify several Project features, including:

- remove diversion dams and allow for free passage of fish and sediment;
- leave in place some diversion dam abutments and foundations to protect stream banks and provide grade control;
- leave in place and secure powerhouse structures during decommissioning with an option for preservation of powerhouse structures for future reuse;
- remove electric generators, turbines, and other equipment;
- grade and fill forebays;

- in consultation with affected landowners, leave in place, breach, or fill canal segments and remove metal and wood flume structures; and
- retire access roads to the Project where possible.

PG&E will develop detailed engineering and management plans for decommissioning of the Project facilities after an order approving decommissioning is issued by FERC. Upon receipt of State Water Board certification and other required permits, including FERC's final approval, PG&E intends to commence decommissioning activities in phases, beginning with decommissioning either the Kilarc Development or the Cow Creek Development and then proceeding to decommission the other development.

PG&E has proposed PM&Es to "reduce or eliminate" Project impacts. PM&Es are listed in Table 2-3 and can also be found in Appendix B-3 as presented in PG&E's LSA, Exhibit E. These measures are considered part of the Proposed Project and are addressed in each resource section in Chapter 4, Environmental Analysis.

The following provides an outline for PG&E's proposed decommissioning activities for each feature in each development.

2.6.1 Kilarc Development Decommissioning Proposal

2.6.1.1 North Canyon Creek Diversion and Canal Proposal for Decommissioning:

Diversion Dam

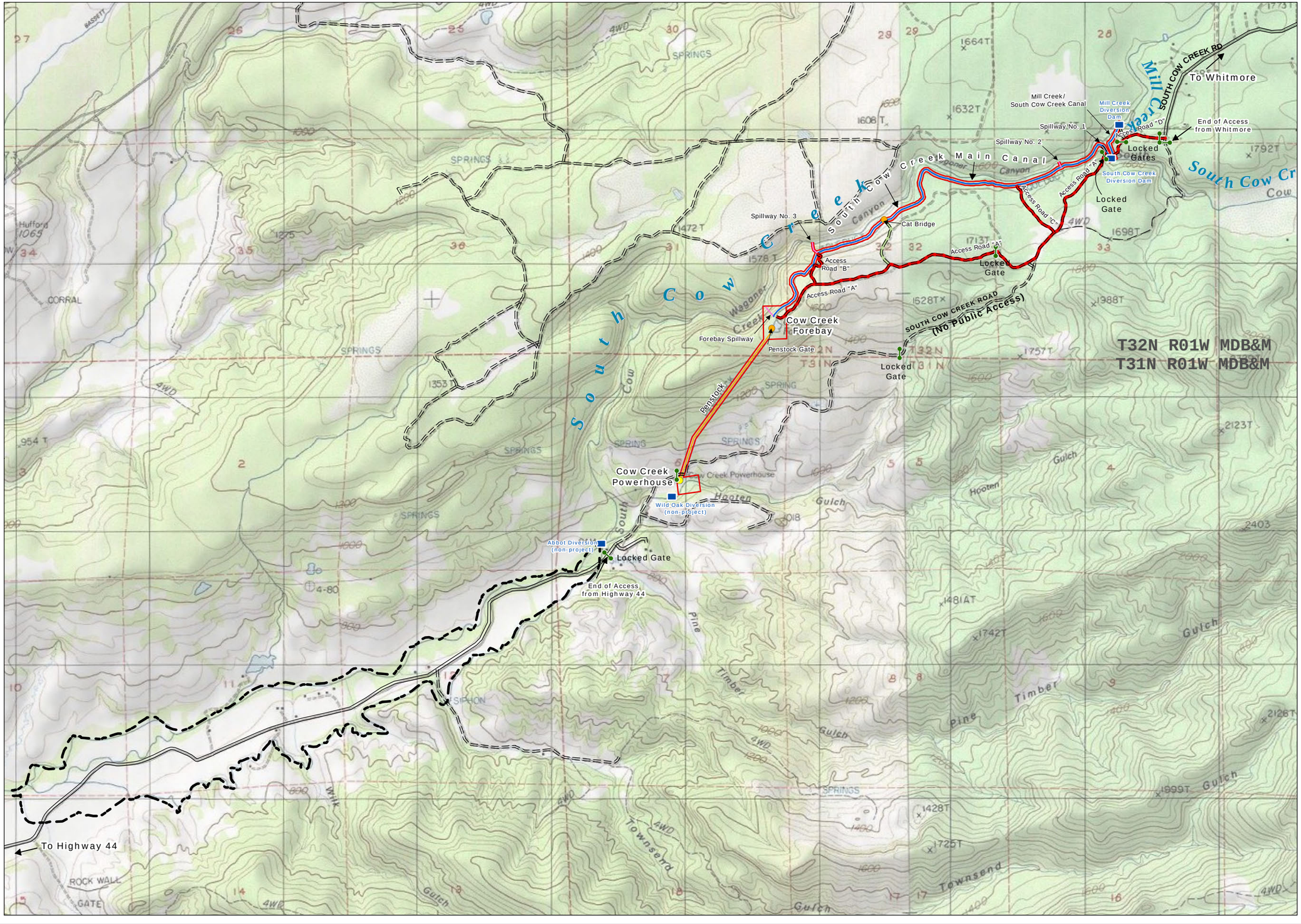
- Remove wooden stream bank supports and bottom boards as appropriate; leave in place other wooden structures that would cause more disturbances to remove than to leave in place.

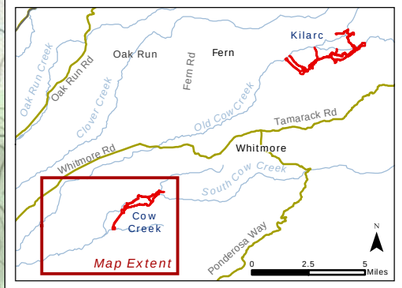
Canal

- Two options are proposed for decommissioning the earthen canal depending on accessibility to the canal section: abandoning in place (for limited accessibility) and filling the canal (for full accessibility). If abandoned in place, the canal will be strategically breached to address storm runoff and avoid potential erosion/sediment issues. Filling the canal will entail excavating one-half of the height of the canal berm and using the excavated materials as fill (the canal is constructed of native material and has no lining). If filled, the surface will be graded to drain rainwater and snowmelt; erosion control measures will be implemented consistent with Best Management Practices (BMPs) and Project-specific PM&Es will be implemented. South Canyon Creek Diversion and Canal Proposal for Decommissioning:

Diversion Dam

- Remove diversion walls to natural ground or streambed level, gate, operating mechanism, and all segments. Concrete will be removed from site with mechanical components.





- Gate
- Diversion
- Miscellaneous Feature
- PG&E Facility
- Canal
- Penstock
- Spillway
- FERC Boundary
- Abbott Ditch Boundary (ADB)
- Section Boundary

Roads *Defined per USGS topographic base map*

- Trail
- Light Duty Road
- Unimproved Road
- Road within FERC Boundary

0 0.25 0.5 0.75 Mi
0 0.25 0.5 0.75 1 Km

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure 2-2
Features of the Cow Creek Development

Date: 11/10/2013 Document Path: C:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\Fig 2-2_KC_CowCreek.mxd

This Page Intentionally Left Blank

Flume

- Remove wooden and corrugated metal pipe structures. Concrete foundations will be left in place.

Canal

- Two options are proposed for decommissioning the earthen canal depending on accessibility to the canal section: abandoning in place (for limited accessibility) and filling the canal by excavating one-half of the height of the canal berm and using the excavated materials as fill (for full accessibility; the canal is constructed of native material and has no lining). If abandoned in place, the canal will be strategically breached to address storm runoff and avoid potential erosion/sediment issues. If filled, the surface will be graded to drain rainwater and appropriate erosion controls will be implemented. The concrete spillway and concrete gate slots will be removed and backfilled with excavated berm material.

Siphon

- Remove trash bars and concrete wing walls, collapse a rubble wall, and bury it with excavated berm material.
- Remove all above-grade pipe and install concrete block wall at the vertical intake. Buried portions of the siphon will be capped and abandoned in place.

2.6.1.2 Kilarc Diversion Dam Proposal for Disposition:

- Remove the structures, guide walls, diversion gate and frame, gate operator, and debris from the site.
- A temporary cofferdam or diversion may be required.
- The diversion dam appears to be constructed on natural bedrock. The concrete portion that was added to construct the diversion will be removed.

2.6.1.3 Kilarc Main Canal Proposal for Disposition:

- For the earthen canal sections, two options are proposed for decommissioning depending on accessibility to the canal section: abandoning in place (for limited accessibility) and filling the canal (for full accessibility). A canal will be filled by excavating one-half of the height of the canal berm and using the excavated materials as fill (the canal is constructed of native material and has no lining). If filled, the surface will be graded to drain rainwater and appropriate erosion controls will be implemented. If abandoned in place, the canal will be strategically breached to address storm runoff and avoid potential erosion/sediment issues.
- For the concrete and shotcrete-lined canal sections, several options are available for decommissioning depending on accessibility to the canal section. If the canal is easily accessible for heavy equipment, the concrete walls and bottom will be broken up and pushed into the canal bottom. If there is little to no accessibility for heavy equipment to the canal section, the canal will be abandoned in place. Abandoned in place sections will be strategically breached to address storm runoff and avoid potential erosion/sediment

issues. Concrete sections with the downhill wall exposed may be hand cut, broken along the bottom edge, and pushed into the canal bottom. If excess native material is readily available, the canal will be filled with excavated berm material and graded, and erosion control measures will be implemented. Final disposition of sections not accessible by construction equipment will be determined on a case-by-case basis and the practicality of hand removal options will be considered.

- The flumes will be removed to their foundations, anchor bolts will be saw cut or ground flush, and foundation piers will be left in place.
- Mechanical equipment, a shed, and concrete sections, including foundations to grade, will be removed, grading will be conducted, and rip-rap will be installed, if required.
- Broken concrete will be used for rip-rap, if required, where removal of a structure damages the slope.
- Gates, frames, gate operators, support structures, the catwalk, guidewalls, and any foundations to grade will be removed.
- The overflow spillway will be demolished, filled and graded, and appropriate erosion control measures will be implemented.
- The thermal electric generator and building will be removed along with slab or foundation concrete.

2.6.1.4 Kilarc Forebay Proposal for Disposition:

- The intake trash rake, telemetry, and electrical equipment will be removed; fencing and structures will be demolished and removed, along with any concrete foundations to grade; and the culvert will be backfilled when the canal is backfilled.
- The forebay will be filled with excavated bank material, graded for drainage, and seeded with appropriate seed mix; appropriate erosion control measures will be implemented in accordance with proposed PM&E measures.
- The overflow spillway will be demolished, filled, and graded (as part of reservoir fill work), and appropriate erosion control measures will be implemented.
- The bridge and platform will be disassembled and removed, control equipment will be removed, and the shaft will be cut off at the bottom of the reservoir. Concrete supports, if any, will be left in the reservoir bottom and covered by fill during reservoir backfilling operations.
- The picnic tables and site furnishings will be removed. The restroom buildings and slabs will be demolished and removed. The toilet vaults will be pumped, backfilled and abandoned in place.

2.6.1.5 Kilarc Penstock Proposal for Disposition:

- The upper and lower ends of the penstock will be plugged with concrete and graded to cover the exposed section at the surge tower. Because removal of the buried pipe will cause significant site disturbance at a significant cost, the buried pipe will be left in place.

- The surge tower will be cut off and removed; the opening will be covered with a welded steel plate.

2.6.1.6 Kilarc Powerhouse and Switchyard Proposal for Disposition:

- Turbines, generators, and all associated electrical and mechanical equipment associated with the powerhouse will be removed and the structure will be abandoned in place.
- Turbine pits (located inside the Powerhouse structure) will be filled with mass concrete or other suitable fill material and capped with concrete to be flush with the surrounding floor.
- All exterior openings in the Powerhouse structure will be sealed in a manner dependent on their use. Draft tube openings will be sealed with formed concrete plugs; penetrations for electrical connections will be sealed with foam type filler or plywood, depending on size; windows will be left in place but covered with plywood cut to match the opening and doors and windows will be closed and locked but not permanently sealed. The tailrace will be backfilled to the confluence using local earth materials.
- Powerhouse structure will be secured (in accordance with PM&E measures) and left in place during decommissioning; an option for future reuse of the structure will be preserved. The switchyard will be left in place as it is an integral part of the PG&E inter-connected transmission system.

2.6.2 Cow Creek Development Decommissioning Proposal

2.6.2.1 Mill Creek Diversion – Dam and Canal Intake Proposal for Disposition:

- Demolition and removal of gate and supporting structure from the site. Concrete from the dam and guide walls will be buried in the canal.
- Demolition may require construction of a temporary channel diversion.
- A temporary cofferdam may be required.

2.6.2.2 Mill Creek-South Cow Creek Canal Proposal for Disposition:

- Abandon the canal and fill with excavated dam material, where reasonably feasible, to minimize environmental disturbance of the berm. This is the preferred outcome of the private landowner on whose property the canal is located. Strategic breaching will also be implemented to prevent retention of runoff water, where necessary.

2.6.2.3 South Cow Creek Diversion Dam and Appurtenant Structures Proposal for Disposition:

- Dam removal will include removing the concrete cap, removing fill, and removing the bin walls and interior baffles.
- A temporary cofferdam/diversion will likely be required.
- Some abutments and foundation structures, connecting to the steep side slopes and below the channel bed, will be left in place to minimize potential future erosion and disturbance to the slopes. These structures include the two parallel cutoff walls beneath the bin-wall dam structure and the retaining walls on both slopes. Retention of the cutoff walls will provide bed grade control after the dam is removed. A portion of the north bank

retaining wall will be left in place, with fill behind the wall graded to match the existing slope. Retention of the wall will provide erosion protection and address bank stability. A portion of the south bank retaining wall adjacent to the intake will also be left in place to avoid destabilizing the steep bank behind and above it. All other structures and equipment will be removed (e.g., electrical, mechanical devices, gates, screens, exposed rebar, rakes, metal cables, crib dam sheet metal panels, tie bars and drainage pipes). Where feasible, it is acceptable to the private landowner if structures at or below ground level are left in place so long as they are graded over with sediment fill or fill from elsewhere.

- Equipment access will minimize environmental damage to the surrounding vicinity.
- The broken concrete from the dam and ancillary structure removal will be placed in the first reaches of the main canal and graded over with fill from the canal banks or with sediment from behind the dam if the sediment is not needed or not suitable for stream restoration.
- To allow recruitment of native material stored behind the dam to downstream reaches, sediment from behind the dam, composed mostly of gravel and cobble, will be distributed along stream margins, taking care to not affect riparian vegetation.
- Nonnative material, which may be removed from between the bin walls, may be used for backfill in canals. This nonnative material will not be placed in or along the margins of the stream.

2.6.2.4 South Cow Creek Canal and Tunnel Proposal for Disposition:

- Abandoning the canals in place, with strategic breaching, is the preferred outcome of the private landowners on whose property the canal is located. For the earthen section of the canal, strategic breaching will address storm runoff and avoid potential erosion/sediment issues. The short, shotcrete-lined canal segment, from the diversion structure to the bridge, will have the shotcrete removed and placed in the bottom of the canal. The canal segment will then be filled with material from the berm, burying the shotcrete.
- The Cross-over flume is a metal structure that can be easily removed. Given the minimal amount of runoff from uphill sources and the difficulty of maintaining the structure after abandonment, the recommendation is to remove the flume. Removal can be done primarily through unbolting or cutting metal connections. Foundations will be left in place to avoid disturbance to the steep slopes.
- The Cat Bridge is a substantial structure tied into the walls of the canal. Given the landowners' preference for abandoning the canal in place, the bridge will also be abandoned to allow access across the dry canal.
- Tunnel work includes plugging the upstream and downstream ends of the tunnel with concrete and abandoning the tunnel in place.
- Spillways (2 or 3) will be modified such that spill height elevation is the same as the canal bottom.

2.6.2.5 Cow Creek Forebay Proposal for Disposition:

- The Cow Creek Forebay will be dewatered and all removal work will occur when the forebay is dry.
- Work will involve removing the forebay by backfilling with the adjacent berm material, grading, and reseeding.
- Removal of the outlet structure will consist of removing structural steel elements, cutting off corrugated metal pipe flush with the bottom, breaking up concrete, and backfilling.
- Broken concrete will be placed in the forebay and covered with earth.
- The mechanical trash rake will be removed and the concrete walls will be demolished and removed.
- Below-grade structures will be left in place and graded over.
- The spillway will be abandoned in place to minimize disturbance to the slope that will be caused by its removal.

2.6.2.6 Cow Creek Penstock Proposal for Disposition:

- Upstream and downstream ends of the penstock will be plugged with an engineered concrete block.
- Because removing the remaining buried penstock will cause a significant environmental disturbance and be extremely costly, the buried penstock will be left in place.

2.6.2.7 Cow Creek – Powerhouse and Switchyard Proposal for Disposition:

- Powerhouse work will include removing turbines, generators, and all associated electrical and mechanical equipment, and abandoning the structure in place.
- Existing concrete will be left in place.
- Turbine pits (located inside the Powerhouse structure) will be filled with mass concrete or other suitable fill material and capped with concrete to be flush with the surrounding floor.
- The powerhouse structure will be secured (in accordance with PM&E measures) and left in place during decommissioning; an option for future reuse of the structure will be preserved.
- Switchyard work includes removing equipment and structures.
- Hooten Gulch will have the shotcrete armor removed for burial in the tailrace to allow a more natural stream bed. Replacement bank stabilization measures will be installed.

2.6.2.8 Proposed Decommissioning Access

Project decommissioning may require improvement of existing roads and/or new access for equipment required for decommissioning the Project facilities. PG&E proposes to establish access for decommissioning as follows:

A small number (approximately 0.5 mile total) of new, temporary access road segments may be built for the Kilarc Development, but no new access roads are anticipated to be needed for the Cow Creek Development. Existing access roads fall both within and outside of the

Project boundary and cross a mix of PG&E and private lands. Existing road improvements will be limited to the existing road bed and will consist primarily of surface smoothing and pothole filling with a motor grader. Typical equipment may include multi-terrain loaders and rubber tired backhoe loaders similar to Caterpillar models 297C and 450E, respectively. Construction equipment will be offloaded from haulers at locations served by major Project roads and travel under their own power to the work sites to minimize the need for extensive road improvements. In some areas on the Kilarc drainage, new, temporary road segments are proposed to allow access to canal segments that are otherwise rendered inaccessible by elevated flume structures. Some of these proposed access roads will cross private property, and PG&E will discuss proposed access with the private property owners. Proposed new access roads total approximately 0.5 mile, serving eight canal locations, accounting for less than 9 percent of the access road total.

Table 2-2 provides a summary of road segments that have been identified by PG&E as access routes for decommissioning activities. These roads are also shown in Figures 2-3 and 2-4. Because new temporary access routes are proposed for the Kilarc Development, Figure 2-4 contains insets reflecting greater detail for the proposed routes.

2.6.2.9 Kilarc Development Access Roads

The Kilarc Development is accessed from Fern Road East via Whitmore Road. A junction connecting to Whitmore Road lies approximately 30 miles east of Redding along State Route (SR) 44. The paved Whitmore Road transitions into the partially graveled Miller Mountain Road as far as the Kilarc Forebay intake structure. Miller Mountain Road continues on, transitioning into a Project road for the length of the Kilarc Main Canal system. Access to the North and South Canyon portion of the Kilarc Development from Fern Road is via Oak Run Fern Road to Smith Road.

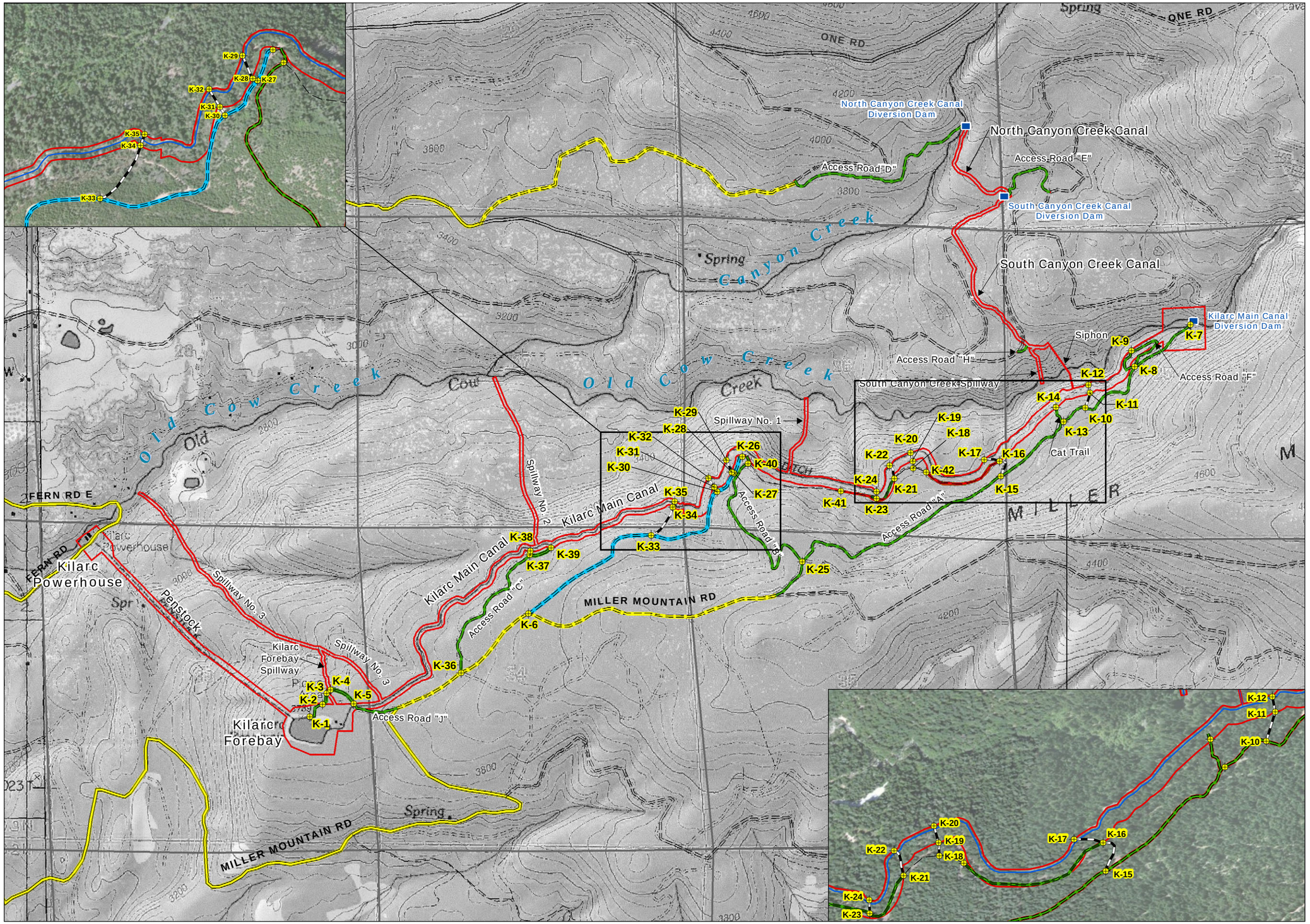
The Kilarc Development has several main Project features, with numerous sub-features. Access for each feature is discussed below. Proposals by PG&E to improve access roads, or to develop temporary new road segments to Kilarc Development facilities, are presented below.

- **Kilarc Powerhouse**. The powerhouse is accessible from a paved road in Whitmore via Whitmore and Fern roads. No improvements are proposed by PG&E for these roads.
- **Kilarc Forebay.** The Kilarc Forebay is accessed from Miller Mountain Road up to the Kilarc Forebay intake structure, K-5. From K-5 to the Kilarc Forebay, access is along the existing recreation area roads and parking lot. No work is proposed by PG&E for access to the start of the Kilarc Forebay. Proposed access from the Kilarc Forebay to the overflow and spillway features would require improvements to road sections K-1 to K-2, K-2 to K-3, K-3 to K-4 and K-4 to K-5. Less than 0.25 road mile are proposed by PG&E.
- **Kilarc Penstock.** The Kilarc Penstock is accessible at the lower end from the powerhouse and the upper end from the Kilarc Forebay. It is approximately 4,000 feet long and drops approximately 1,100 feet in elevation. According to PG&E, removal of the buried Kilarc Penstock is not recommended because removal of the buried pipe will cause significant site disturbance at a significant cost. The buried pipe is proposed to be left in place, and therefore no access road is proposed for this feature.

Table 2-2 Proposed Access to Decommission Kilarc and Cow Creek Facilities as Presented in License Surrender Application

Facility	Access	PG&E Proposed Improvements
Kilarc Development		
Kilarc Powerhouse	Whitmore and Fern roads	none
Kilarc Forebay	Miller Mountain Road	none
Kilarc Forebay overflow and spillway features		Improve 0.25 road mile: K-1 to K-2; K-2 to K-3; K-3 to K-4; K-4 to K-5
Kilarc Penstock	N/A	none
Kilarc Main Canal Diversion Dam	Miller Mountain Road	Minor grading, 3.2 road miles: K-5 to K-7
Kilarc Main Canal	Miller Mountain Road	Improve: K-36 to K-38; K-13 to K-14; K-8 to K-9; K-25 to K-40 or K-6 to K-26 Potential new access: K-10 to K-12 (0.075 mile); K-15 to K-17 (0.114 mile); K-18 to K-20 (0.050 mile); K-21 to K-22 (0.046 mile); K-23 and K-24 (0.022 mile); K-27 to K-28 (0.042 mile); K-30 to K-32 (0.051 mile); K-33 to K-35 (0.134 mile)
North and South Canyon Creek Canals	Access Roads D and E, access may be along canal itself	none
Cow Creek Development		
Cow Creek Powerhouse	SR 44 and South Cow Creek Road	none
Cow Creek Penstock	N/A	none
Cow Creek Forebay	Access Road A	Improve 3.0 miles: C-9 to C-3 (via wet crossing); C-3 to C-17 As described in Section 2.3.1, PG&E has recommended the road segment C-9 to C-3, and C-3 to C-17 because it is in much better condition than C-1 to C-18 and is in need of only minor improvement.
South Cow Creek Main Canal	Access Road A - accessible from other facilities along canal	Improve C-9 to C-3; C-3 to C-4; and C-3 to C-17; C-13 to C-14 or C-3 to C-11

Facility	Access	PG&E Proposed Improvements
South Cow Creek Diversion Dam and appurtenant structures	Access Roads D and A	Improve 0.375 mile: C-9 to C-7 and C-7 to C-6; or C-9 to C-3 (via wet crossing) and on to C-4
Cat Bridge	Access Road A	Improve 0.25 mile: C-13 to C-14
Cross-over Flume	Access Road A	Same as Cat Bridge (above)
Mill Creek Diversion Dam	Access Road D	Improve 373 feet: C-7 to C-8
Mill Creek-South Cow Creek Canal	Accessed via the canal itself	none



- Road Segment Endpoint
- Diversion
- Watercourse
- FERC Boundary
- Revised Section Boundary

Roads *Defined per USGS topographic base map or PG&E road database*

- Trail
- Light Duty Road
- Unimproved Road
- Road within FERC Boundary
- Existing Access to Kilarc Development
- Optional Access to Kilarc Main Canal
- Potential New Road* (see inset maps)

* Potential New Roads are between endpoints:
K-10 & K-12
K-15 & K-17
K-18 & K-20
K-21 & K-22
K-23 & K-24
K-27 & K-29
K-30 & K-32
K-33 & K-35

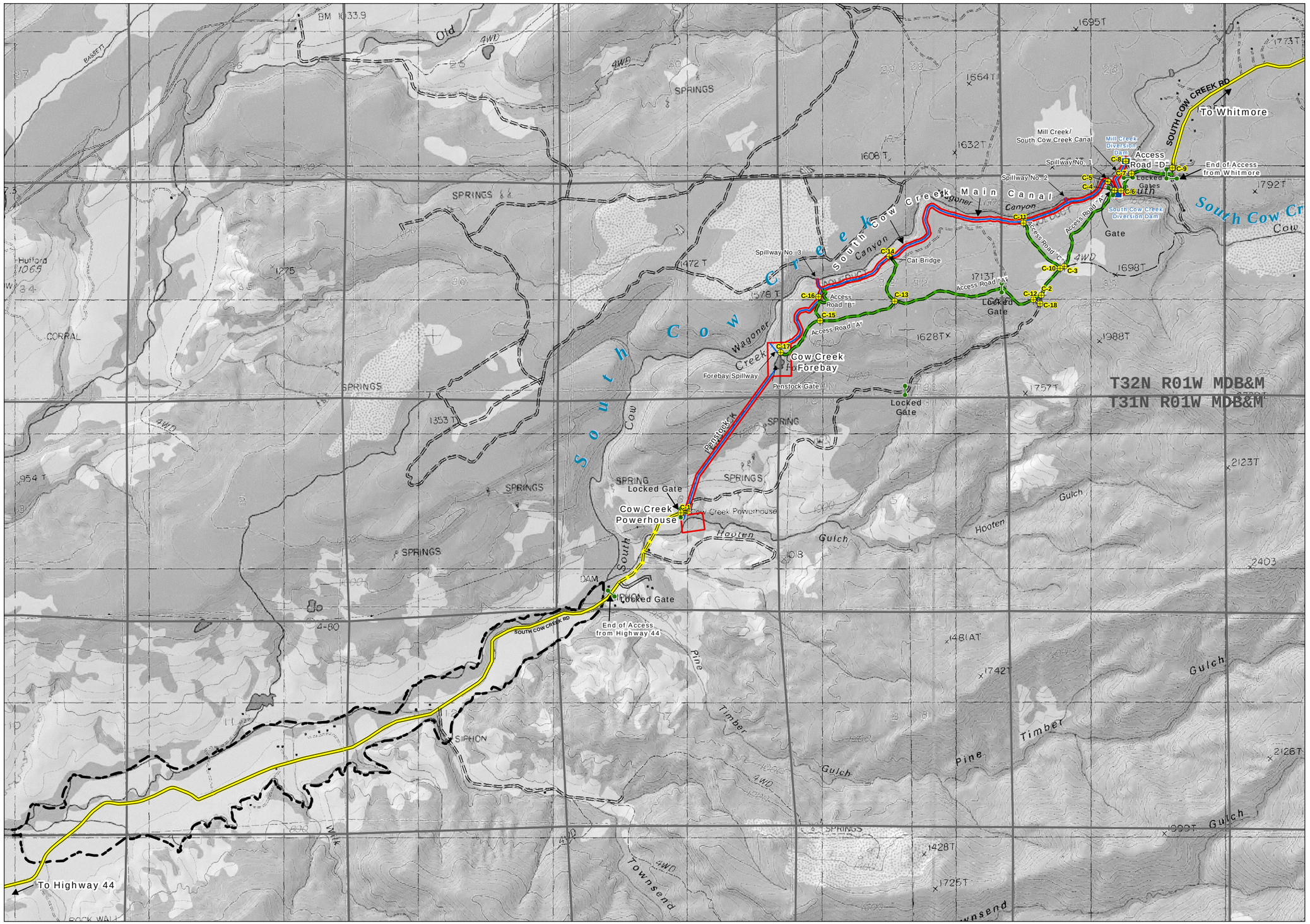
Source: PG&E 2009 and Cardno ENTRIX
Imagery: USGS Digital Raster Graphic, 7.5-minute Quadrangle: Miller Mountain, CA. 1995.

0 0.1 0.2 0.3 0.4 Mi
0 0.1 0.2 0.4 Km

Figure 2-3
Kilarc Project
Features and Access Roads

T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\LSA_Feb09\KC_AccessRoads_Kilarc_111171_03.mxd 5/5/09

This Page Intentionally Left Blank



- Road Segment Endpoint
- Gate
- Diversion
- Watercourse
- FERC Boundary
- Abbott Ditch Boundary (ADB)
- Revised Section Boundary

Roads *Defined per USGS topographic base map or PG&E road database*

- Trail
- Light Duty Road
- Unimproved Road
- Road within FERC Boundary
- Existing Access to Cow Creek Development

Source: PG&E 2009 and Cardno ENTRIX
Imagery: USGS Digital Raster Graphic, 7.5-minute Quadrangle: Miller Mountain, CA. 1995.

0 0.1 0.2 0.3 0.4 Mi
0 0.1 0.2 0.4 Km

Figure 2-4
Cow Creek Project
Features and Access Roads

T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\LSA_Feb09\KC_AccessRoads_Cow_111171_03.mxd 5/5/09

This Page Intentionally Left Blank

- **Kilarc Main Canal.** The Project road that continues from Miller Mountain Road, from K-5 to the Kilarc Main Canal Diversion Dam at K-7, is approximately 3.2 miles long and according to PG&E, is in generally good condition. Only minor improvement with a motor grader is proposed. This road segment provides access to the two ends of the canal. Intermediate access is provided by road segments K-36 to K-38, K-25 to K-40, K-13 to K-14 and K-8 to K-9. With the exception of K-25 to K40, PG&E proposed minor to moderate improvement to provide construction access. According to PG&E, K-25 to K-40 is a very steep segment with a tight bend in the middle that will be difficult to improve for good access. "An existing road on private property, K-6 to K-26, provides access to the same canal point on a much flatter route of about 1 mile in length and requires only moderate improvement. The canal is broken up along its length by a number of flumes that are designated for removal. Because of the terrain gaps bridged by the flumes, the canal is not crossable along its length by accessing one end or the other. Even with the intermediate roads described above, there are canal segments that cannot be accessed without new road segments. Typically, these proposed new road segments will be very short and begin at an existing road near the canal. Without these new segments there are a number of canal segments that will have to be either abandoned in place or hand cut." New temporary road segments are identified in Table 2-2 and Figure 2-4.
- **Kilarc Main Canal Diversion.** Access is proposed via road K-5 to K-7, which has segments both inside and outside the Project boundary. According to PG&E, this is a major logging road in reasonably good condition and requires minimum dressing with a motor grader.
- **North and South Canyon Creeks**. An existing road network will reach the Canyon Creek area. PG&E proposes access to and removal of features along the canal itself.

2.6.2.10 Cow Creek Development Access Roads

The Cow Creek Development is accessed from the southwest from SR 44 via South Cow Creek Road. South Cow Creek Road, a paved County road, connects with SR 44 approximately 35 miles east of Redding. South Cow Creek Road has been defined by Shasta County to end at the pavement terminus where it is gated. The unpaved road continues over private property to the Cow Creek Powerhouse. From there, a single lane unpaved rough road continues over private land to the Cow Creek Forebay and South Cow Creek Diversion Dam. The South Cow Creek Diversion Dam and Cow Creek Forebay can also be reached from the northeast through gates at the County-defined end of South Cow Creek Road on the Whitmore side. These single lane roads are unpaved and run across private land. This road segment crosses South Cow Creek via a wet crossing. Since the County maintained portion of South Cow Creek Road is gated on the southwest and northeast of the Project, the Cow Creek Development is inaccessible to the public.

Cow Creek Development has six main Project features. PG&E's proposal for access to each feature is discussed below. In general, the Cow Creek Powerhouse can be accessed from roads to the southwest, and the South Cow Creek Diversion Dam and Forebay can be accessed from roads to the northeast. An existing network of roads, both in and out of the Project boundary, interconnects all six features. Proposals by PG&E to improve access roads to Cow Creek Development facilities are presented below.

- **Cow Creek Powerhouse.** Access to the Cow Creek Powerhouse is from SR 44 and South Cow Creek Road. The Cow Creek Powerhouse is located approximately 0.5 mile past a locked gate on an unpaved road that is in very good condition and will not, according to PG&E, require any improvements for access.
- **Cow Creek Penstock**. Access to the lower end of the Cow Creek Penstock is proposed via the Cow Creek Powerhouse. The upper end of the penstock is accessible from the Cow Creek Forebay on access roads as described in the Cow Creek Forebay section below. According to PG&E, the penstock runs approximately 4,200 feet in length and climbs approximately 720 feet in elevation between the Cow Creek Powerhouse and Cow Creek Forebay. PG&E is not proposing removal of the buried Cow Creek Penstock because "removing it would cause a significant environmental disturbance and be extremely costly." The buried penstock is proposed to be left in place, and no access road is proposed for this feature.
- **Cow Creek Forebay.** PG&E proposes access to the Cow Creek Forebay along the main access road segment connecting the South Cow Creek Diversion Dam to the Cow Creek Forebay, designated as C-3 to C-17 (see Figure 2-3). This road segment is approximately 2 miles long. PG&E proposes only minor improvement for construction access.

PG&E proposes two options for reaching the main access road segment C-3 to C-17; one from the Cow Creek Powerhouse on road segment C-1 to C-18, and the second from the north side on road segment C-9 to C-3.

Road segment C-1 to C-18 is approximately 2.25 miles long and climbs over 800 feet in elevation. PG&E has not recommended road segment C-1 to C-18 for use or improvement.

Road segment C-9 to C-3 is approximately 1 mile long. This road segment crosses South Cow Creek at a paved wet crossing and climbs less than 100 total feet to the main access road segment road, C-3 to C-17. PG&E proposes use of road segment C-9 to C-3, and C-3 to C-17 for access to Cow Creek Forebay because it is in much better condition than C-1 to C-18 and according to PG&E, will need only minor improvement.

- **South Cow Creek Main Canal.** PG&E has recommended that the flume be accessed from the canal side via C-3 to C-14. C-3 is located in a wide, relatively flat meadow area, and is the central point proposed for off-loading and staging of construction equipment to avoid heavy truck traffic on the small, less improved connecting road segments.
- **South Cow Creek Diversion Dam and associated structures**. The South Cow Creek Diversion Dam can be accessed from the north side via road segments C-9 to C-7 and C-7 to C-6. PG&E has recommended that the south side of the South Cow Creek Diversion Dam and all the appurtenant structures be accessed from C-9, through the wet crossing, to C-3 and on to C-4. Construction equipment will be off-loaded near C-3 and driven to the construction site as described in the South Cow Creek Main Canal section above.
- **Mill Creek Diversion Dam and Mill Creek-South Cow Creek Canal.** Light equipment and hand tools have been recommended proposed by PG&E for decommissioning the Mill Creek Diversion and the Mill Creek-South Cow Creek Canal. As the canal is decommissioned, it will serve as an access to reach the portion of the north bank

retaining wall of the South Cow Creek Diversion Dam that is to remain in place for the associated minor backfilling and grading.

2.6.2.11 PG&E Proposal for Disposition of Roads

- PG&E proposes to leave existing Project roads in place per landowner requests, scarify, and seed the surfaces of any roads to be rehabilitated, and erect barriers or obstacles to limit future access.
- If any new access roads are needed for decommissioning activities, PG&E has proposed to follow the protocols discussed in the applicable proposed PM&E measures (see below) to reduce or avoid impacts to environmental and cultural resources.
- PG&E proposes to leave any new access roads in place per landowner requests, scarify, and seed the surfaces of any roads to be rehabilitated, and erect barriers or obstacles to limit future access.

2.6.3 PG&E Proposed Protection, Mitigation and Enhancement Measures

PG&E has proposed PM&E measures to “reduce or eliminate” Project impacts. PM&Es are listed in Table 2-3 and can also be found in Appendix B-3 as presented in PG&E’s LSA, Exhibit E. These measures are considered part of the Proposed Project and are addressed in each resource section in Chapter 4, Environmental Analysis.

Table 2-3 PG&E's Proposed Protection, Mitigation, and Enhancement Measures

Measure	Description
Geology and Soils	
PM&E Measure GEOL-1: Implement Soil Erosion and Sedimentation Control Best Management Practices	The Licensee shall identify and implement Soil Erosion and Sedimentation Control BMPs that address soil erosion impacts that may occur both during and after decommissioning construction work. The Licensee shall adhere to standard erosion control procedures, including applicable measures developed by the U.S. Forest Service (USDA-FS) and published in the Water Quality Management for Forest System Lands in California Best Management Practices (USDA-FS, 2000).[10] Prior to construction, the Licensee shall identify all natural drainage paths along the canals and tunnel during pre-construction surveys. Slopes prone to instability shall be identified, and site specific BMPs shall be implemented to avoid potential slope erosion and increased sedimentation in streams during and after construction activities. During the construction period, the Licensee shall install BMPs in all areas where soil is disturbed and could result in an increase in sedimentation and/or erosion. The Licensee shall perform inspections after storm events and perform any necessary repairs, replacements, and/or addition of BMPs. At the end of construction, the Licensee shall identify potential future erosion sites and install long-term BMPs.[11] Specific areas to be addressed are listed below: ▪ After removal of the canals, diversions, and impoundment structures, the Licensee shall implement BMPs such as restoration of natural drainage paths, and recontouring of slopes to match pre-existing slope morphology, as feasible. Revegetation shall be implemented to increase bank stability (See PM&E Measure BOTA-1). ▪ The Licensee shall implement BMPs to address potential erosion of access roads and staging areas throughout the Kilarc and Cow Creek Developments. Artificial swales, culverts, and/or other structures shall be designed to direct runoff away from disturbed areas based on the natural drainage features of the area. For any temporary access roads that are removed, the Licensee shall implement measures in accordance with BMP 2-26 Obliteration or Decommissioning of Roads, as defined in the USDA-FS Water Quality Management for Forest System Lands in California Best Management Practices (USDA-FS, 2000). To ensure the effectiveness of the long term BMPs, post-construction monitoring will be conducted for two years within the stream channel (See PM&E Measure GEOM-2) and for one year in all other construction areas.[12] The post-construction inspections will be to ensure that BMPs installed at the end of construction are effective and/or to identify areas where installation of additional BMPs is necessary.

[10] Water Quality Management for Forest System Lands in California (USDA-FS, 2000) provides a set of standardized BMPs to protect water quality during the planning and construction of projects. The BMPs are organized into eight land use activity categories including Road and Building Site Construction and Watershed Management.

Measure	Description
PM&E Measure GEOL-2: Implement Storm Water Pollution Prevention Best Management Practices	The Licensee shall identify all potential pollutant sources, including sources of sediment (e.g., areas of soil exposed by grading activities, soil/sediment stockpiles) and hazardous pollutants (e.g., from petroleum products leaked by heavy equipment or stored in maintenance areas). Also, the Licensee shall identify any non-storm water discharges and implement BMPs[13] to protect streams from potential pollutants and minimize erosion of topsoil. The Licensee shall include a monitoring and maintenance schedule to ensure BMP effectiveness for sediment control, spill containment, and post-construction measures. The Licensee shall include a monitoring and reporting program, including pre- and post-storm inspections, to determine if BMPs are sufficient to protect streams and to identify any areas where storm water can be exposed to pollutants. The monitoring program will include provisions for sampling and analysis to evaluate whether pollutants that cannot be visually observed are contributing to degradation of water quality.
PM&E Measure GEOL-3: Professional Engineering Design Plans and Specifications	The Licensee shall develop detailed design plans and specifications after FERC orders the Project to be decommissioned. These plans shall consider the potential for landslides and shall include provisions to minimize this potential. The Licensee shall prepare engineering plans for new access roads or staging areas to minimize grades and cut and fill volumes, as well as to minimize any potential for landslides as a result of the grading work.
Geomorphology	
PM&E Measure GEOM-1: Sediment Release Measures	Following removal of the South Cow Creek and Kilarc Main Diversion dams, the Licensee shall reshape the downstream face of the sediment wedge left in place at each diversion structure to an appropriate angle of repose. The Licensee shall also form a pilot thalweg to ensure temporary fish passage until the stored sediments have been transported by flow from the former impoundment sites and to help advance the processes of natural channel formation at the nickpoint created by the dam removal, by performing the following measures: ▪ Excavate a pilot thalweg through the sediment wedge that connects with the existing thalweg at a nearby upstream point to the thalweg immediately downstream of the dam. ▪ Shape the pilot thalweg on-site during the dam removal process. ▪ Dimension the pilot thalweg so that it has at minimum a 6-foot bottom width, which is approximately 20 percent of the 30 foot bankfull channel width downstream from the dam.

11 If, for example, stabilization measures are warranted, the Licensee shall design BMPs to protect the banks at dam abutments and diversion canal intakes during high flow events.

12 The erosion control measures will be designed to develop and maintain geomorphically-stable stream channels above, below, and at the diversions, and the erosion control measures will also be designed to prevent contributions of sediment to drainages and streams.

13 These measures may include: (1) requiring that fueling or maintenance of equipment (including washing) only be performed in specified areas outside an approved protective strip of predominately undisturbed and vegetated soil; (2) not allowing refueling of construction equipment within 100 feet from riparian or aquatic habitats; (3) reporting any release of oil or hazardous materials immediately upon detection in accordance with all applicable laws and regulations; and (4) requiring all contractors to have materials on hand to control and contain a spill of oil or hazardous materials.

Measure	Description
	▪ Lay back the side slopes of the pilot thalweg to a natural, stable angle of repose. ▪ Construct the thalweg channel so that the starting depth at the downstream end of the channel is approximately equivalent to the water surface elevation of the plunge pools immediately downstream from each of the respective dams. ▪ Incorporate into the pilot thalweg channel, coarse bed-elements, or other techniques, to ensure appropriate depth and velocities for fish passage, as needed. The final design will be based on the best available information at the time prior to implementation, in consultation with NMFS and CDFW. The Licensee shall make adjustments to the thalweg dimensions and elevation if site-specific conditions make it infeasible to construct the pilot channel to the recommended dimensions at either of the dam sites. The Licensee shall allow the sediments remaining behind the diversions after excavation of the pilot channel to redistribute downstream during natural high flow events.[14] The Licensee shall place sediments excavated from the South Cow Creek and Kilarc Main Canal diversion impoundments along channel margins for future recruitment during high flow events to downstream areas. The Licensee shall place these native sediments so they do not interfere with riparian vegetation.[15] The Licensee shall not place non-native angular rock material (which may be found between the bin walls of South Cow Creek Dam) in the stream, but shall dispose of it locally at a suitable site (e.g. as canal fill). The Licensee shall monitor fish passage conditions along the pilot thalweg channels and for 10 channel widths downstream of the dams for two years following removal. The monitoring program is discussed under PM&E Measure AQUA-5.

[14] It is estimated that up to approximately 150 cubic yards (0.09 acre feet) of sediment behind South Cow Creek Diversion Dam would need to be removed in order to remove the dam itself, to help shape the sediment wedge against the upstream dam face, and to create a pilot thalweg channel. This would leave approximately 1,150 cubic yards (0.70 acre-foot) stored behind the dam, all of which will be mobilized over time by natural sediment transport processes. Approximately 50 cubic yards (0.03 acre-foot) of sediment would need to be removed from behind Kilarc Main Canal Diversion Dam to accomplish dam removal, shape the sediment wedge, and to create a pilot thalweg connecting the upstream and downstream channels. This would leave approximately 530 cubic yards (0.31 acre-foot) behind the diversion dam. Of the 530 cubic yards, about 250 cubic yards of predominantly gravel and cobble material will be entrained over time and transported through the diversion and dispersed to the downstream reach by natural fluvial processes. About 230 cubic yards (approximately 40 percent of the 530 cubic yards) is boulder sized material, most of which will likely remain in place.

[15] This assumes that on-site inspection during dam removal indicates that the excavated sediments are comprised of mostly gravel to cobble size material. The particle size composition obtained from bulk samples of the sediments stored behind the diversions (Appendices G and H) indicates that most material is within the gravel-cobble size range.

Measure	Description
PM&E Measure GEOM-2: Bank Erosion Measures	To minimize potential impacts associated with bank erosion, the Licensee shall conduct the following monitoring and mitigation: ▪ The Licensee shall conduct a monitoring assessment after removal of the Kilarc Main Canal and South Cow Creek diversion dams. The monitoring shall consist of a visual assessment with photographic documentation of the impounded sediment wedge and streambanks adjoining the perimeter of the former sediment impoundment area. The monitoring shall be conducted after spring runoff, as soon as weather permits access to the sites and flows are low enough that the streambanks can be easily observed. The Licensee shall utilize the visual assessment to identify any areas of active erosion or undercutting, or areas that appear to be susceptible to erosion. The Licensee shall conduct the monitoring assessment for two years. ▪ If during the monitoring assessment, the Licensee observes significant erosion or bank undercutting, then the Licensee shall implement and install erosion control measures, as feasible, in the channel. The Licensee shall adhere to standard erosion control procedures, including applicable measures developed by the USDA-FS and published in the Water Quality Management for Forest System Lands in California Best Management Practices (USDA-FS, 2000).[16] During the permitting process, the Licensee will design bank erosion control measures in consultation with CDFW, and the RWQCB-CVR. These erosion control measures may include planting vegetation on the exposed banks to help in stabilization, use of geotextile fabric, dormant pole plantings, or other techniques that may be suitable, potentially in combination with rip-rap for stabilization. Any re-vegetation will be consistent with the MMP (see PM&E Measure BOTA-1). PM&E Measure GEOL-1 will also be implemented to address slope stabilization and erosion control protection at the site of infrastructure removal including the dam abutments and diversion canal intakes.
Aquatic Resources	
PM&E Measure AQUA-1: Isolate Construction Area	To minimize the deconstruction impacts at the five diversion dams and the Kilarc Tailrace (where instream construction would be required), the Licensee shall isolate the construction area from the active stream using coffer dams or other such barriers. The Licensee shall route water around the construction area in pipes or by removing the dam in two or more phases, allowing the flow to move down the other portion of the stream, while the isolated portion of the dam is removed.
PM&E Measure AQUA-2: Conduct Fish Rescue in Instream Work Area	After a work area is isolated, the Licensee shall conduct a fish rescue to remove any fish trapped in the work area. The Licensee shall relocate these fish to an area of suitable habitat within Old Cow Creek or South Cow Creek downstream of the work area.

[16] The Water Quality Management for Forest System Lands in California (USDA-FS 2000) provides a set of standardized BMPs to protect water quality during the planning and construction of projects.

Measure	Description
PM&E Measure AQUA-3: Avoid Sensitive Periods for Steelhead and Chinook Salmon for the Removal of South Cow Creek Diversion Dam	The Licensee shall conduct decommissioning work at South Cow Creek Diversion Dam from July through September when adult anadromous salmonids are not present in South Cow Creek.
PM&E Measure AQUA-4: Meet NMFS Passage Guidelines for Anadromous Salmonids	If the South Cow Creek Diversion Dam cutoff walls become fish passage barriers, the Licensee shall modify these cutoff walls or implement other appropriate measures to meet NMFS passage guidelines (drop, velocity, depth, roughened channel, and other site specific factors) for anadromous salmonids. The Licensee shall consult with NMFS on designs to provide adequate fish passage.
PM&E Measure AQUA-5: Monitor Passage Conditions Following Removal of Kilarc Main Canal and South Cow Creek Diversion Dams	To assess the efficacy of PM&E Measure GEOM-1 and monitor for any potential development of long-term barriers, the Licensee shall monitor fish passage conditions from upstream of the current sediment accumulations above the dam to a point approximately 10 channel widths downstream of the dam after the diversions are removed. The Licensee shall conduct monitoring for two years after decommissioning of each diversion dam. In each year of monitoring, the Licensee shall conduct monitoring once after the first major runoff event (as access conditions and staff safety allows) and once again later in the year, during the low-flow season, when the condition of the streambed can be more easily assessed. A biologist with experience in assessing fish passage shall conduct the monitoring. The biologist shall walk the stream segment described above and visually assess for any passage challenges arising from sediment movement (i.e., shallow riffles or bars) and obtain depth and velocity measurements at critical high elevation points. The Licensee shall provide notification to resource agencies prior to monitoring so that agency staff may participate in this survey. The Licensee shall provide a summary of monitoring results at the conclusion of each year of monitoring to FERC, NMFS, CDFW, USFWS, and SWRCB. If, during the monitoring, a long-term passage impediment is identified as a result of the diversions being removed, the Licensee will consult with CDFW and NMFS and the USACE under the Section 404 permit to determine appropriate measures to remedy the situation.
PM&E Measure AQUA-6: Consult with CDFW	The Licensee shall consult with CDFW on fish management options (including reduced stocking, increased catch limits, and other measures) to reduce the number of fish in Kilarc Forebay prior to decommissioning, with the intent of minimizing the number of fish needing to be rescued.

Measure	Description
PM&E Measure AQUA-7: Conduct Fish Rescue in Canals and Forebays, as Needed	The Licensee shall conduct fish rescues in the Kilarc Main Canal and Forebay to rescue any fish that remain in these waters during the decommissioning process. These fish shall be relocated to suitable areas to be determined in consultation with CDFW and NMFS. The Licensee shall consult with CDFW and NMFS with regard to the need to conduct fish rescues in South Cow Creek Main Canal and Cow Creek Forebay.[17] If consultation determines that a fish rescue is required for Cow Creek Canal or Forebay, the Licensee shall target salmonids and lamprey for rescue. Non-native fish, such as golden shiner, will not be rescued. The North Canyon Creek and South Canyon Creek diversions shall be decommissioned after diversions cease (these diversions have been out of service for several years), so that the channels are dry and cannot support fish. If the area is not dry, the Licensee shall conduct fish rescues as described for Kilarc Main Canal and relocate the rescued fish to an area to be determined in consultation with CDFW and NMFS.
PM&E Measure AQUA-8: Retain Fish Screen in South Cow Creek Main Canal	The Licensee shall retain the fish screen in South Cow Creek Main Canal until after any fish rescue, if needed (see PM&E Measure AQUA-7), is complete and the canal is closed off so fish can no longer enter the canal.[18] Once the fish rescue has been accomplished, the Licensee shall close off the head of the canal before the screens are removed.
PM&E Measure AQUA-9: Discontinue Cow Creek Powerhouse Operations in Spring	The Licensee shall discontinue Cow Creek Powerhouse operations in the spring when natural flow is present upstream of the powerhouse
PM&E Measure AQUA-10: Remove Hooten Gulch Gunite and Implement Bank Stability Measures during the Dry Season	The Licensee shall remove the gunite in Hooten Gulch and install any replacement bank stabilization measures during the summer when the gulch is dry.[19]

[17] Fish surveys in 2003 indicated that these waters are dominated by non-desirable golden shiner and sunfish and have a very low incidence of rainbow trout/steelhead or lamprey due to the fish screens at the South Cow Creek Diversion Dam.

[18] This will minimize potential impacts to steelhead and resident fish.

[19] This will minimize the potential for turbidity and contaminant impacts, as no fish or aquatic organisms would be present.

Measure	Description
Wildlife Resources	
PM&E Measure WILD-1: Conduct Pre-Construction Surveys for Amphibians, Pond Turtles and Nesting Birds and Implement Avoidance and Protection Actions for Species Present	The Licensee shall conduct pre-construction surveys for amphibians (foothill yellow-legged frog and California red-legged frog) reptiles (pond turtles), and any other individual at risk prior to construction activities at the diversions, forebays, and powerhouse tailraces, using standard protocols, including USFWS species-specific protocols.[20] The Licensee shall capture and relocate to suitable habitat any individuals of these species observed in the construction area. The Licensee shall install exclusion fencing around the construction area. The Licensee shall have a biological monitor on-call throughout the construction phase to identify and relocate, if necessary, any individual animals found in the construction area. If a California red-legged frog is found, the Licensee shall stop construction work and notify USFWS; construction activity will recommence upon USFWS approval. The Licensee shall conduct pre-construction surveys for nesting birds if vegetation removal is scheduled during the breeding period (generally March 1 - September 1). The Licensee shall use biologists with experience in conducting breeding bird surveys to conduct the surveys. These biologists shall conduct the surveys between dawn and 10 am. If an active nest occupied by a special-status species or by other species protected by the Migratory Bird Treaty Act is found, the Licensee shall avoid the area and construction activities shall be restricted to an appropriate distance to avoid nest disturbance until nestlings have fledged.
PM&E Measure WILD-2: Conduct Environmental Training for Construction Personnel	The Licensee shall conduct environmental tailboard sessions with construction personnel to provide information on special-status-species potentially present in the area and the avoidance/minimization measures to be implemented. The Licensee's biological monitor shall be responsible for conducting worker environmental awareness training for all construction personnel (including new, added, and/or replaced workers) prior to the onset of active construction. The training shall include a brief description of the special-status species that potentially occur at the site and distribution of a brochure or pamphlet that describes the species to all workers. Workers shall be instructed to drive carefully and look for amphibians, reptile, or mammal in the path of their vehicles. In the event that an amphibian of any species is observed, workers shall stop their equipment immediately until such a time that the onsite biological monitor has identified it, relocated it if necessary or it moves from the active construction area by its own initiative.

[20] USFWS, 2005. Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog. August 2005.

Measure	Description
PM&E Measure WILD-3: Conduct Pre-Construction Surveys for Raptors and Implement Avoidance and Protection Actions for Species Present	The Licensee shall conduct pre-construction surveys for raptors at protocol or standard distances (0.5 mile for peregrine falcons, 0.75 mile for goshawk, 660 feet for the bald eagle, and 300 feet for other raptors) from the deconstruction area (Call, 1978; Fuller and Mosher, 1987; Cade, et. al., 1996, PBRG 2007, USFWS 2007). For peregrine falcon, the Licensee shall conduct pre-construction surveys no earlier than 14 days prior to start of construction during the protocol survey period (March 15 to August 15). For northern goshawk, the Licensee shall conduct dawn acoustical surveys if the surveys must be done from February to April, or implement intensive search surveys from late June to fall. If goshawks are detected, the Licensee shall conduct a brief search of the detection area during the late incubation or nestling stage to determine the location of an active nest. For the bald eagle, the Licensee shall conduct an initial survey from late February through March (Jackman and Jenkins, 2004). If necessary, the Licensee shall conduct additional surveys in mid-nesting season (late April through May) and late in the season (early June to early July). Surveys may be conducted on foot, or with terrestrial vehicles, or aircraft. If an active raptor nest is found within the survey area, the Licensee shall avoid the nest and deconstruction activities shall be restricted to an appropriate distance to avoid nest disturbance until nestlings have fledged.
PM&E Measure WILD-4: Conduct Pre-Construction Surveys for Elderberry Shrubs and Implement Existing Mitigation Measures	The Licensee shall conduct protocol pre-construction elderberry surveys within 100 feet of any deconstruction activities that could affect vegetation. If an elderberry shrub with one or more stems greater than 1 inch in diameter could be directly or indirectly affected by the activities, the measures provided in the Biological Opinion covering the Licensee's service area in the range of the VELB (USFWS, 2003) shall be implemented.
PM&E Measure WILD-5: Conduct Pre-Construction Surveys for Bats	If deconstruction activities are initiated between March 1 and September 30, the Licensee shall conduct pre-construction surveys for bats at the tunnels and powerhouses. For the surveys, during the day, the Licensee shall search these facilities for bats or bat sign such as guano, staining, and culled insect parts. Internal surveys shall consist of surveying the interiors of tunnels and powerhouses. External surveys shall consist of surveying the external features of structures that could be used for roosting. Nighttime surveys in or near the facilities shall consist of counting bats as they exit to forage in the evening, assessing use of facilities to roost in at night, and acoustic monitoring with ultrasonic equipment in conjunction with computer software and visual observation. At its discretion, the Licensee may conduct limited capture of bats using nets to facilitate species identification (captures shall be conducted by a qualified bat biologist). If deconstruction activities occur between October 1 and February 28 (non-breeding season) the Licensee shall not be required to conduct pre-construction surveys for bats unless existing facilities with known (previously documented through monitoring surveys or historic observations) or potential hibernation roost sites will be disturbed.
PM&E Measure WILD-6: Exclude Wildlife from Tunnels	The Licensee shall seal off Project tunnels at both ends for public safety, which will exclude wildlife (i.e., bats) from entry or habitation. The Licensee shall verify that the tunnels are uninhabited through pre-construction surveys (see PM&E Measure WILD-5). If bats are present, the Licensee shall install one-way exclusion devices prior to the breeding season before construction begins, in order to allow bats to leave the tunnels, but not return. The exclusion devices shall be placed at all active entry points and shall remain in place for at least five to seven days. These devices shall be removed after the bats are excluded, and then exclusion points shall be sealed (BCI, 2008).

Measure	Description
PM&E Measure WILD-7: Speed Limit on FERC Project and Temporary Access Roads	The Licensee shall implement a speed limit of 15 miles per hour on FERC Project roads and temporary access roads while decommissioning activities are conducted.
Botanical Resources	
PM&E Measure BOTA-1: Prepare and Implement a Mitigation and Monitoring Plan (MMP)	The Licensee shall prepare and implement a Mitigation and Monitoring Plan (MMP) for impacts to riparian and wetland vegetation as part of the permitting process. The MMP shall be developed in consultation with the USACE, CDFW, and SWRCB. The Licensee's MMP shall include mitigation areas (e.g., South Cow Creek Diversion Dam, Kilarc and Cow Creek Forebays), goals, the species to be assessed, as well as methods and performance criteria in the MMP. Riparian and wetland vegetation requiring restoration or mitigation shall be monitored by the Licensee under FERC's authority for two years following decommissioning. The Licensee shall include restoration of abandoned or temporary roadbeds as part of the MMP, including compaction issues, seeding, mulching, and planting, and shall develop the MMP in consultation with the private landowners, where appropriate. The Licensee shall re-seed other disturbed areas, including temporary work areas, filled and graded areas, and roads requiring rehabilitation, and consult with private landowners, where appropriate. If straw is used for temporary erosion control, it shall be certified weed-free. Native plants shall be used for re-seeding and other revegetation on the Licensee's property, and on private property unless the private landowner specifies the use of other materials. If the use of native seed is intended, but sufficient supplies are not available, then cereal seed shall be used for temporary erosion control. Cereal seed used for erosion control shall be seed for sterile cereal, if available. If seed for sterile cereal is not available, then other cereal seed may be used.
PM&E Measure BOTA-2: Conduct Pre-Construction Surveys	The Licensee shall conduct pre-construction surveys for special-status plants in all areas that will be disturbed by decommissioning activities.
PM&E Measure BOTA-3: Avoid Special-Status Plants to the Extent Possible and Restore Habitat Conditions	The Licensee shall avoid any identified populations of special-status plants to the extent practical. If decommissioning activities will result in temporary disturbance to part of a population, the Licensee shall stockpile the top 10 inches of soil from the disturbed area, protect the soil from exposure to weed seeds, and replace the soil when the decommissioning activities are complete.
Historical Resources	
PM&E Measure HIST-1: Documentation	The Licensee shall prepare a Memorandum of Agreement (MOA) to address the unanticipated discovery of human remains and the long-term management and treatment of the architecturally and historically significant powerhouses. As will be stipulated in the MOA, the Licensee shall prepare photographic, architectural, and written documentation that meets Historic American Building Survey (HABS) and Historic American Engineering Record (HAER) standards prior to commencing decommissioning activities.
PM&E Measure HIST-2: Securing Buildings	The Licensee shall secure the two powerhouse structures from unwanted entry, provide adequate ventilation to the interiors, shut down or modify the existing utilities and mechanical systems, and employ maintenance and monitoring measures for the buildings.

Measure	Description
Archaeological Resources	
PM&E Measure ARCH-1: Archaeological Resources Summary	The Licensee shall avoid all ground disturbing activities in the vicinity of the five archaeological sites.21 A qualified Licensee or consulting archaeologist shall monitor Project activities if they occur within 50 feet of these identified resources. If the Licensee cannot avoid ground disturbing activities at or near the five sites, the Licensee shall conduct formal evaluations of the sites' eligibility for listing in the NRHP and CRHR.
PM&E Measure ARCH-2: Unanticipated Archaeological Sites	If archaeological resources are accidentally disturbed during decommissioning activities, the Licensee shall stop all work within the immediate vicinity until a qualified Licensee or consulting archaeologist can evaluate the discovery and provide recommendations, if an archaeological monitor is not already present. Table E.4.9-1 summarizes recommendations for archeological resources identified within the APE.
PM&E Measure ARCH-3: Encountering Human Remains	If human remains are encountered as a result of decommissioning activities, the Licensee shall stop all work in the vicinity and immediately contact the County Coroner. In addition, a qualified Licensee or consulting archaeologist shall be contacted immediately to evaluate the discovery, if a monitor is not already present. If the human remains are Native American in origin, then the Licensee shall request that the Coroner notify the NAHC within 24 hours of this identification.
Fire Protection	
PM&E Measure FIRE-1: Spark Arrestors	The Licensee shall equip earthmoving and portable equipment with internal combustion engines with a spark arrestor to reduce the potential for igniting a wildland fire.
PM&E Measure FIRE-2: Fire Suppression Equipment	The Licensee shall maintain appropriate fire suppression equipment during the highest fire danger period – from April 1 to December 1.
PM&E Measure FIRE-3: Flammable Materials	On days when a burning permit is required, the Licensee shall remove flammable materials to a distance of 10 feet from any equipment that could produce a spark, fire, or flame, and the Licensee shall maintain the appropriate fire suppression equipment.
PM&E Measure FIRE-4: Portable Gas-Powered Tools	On days when a burning permit is required, the Licensee shall not use portable tools powered by gasoline fueled internal combustion engines within 25 feet of any flammable materials.

Source: PG&E 2009, Appendix B-2

[21] The five archaeological resources that have a prehistoric archaeological component within the APE are 482-12-03/H, -04, -05/H, -08/H, and -11/H, and one historical archaeological site 482-12-03H.

2.6.4 Proposed Termination of Project Operation

PG&E would continue operating the Project, or some portion thereof, until decommissioning activities make such operation infeasible. Dates when decommissioning activities would take place have not been identified at this point. Power generation would continue until the facilities required for generation are removed or decommissioned. It is expected that removal of the Project facilities would take three years, followed by at least two years of maintenance and monitoring of the restoration work overseen by FERC. The license for the Project expired on March 27, 2007, and the Project is currently operating under an annual license from FERC. As determined by the Agreement and outlined in the FERC EIS, it is anticipated that PG&E will continue to operate the project on an annual license basis until the project is decommissioned.

2.7 Project Permits and Approvals

The primary permits and approvals PG&E has obtained and must still obtain are summarized in Table 2-4. Other public agencies whose approval may be required (e.g., permits, financing approval, or participation agreement) include the National Park Service, U.S. Bureau of Indian Affairs, California Office of Historic Preservation, and Shasta County.

Table 2-4 Primary Regulations Pertaining to Kilarc-Cow Creek

Regulation	Regulating Agency	Agency's Authority	Status
Clean Water Act Section 404	U.S. Army Corps of Engineers (USACE)	Regulates placement of dredged or fill material into waters of the United States	Not yet completed
Clean Water Act Section 401	State Water Resources Control Board (SWRCB)	Issues water quality certification; certification required for Section 404 permits	Pending
Federal Endangered Species Act (ESA) Section 7	U.S. Fish and Wildlife Service (USFWS)	Other federal agencies (i.e., FERC and USACE) must consult with USFWS if their activities may affect federally-listed species	On September 10, 2009, USFWS filed a letter of concurrence with PG&E staff that the Proposed Project would not adversely affect federally-listed species
Federal Endangered Species Act (ESA) Section 7	National Marine Fisheries Service (NMFS)	Other federal agencies (i.e., FERC and USACE) must consult with NMFS if their activities may affect federally-listed species	On March 1, 2011, NMFS filed its Biological Opinion

This Page Intentionally Left Blank

Chapter 3 Project Alternatives

This chapter describes the Project Alternatives to the proposed Kilarc-Cow Creek Hydroelectric Project License Surrender (Proposed Project) that the State Water Board has included in this document for consideration and comparison to PG&E's Proposed Project.

3.1 Introduction

The CEQA Guidelines, section 15126.6, subdivision (a) requires that an EIR "...describe a range of reasonable alternatives to the project, or the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives."

As stated in Section 2, Project Description, the Proposed Project objectives are to:

- Surrender the license for operation of the Project in conformity with the March 2005 Memorandum of Agreement (Agreement) executed by PG&E, the State Water Board, and others. The Agreement contains a list of subjects to be addressed through the decommissioning process (e.g., the disposition of canals),
- Decommission and remove or modify several Project features and facilities in compliance with California water quality standards.

Alternatives are analyzed to determine whether or not a variation of the project would reduce, or eliminate, significant project impacts within the basic framework of the objectives.

3.2 Alternatives Analysis and Screening Process

A summary of CEQA Guidelines, section 15126.6, as it pertains to the alternatives analysis, is provided below.

- The discussion of alternatives shall focus on alternatives to the project or its location that are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives or would be more costly.
- The "no project" alternative shall be evaluated, along with its impacts. The "no project" analysis shall discuss the existing conditions at the time the notice of preparation was published, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services.
- The range of alternatives required in an EIR shall be governed by a "rule of reason"; therefore, the EIR needs to evaluate only those alternatives necessary to permit a reasoned choice.
- An EIR need not consider an alternative whose effects cannot be reasonably ascertained or that would not achieve most of the basic project objectives.

According to CEQA, the range of feasible alternatives should be selected and discussed in a manner that fosters meaningful public participation and informed decision-making. The State Water Board hosted a public scoping meeting and reviewed comments received. The State Water Board then performed a review of the Proposed Project and the potential impacts in light of the comments received and the records of the Proposed Project, and identified a "reasonable range" of alternatives, as defined by the CEQA Guidelines.

3.3 Alternatives Evaluated in this Draft EIR

The FERC EIS evaluated four alternatives: the No Action Alternative, the Proposed Action, Alternative 1 – Retaining Kilarc Forebay, and Alternative 2 – Retaining Flow to Abbott Ditch Users Existing Point of Diversion. The Draft EIR has used the alternatives presented in the EIS as a starting point and has added variations of Alternative 2. Each alternative is described in detail below, followed by a qualitative comparison of project alternatives with the Proposed Project (refer to Table 5-1).

None of the alternatives explicitly include the continuation of hydropower generation. Because continued hydropower generation is incapable of being accomplished in a reasonable period of time given economic, environmental, social, technical, and legal factors, such an alternative would be infeasible. (Pub. Resources Code, § 21061.1; CEQA Guidelines, § 15364.)

Further, as part of PG&E's relicensing application, FERC regulations allowed a period of time for a new party to take ownership of and relicense the Project. No successful applications to take ownership of the Project were completed during the allotted period; once PG&E submitted a license surrender application, no other parties could assume ownership of and relicense the Project. Accordingly, the alternatives considered below do not include continued hydropower generation.

3.3.1 Alternative 1 — Retaining Kilarc Forebay

Alternative 1 is intended to provide continued recreation access at the Kilarc Forebay, reducing the significant impacts to recreation resources to less than significant (see Section 4.16 for more details). Those facilities of the Kilarc Development required to maintain the flow of water to the forebay would be improved to prevent fish entrainment and to increase flows to the reach of Old Cow Creek below the Kilarc Canal Diversion Dam. The remainder of the Kilarc Development and the entire Cow Creek Development would be decommissioned as described for the Proposed Project.[22] Implementation of Alternative 1 would result in a change in land ownership at the Kilarc Forebay, as well as require approval of a change in the beneficial use of the water rights associated with the water supplying the forebay. Kilarc Forebay Kilarc Forebay Features of the Kilarc Development that are not necessary for forebay maintenance would be decommissioned as described in Chapter 2, Proposed Project, including implementation of all the relevant PM&E measures proposed for the Kilarc Development, resulting in similar impacts

[22] The alternatives for the Kilarc Development assume that the Cow Creek Development is decommissioned as stated in the Proposed Project, and the same is assumed for the Cow Creek Development alternatives. This is done to be able to compare the alternative to the Proposed Project as a whole, however it is possible that an alternative for the Kilarc Development and an alternative for the Cow Creek Development could simultaneously be adopted, as the two developments are not physically connected. It is assumed that a combination of alternatives would include the cumulative effects of each alternative's impacts.

to those described for the Proposed Project under each resource area in Chapter 4. No power generation would occur at either Project development.

Alternative 1 assumes that an interested entity with adequate financial resources can be immediately identified to take over operation and maintenance of the remaining Kilarc facilities that are not decommissioned by PG&E, implement improvements for exclusion of fish entrainment, and conduct any monitoring required by Federal and State resource agencies. It is assumed that PG&E would not be responsible for the implementation of the upgrades to Project facilities or the design and installation of fish screens.

Alternative 1 would require PG&E to transfer the water rights for the Kilarc Canal Diversion Dam, and for the new party to petition for change in the water rights use from power to the new use. Alternative 1 would also require the use of PG&E project facilities, and the sale, lease, or use of such facilities would be at PG&E's discretion. There are potentially other land use issues associated with this alternative that have not been analyzed in this document, but could include the transfer of private property easements that PG&E currently holds for maintenance of the Kilarc Canal, Diversion Dam, Forebay, and access roads, all of which could involve a number of private entities and legal actions.

On March 10, 2008, PG&E issued the "Solicitation of Interest for Operation of Kilarc Forebay as a Recreation Facility" (Solicitation). The Solicitation stated that during preparation of PG&E's Preliminary Proposed Decommissioning Plan, local community members expressed concerns regarding the decommissioning of Kilarc Forebay and suggested that another entity could potentially take over operation of the existing recreational facilities associated with the forebay (PG&E 2008). PG&E was not opposed to transferring the facilities necessary to continue operation of Kilarc Forebay as a recreational facility to another entity, and stated in the Solicitation that it expected that any entity proposed to take over the said recreational facilities be a State or Federal agency, local government, or nonprofit group that has the demonstrated capacity and capability to continue operations for recreational purposes. The Solicitation also outlined that PG&E had prepared a guidance document to assist organizations potentially interested in owning, managing, and operating the recreational facilities at Kilarc Forebay, and which evaluated the requirements and obligations associated with such an undertaking.

PG&E requested that interested parties submit the Solicitation of Interest Form by April 24, 2008. Response to the Solicitation was limited to a response from Davis Hydro, described in further detail below in Section 3.4, Alternatives Considered but Eliminated. According to PG&E, the Davis Hydro response was not accompanied by a completed Solicitation of Interest Form, and yet was evaluated by PG&E to the extent possible. As discussed in Section 3.4, the Davis Hydro response was considered but eliminated from further analysis due to the lack of detail, scientific foundation, and scientific analysis, as well as a lack of complete plans and studies. No other interested parties submitted a Solicitation of Interest Form to PG&E by the deadline.

3.3.2 Alternative 2 — Retaining Flow to the Abbott Ditch Users

Implementation of the Proposed Project would remove the outflow of water from the South Cow Powerhouse to Hooten Gulch, and thus the existing Abbott Ditch diversion would experience a loss of flows up to no flow in the late summer when Hooten Gulch has no natural flow. Under Alternative 2, flows to the Abbott Ditch diversion, which is used by a collection of land owners downstream known as the Abbott Ditch Users (ADU), would be retained via one of the following

four options: the existing point of diversion (Option A); a restored East Channel (Option B); a new pump in South Cow Creek (Option C); or new conveyance to Hooten Gulch (Option D). Each option is described in detail below.

While PG&E has stated its commitment to work in good faith to resolve potential water rights issues with its proposed decommissioning of the Cow Creek Development, no concrete plans for undertaking any of these Alternative 2 options currently exist. However, in light of strong public interest and the possibility that parties may reach an agreement by which an alternative water supply for ADU may be feasibly implemented, this EIR provides information regarding where impacts and mitigations would differ from those of the Proposed Project. Implementation of any of the options within Alternative 2 would reduce the significant impacts to agricultural resources identified in Section 4.4, Agriculture and Forestry Resources, and would preserve Abbott Ditch riparian habitat, as described in detail in Section 4.7, Terrestrial Biological Resources.

3.3.2.1 Alternative 2, Option A – Retaining Flow to ADU via Existing Point of Diversion

Alternative 2, Option A (2A) would maintain flow in Hooten Gulch to ensure continued flow to the ADU's existing point of diversion. ADU would continue to access water at the current point of diversion. Those facilities of the Cow Creek Development required to maintain flow to Hooten Gulch would be improved to provide fish passage, fish screens, and to increase flow to the bypass reach. The remainder of the Cow Creek Development and the entire Kilarc Development would be decommissioned as described in Section 2, Proposed Project (see footnote 19).

Under Alternative 2A, the existing fish ladder and fish screen at the South Cow Creek diversion dam would be upgraded or replaced with new fish passage facilities that meet current standards to provide upstream passage of migratory salmonids. Fish passage would be monitored during salmon and steelhead migratory periods. A new fish screen that meets current standards would be designed and installed at the entrance to the South Cow Creek main canal to block entrainment of resident and anadromous fish from South Cow Creek into the canal. The South Cow Creek diversion dam and canal intake would be modified as necessary to provide the main canal with a flow adequate to provide 13.13 cfs for ADU. All flow above what is needed to convey ADU's decreed amount would be released back to the South Cow Creek reach below the diversion dam. The main canal structures and overflow spillways would be upgraded and maintained as necessary for the continuation of ADU's water delivery. The Cow Creek Forebay would be filled and graded, and the main canal extended through the former forebay area to the penstock intake. The penstock and tailrace would be improved if necessary and maintained for discharge to Hooten Gulch.

Under Alternative 2A, access and maintenance agreements would need to be developed with private landowners as necessary to maintain access to the South Cow Creek main canal diversion dam, canal, penstock, and tailrace. Alternative 2A assumes that an interested entity with adequate financial resources can be immediately identified to take over operation and maintenance of the remaining Cow Creek facilities that are not decommissioned by PG&E, implement improvements for fish passage/exclusion, and conduct any monitoring required by resource agencies.

3.3.2.2 Alternative 2, Option B – Retaining Flow to ADU via Restored East Channel (Technical Solution)

Alternative 2, Option B (Alternative 2B) would retain flow to ADU via a restored east channel in South Cow Creek, as described in detail below. ADU would continue to access water at the current point of diversion, but the water would be supplied to Hooten Gulch via the restored east channel of South Cow Creek instead of via the Cow Creek Development facilities.

Also known as the "Technical Solution," Alternative 2B was proposed in a letter from Mr. Steve Tetrick on April 20, 2013, and titled "Comments from the Tetrick Ranch Regarding South Cow Creek Portion of FERC Project 606." [23] In his letter, Mr. Tetrick states that the Tetrick Ranch and the ADU have developed a proposed solution, the Technical Solution, which would reestablish approximately 1,200 feet of the historic east channel of South Cow Creek so that it would once again flow into Hooten Gulch, resulting in a continued water supply to the Abbott Ditch. Proposed elements of the Technical Solution included:

- Construct a rock weir to deliver water from the existing east channel of South Cow Creek into a restored historic channel.
- Restore the aquatic and riparian habitat and adjacent floodplain within the historic channel to optimize fish habitat value and create wetland habitat.
- Design the boulder weir to allow fish passage and feature a failsafe diversion that allowed peak flows to continue to the main stem of South Cow Creek should they exceed the capacity of the restored channel.
- Stabilize the newly restored channel banks with on-site rock, planted with native riparian vegetation and fenced to exclude livestock as necessary.
- Maintain existing aquatic habitat in the lower quarter mile of Hooten Gulch by reestablishing historic flow from the restored east channel of South Cow Creek.
- Install a fish screen and ladder at the currently unscreened and un-laddered Abbott Ditch diversion dam (Diversion 73).

Per the proposed Technical Solution, reestablished flow in Hooten Gulch via restoration of the historic east channel of South Cow Creek would minimize changes to the existing water delivery pattern and maintain the Abbott Ditch diversion (Diversion 73) in its original and current location. According to the proposal, theTechnical Solution would not require fish screens at the inflow and outflow of the channel, and fish would be encouraged rather that prevented from using the habitat. According to the proposal, adequate flow would be maintained in the restored east channel of South Cow Creek because existing Cow Creek Development bypasses would cease and result in increased year-round flow in South Cow Creek. According to the proposal, the Technical Solution would cost an estimated $2.5 million to complete all phases, including right-of-ways for construction and maintenance, fees, permits, studies, design, engineering and construction.

Under Alternative 2B, the Kilarc Development and the Cow Creek Development would be decommissioned as described in Section 2.6, Proposed Project. Under Alternative 2B, access

[23] The Tetrick Hydroelectric Project reportedly uses or used water from Hooten Gulch for power generation. References to "ADU" in this document are also intended to include apparent or reported similarly situated water users along Hooten Gulch such as Tetrick Ranch and Tetrick Hydroelectric Project.

and maintenance agreements would likely be required and developed with private landowners as necessary to maintain access to the creek channel and new fish passage/exclusion features. Costs involved with Alternative 2B include purchase of new materials (i.e., rock and boulder weirs, fish screen, and ladder); construction activities to install the weirs, fish screen, and ladder; and operation of the weirs, fish screen, and ladder (i.e., routine maintenance). Implementation of Alternative 2B would also require that a funding source for these costs be identified, and that the parties responsible for construction and operation be identified.

3.3.2.3 Alternative 2, Option C – Retaining Flow to ADU via New Pump in South Cow Creek

Alternative 2, Option C (Alternative 2C) would retain flow to ADU via a new pump in South Cow Creek near the current ADU diversion location. Implementation of Alternative 2C would involve installation of a new pump in South Cow Creek below the Cow Creek powerhouse tailrace, resulting in a continued water supply to the ADU. Under Alternative 2C, the Kilarc Development and the Cow Creek Development would be decommissioned as described in Section 2, Proposed Project, and would result in similar impacts to those described under each resource area in Section 4, Environmental Analysis.

The new pump would need to be of adequate size to divert 13.13 cfs. For the purposes of this alternative, this is estimated to be a 28 horsepower pumping station requiring a 7.5 ft by 6 ft by 10 ft deep footprint. A pipeline trench for intake and release would be estimated at 5 ft wide by 5 ft deep; however the length of the pipeline would vary depending on the exact placement location of the pump in South Cow Creek. In order to power the pump, 3-phase power would need to be brought in from the closest location, which as stated above, would depend on the location of the pump. The pumping station would consist of a wet well, pumps, and electrical controls, and water would enter the wet well by gravity flow from the creek and be lifted to the Abbott Ditch through a discharge pipeline. The length of the discharge and intake lines would vary depending on pump location. A fish screen would need to be installed on the intake line in the creek. An easement corridor for access to the pump would also be required.

Under Alternative 2C, access and maintenance agreements would need to be developed with private landowners as necessary to maintain access to the creek at the location of the new pump. Costs involved with Alternative 2, Option C include purchase of new materials (i.e., new pump and associated equipment), construction activities to install the pump, operation of the installed pump (i.e., power source and routine maintenance). Implementation of Alternative 2C would also require that a funding source for these costs be identified, and that the parties responsible for construction and operation be identified.

3.3.2.4 Alternative 2, Option D – Retaining Flow to ADU via New Conveyance to Hooten Gulch

Alternative 2, Option D (2D) would retain flow to ADU via a new conveyance from South Cow Creek to the Hooten Gulch. Implementation of Alternative 2D would involve installation of a new gravity fed pipe along the natural contours between South Cow Creek and the tailrace area at the Hooten Gulch. Under Alternative 2D the Hooten Gulch would receive less water, but the flow would be continuous. ADU would continue to access water at the current point of diversion, but the water would be supplied to Hooten Gulch via the new pipeline instead of via the Cow Creek Development facilities. The Kilarc Development and the Cow Creek Development would be

decommissioned as described in Section 2.6, Proposed Project, and would result in similar impacts to those described under each resource area in Chapter 4, Environmental Analysis.

Under Alternative 2D, an approximately 2-ft diameter pipeline would either be installed underground in a 5-ft wide by 5-ft deep trench or be located on the surface. Estimates for a new pipeline at this location would also include the following: pipeline intake would need to be located in the creek at a deep section near shore, with a depth of water at intake of 2 ft or more; a control structure (valve or weir box) would need to be located along the pipeline; an overflow pipe would be needed back to the creek for surplus flow. Erosion control would be required at the pipeline outfall in Abbott Ditch. A fish screen would also be installed on the intake line in the creek.

Under Alternative 2D, access and maintenance agreements would need to be developed with private landowners as necessary to maintain access to the creek at the source of the pipeline, and to the full extent of the pipeline. Costs involved with Alternative 2D include purchase of new materials (i.e., pipeline and associated equipment), construction activities to install the pipeline, and operation of the installed pipeline (i.e., routine maintenance). Implementation of Alternative 2D would also require that a funding source for these costs be identified, and that the parties responsible for construction and operation be identified.

3.3.3 No Project Alternative[24]

For the purposes of this document, the State Water Board has developed the following assumptions of reasonable events that would occur under the No Project Alternative, which would occur where the 401 water quality certification is denied.

If the 401 certification is denied, FERC could not issue an order approving PG&E's License Surrender Application (LSA) for any portion of the LSA requiring water quality certification. According to the FEIS for the project, FERC would not renew annual licenses for the existing Project in perpetuity. PG&E indicated in an email on July 25th, 2013, that if FERC neither approved the LSA nor renewed the annual license for the Project, PG&E would cease to operate the project. PG&E stated that, under this scenario, PG&E would presumably abandon the facilities in place and reduce potential liabilities by taking steps to secure the facilities to: protect public safety and the environment, minimize or eliminate maintenance needs, and protect the facilities from vandalism. FERC could then issue an order that declares the Project abandoned and the associated FERC license terminated.

3.4 Alternatives Considered but Eliminated

3.4.1 Davis Hydro Alternative

In a letter dated April 24, 2008, Davis Hydro submitted their "Statement of Interest in Future Disposition of Kilarc Development Assets following PG&E Surrender of P-606 Hydropower License" (FERC 2011). The letter was submitted in response to PG&E's two Solicitation of Interest letters issued on March 10, 2008. The Solicitation of Interest was for qualified entities interested in owning, managing, and operating Kilarc Forebay and Kilarc Powerhouse (in a non-power generating capacity) and adjacent lands specifically for recreation and/or historical uses. PG&E requested that interested entities complete a Solicitation of Interest form so that it could evaluate whether the party had the capability to maintain and operate the facilities, and to obtain

[24] The No Project Alternative is based on FERC's No Action Alternative.

regulatory and legal approvals for transfer and operation of the facilities. While the Davis Hydro letter did not include a Solicitation of Interest form, PG&E states that it was evaluated to the extent possible. Per PG&E, the Davis Hydro letter referenced a proposal for continued operation of the Project for generation, and did not provide a specific outline for continued operation for recreation and/or historical public use.

On June 18, 2009, Davis Hydro filed an alternative for consideration titled “An Alternative to the Demolition of the Kilarc Hydropower Project.” The Davis Hydro proposal was supplemented in numerous additional filings in 2010 and 2011 which proposed variations of the alternative. A summary of the Davis proposals was filed on January 14, 2011, and which indicated that Davis Hydro proposed to maintain the Kilarc Development for hydropower operations while using Project infrastructure and revenue to conduct fisheries restoration work. Fisheries restoration projects would be funded by revenues from operating the Kilarc Development. The Davis Hydro Alternative did not propose any plans for the Cow Creek Development.

In the Davis Hydro proposal, water diversions would be maintained and instream flows would be similar to those under the current license. The Davis Hydro proposal is similar to the No Project Alternative, where flows are maintained at the Kilarc Development as currently licensed, and would result in similar impacts. However, FERC, CDFW, USFWS, and NMFS are generally in agreement that the Davis Hydro Alternative does not use established fisheries management practices; lacks scientific support or literature documentation; is highly experimental and untested; and provides no evidence that it is economically feasible. Additionally, all of the measures contained within the Davis Hydro Alternative require that PG&E lease, sell, give, or by some other means to transfer the right to Davis Hydro. For these reasons, the Davis Hydro Alternative was eliminated by FERC from further analysis in the EIS. The State Water Board has also rejected the Davis Hydro Alternative as infeasible for analysis in the Draft EIR, due to its inability to be accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, technological, and legal factors.

3.4.2 Community Proposal

On January 22, 2010, Tetrick Ranch, ADU, Shasta County, Sierra Pacific Industries, Inc., and Evergreen Shasta Power, LLC filed a Community Proposal as part of their Offer of Settlement (FERC 2011). The Community Proposal includes no major changes at the Kilarc Development, but states that the North Canyon Creek Diversion Dam and Canal would be removed and would provide an additional 2.5 cfs of minimum flows to the bypassed reach of Old Cow Creek. However, according to the FERC EIS, the North Canyon Creek Diversion Dam has not been operated in approximately 20 years, in part, because of the requirement to meet superior downstream water rights on South Canyon Creek. Therefore, removing the small diversion dam is not expected to have a significant positive impact on instream flows, especially during periods of low flow where the increase in flows would be most beneficial.

The Community Proposal would result in the same environmental conditions at the Kilarc Development as under the existing license for all resource areas, and would result in similar impacts. At the Cow Creek Development, flows under the Community Proposal would not differ significantly from current licensed conditions, but flows are anticipated to be less and to result in fewer benefits to habitat for aquatic resources in the bypassed reach than the Proposed Project. The Community Proposal is similar to the No Project Alternative in that it continues diversions very similar to the existing conditions, and would result in similar impacts. It has been

documented that NMFS objects to the Community Proposal because it does not provide a substantial basis to indicate that fisheries benefits would be likely, practical, or beneficial. All of the wildlife resource agencies object to the Community Proposal because it does not provide the increased instream flows considered necessary for the enhancement of aquatic resources. Because flows would remain very similar to existing conditions, water quality conditions in the bypassed reach of South Cow Creek and downstream of the Project would not change. For these reasons, the Community Proposal Alternative was eliminated by FERC from further analysis in the EIS.

The Community Proposal also assumes the continued generation of power using the Project facilities and that the Project would be relicensed under the FERC exemption process. As stated in the beginning of this chapter, continued generation using Project facilities is not feasible under the current Proposed Project. Consequently, the Community Proposal has been eliminated for consideration in this Draft EIR for infeasibility and inability to avoid or substantially lessen significant environmental impacts. However, portions of the Community Proposal, specifically the continued delivery of water to the ADU, are considered in the variations of Alternative 2.

This Page Intentionally Left Blank

Chapter 4 Environmental Analysis

Chapter 4 provides the analysis of the Kilarc-Cow Creek Hydroelectric Project License Surrender (Proposed Project's) and the Alternatives' environmental effects, identifying and quantifying to the extent feasible the physical changes that would occur when compared to existing/baseline conditions. While this analysis relies upon studies performed by PG&E as part of the License Surrender Application (LSA), as well as the National Environmental Policy Act (NEPA) analysis conducted by Federal Energy Regulatory Commission (FERC), the analysis considers input during public scoping and reflects the independent, professional judgment of the Environmental Impact Report (EIR) preparers.

4.1 Introduction to the Analysis

This chapter provides a description of the existing environmental setting (baseline) for the Proposed Project and identifies the environmental impacts for each of the following resource topics. This discussion can be found under the sections noted below:

- Section 4.3 Aesthetics and Visual Resources
- Section 4.4 Agricultural and Forestry Resources
- Section 4.5 Air Quality
- Section 4.6 Aquatic and Fisheries Resources
- Section 4.7 Terrestrial Biological Resources
- Section 4.8 Cultural Resources
- Section 4.9 Geology and Soils
- Section 4.10 Greenhouse Gas Emissions
- Section 4.11 Hazards and Hazardous Materials
- Section 4.12 Hydrology and Geomorphology
- Section 4.13 Water Quality
- Section 4.14 Land Use and Planning
- Section 4.15 Noise
- Section 4.16 Recreation
- Section 4.17 Transportation/Traffic

Each section describes the existing physical and regulatory setting to characterize the conditions that could be affected by the Proposed Project. In addition, each section includes a description of the analytical methodology and criteria used in determining the significance levels of project impacts. Finally, each section recommends mitigation measures to reduce or eliminate, where possible, the adverse environmental effects of the Proposed Project, if PG&E's proposed Protection, Mitigation, and Enhancement (PM&E) measures are not adequate to reduce or eliminate the environmental effects.

4.2 Resource Areas Eliminated from Further Analysis

The following sections briefly address environmental resource topics that would not be affected by the Proposed Project.

4.2.1 Mineral Resources

According to the Minerals Element of the Shasta County General Plan, there are currently six different mineral resources under production in Shasta County: alluvial sand and gravel, crushed stone, volcanic cinders, limestone, diatomite, and gold (Shasta County 2004a). According to Shasta County, the 1997 Mineral Land Classification Study (MLCS) prepared by the California Division of Mines and Geology identifies the location of the significant mineral resource areas in the County (Shasta County 2004a). The study was limited to the industrial minerals described above and which are presently being commercially extracted in Shasta County; however, gold was not included in the MLCS. With the exception of historic mining of Cow Creek for alluvial sand and gravel, and historic gold mining activities which occurred in the Kilarc and Cow Creek Development areas, the Project area is not included in any of the production areas identified for Shasta County mineral resources (Shasta County 2004a).

The Proposed Project would not require the extraction or use of any mineral resources, and therefore would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state. The Proposed Project would not result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan. No impacts related to mineral resources are anticipated.

4.2.2 Population and Housing

The Proposed Project is located in Shasta County, near the community of Whitmore and about 30 miles east of Redding. According to the Housing Element of the Shasta County General Plan, the Shasta County population in January 2009 was 183,023, and is projected to expand to 331,724 by the year 2050 (Shasta County 2004b). About 50 percent of Shasta County's population resides in the city of Redding (population 90,898). No U.S. Census data exist for the community of Whitmore, but it is estimated that about 800 families live there. The largest employment sectors in Shasta County are retail trade, state and local government, and health care and social assistance.

Currently, PG&E employees are onsite daily at the powerhouses during the work week and once a week (or more often if problems exist) at the waterways. About 15 PG&E employees operate and maintain the existing Project features, but between 2 and 50 PG&E employees may be present on any given day. In addition to Project employment, lands in the Project area support other economic activity and employment related to timber production, agriculture, cattle ranching and grazing, recreation, conservation, transportation, and hydroelectric power generation (FERC 2011).

According to PG&E, an estimated 12 contract workers would be hired to decommission the Project. It is anticipated that these contract workers would be Shasta County residents, although there may be a few individuals from outside Shasta County who would relocate temporarily to Redding. Since Proposed Project activities would result in an insignificant increase of about 12

people who could easily be accommodated in the vacant housing units in Shasta County, population growth would not be induced in the Project area and no impacts are anticipated.

4.2.3 Public Services

Police services in the Project area are provided by the Shasta County Sheriff (Shasta County Sheriff 2013). According to the Fire Safety and Sheriff Protection Element of the Shasta County General Plan, fire protection services are provided by both the Shasta County Fire Department and California Department of Forestry and Fire Protection (CAL FIRE) (Shasta County Fire Department 2013). Existing Project facilities do not rely heavily on or involve public services such as police, schools, and parks, due to their nature as a hydroelectric power facility in a relatively remote area. However, these existing facilities do rely on fire protection services.

The Proposed Project does not propose new or physically altered government facilities that would result in a decrease in acceptable service ratios, response times, or other performance objectives. Therefore, no impacts would occur related to these public services.

The displacement of existing recreational resources is addressed in Section 4.16, Recreation. Impacts related to emergency response and/or wildland fires are addressed in Section 4.11, Hazards and Hazardous Materials.

4.2.4 Utilities and Service Systems

Existing Project facilities do not rely on utilities and service systems due to their nature as a hydroelectric power facility in a relatively remote area.

The Proposed Project would not produce wastewater, and therefore would not exceed applicable requirements set forth by the Central Valley Regional Water Quality Control Board (Central Valley Water Board). No new water, wastewater, or storm water facilities would be required as a result of implementation of the Proposed Project.

No long-term water supplies would be required for implementation of the Proposed Project. Water may be needed during decommissioning activities and would be provided by existing infrastructure in place.

Decommissioning activities may result in some solid waste generation in terms of construction waste, but would not be in quantities that would significantly affect local landfills. Excess materials would be recycled when possible. The Proposed Project would be required to comply with federal, state, and local statutes regarding solid waste. Therefore, no impacts would occur related to these utilities and service systems.

Impacts related to water quality are addressed in Section 4.12, Hydrology and Geomorphology, and Section 4.13, Water Quality. Impacts related to changes in water diversion are addressed in Section 4.4, Agricultural and Forestry Resources; Section 4.6, Aquatic and Fisheries Resources; Section 4.12, Hydrology and Geomorphology; and, Section 4.13, Water Quality. Impacts related to the abandonment of restroom facilities and the generation of solid waste are addressed in Section 4.11, Hazards and Hazardous Materials, and Section 4.16, Recreation.

This Page Intentionally Left Blank

4.3 Aesthetics and Visual Resources

This section describes the regional visual character, visual resources of the Project area and views of the Project construction areas from important adjacent vantage points. It also describes the changes in these views that would result from implementation of the Proposed Project.

4.3.1 Environmental Setting

4.3.1.1 Sources of Information

A Visual Impact Assessment (VIA) was prepared for the Proposed Project using a process developed by the Federal Highway Administration (FHWA) in conjunction with the American Society of Landscape Architects and is provided in Appendix C (Cardno ENTRIX 2013).

The Scenic Highways Element (Shasta County 2004c) and the Open Space and Recreation Element (Shasta County 2004d) of the Shasta County General Plan identify officially designated scenic highways and open space within the County and provide goals and objectives for preservation of these resources.

4.3.1.2 Regional Setting

The Proposed Project is located approximately 30 miles east of Redding in the foothills of the Cascade Mountain Range, approximately 6 miles from the community of Whitmore. The facilities associated with the Kilarc and Cow Creek Developments are at elevations ranging from approximately 850 feet above mean sea level (ft msl) at the Cow Creek powerhouse to approximately 3,950 ft msl at the North Canyon Creek diversion dam. The landform of the region varies from gently rolling hills near the Cow Creek Powerhouse to steeper narrow canyons at the upper elevations near the Old Cow Creek drainage. The vegetation throughout the Project area is diverse and includes river banks and canyons densely vegetated with conifer forest, and oak savannah and pine grassland at the lower elevations. Because of the dramatic topography, natural vegetative patterns, and abundance of visible water bodies, the region is known for its many high-quality vistas and scenery.

Land use in the Project area outside of community centers is predominantly national forest, timber production, agriculture, recreation, and conservation. Several of these designations are intended for lands that are mostly unimproved and are intended to remain as open space in visual character.

State Routes (SR) 44 and 299 are the primary state transportation corridors that serve the region. SR 44 is a state highway that runs from Redding to Lassen Volcanic National Park and is considered an Eligible State Scenic Highway as part of the Volcanic Legacy Scenic Byway. Several county roadways provide secondary access throughout the area. Fern Road East is the closest public roadway to the Project, where it passes immediately adjacent to the Kilarc powerhouse, switchyard, and penstock. No other Project features are visible from public roads in the area, including SR 44.

The Project is located on land owned in fee by PG&E or occupied under the appropriate real property agreements. Much of the land surrounding the Project is privately held, and access to many of the Project facilities is restricted or only allowed by way of easements. The Kilarc facilities are adjacent to property owned by Sierra Pacific Industries, and land surrounding the Cow Creek Development has several privately held large ranches.

4.3.1.3 Kilarc Development Setting

Kilarc Forebay is located on a ridge approximately 1,200 feet above the Kilarc power house to the southeast. The Kilarc Forebay facility includes the approximately 4.5 acre forebay pond, the forebay dam, a diversion canal (Kilarc Main Canal), and a day-use area with picnic tables and restrooms. The Kilarc Forebay facility is accessed by approximately 4 miles of unpaved road, including Miller Mountain Road as well as an access road over private land easements. The Project cannot be seen from Miller Mountain Road. Views from the access road to the Kilarc Forebay area are substantially reduced by topography and vegetation except for a short section where it terminates at the day use area. Views within and through the forebay and day use facilities are somewhat filtered by the existing trees and other vegetation growing in and around the various recreational use areas.

The Kilarc Forebay dam is an earth-filled structure with established grasses and forbes covering its slopes. The dam is located along the forebay's western edge, and the day use area is located east and northeast of the forebay. As a result the dam-face is not easily visible from the day use area and is only partially visible from the path around the forebay pond perimeter. A metal access bridge and platform are visible in the forebay pond, along with associated fencing, electrical equipment, power poles, and overhead lines. A small metal pedestrian bridge can be seen at the canal inlet to the pond. The vegetative character of the Kilarc Forebay vicinity is predominantly white fir, Jeffrey pine, and lodgepole pine forest (Figure 4.3-1). Because of the forebay's location on the ridge top, distant views are available from the few spots where they're not obscured by intervening vegetation surrounding the facility. Where openings in the vegetation allow, distant views of the peaks in the Shasta National Forest can be seen to the northwest, and Lassen Peak is visible to the southeast (Figure 4.3-2).

Figure 4.3-1 View of the Kilarc Forebay

Kilarc powerhouse is located at an elevation of approximately 2,580 ft msl on the western slope of Miller Mountain. The Kilarc powerhouse building is constructed of locally-quarried stone walls, with a steep-pitched gable roof clad in metal sheathing. The building includes arched windows with glass or wooden louvres and painted wooden doors. Concrete arch-top vent openings are seen on the gable-end walls. The switchyard, immediately east of the power house along Fern Road East, is characterized by its equipment, poles, wires, conductors and other elements, and is surrounded by galvanized chain-link fence. For the most part, the Kilarc powerhouse and switchyard are surrounded by densely forested hillsides. Ranches can also be seen occasionally in the area along Fern Road East. Because of the curvilinear roadway and dense vegetation, views from the roadway to the Kilarc powerhouse, switchyard and penstock are limited to an approximately 800-foot section of Fern Road East. (Figure 4.3-3)

Figure 4.3-2 Distant View of Lassen Peak to the Southeast from Kilarc Forebay

Figure 4.3-3 View of the Kilarc Powerhouse and Switchyard

Where visible, the powerhouse and switchyard are highly noticeable due to their close viewing proximity and unique visual character. The powerhouse is also accessible to the public along the northern side away from the road. The Kilarc penstock is mostly underground and is recognizable by the approximately 50-foot wide cleared area following its alignment up the hillside toward the Kilarc Forebay.

The Kilarc day use area is modestly developed, and the visual character includes scattered wooden picnic tables, small metal pedestal barbeques, parking bollards, trash cans, and signage (Figure 4.3-4). The day use area is unpaved, and the concrete block and wood restroom building is the largest, most noticeable built element.

Figure 4.3-4 View of the Kilarc Day Use Area Near the Forebay

A mechanized trash rake is located on the Kilarc Main Canal just east of the day use area and is readily seen from the terminus of the access road. The trash rake is surrounded by chain-link fencing with razor wire and includes telecommunications equipment and signage. The Kilarc Main Canal continues east from the trash rake and has limited to no visibility from the access road and day use area.

4.3.1.4 Cow Creek Development Setting

The Cow Creek Development is approximately 8 miles southwest of the Kilarc Development. The Cow Creek powerhouse is a steel truss building located at an elevation approximately 856 ft msl. The landform of the Cow Creek area is generally characterized by undulating foothills bisected by shallow drainages and steeper creekways. The vegetative cover surrounding the Cow Creek powerhouse is mostly interior live oak woodland, blue oak-foothill pine woodland, and non-native annual grassland. The area immediately surrounding the powerhouse is primarily non-native grassland with scattered sycamore, pine, and oak trees (Figure 4.3-5).

The Cow Creek powerhouse is located along South Cow Creek Road; however public access is prohibited because of locked gates approximately 1 mile southwest and 1.5 miles northeast of the powerhouse. As a result, no public views of the Cow Creek powerhouse are available. The Cow Creek powerhouse can be seen from private viewing areas, although because of the curvilinear roadway and intervening vegetation, visibility is substantially limited.

The Cow Creek Forebay is located northeast of the powerhouse at an approximate elevation of 1,550 ft msl. The forebay pond has a surface area of approximately 1 acre and is retained by a 16-foot tall earth-filled dam. Public access to the Cow Creek Forebay facility is prohibited. Due to the approximately 700 foot elevation differential and the mature vegetation, the Cow Creek Forebay cannot be seen from South Cow Creek Road. In addition the Cow Creek penstock and

main canals are not visible from the publicly accessible portions of South Cow Creek Road. Because of this, no public views of the Cow Creek Development are available.

Figure 4.3-5 View of the Cow Creek Powerhouse and Switchyard

Within the Abbott Ditch area south of the Cow Creek powerhouse, landowners experience private views of the riparian habitat that is supported by Abbott Ditch irrigation. Abbott Ditch habitat is discussed in further detail in Section 4.7, Terrestrial Biological Resources.

4.3.2 Regulatory Setting

Public opinion and policy concerning the established visual character of the regional landscape are important factors in assessing the baseline values ascribed to the setting. Community-based goals serve as an essential tool for predicting the likely reaction that changes resulting from the Proposed Project would evoke from the viewing public.

The Project is located within the jurisdictional boundaries of Shasta County. The Shasta County General Plan (as amended in September 2004), Sections 6.8 (Scenic Highways), Figure SH-1 indicates that the project is not within the viewshed of any planned or officially designated scenic highway (Shasta County 2004c). Furthermore, Section 6.9 (Open Space and Recreation), states that the project area is not included in Shasta County's Open Space Inventory (Shasta County 2004d). The objectives and policies contained in the Scenic Highways and Open Space and Recreation Elements of the General Plan are not applicable to the Proposed Project.

4.3.3 Analysis Methodology

As described above, the VIA employed a model developed by FHWA in conjunction with the American Society of Landscape Architects. The major components of this process include establishing the visual environment of the Proposed Project, assessing the visual resources of the Project area, and identifying viewer response to those resources. Those components define the existing or baseline conditions. Resource change introduced by the Project and the associated viewer response is then assessed, providing a basis for determination of potential visual impacts. Visual impact is a function of assessing the extent of physical change (resource change), and comparing that with the degree of viewer sensitivity (viewer response).

4.3.3.1 Analytical Approach

The following methods were used to evaluate the visual character of the Project area, to assess the quality and character of its visual resources, and to describe views of and from it:

- direct field observation from vantage points including public roadways and public property;
- interpretation of aerial and general site photographs;
- review of Project site plans; and,
- review with regard to compliance with state and local ordinances and regulations pertaining to visual quality.

The VIA established various viewing locations called Observer Viewpoints (OVs) throughout the Project area. The OVs selected were those that best disclose the typical visual character of the Proposed Project, show unique Project components or affected resources, and which represent affected public viewer groups.

Each viewpoint was analyzed for its visual quality, defined as a measure of the overall impression or appeal. Viewer sensitivity is defined as the viewer's concern for scenic quality in response to change in the visual resources. The value of high, moderate, or low visual resources are defined as follows:

- "High" defines a landscape with great scenic value. People typically go out of their way to visit areas of high visual quality with high levels of vividness, unity, and intactness. Viewers have substantial concern for the scenic quality of these areas.
- "Moderate" defines landscapes that are common or typical and have average scenic value. They usually lack significant man-made or natural features. Levels of vividness, intactness, and unity are average. Viewers have some concern for scenic quality in response to changes in views.
- "Low" defines landscapes that are below average in scenic value. They often contain visually discordant man-made. Views are typically classified as indistinct, unharmonious, and disjunctive. Levels of vividness, intactness, and unity are low. Viewers have little to no concern for views in these areas.

Additionally, viewer exposure was assessed for each viewpoint by measuring the number of viewers exposed to the resource change, type of viewer activity, duration of their view, speed at which the viewer moves, and position of the viewer.

Photographs of the existing conditions along with photo-simulations of the Proposed Project provided a basis for understanding the proposed visual changes. In each case, the "existing" image shows how the view looked at the time of the VIA, and the "proposed" simulation represents how that location might appear with implementation of the Proposed Project. For the purpose of the VIA, new vegetative growth in the photo-simulations show plant growth at approximately 10 years after Proposed Project implementation.

The OVs selected for the Kilarc Development are shown in Figures 4.3-6 through 4.3-13. Field assessment of the other features of the Kilarc Development determined that because of limited visibility, no OVs were appropriate for those locations. All of the proposed Cow Creek elements are located either on private property, away from public roadways, or are too remote to be seen by the viewing public. As a result, no visual impacts were identified relating to the changes proposed at the Cow Creek Development.

Observer Viewpoint 1 - From the Perimeter Path toward the Kilarc Forebay

Because of existing trees and other vegetation in the area, views of the Kilarc Forebay are generally limited to locations within relatively close proximity to the facility itself (Figure 4.3-6). The existing view of the Kilarc Forebay is of moderately high visual quality. The vividness or memorability of the view is increased by the site's somewhat unique location on the ridge top. Although mostly blocked by surrounding trees, views from the forebay perimeter path include long-distance vistas of the Shasta Range to the north and Mount Lassen to the east. The built characteristics of the metal platform apparatus and bridge, and the engineered appearance of the dam are visually inconsistent with the surrounding natural landscape.

Figure 4.3-6 OV-1 Existing Condition

Viewer Response

The Recreational Resources Report (PG&E 2007c) indicates that most users of the Kilarc Forebay visit the site during the summer months, with as many as 25 visitors observed during Memorial Day weekend. The average number of visitors at one time was observed to be 5.4. However the total number of visitors is relatively low compared to many other recreational lakes in the region. In addition, the report found that the predominant use is fishing, and that sightseeing is also one of the top activities listed by users. Fishing, which is often a passive activity, affords the user prolonged viewing opportunities of the surroundings. Sightseeing by definition indicates a high user appreciation for the scenic quality of the area. In addition, the somewhat unique location of the Kilarc Forebay on the ridge top creates a sense of anticipation for visitors travelling to the site, as well as increased expectations regarding the viewing experience. Although expansive

panoramas are substantially limited by vegetation surrounding the forebay, the occasional glimpse of a distant mountain peak increases the sensitivity to view quality.

The Proposed Project would remove the Kilarc dam, intake, and other man-made elements and restore the site to a somewhat natural condition (Figure 4.3-7). In doing this, the uniqueness of the forebay would be gone and the site would in time be visually indistinguishable from the adjacent landscape. Removal of the existing built elements would cause the site to visually blend with the surrounding forest setting. Regardless of the visual quality of the deconstructed forebay, the Proposed Project would close the facility and prohibit access to the area. As a result, these views would no longer be available to the public. The public's ability to enjoy of the type of visual amenities found at the Kilarc Forebay would be dependent on the availability of similar views at other recreational sites in the area, such as Lake Nora, Lake Grace, and McCumber Reservoir, which each provide recreational uses and associated visual enjoyment opportunities similar to that of Kilarc. Lake Grace, Lake Nora, and McCumber Reservoir are PG&E facilities associated with other Hydroelectric Projects and provide comparable recreation opportunities available to visitors that recreate at Kilarc Forebay, including campgrounds, picnic areas, boating, and fishing access in the general vicinity of the Proposed Project. At Lake Grace and Lake Nora PG&E the Licensee provides picnic areas (10 each). McCumber Reservoir provides seven camping units and five walk-in campsites. There is a car-top boat launch nearby affording boating and fishing opportunities.

Figure 4.3-7 OV-1 Proposed Condition

Additionally, the Project area is surrounded by millions of acres of public lands that offer both developed and dispersed recreation opportunities. The region offers a wide assortment of water-based recreation opportunities such as fishing, swimming, and boating. Recreation attractions include Shasta Lake, Whiskeytown Lake, Mount Shasta, Whiskeytown– Shasta–Trinity National Recreation Area, Lassen National Forest, Castle Crags State Park, Pacific Crest Trail, McArthur-Burney Falls Memorial State Park, as well as a variety of streams, like Hat Creek and the Sacramento River. Nearby hiking areas include Trinity Divide Country, Pacific Crest Trail, Lassen Park, and the Thousand Lakes Wilderness Area. An estimated 2 to 3 million visitors each year come to Shasta County to enjoy these recreation resources (PG&E 2007c). A detailed description of regional recreational sites is provided in Section 4.17 Recreation.

Observer Viewpoint 2 – From Fern Road East toward the Kilarc Powerhouse and Switchyard

The existing visual quality of the Kilarc Powerhouse is moderately high. The memorability of the view is increased by the uniqueness of the old stone building and the picturesque architectural style. Although the adjacent switchyard adds to the noticeability of the site, the visual clutter and industrial appearance detract from the otherwise positive viewing experience. Approaching the site from the west, the switchyard is mostly blocked from view until past the powerhouse. Travelling in the westbound direction the switchyard is more prominent in the view (Figure 4.3-8). The penstock alignment and headwalls on the hillside can be seen but are not easily noticed while driving on Fern Road East. The man-made elements of the site are not unexpected in this rural highway environment, and farms and ranches can be seen elsewhere along the roadway.

Figure 4.3-8 OV-2 Existing Condition

Viewer Response

The Kilarc Powerhouse is visible along an approximately 800-foot section of Fern Road East. Approaching from either direction at a speed of 35 miles per hour, the powerhouse can be seen for a duration of approximately 8 seconds. At the closest, roadway users pass within approximately 20 feet of the powerhouse. Many users of Fern Road East are local travelers, which because of their familiarity may have increased sensitivity to change in the visual environment. Although traffic counts are not available specifically at the powerhouse, average daily traffic (ADT) counts measured in 2009 on Fern Road East at Whitmore Road (340 ADT) and at Oak Run to Fern Road (230 ADT) indicate that a relatively low number of viewers pass by the powerhouse site each day. Fern Road East is not designated as a scenic roadway in county or state planning documents. The close proximity of the view and the anticipated sensitivity regarding potential changes to the historic-looking powerhouse building are balanced by the short duration of the viewing time and the relatively low number of potential viewers.

The Proposed Project would leave the Kilarc Powerhouse and switchyard in place (Figure 4.3-9). Most of the changes to the powerhouse would be conducted inside the powerhouse building and would not be visible from the East Fern Road East or the surrounding area. The doors, windows, and other openings would be secured in some manner to protect the building from vandalism and deterioration. As a result the most visible elements of the Proposed Project at the Kilarc powerhouse would be the covering of windows and other openings. Windows would be covered with plywood cut to match the openings. The noticeability of these covered windows would depend mostly on the finish color and the type of construction used to affix the plywood. If the window coverings were not visually compatible with the natural stone architectural style, the intactness and unity ratings would be reduced a minor amount.

Figure 4.3-9 OV-2 Proposed Condition

Observer Viewpoint 3 – From the Kilarc Day Use Area

The existing visual quality of the Kilarc day use area is moderate. Because the site is typical of many other forested picnic facilities throughout the region, the memorability of the view is reduced. While in the day use area, potential long range views and distant vistas are mostly blocked by the exiting trees in and surrounding the site. The day use area includes built elements such as restrooms, picnic benches, trash cans and signage, which encroach on the otherwise natural setting (Figure 4.3-10). In spite of their visibility, because of the mostly natural materials, textures, and colors these built elements are somewhat visually compatible with the setting.

Figure 4.3-10 OV-3 Existing Condition

Viewer Response

All visitors to the Kilarc Forebay pass by the day use area on their way to the forebay. The Recreational Resources Report (PG PG&E 2007c) found that an average of 2.5 persons at one time visit the Kilarc day use area, with most use occurring the summer months. However, as described in the Recreational Resources Report, as well as in FERC visitation forms for regional recreation facilities usage (see Section 4.17 Recreation for additional description), the total number of visitors to the Kilarc day use area is relatively low compared to many other day use areas in the region. The report also indicated that picnicking is the predominant activity at the site. Although not all potential activities associated with picnicking are passive in nature, the opportunity exists for prolonged viewing of the surroundings. As described for visitors to the forebay, the location of the Kilarc day use area on the ridge top increases the anticipation and expectations regarding the viewing experience. The day use area is situated among the trees, and as a result views outward to the surrounding landscape are limited.

With implementation of the Proposed Project, the man-made elements of the day use area would be removed, and the site would be restored to a more natural condition (Figure 4.3-11). As a result the vividness or memorability would be slightly reduced since the site would not be visually unique, and would look similar to the adjacent landscape. However, the removal of the built elements and the restoration would result in a more natural and visually compatible condition. Although the area would be restored, the Proposed Project would close the facility and prohibit access to the day use area. As a result, these views would no longer be available to the public. The public's ability to enjoy of the type of visual amenities found at the Kilarc day use area would be dependent on the availability of similar views at other recreational sites in the area, such as Lake Nora, Lake Grace, and McCumber Reservoir.

Figure 4.3-11 OV-3 Proposed Condition

Observer Viewpoint 4 – From Kilarc Access Road Looking Toward the Trash Rake on the Main Canal

The existing visual quality of the Kilarc access road approaching the forebay is moderate. The views are generally limited to the fore- and mid-ground, although glimpses of longer-range vistas do occur. The surrounding trees and other vegetation substantially block views beyond the site itself. At this location, a portion of the Kilarc Main Canal and the trash rake can be easily seen from the access road (Figure 4.3-12). The trash rake is prominent in the view and distracts from the otherwise mostly natural setting. The trash rake, however, is somewhat unique in terms of machinery, and does slightly add to the memorability of the view.

Figure 4.3-12 OV-4 Existing Condition

Viewer Response

Visitors to the Kilarc Forebay and day use area pass by a portion of the main canal and the trash rake on their way to the forebay. The Recreational Resources Report (PG&E 2007ca) found that an average of 5.4 people at one time visit the Kilarc Forebay, and an average of 2.5 people at one time utilize the day use area, with most use occurring the summer months. As described above, the number of people who use the Kilarc Forebay and who pass the main canal and trash rake is relatively low compared to many other day use areas in the region. The trash rake and main canal are part of the view while approaching the Kilarc Forebay and day use area on the access road and the trash rake can also be seen from portions of the day use area. As described for visitors to the forebay and day use area, because of the site's location on the ridge top, viewing expectations are somewhat increased for people using the access road approaching the site. However viewer sensitivity while traveling the access road is somewhat less than for viewers who have already arrived at the facility.

The Proposed Project would fill-in the main canal, and remove the trash rake and most other built elements along the canal (Figure 4.3-13). The topography and the area would be restored to a more natural condition. As seen from this viewpoint, the removal of the trash rake and other equipment would make the site slightly less memorable since the site would visually blend with the surroundings; however, the site would appear as a more unified natural landscape. Regardless of the visual quality of the restored day use area, the Proposed Project would close the facility and prohibit access to the area. As a result, these views would no longer be available to the public. The public's ability to enjoy of the type of visual amenities found at the Kilarc day use would be dependent on the availability of similar views at other recreational sites in the area, as described above.

Figure 4.3-13 OV-4 Proposed Condition

4.3.3.2 Criteria for Determining Significance

According to the State Water Board's Environmental Checklist in Appendix A of the Board's CEQA regulations and Appendix G of the State CEQA Guidelines, visual resource impacts are considered significant if a project has a "substantial, demonstrable negative aesthetic effect." Based on professional standards and practices, a Proposed Project would have a significant impact if it would:

- have a substantial adverse effect on a scenic vista;
- substantially damage scenic resources;
- substantially degrade the existing visual character or quality of the site and its surroundings;
- introduce a substantial source of light or glare into the viewshed; or
- conflict with adopted visual resource policies.

4.3.4 Environmental Impacts and Mitigation

PG&E has included the following measure to address aesthetic impacts on the Kilarc and Cow Creek powerhouse structures due to decommissioning activities.

- **PM&E Measure HIST-2: Securing Buildings.** The Licensee shall secure the two powerhouse structures from unwanted entry, provide adequate ventilation to the interiors, shut down or modify the existing utilities and mechanical systems, and employ maintenance and monitoring measures for the buildings.

4.3.4.1 Kilarc Development

IMPACT 4.3-1 (Kilarc): Would the action have a substantial adverse effect on a scenic vista?

Proposed Project

A substantial adverse impact to a scenic vista would occur if the project would significantly degrade the scenic landscape as viewed from public roads, or in particular county or state-designated scenic roadways, or from other public areas. Scenic vistas throughout the Proposed Project area are mostly comprised of broad panoramas and distant views of mountains, valleys and other natural landscapes. Because of the generally forested condition of the areas surrounding the various Project elements, most of the scenic vista opportunities are substantially limited or are non-existent. Glimpses of distant mountain peaks are available from certain locations at the Kilarc Forebay area. These views, although minimal, do contribute somewhat to the visual experience of the site. The proposed physical changes to the forebay itself would not preclude long distance views; however, the proposal to restrict access to the site would make these existing views unavailable to the public. This loss of views would result in a minor adverse effect to the scenic vista. Since the existing views are substantially limited, and other equal and higher quality long-range views are found throughout the surrounding region, the Proposed Project's effect on scenic vistas would be minimal. Therefore, the impact is less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1

Alternative 1 would result in no change at the Kilarc Forebay site, and all existing views of the Kilarc Forebay and other landscapes viewable from the site would be retained. There would be no additional impacts from this alternative related to IMPACT 4.3-1 (Kilarc).

No Project Alternative

The No Project Alternative would result in no change at the Kilarc Forebay site; however, public access to the site and associated views may be restricted. As with the Proposed Project, the loss of views would result in a minor adverse effect to the scenic vista. Since the existing views are substantially limited, and other equal and higher quality long-range views are found throughout the surrounding region, impacts would be less than significant for the No Project Alternative.

IMPACT 4.3-2 (Kilarc): Would the action substantially damage scenic resources?

Proposed Project

The Proposed Project is not within the view corridor of any officially designated state scenic highway. All project facility operations occur on existing creeks and canals, most of which are located away from major roadways and are not visible from the surrounding area due to steep terrain and dense vegetation. Implementation of the Proposed Project would result in no impact to scenic resources, such as trees, rock outcroppings, and historic buildings within a state scenic highway.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative:

Because the Kilarc Forebay is not within the view corridor of any officially designated state scenic highway, there would be no additional impacts from these alternatives related to IMPACT 4.3-2S (Kilarc).

IMPACT 4.3-3 (Kilarc): Would the action substantially degrade the existing visual character or quality of the site and its surroundings?

Proposed Project

Project-related actions would be considered to have a significant impact on the visual character of the site if they altered the area in a way that substantially changed, detracted from, or degraded the visual quality of the site. The Proposed Project would change existing features at numerous locations in the Kilarc Development, which includes features that are visible to the public such as the forebay, day use area, a portion of the main canal, and the powerhouse and switchyard facility. The remaining Kilarc elements are located either on private property, away from public roadways, or are too remote to be seen by the viewing public. Of the publicly visible elements of the Kilarc Development, such as the forebay, portions of the main canal, trash rack, and day use area; the proposed changes would result in a low to moderately-low improvement in visual quality. The improved quality would be due primarily to the removal of the built elements and the restoration of the sites to a more natural condition.

The Proposed Project would completely restrict public access to the Kilarc Forebay, day use area, and related facilities. Regardless of the proposed physical changes, these elements would no longer be available for public viewing. As a result, the loss of visual access to the Kilarc Forebay would result in an adverse visual impact for the current, regular users of the facility. This impact, however, would be offset by the relatively low number of users, the abundance of high-quality public views in the surrounding area, and by the proximity of other recreation spots providing comparable viewing experiences. Specifically, Lake Nora (approximately 22 miles from Whitmore), Lake Grace (approximately 20 miles), and McCumber Reservoir (approximately 27 miles) each provide recreational uses and associated visual enjoyment opportunities similar to Kilarc. As described in the Recreational Resources Report (PG&E 2007c2007a), the Accessibility/Recreational Assessment (Appendix F), as well as in FERC visitation forms for regional recreation facilities usage (see Section 4.17 Recreation for additional description), the

access and driving distance to Lake Nora, Lake Grace and McCumber Reservoir would be comparable to that of the Kilarc Forebay for many local residents and visitors, depending on their specific origin of travel. In addition, because of the hillside grade and condition, the access road to Kilarc Forebay and day use area can be impassible during certain times of the year, which is not necessarily the case at other recreational areas.

The Kilarc Powerhouse along Fern Road East would remain visible from public viewpoints. Fern Road East passes immediately adjacent to the powerhouse and switchyard. The Proposed Project would leave the powerhouse and switchyard in place. The windows, doors and other openings to the powerhouse would be secured which may result in a minor visual change to the exterior of the building. This change, if not designed and installed to be visually compatible with the building's architecture, would result in a slight reduction of visual quality at that location, but the impact would not be considered significant. Therefore, the Proposed Project at the Kilarc Development would result in less-than-significant impacts related to degrading the existing visual character of the area.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site, and the existing visual character of the site would be retained. There would be no additional impacts from these alternatives on related to IMPACT 4.3-3 (Kilarc).

IMPACT 4.3-4 (Kilarc): Would the action introduce a substantial source of light or glare into the viewshed?

Proposed Project

The Proposed Project does not include any new sources of light or glare. Further, some existing light sources such as headlights along portions of the Kilarc access road, and some security and maintenance activity lighting would no longer be needed with implementation of the Proposed Project. Therefore, no impact would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site, and no new sources of light or glare would be introduced to the viewshed. There would be no additional impacts from these alternatives related to IMPACT 4.3-4 (Kilarc).

IMPACT 4.3-5 (Kilarc): Would the action conflict with adopted visual resource policies?

Proposed Project

As stated above, the Proposed Project is located within the jurisdictional boundaries of Shasta County. The Proposed Project would not conflict with implementation of policies dedicated to the protection of scenic resources, as outlined in the Shasta County General Plan.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site, and there would be no conflict with implementation of policies dedicated to the protection of scenic resources. There would be no additional impacts from these alternatives related to IMPACT 4.3-5 (Kilarc).

4.3.4.2 Cow Creek Development

IMPACT 4.3-6 (Cow Creek): Would the action have a substantial adverse effect on a scenic vista?

Proposed Project

A substantial adverse impact to a scenic vista would occur if the project would significantly degrade the scenic landscape as viewed from public roads, or in particular county or state-designated scenic roadways, or from other public areas. Scenic vistas throughout the Proposed Project are mostly comprised of broad panoramas and distant views of mountains, valleys and other natural landscapes. Because of the generally forested condition of the areas surrounding the various project elements, most of the scenic vista opportunities are substantially limited or are non-existent. As described above, all of the proposed Cow Creek elements are located either on private property, away from public roadways, or are too remote to be seen by the viewing public. As a result, no impact would occur relating to the changes proposed at the Cow Creek Development.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, 2D, and No Project Alternative

As with the Proposed Project, Alternative 2A, 2B, 2C, 2D, and the No Project Alternative would be located either on private property, away from public roadways, or are too remote to be seen by the viewing public. There would be no additional impacts from these alternatives related to IMPACT 4.3-6 (Cow Creek).

IMPACT 4.3-7 (Cow Creek): Would the action substantially damage scenic resources?

Proposed Project

The Proposed Project is not within the view corridor of any officially designated state scenic highway. Implementation of the Proposed Project would result in no impact to scenic resources, such as trees, rock outcroppings, and historic buildings within a state scenic highway.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, 2D and No Project Alternative

As with the Proposed Project, Alternative 2A, 2B, 2C, or 2D, and the No Project Alternative would not be located within the view corridor of any officially designated state scenic highway. There would be no additional impacts from these alternatives related to IMPACT 4.3-7 (Cow Creek).

IMPACT 4.3-8 (Cow Creek): Would the action substantially degrade the existing visual character or quality of the site and its surroundings?

Proposed Project

Project-related actions would be considered to have a significant impact on the visual character of the site if they altered the area in a way that substantially changed, detracted from, or degraded the visual quality of the site. The Proposed Project would change existing features at numerous locations in the Cow Creek Development. These elements are located either on private property, away from public roadways, or are too remote to be seen by the viewing public. As described above, several OVs were selected to document the extent and type of visibility expected for the Proposed Project. However, for the Cow Creek Development, no OVs were identified because no public viewing opportunities exist due to distance, topography, and intervening vegetation.

Within the Abbott Ditch area south of the Cow Creek powerhouse, landowners experience private views of the riparian habitat that is supported by Abbott Ditch irrigation. The Proposed Project would remove artificial flow through the Abbott Ditch area. Riparian and wetland areas would return to systems more naturally adapted to seasonal and cyclic hydrologic conditions that prevailed prior to the existence of the Project, reverting to the surrounding blue oak-digger pine and dry non-native annual grassland habitat types. While the change would be noticeable to adjacent landowners, it would not substantially degrade the existing visual character or quality of the site. Therefore, the impact would be considered less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A, ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Ditch. As with the Proposed Project, these features would be located either on private property, away from public roadways, or are too remote to be seen by the viewing public, and

such changes are not anticipated to substantially degrade the existing visual character. Implementation of Alternatives 2A, 2B, 2C, or 2D would include coordination with landowners as necessary. Further, implementation of Alternative 2A, 2B, 2C, or 2D would retain the private views of the riparian habitat that is supported by Abbott Ditch irrigation. Impacts from these alternatives related to IMPACT 4.3-8 (Cow Creek) would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. All flows would pass through the natural channels of Old Cow and South Cow Creeks, and the Hooten Gulch would return to its natural, ephemeral condition. As with the Proposed Project, the change to these private views is not anticipated to substantially degrade the existing visual character or quality of the site. There would be no additional impacts from this alternative related to IMPACT 4.3-8 (Cow Creek).

IMPACT 4.3-9 (Cow Creek): Would the action introduce a substantial source of light or glare into the viewshed?

Proposed Project

The Proposed Project does not include any new sources of light or glare. Further, some existing light sources such as headlights along portions of the Kilarc access road, and some security and maintenance activity lighting would no longer be needed with implementation of the project. Therefore, no impact would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

As with the Proposed Project, Alternative 2A, 2B, 2C, or 2D would be located either on private property, away from public roadways, or are too remote to be seen by the viewing public. Although, new sources of light may be required for security or maintenance activity, additions are not anticipated to introduce a substantial source of light or glare to the viewshed, and impacts from these alternatives on related to IMPACT 4.3-9 (Cow Creek) would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place, and no new sources of light or glare would be introduced. As with the Proposed Project, some security, and maintenance activity lighting may no longer be needed. There would be no additional impacts from this alternative related to IMPACT 4.3-9 (Cow Creek).

IMPACT 4.3-10 (Cow Creek): Would the action conflict with adopted visual resource policies?

Proposed Project

The Proposed Project is located within the jurisdictional boundaries of Shasta County. The Proposed Project would not conflict with implementation of policies dedicated to the protection of scenic resources, as outlined in the Shasta County General Plan.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Ditch. As with the Proposed Project, these features would be located either on private property, and would not conflict with the implementation of policies dedicated to the protection of scenic resources. There would be no conflict with visual resource policies, and there would be no additional impacts from these alternatives related to IMPACT 4.3-10 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place, and there would be no conflict with implementation of policies dedicated to the protection of scenic resources. There would be no additional impacts from this alternative related to IMPACT 4.3-10 (Cow Creek).

4.4 Agricultural and Forestry Resources

Land uses in the project area are classified as Timber Production, Exclusive Agriculture, and Unclassified. These lands support economic activity and employment related to timber production, agriculture, cattle ranching and grazing, recreation, conservation, transportation, and hydroelectric power generation. This section addresses the potential effects to agricultural and forestry resources resulting from project implementation.

4.4.1 Environmental Setting

4.4.1.1 Sources of Information

The Agricultural Lands Element (Shasta County 2004e) and the Timberlands Element (Shasta County 2004f) of the Shasta County General Plan contain objectives and policies that help guide agricultural land use decisions in the County.

The Shasta County Zoning Plan contains regulations and maps which help to implement the agricultural objectives and policies of the General Plan, and to facilitate and guide growth in accordance with the General Plan (Shasta County 2016).

The Shasta County Crop and Livestock Report summarizes the acreage, production, and gross value of agricultural commodities and livestock produced in Shasta County (Shasta County 2012a).

4.4.1.2 Regional Setting

Agricultural Resources

According to the Agricultural Lands Element of the Shasta County General Plan, agricultural land uses are a major component of Shasta County's resource land base. They are also a major element in defining the quality of life available to the residents of Shasta County. Were agriculture to lose its land-based prominence in the County, the rural character, and country living so valued by its residents and so important to its economy would likely decline (Shasta County 2004e). According to the Shasta County General Plan, the County's total land area in farms was 333,828 acres in 2002, and field crop acreage is primarily in hay (including grass, alfalfa, Timothy, and other) and pasture (irrigated, improved, and rangeland); wild rice and mint are also cultivated in the county (Shasta County 2004e).

The Proposed Project is located in the foothills situated in the Eastern Upland region of the County. The primary use of these lands is for the grazing of livestock. According to Shasta County, conflicts between rural residential uses and grazing operations pose a significant threat to the economic viability of the latter (Shasta County 2004e). However, the project area lands support economic activity and employment related to timber production, agriculture, cattle ranching and grazing, recreation, conservation, transportation, and hydroelectric power generation. Agricultural land uses in the Kilarc Development mostly consist of evergreen forest and shrubland, and are shown on Figure 4.4-1. Agricultural land uses in the Cow Creek Development mostly consist of evergreen forest, shrubland, and herbaceous grassland, and are shown on Figure 4.4-2. Agricultural land uses for the Abbott Ditch area, as described in further detail below, mostly consist of developed/open space, deciduous forest, evergreen forest, shrubland, and herbaceous grassland and are shown on Figure 4.4-2.

Per the Shasta County Zoning Plan, the Kilarc Development is zoned as Timber Production District (TP) and Unclassified (U), and the Cow Creek Development is zoned as Exclusive Agricultural District (EA), Agricultural Preserve District (AP), TP, and U (Shasta County 2016). Additional description of Shasta County zoning designations and zoning maps are provided in Section 4.14, Land Use.

California Farmland Mapping and Monitoring Program

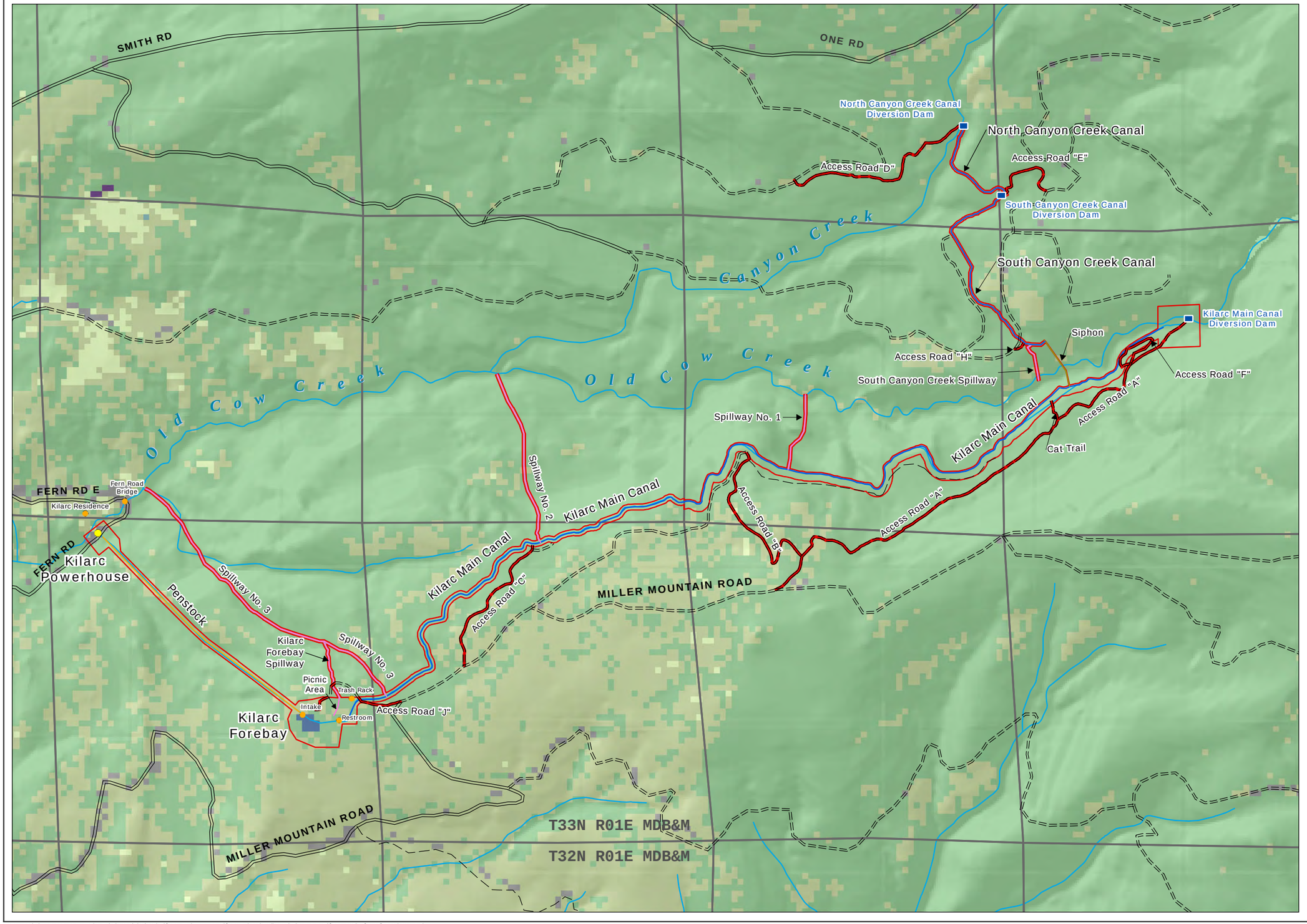
The California Farmland Mapping and Monitoring Program (FMMP) produces maps and statistical data used for analyzing impacts on California's agricultural resources; agricultural land is rated according to soil quality and irrigation status (California Department of Conservation 2013a). The FMMP designation for the Kilarc Development is Other Land (125 acres), as shown on Figure 4.4-3, and the FMMP designation for the Cow Creek Development is Grazing Land (59.3 acres), as shown on Figure 4.4-4. The FMMP designations for the Abbott Ditch, as described in further detail below and as shown on Figure 4.4-4, are: Prime Farmland (263.5 acres), Farmland of Local Importance (41.8 acres), and Grazing Land (148.8 acres).

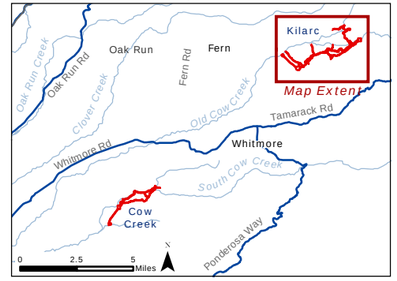
According to the FMMP, definitions for each of the land types described for the project area are (Department of Conservation 2013a):

- Other Land is defined as land not included in any other mapping category, such as timber, wetland, and riparian areas not suitable for livestock grazing.
- Grazing Land is defined as land on which the existing vegetation is suited to the grazing of livestock.
- Prime Farmland is defined as the having the best combination of physical and chemical features able to sustain long-term agricultural production; and has the soil quality, growing season, and moisture supply needed to produce sustained high yields.
- Farmland of Local Importance is defined as dryland grain producing lands.

Williamson Act

The California Land Conservation Act of 1965, commonly referred to as the Williamson Act, (Gov. Code, § 51200 et seq.) enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use (Department of Conservation 2013b). The Williamson Act provides incentives to landowners through reduced property taxes to deter the early conversion of agricultural and open space lands to other uses. The Kilarc Development area does not contain any parcels under Williamson Act Contract and is designated as Non-enrolled Land. Williamson Act Contract lands in the Cow Creek Development area are shown on Figure 4.4-5, and include: Prime Agricultural Land (0.59 acres), Non-Prime Agricultural Land (55.4 acres), and Non-enrolled Land (3.3 acres). Williamson Act Contract lands in the Abbott Ditch, as described in further detail below and as shown on Figure 4.4-5, include Prime Agricultural Land (355.8 acres) and Non-Prime Agricultural Land (98.1 acres).





- Diversion
- Miscellaneous Feature
- PG&E Facility
- Trail
- Light Duty Road
- Unimproved Road
- Unimproved Road (in FERC boundary)
- Stream/River
- Canal
- Penstock
- Siphon
- Spillway
- FERC Boundary
- Section Boundary

Land Cover *(acres within FERC Boundary)*

- Grapes (0.0)
- Open Water (2.0)
- Developed/Open Space (0.78)
- Developed/Low Intensity (0.44)
- Deciduous Forest (0.0)
- Evergreen Forest (110.65)
- Mixed Forest (0.05)
- Shrubland (10.89)
- Grassland Herbaceous (0.19)
- Herbaceous Wetlands (0.0)

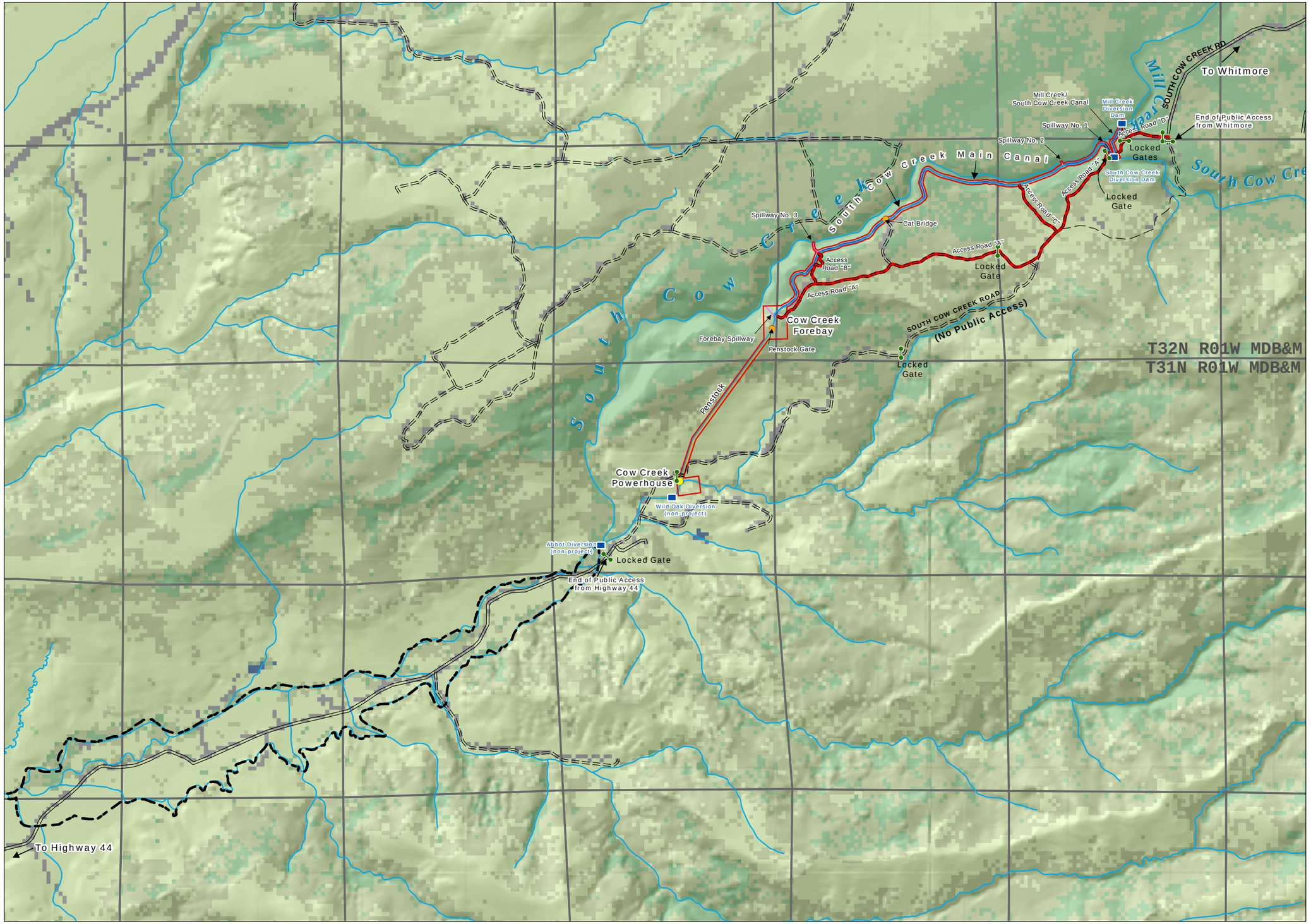
0 0.125 0.25 0.375 0.5 Mi
0 0.1 0.2 0.4 0.6 0.8 Km

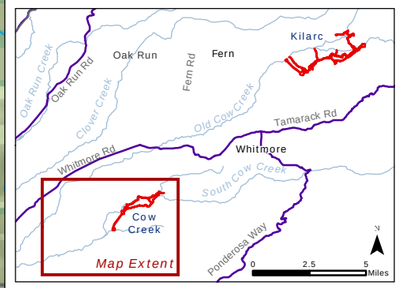
Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.4-1**
Kilarc Development
Agricultural Land Use

Date: 11/7/2013 Document Path: T:\sharegis\gisnt\Kilarc_Cow\3060054_KilarcCow\map\mxd\2013\Fig 3-4-1 Kilarc Agricultural Land Use.mxd

This Page Intentionally Left Blank





- Gate
- Diversion
- Miscellaneous Feature
- PG&E Facility
- Trail
- Light Duty Road
- Unimproved Road
- Unimproved Road (in FERC boundary)
- Stream/River
- Canal
- Penstock
- Spillway
- FERC Boundary
- Abbott Ditch Boundary (ADB)
- Section Boundary

Land Cover *(acres w/in FERC) / (acres w/in ADB)*

- Other Hay/Non Alfalfa (0.0) / (0.22)
- Open Water (0.0) / (0.0)
- Developed/Open Space (1.66) / (35.25)
- Developed/Low Intensity (0.0) / (1.55)
- Deciduous Forest (1.26) / (19.73)
- Evergreen Forest (27.25) / (11.72)
- Mixed Forest (0.0) / (2.45)
- Shrubland (18.55) / (80.83)
- Grassland Herbaceous (10.58) / (302.28)
- Herbaceous Wetlands (0.0) / (0.0)

N

0 0.25 0.5 0.75 Mi

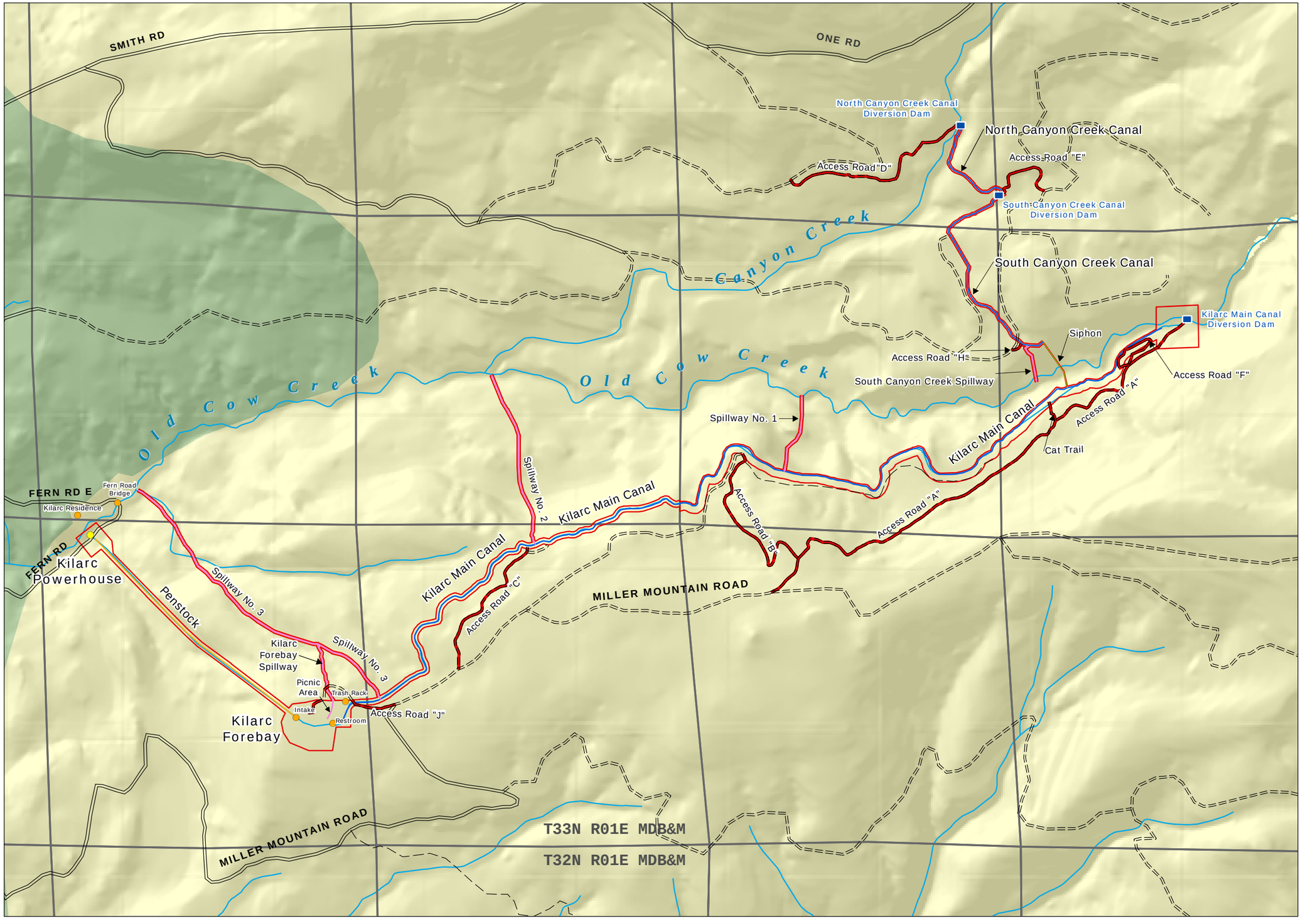
0 0.25 0.5 0.75 1 Km

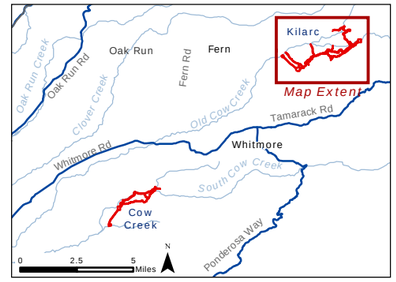
Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.4-2**
Cow Creek Development Agricultural Land Use

Date: 11/7/2013 Document Path: T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\Fig 3-4-2 Cow Creek Agricultural Land Use.mxd

This Page Intentionally Left Blank





- Diversion
- Miscellaneous Feature
- PG&E Facility
- Trail
- Light Duty Road
- Unimproved Road
- Road within FERC Boundary
- Canal
- Penstock
- Siphon
- Spillway
- FERC Boundary
- Section Boundary
- Stream/River

Farmland Classification

(acres within FERC Boundary)

- Grazing Land (0.0)
- Other Land (125.0)

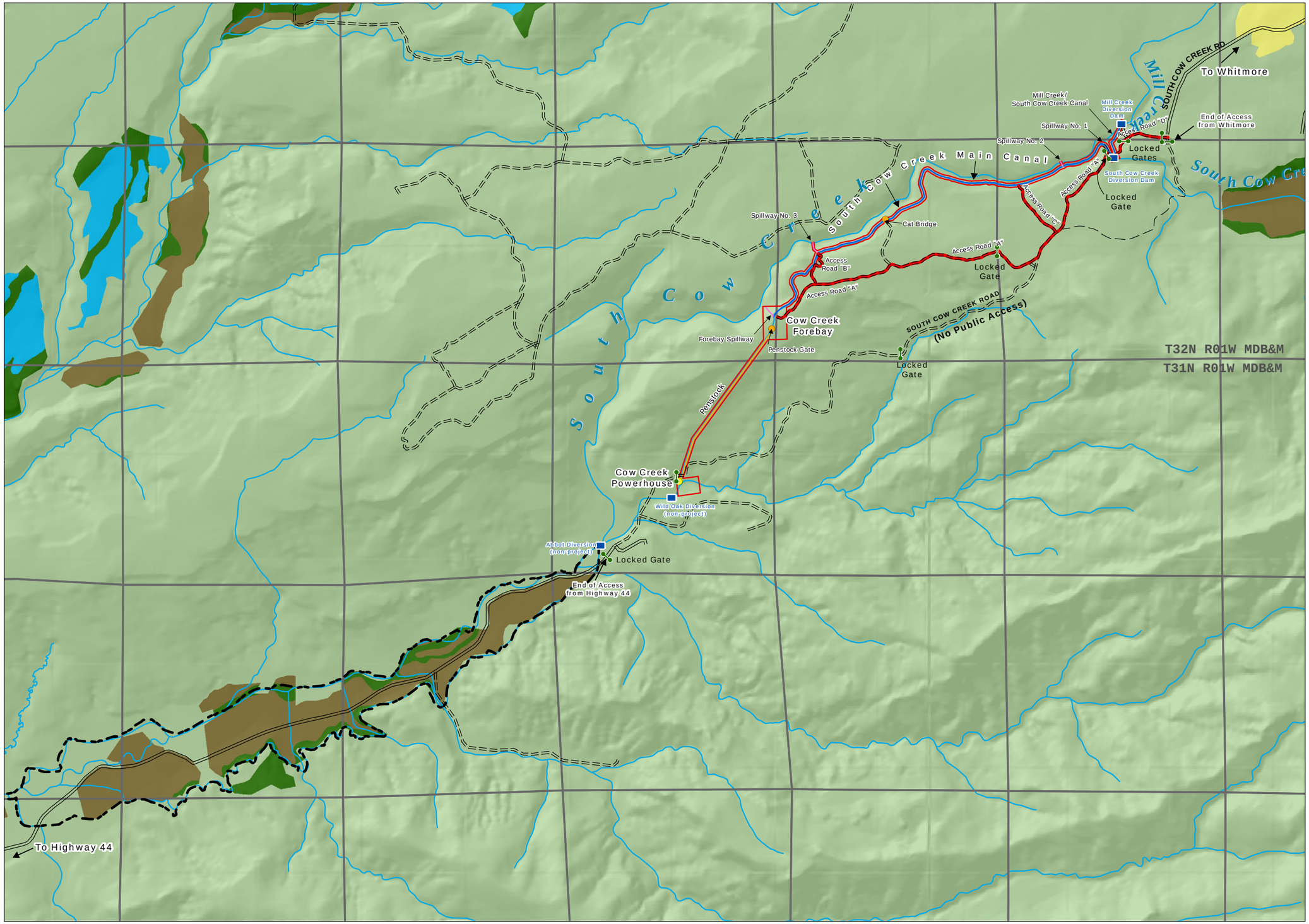
0 0.125 0.25 0.375 0.5 Mi
0 0.1 0.2 0.4 0.6 0.8 Km

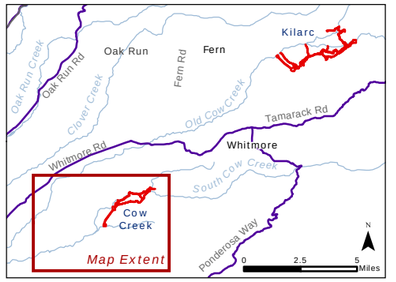
Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.4-3**
Kilarc Development
Important Farmland

Date: 11/10/2013 Document Path: C:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\Fig 3-4-1 Kilarc Important Farmland.mxd

This Page Intentionally Left Blank





- Gate
- Diversion
- Miscellaneous Feature
- PG&E Facility
- Trail
- Light Duty Road
- Unimproved Road
- Road within FERC Boundary
- Stream/River
- Canal
- Penstock
- Spillway
- FERC Boundary
- Abbott Ditch Boundary (ADB)
- Section Boundary

Farmland Classification

(acres within FERC Boundary) / (acres within ADB)

- Grazing Land (59.3) / (148.8)
- Farmland of Local Importance (0.0) / (41.8)
- Prime Farmland (0.0) / (263.5)
- Farmland of Statewide Importance (0.0) / (0.0)
- Other Land (0.0) / (0.0)

N

0 0.25 0.5 0.75 Mi

0 0.25 0.5 0.75 1 Km

Pacific Gas & Electric Company

KILARC-COW CREEK HYDROELECTRIC PROJECT

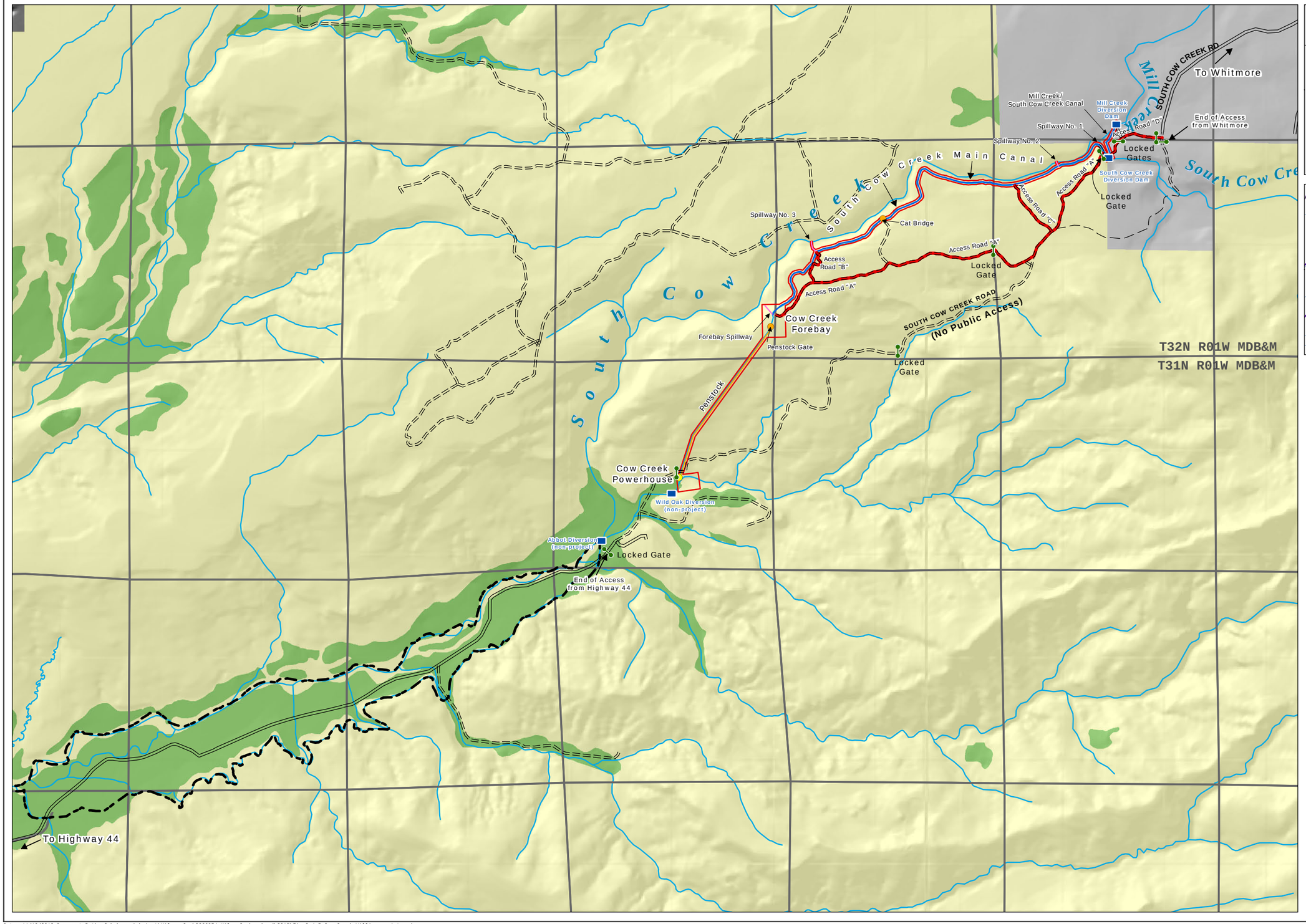
Figure **4.4-4**

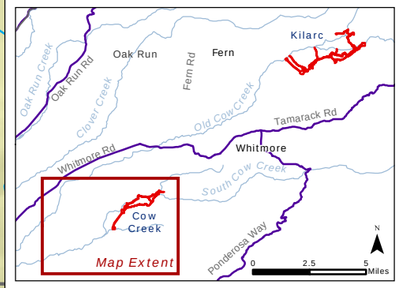
Cow Creek Development

Important Farmland

Date: 11/10/2013 Document Path: C:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\Fig 3-4-4 Cow Creek Important Farmland.mxd

This Page Intentionally Left Blank





- Gate
- Diversion
- Miscellaneous Feature
- PG&E Facility
- Trail
- Light Duty Road
- Unimproved Road
- Road within FERC Boundary
- Stream/River
- Canal
- Penstock
- Spillway
- FERC Boundary
- Abbott Ditch Boundary (ADB)
- Section Boundary

Williamson Act

(acres within FERC Boundary) / (acres within ADB)

- Prime Agricultural Land (0.59) / (355.8)
- Non-Prime Agricultural Land (55.4) / (98.1)
- Non-Enrolled Land (3.3) / (0.0)

N

0 0.25 0.5 0.75 Mi

0 0.25 0.5 0.75 1 Km

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.4-5**
Cow Creek Development
Williamson Act

Date: 11/10/2013 Document Path: C:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\Fig 3-4-5 Cow Creek Williamson Act.mxd

This Page Intentionally Left Blank

According to the Williamson Act Program, definitions for each of the land types described for the project area are (Department of Conservation 2013b):

- Non-enrolled Land is defined as land not enrolled in a Williamson Act contract and not mapped by FMMP as Urban and Built-Up Land or Water.
- Non-Prime Agricultural Land is defined as land which is enrolled under California Land Conservation Act contract and does not meet any of the criteria for classification as Prime Agricultural Land. Most Non-Prime Land is in agricultural uses such as grazing or non-irrigated crops.
- Prime Agricultural Land is defined as Land which is enrolled under California Land Conservation Act contract and meets any of the following criteria: 1) Land which qualifies for rating as class I or class II in the Natural Resources Conservation Service land use capability classifications; 2) Land which qualifies for rating 80 to 100 in the Storie Index Rating; 3) Land which supports livestock used for the production of food and fiber and which has an annual carrying capacity equivalent to at least one animal unit per acre as defined by the United States Department of Agriculture; 4) Land planted with fruit or nut-bearing trees, vines, bushes or crops which have a nonbearing period of less than 5 years and which will normally return during the commercial bearing period on an annual basis from the production of unprocessed agricultural plant production not less than $200 per acre; and 5) Land which has returned from the production of unprocessed agricultural plant production and has an annual gross value of not less than $200 per acre for three of the previous 5 years.

Abbott Ditch

The Abbott Ditch area is outside of the direct impact area of the Proposed Project; however, the Abbott Ditch receives irrigation water from the existing Project features for area farming and ranching operations. Below the Cow Creek powerhouse tailrace, waters are diverted from Hooten Gulch for private landowner use, including for livestock and for crop and pasture irrigation on the South Cow Creek bottomlands. The diversion is located a short distance upstream of the confluence of Hooten Gulch with South Cow Creek. Water is conveyed about 4 miles down valley from the Abbott Ditch diversion by gravity flow in an unlined ditch. The main canal laterals and turnouts irrigate approximately 320 acres of crop and pasture lands by flood irrigation (FERC 2008).

The Abbott Ditch is operated by the Abbott Ditch Users (ADU), and informal association of eight property owners. The Abbott Diversion redirects flows pursuant to an adjudication of the watershed entitling the ADU to divert 13.13 cfs from the natural flow of South Cow Creek. In addition, a mini-hydro facility known as the Wild Oak Development, with a generating capacity of 110 kilowatts, has operated since 1984 by diverting water from Hooten Gulch for power generation. Following the decommissioning process, Hooten Gulch down to the confluence with South Cow Creek would be returned to an ephemeral channel condition and artificial flows from diversion of water to, and discharge of water from, the Project facilities into Hooten Gulch no longer would occur.

Forestry Resources

According to the Shasta County 2012 Crop and Livestock Report, one of the most valuable resources is its timberland, with timber production and other forest products representing over 50 million dollars in production value for the County in 2012 (Shasta County 2012a). According to the Timberlands Element of the Shasta County General Plan, of the County's 2,428,000 total acres, approximately 50 percent are dedicated to commercial forest uses, and in 2002, 613,495 acres of non-federally owned timberlands were designated in timber preserve zones (TPZs) (Shasta County 2004f). Sierra Pacific Industries, which owns lands adjacent to the Kilarc Development, has over 221,000 acres in TPZs, representing more than 35 percent of their total acreage (Shasta County 2004f). Private timberland owners within the County range from large corporations to operators of small woodlots and Christmas tree farms. Agricultural land uses depicted on Figures 4.4-1 and 4.4-2 show the types of timber lands in the project area, which include deciduous forest, evergreen forest, and mixed forest lands.

4.4.2 Regulatory Setting

CEQA requires the review of projects that would: a) convert to non-agricultural use, any Prime Farmland, Unique Farmland, or Farmland of Statewide Importance pursuant to the FMMP; b) convert Williamson Act contract land to non-agricultural uses; or c) conflict with existing zoning for, or cause rezoning of, forest land or timberland or timberland zoned Timberland Production.

4.4.2.1 Shasta County General Plan

The Shasta County General Plan Section 6.1 (Agricultural Lands) and Section 6.2 (Timberlands) include the following objectives and policies relevant to agricultural and forestry resources.

Agricultural Lands

General Plan Objectives

AG-5 Protection of agricultural lands from development pressures and or uses which will adversely impact or hinder existing or future agricultural operations.

AG-6 Protection of water resources and supply systems vital for the continuation of agriculture.

General Plan Policies

AG-h The site planning, design, and construction of on-site and off-site improvements for nonagricultural development in agricultural areas shall avoid unmitigatable short- and long-term adverse impacts on facilities, such as irrigation ditches, used to supply water to agricultural operations.

Timberlands

General Plan Objectives

T-1 Preservation of timberlands suitable for forest management and production to allow for the continuation of such uses or to provide opportunities for the future establishment of such uses.

T-2 Protection of timberlands from incompatible adjacent land uses which adversely impact forest management activities.

4.4.3 Analysis Methodology

The following methods were used to evaluate potential effects on agricultural and forest resources:

- Review maps documenting agricultural resources and production
- Review maps documenting forest resources and production
- Review project features in the context of agricultural and forest resources, including: changes to water supplies that support agricultural uses
- Review project with regard to compliance with state and local ordinances and regulations pertaining to agricultural and forest resources.

4.4.3.1 Analytical Approach

With implementation of the Proposed Project, change in flows in Abbott Ditch would affect adjacent farming and ranching operations. Proposed decommissioning activities could also result in short-term conflicts with agricultural and forestry uses on surrounding properties. Impacts to agricultural and forestry uses were assessed using published information, aerial photos, scoping comments and prior correspondence, FERC NEPA analysis, recent field reconnaissance, state and federal regulations, and conversations with knowledgeable individuals.

4.4.3.2 Criteria for Determining Significance

Based on the State Water Board's Environmental Checklist in Appendix A of the Board's CEQA regulations, Appendix G of the CEQA Guidelines, and professional standards and practices, a Proposed Project would have a significant impact if it would:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use
- Conflict with existing zoning for agricultural use, or a Williamson Act contract
- Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)) or timberland (as defined in Public Resources Code section 4526) or timberland zoned Timberland Production (as defined by Government Code section 51104(g)
- Result in the loss of forest land or conversion of forest land to non-forest use
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use or conversion of forest land to non-forest use

4.4.4 Environmental Impacts and Mitigation

PG&E has not included any PM&E measures to address agricultural and forest-related impacts due to decommissioning activities. Impacts related to the riparian habitat that is supported by Abbott Ditch irrigation are addressed in Section 4.7, Terrestrial Biological Resources. Impacts to land use resulting from project implementation are addressed in Section 4.14, Land Use.

4.4.4.1 Kilarc Development

IMPACT 4.4-1 (Kilarc): Would the action convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use?

Proposed Project

There are no farmlands or agricultural land uses within or in the immediate vicinity of the Kilarc Development that would be affected by the Proposed Project. No conversion of prime farmland or other important farmland designated lands to non-agricultural use would occur as a result of the Proposed Project at the Kilarc Development. Therefore, no impact would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Because there are no farmlands or agricultural land uses at the Kilarc Forebay, there would be no additional impacts from these alternatives related to IMPACT 4.4-1 (Kilarc).

IMPACT 4.4-2 (Kilarc): Would the action conflict with existing zoning for agricultural use, or a Williamson Act contract?

Proposed Project

Per the Shasta County Zoning Plan, lands within the Kilarc Development are zoned as Timber Production District or Unclassified (Shasta County 2003). There are no parcels within the Kilarc Development that are under Williamson Act Contract. Implementation of the Proposed Project at the Kilarc Development would not result in conflicts with existing zoning for agricultural use or lands under Williamson Act contract. Therefore, no impact would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Because there are no parcels at the Kilarc Forebay that are under Williamson Act Contract, there would be no additional impacts from these alternatives related to IMPACT 4.4-2 (Kilarc).

IMPACT 4.4-3 (Kilarc): Would the action conflict with existing zoning for, or cause rezoning of, forest land, or timberland?

Proposed Project

Lands in the immediate vicinity of the Kilarc powerhouse and associated facilities are used primarily for the management of commercial timber harvesting by state and private landowners. Per the Shasta County Zoning Plan, the Kilarc Development is zoned TP (Shasta County 2016). However, implementation of the Proposed Project at the Kilarc Development would not change existing land uses designated for timber production, and would not result in any conflicts with existing zoning or cause rezoning of forest land. Therefore, no impact would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Because leaving the Kilarc Forebay in place would not change existing land uses, there would be no additional impacts from these alternatives related to IMPACT 4.4-3 (Kilarc).

IMPACT 4.4-4 (Kilarc): Would the action result in the loss of forest land or conversion of forest land to non-forest use?

Proposed Project

Implementation of the Proposed Project at the Kilarc Development would not result in the long-term loss of forest land. However, access to facilities may require construction of temporary access roads, resulting in a conversion of forest land to non-forest use. As described in Chapter 2, Project Description, there are segments of the Kilarc Main Canal that cannot be accessed without new road segments. Typically, these proposed new road segments would be very short and would begin at an existing road near the canal. Some of these proposed access roads would cross private property. As outlined in the Proposed Decommissioning Plan (PDP), PG&E would discuss proposed access with the private property owners. Proposed new access roads total approximately 0.5 mile, serving eight canal locations, accounting for less than 9 percent of the access road total. As outlined in the PDP, environmental impacts from road improvement activities would be minimized to the extent possible through the application of Best Management Practices (BMPs) as set forth in the United States Department of Agriculture, Forest Service guidance on Water Quality Management for Forest System Lands in California, and described in the applicable PM&E measures (PG&E 2009). These applicable PM&E measures are described in detail in Section 4.9, Geology and Soils. When the decommissioning of existing Project features is completed, any new temporary access roads would be left in place per landowner requests, rehabilitated, and/or blocked off to limit future access. Therefore, the impact would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 1 and No Project Alternative

Because leaving the Kilarc Forebay in place would not involve any changes in access roads, no loss of forest land would occur, and there would be no additional impacts from these alternatives related to IMPACT 4.4-4 (Kilarc).

IMPACT 4.4-5 (Kilarc): Would the action involve other changes in the existing environment which could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?

Proposed Project

Implementation of the Proposed Project at the Kilarc Development would not result in a change to any existing land uses, and would not convert any existing farmland or forest-land to non-agricultural or non-forest use. Therefore, no impact would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required.

Alternative 1 and No Project Alternative

As described above, there would be no changes in land use under Alternative 1 or the No Project Alternative. There would be no additional impacts from these alternatives related to IMPACT 4.4-5 (Kilarc).

4.4.4.2 Cow Creek

IMPACT 4.4-6 (Cow Creek): Would the action convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use?

Proposed Project

The Project discharges water below the Cow Creek powerhouse tailrace into Hooten Gulch. The Decree entitles the ADU to divert 13.13 cfs from the natural flow of South Cow Creek for agricultural uses. The Abbott Diversion currently diverts up to this flow throughout the year from Hooten Gulch. The 110 kilowatt-capacity Tetrick Hydroelectric Project (conduit exempt FERC Project No. 6594) reportedly uses or used water from Hooten Gulch for power generation. Following the decommissioning process, Hooten Gulch down to the confluence with South Cow Creek would be returned to an ephemeral channel condition, and artificial flows from discharge of water from the Project facilities into Hooten Gulch no longer would occur.

PG&E proposes to dispose of its own six water rights under the Decree by voluntarily abandoning them upon receiving a final order from FERC approving the decommissioning and removing the Project from FERC's jurisdiction. Upon abandonment, which simply involves PG&E taking affirmative steps to discontinue its diversions with the intent not to resume the diversions, PG&E's pre-1914 rights would cease to exist and would not impact any other water rights or the priorities of those rights under the Decree. In addition to abandoning the water rights it holds outright, upon Project decommissioning, PG&E also proposes to divest its shares in, and its proportional ownership of South Cow Creek water rights held by, the South Cow Creek Ditch Association.

Conversion of prime farmland or other important farmland designated lands to non-agricultural use could occur as a result of the Proposed Project at the Cow Creek Development. The FMMP designations for the Abbott Ditch are: Prime Farmland (263.5 acres), Farmland of Local Importance (41.8 acres), and Grazing Land (148.8 acres).

While the proposed changes would decrease surface flows relative to existing (and historic) conditions, they would restore a more natural seasonal flow, as described in Section 4.12, Hydrology and Geomorphology. Implementation of the Proposed Project would not affect the ADU's water rights or ability to divert water from another location, nor would the Proposed Project prevent the continued use of these private lands for agricultural purposes, such as for dryland pasture. Several alternatives for retaining flow to ADU are evaluated in detail and discussed in Section 5, Alternatives.

A number of stakeholders commented on FERC's EIS that approval of PG&E's decommissioning proposal would result in the expenditure of perhaps two million dollars or more by local ranching and farm families to design, site, acquire easements and rights of way, obtain permit approvals, and construct an alternative water diversion feature to exercise their present water rights, if it is in fact possible to construct a new diversion at all. CDFW, in response to FERC's September 2009 Notice of Scoping Meetings and Environmental Site Review, expressed support for a new Abbott Ditch diversion, at a location about 3.5 miles downstream of PG&E's current diversion, on South Cow Creek.

At this time it is unknown whether an alternative point of diversion is in fact feasible. However, meither replacement of augmented flows to Hooten Gulch nor the construction of an alternative new diversion for ADU or similarly situated water users is included as part of the Proposed Project. The selection and ultimate construction of an alternative diversion location would be subject to a separate state authorization and permitting process with additional associated environmental review. No other feasible mitigation is available to reduce the impact to less than significant. Therefore, potential indirect offsite impacts related to conversion of important farmland to non-agricultural uses are significant and unavoidable. Also refer to IMPACT 4.4-7(Cow Creek) and IMPACT 4.4-10 (Cow Creek).

- **Level of Significance:** Significant and Unavoidable
- **Mitigation Measures:** None available

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2, flows to the Abbott Diversion would be retained via Alternative 2A, 2B, 2C, or 2D. All of the Abbott Ditch alternatives would prevent the loss of farmlands owned or operated by the ADU, and therefore would not indirectly convert farmland to non-agricultural use. As compared to the Proposed Project, the significant and unavoidable impact would not occur under these alternatives.

No Project Alternative

The No Project Alternative would lead to the same impacts as the Proposed Project, as the diversion facility on South Cow Creek would be secured to prevent flows to the South Cow Canal, and thus the Hooten Gulch would cease to receive year round flows. Therefore, the No Project would result in significant and unavoidable impacts related to important farmland.

IMPACT 4.4-7 (Cow Creek): Would the action conflict with existing zoning for agricultural use, or a Williamson Act contract?

Per the Shasta County Zoning Plan, lands within the Cow Creek Development are zoned as Exclusive Agricultural District, Agricultural Preserve District, Timber Production District, and Unclassified (Shasta County 2016). Williamson Act Contract lands in the Cow Creek Development area include: Prime Agricultural Land (0.59 acre), Non-Prime Agricultural Land (55.4 acres), and Non-enrolled Land (3.3 acres). Implementation of the Proposed Project at the Cow Creek Development would not result in conflicts with existing zoning for agricultural use or lands under Williamson Act contract. However, as described above, the Abbott Ditch area also contains Williamson Act Contract lands, including Prime Agricultural Land (355.8 acres) and Non-Prime Agricultural Land (98.1 acres).

Implementation of the Proposed Project would end the augmented flows to Hooten Gulch, resulting in insufficient flows to fulfill the ADU water right at the current point of diversion during periods of low flow. Because flows from the Abbott Diversion are used by area farming and ranching operations for flood irrigation, the cessation of augmented flows to Hooten Gulch would have an indirect, yet significant long-term impact on existing agricultural uses in the Abbott Ditch area for crop, pasture, and livestock production. Also refer to Impact 4.4-6 (Cow Creek). Therefore, the impact would be considered significant and unavoidable.

- **Level of Significance:** Significant and Unavoidable
- **Mitigation Measures:** None available

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2, flows to the Abbott Diversion would be retained via Alternative 2A, 2B, 2C, or 2D. All of the Abbott Ditch alternatives would prevent the loss of farmlands owned or operated by the ADU, and therefore would not conflict with existing zoning for agricultural use or Williamson Act Contract. As compared to the Proposed Project, the significant and unavoidable impact would be lessened to no impact under these alternatives.

No Project Alternative

The No Project Alternative would lead to the same impacts as the Proposed Project, as the diversion facility on South Cow Creek would be secured to prevent flows to the South Cow Canal, and thus Hooten Gulch and the Abbott Ditch would cease to receive year round augmented flows. Therefore, the No Project would result in significant and unavoidable impacts related to conflicts with Williamson Act contract lands.

IMPACT 4.4-8 (Cow Creek): Would the action conflict with existing zoning for, or cause rezoning of, forest land or timberland?

Proposed Project

Per the Shasta County Zoning Plan, lands within the Cow Creek Development include Timber Production (Shasta County 2016). However, implementation of the Proposed Project at the Cow Creek Development would not change existing land uses as designated for timber production, and would not result in any conflicts with existing zoning or cause rezoning of forest land. Therefore, no impact would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, 2D and No Project Alternative

Under Alternatives 2A, 2B, 2C, 2D, and the No Project Alternative, no changes in zoning for forest land or timberland would occur. There would be no additional impacts from these alternatives related to IMPACT 4.4-8 (Cow Creek).

IMPACT 4.4-9 (Cow Creek): Would the action result in the loss of forest land or conversion of forest land to non-forest use?

Proposed Project

Per the Shasta County Zoning Plan, zoning for the Cow Creek Development includes Timber Production District (Shasta County 2016). However, implementation of the Proposed Project at the Cow Creek Development would not change existing land uses as designated for timber production, and would not result in any conflicts with existing zoning or cause rezoning of forest land. Therefore, no impact would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, 2D and No Project Alternative

Under Alternatives 2A, 2B, 2C, 2D, and the No Project Alternative, no changes in existing land uses as designated for timber production would occur. There would be no additional impacts from these alternatives related to IMPACT 4.4-9 (Cow Creek).

IMPACT 4.4-10 (Cow Creek): Would the action involve other changes in the existing environment which could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?

Proposed Project

Implementation of the Proposed Project at the Cow Creek Development would not directly convert any existing farmland or forest-land to non-agricultural or non-forest use. However, as described above, implementation of the Proposed Project would end the augmented flows to Hooten Gulch, resulting in insufficient flows to fulfill the ADU water right at the current point of diversion. Because flows from the Abbott Diversion are used by area farming and ranching operations for flood irrigation, the removal of flows from the diversion would have a significant long-term indirect impact on existing agricultural uses in the Abbott Ditch area for crop, pasture, and livestock production. While the proposed changes would decrease surface flows relative to existing (and historic) conditions, they would restore a more natural seasonal flow, as described in Section 4.12, Hydrology and Geomorphology. Implementation of the Proposed Project would not affect the ADU's water rights or ability to divert water from another location, nor would the Proposed Project prevent the continued use of these private lands for agricultural purposes, such as for dryland pasture. Several alternatives for retaining flow to ADU are evaluated in detail and discussed in Section 5, Alternatives. However, replacement of augmented flows to

Hooten Gulch or the construction of an alternative, new diversion, is outside the scope of the Proposed Project.

The loss of water sources presents a significant long-term impact for the ADU, as the loss of water for domestic and agricultural purposes could result in a potential loss of income, livestock, and crops. While implementation of the Proposed Project at the Cow Creek Development would not directly convert any existing farmland to non-agricultural use, the loss of water for domestic and agricultural purposes represents changes in the existing environment which could indirectly result in the conversion of farmland to non-agricultural use by reducing the ability of the ADU to use their lands for such purposes. Also refer to IMPACT 4.4-6 (Cow Creek). This would be considered a significant and unavoidable impact.

- **Level of Significance:** Significant and Unavoidable
- **Mitigation Measures:** None available

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2, flows to the Abbott Diversion would be retained via Alternative 2A, 2B, 2C, or 2D. All of the Abbott Ditch alternatives would prevent the loss of farmlands owned or operated by the ADU, and therefore would not indirectly convert farmland to non-agricultural use. As compared to the Proposed Project, the significant and unavoidable impact would be lessened to no impact under these alternatives.

No Project Alternative

The No Project Alternative would lead to the same impacts as the Proposed Project, as the diversion facility on South Cow Creek would be secured to prevent flows to the South Cow Canal, and thus the Abbott Ditch would cease to receive year round flows. Therefore, the No Project would result in significant and unavoidable impacts related to the conversion of farmland to non-agricultural use by reducing the ability of the ADU to use their lands for such purposes.

4.5 Air Quality

State and federal law defines criteria emissions to include the following: reactive or volatile organic compounds (ROCs or VOCs), nitrogen oxides (NO and NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), respirable particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$). Elimination of tetraethyl lead in motor gasoline has eliminated emissions of lead (Pb) from vehicles and portable equipment, although tetraethyl lead is still used in some types of aviation gasoline.

During site preparation, road work, demolition, removal, and restoration activities (hereafter referred to for the purposes of this analysis as "construction"), the Proposed Project would cause criteria emissions (also greenhouse gases, GHGs) from the combustion of fossil fuels (i.e., gasoline and diesel) used to operate off-road equipment, portable equipment, and vehicles in the vicinity of the Kilarc and Cow Creek Developments, including powerhouses, forebays, flumes, canals, and diversion dams as applicable. In addition, some fugitive dust (as PM_{10} and $PM_{2.5}$) may be generated by earthmoving activities, e.g., backfilling of canals, depending on soil moisture content when the work is performed. This section evaluates Proposed Project emissions in relation to established thresholds of significance.

4.5.1 Environmental Setting

A criteria or regulated air pollutant is any air pollutant for which ambient air quality standards have been set by the U.S. Environmental Protection Agency (USEPA) or the California Air Resources Board (ARB). Primary air quality standards are established to protect human (public) health. Secondary air quality standards are designed to protect public welfare from effects such as diminished production and quality of agricultural crops, reduced visibility, degraded soils, materials and infrastructure damage, and damaged vegetation. Criteria pollutants include ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), respirable particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$). These six most prevalent criteria pollutants are described below (USEPA 2013a).

Ground-level ozone (O_3) is a secondary pollutant formed in the atmosphere by a series of complex chemical reactions in the presence of ultraviolet spectrum sunlight above urban areas due to mixing height effects of temperature inversions, typically in valleys. Nitrogen oxides (NO_X) and volatile organic compounds (VOCs) are the principal constituents in these reactions. NO_X and VOC emissions are predominantly attributed to mobile sources (on-road motor vehicles and other mobile sources), also stationary sources such as natural gas combustion and hydrocarbon solvent usage. Thus, regulation and control of NO_X and VOC from these sources is essential to reduce the formation of ground-level O_3.

Reddish-brown nitrogen dioxide (NO_2) is formed in the atmosphere primarily by the rapid reaction of the colorless gas nitric oxide (NO) with atmospheric oxygen. Carbon monoxide (CO) is a common, colorless, odorless, highly toxic gas. It is produced by natural and anthropogenic (caused by human activity) combustion processes. The major source of carbon monoxide in urban areas is incomplete combustion of carbon-containing fuels (primarily gasoline, diesel fuel, and natural gas). Sulfur dioxide (SO_2) is formed when sulfur-containing fuels are burned in the presence of oxygen. The required use of low-sulfur fuels in California has eliminated the bulk of SO_2 emissions within the state.

Particulate Matter (PM) is classified by its aerodynamic diameter in microns ($PM_{2.5}$ and PM_{10}). Respirable particulate matter as PM_{10} consists of fine dusts and aerosols, 10 microns or smaller. When inhaled, particles larger than 10 microns generally are caught in the nose and throat and do not enter the lungs, while particles smaller than 10 microns can enter the lungs. Fine particulate matter as $PM_{2.5}$ is a mixture of fine dusts and aerosols 2.5 microns or smaller. $PM_{2.5}$ can enter the deepest portions of the lungs where gas exchange occurs between the air and the blood stream. These are the most dangerous particles because the lungs have no efficient mechanisms for removing them.

4.5.1.1 Sources of Information

Preliminary lists of construction equipment and estimated usage for three project phases at each site comprising: 1) site preparation and road work; 2) demolition of canals and appurtenant features; and 3) demolition of dams and appurtenant structures were established by the Applicant as shown in Appendix D-1. Chapter 7, References, lists official information sources used in this assessment.

Air districts in California are required to monitor air pollutant levels to assure that National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) are met and, in the event that they are not, to develop strategies to meet these standards. If the standards are met, the local air basin is classified as being in "attainment"; if the standards are exceeded, it is classified as "nonattainment." Where insufficient data exist to make a determination, an area is deemed "unclassified." Table 4.5-1 lists current CAAQS and NAAQS for criteria pollutants. (ARB 2016a)

The Shasta County Air Quality Management District (AQMD) operates ambient air monitoring stations at lower elevations in Anderson (O_3, $PM_{2.5}$), Redding (O_3), and Shasta Lake City (O_3). The nearest stations relative to the Project area are Redding and Anderson, about 28 miles west of the Kilarc Development and about 18 miles west of Cow Creek. Due to a lack of proximity to the Proposed Project sites, these stations do not provide representative ambient air quality data for the Project vicinity (ARB 2017a).

Table 4.5-1 Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards ppm	California Standards µg/m3	Federal Standards ppm	Federal Standards µg/m3
Ozone (O_3)	1-hour	0.09	180	—	—
Ozone (O_3)	8-hour	0.07	137	0.070	137
Nitrogen Dioxide (NO_2)	1-hour	0.18	339	0.100	188
Nitrogen Dioxide (NO_2)	Annual	0.03	57	0.053	100
Sulfur Dioxide (SO_2)	1-hour	0.25	655	0.075	196
Sulfur Dioxide (SO_2)	3-hour Secondary	—	—	0.50	1,300
Sulfur Dioxide (SO_2)	24-hour	0.04	105	0.14[a]	—
Sulfur Dioxide (SO_2)	Annual Primary	—	—	0.03[a]	—

Pollutant	Averaging Time	California Standards ppm	California Standards µg/m3	Federal Standards ppm	Federal Standards µg/m3
Carbon Monoxide (CO)	1-hour	20	23,000	35	40,000
Carbon Monoxide (CO)	8-hour	9	10,000	9	10,000
Carbon Monoxide (CO)	Lake Tahoe (8-hr)	6	7,000	—	—
Particulates (as PM_{10})	24-hour	—	50	—	150
Particulates (as PM_{10})	Annual	—	20	—	—
Particulates (as $PM_{2.5}$)	24-hour	—	—	—	35
Particulates (as $PM_{2.5}$)	Annual Primary	—	12	—	12
Particulates (as $PM_{2.5}$)	Annual Secondary	—	—	—	15
Lead (Pb)	30-day	—	1.5	—	—
Lead (Pb)	Calendar Quarter	—	—	—	1.5[a]
Lead (Pb)	3-month (rolling)	—	—	—	0.15
Sulfates (as SO_4)	24-hour	—	25	—	—
Hydrogen Sulfide (H_2S)	1-hour	0.03	42	—	—
Vinyl Chloride (C2H3Cl)	24-hour	0.01	26	—	—
Visibility Reducing Particles	8-hour	Extinction coefficient of 0.23 per km; visibility of 10 miles or more (0.07 to 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70%.	Extinction coefficient of 0.23 per km; visibility of 10 miles or more (0.07 to 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70%.	—	—

Sources: CARB 2012a, USEPA 2012a

Notes:

ppm = parts per million

µg/m3 = micrograms per cubic meter

The 1.5 µg/m3 federal quarterly lead standard applied until 2008; 0.15 µg/m3 rolling 3-month average thereafter

[a] Standard applicable for certain areas. For more detail, see CAAQS table located here https://www.arb.ca.gov/research/aaqs/aaqs2.pdf.

4.5.1.2 Regional Setting

Shasta County is a state "moderate" nonattainment area for ozone (O_3) and a state nonattainment area for respirable particulate matter 10 microns or less (PM_{10}). For all other California Ambient Air Quality Standards (CAAQS), Shasta County is in attainment or unclassified. For all National Ambient Air Quality Standards (NAAQS), Shasta County is in attainment or unclassified. Table 4.5-2 lists current state and federal attainment status. (ARB 2017b, USEPA 2017)

Table 4.5-2 Attainment Status Summary - Shasta County

Criteria Pollutant	State Designation	Federal Designation
Ozone (O_3) (1-hour)	Nonattainment	—
Ozone (O_3) (8-hour)	Nonattainment	Attainment
Nitrogen Dioxide (NO_2) (1-hour)	Attainment	Attainment
Nitrogen Dioxide (NO_2) (annual)	Attainment	Attainment
Sulfur Dioxide (SO_2)	Attainment	Unclassified(1)
Carbon Monoxide (CO)	Unclassified(1)	Attainment
Respirable Particulates (as PM_{10}) (24-hour)	Nonattainment	Unclassified(1)
Respirable Particulates (as PM_{10}) (annual)	Nonattainment	—
Fine Particulates (as $PM_{2.5}$) (24-hour)	—	Attainment
Fine Particulates (as $PM_{2.5}$) (annual)	Attainment	Attainment
Lead (Pb)	Attainment	Attainment
Sulfates (as SO_4)	Attainment	—
Hydrogen Sulfide (H_2S)	Unclassified(1)	—
Vinyl Chloride (C_2H_3Cl)	n/d	—
Visibility	Unclassified(1)	—

Sources: CARB 2012b, USEPA 2012b

Notes:

[1] At the time of designation, if the available data does not support a designation of attainment or nonattainment, the area is designated as unclassified

n/d - no data/information available

4.5.2 Regulatory Setting

The Proposed Project is located in Shasta County and is within the jurisdiction of the Shasta County Air Quality Management District (AQMD). Under state and federal law, the AQMD is required to develop a plan for attaining ambient air quality standards. The AQMD along with other local air districts in Northern Sacramento Valley jointly prepared and adopted the *Northern Sacramento Valley Planning Area 2012 Triennial Air Quality Attainment Plan* (AQAP) (EEP 2012). It is a triennial update that identifies the progress made towards achieving the 2009 AQAP and strategy updates necessary to attain the CAAQS 8-hour O_3 standard. The 2012 AQAP focuses on adoption and implementation of control measures for stationary, area wide (e.g., consumer products and residential space heating), and indirect sources (e.g. development projects that attract motor vehicle traffic), as well as public outreach and information programs. The air quality element of the *Shasta County General Plan* (Shasta County 2004g) contains control measures aimed at avoiding and reducing emissions of air contaminants into the local environment with a focus on land development, transportation planning and stationary sources.

The Proposed Project would not be subject to AQMD permitting requirements because it would not involve any stationary air pollution sources that are subject to AQMD review, including self-propelled equipment, vehicles, and state-registered portable engine-driven pumps, generators, and air compressors.

4.5.2.1 General Conformity

The General Conformity Rule [Clean Air Act section 176(c)(4); 40 Code of Federal Regulations (CFR) Parts 51 and 93] requires that the actions taken by federal agencies in nonattainment and maintenance areas do not interfere with plans to meet NAAQS. Under the Rule, federal agencies must work with state, tribal, and local governments in NAAQS nonattainment or maintenance areas to ensure that federal actions conform to implementation plans. Specifically, as a FERC action in an NAAQS attainment or unclassified area, General Conformity does not apply to the Proposed Project.

4.5.2.2 Portable Equipment Registration Program (PERP)

The statewide PERP (CCR, Title 13, Division 3, Chapter 3, Article 5) establishes a uniform program to regulate portable engines and portable engine-driven equipment units. Once registered in PERP, engines and equipment units may operate throughout the State of California without the need to obtain individual permits from local air districts. Owners or operators of portable engines and certain types of equipment can register their units under the PERP in order to operate their equipment anywhere in the state. (ARB 2013a)

4.5.2.3 Off-Road Diesel Vehicle Regulation

In July 2007, CARB adopted an ATCM for in-use off-road diesel vehicles (CCR, Title 13, § 2449 et seq.)(ARB 2007). This regulation establishes specific fleet average requirements for NOx and particulate matter emissions. Where average requirements cannot be met, best available control technology (BACT) requirements apply. The regulation also included several recordkeeping and reporting requirements. In response to AB 8 2X, the regulations were revised in July 2009 (effective December 3, 2009) to allow a partial postponement of the compliance schedule in 2011 and 2012 for existing fleets.

On December 17, 2010, CARB adopted additional revisions to further delay the deadlines reflecting reductions in diesel emissions due to the poor economy and overestimates of diesel emissions in California. The revisions delayed the first compliance date until no earlier than January 1, 2014, for large fleets, with final compliance by January 1, 2023. The compliance dates for medium fleets would be delayed until an initial date of January 1, 2017, and final compliance date of January 1, 2023. The compliance dates for small fleets would be delayed until an initial date of January 1, 2019, and a final compliance date of January 1, 2028. Correspondingly, the fleet average targets were made more stringent in future compliance years. The revisions would also accelerate the phase out of older equipment in existing large and medium fleets over time, requiring the addition of Tier 2 or higher engines starting on March 1, 2011, with some exceptions: Tier 2 or higher engines on January 1, 2013, without exception; and Tier 3 or higher engines on January 1, 2018 (January 1, 2023, for small fleets).

On December 14, 2011, the Office of Administrative Law approved amendments to the regulation. The amendments included revisions to the applicability section and additions and revisions to the definition. The initial date for requiring the addition of Tier 2 or higher engines for large and medium fleets, with some exceptions, was revised to January 1, 2012. New provisions would allow removal of emission control devices for safety or visibility purposes. The regulation was amended to combine the particulate matter and NOx fleet average targets under one, instead of two, sections. The amended fleet average targets are based on the fleet's NOx fleet average, and the previous section regarding particulate matter performance requirements was deleted completely. The BACT requirements, which apply if a fleet cannot comply with the fleet average requirements, were restructured and clarified. Other amendments to the regulations included minor administrative changes to the regulatory text.

4.5.2.4 On-Road Heavy Duty Diesel Vehicles Regulation

On December 12, 2008, CARB adopted an ATCM to reduce NOx and PM emissions from most in-use on-road diesel trucks and buses with a gross vehicle weight rating (GVWR) greater than 14,000 pounds (ARB2008). The original ATCM regulation required fleets of on-road trucks to limit their NOx and particulate matter emissions through a combination of exhaust retrofit equipment and new vehicles. The regulation limited emissions of PM for most fleets by 2011, and limited NOx emissions for most fleets by 2013. The regulation did not require any vehicle to be replaced before 2012, and never required all vehicles in a fleet be replaced.

In December 2009, the CARB governing board directed staff to evaluate amendments that would provide additional flexibility for fleets adversely affected by the poor California economy. On December 17, 2010, CARB revised this ATCM to delay its implementation along with limited relaxation of its requirements. Starting on January 1, 2015, lighter trucks with a GVWR of 14,001 to 26,000 pounds with 20-year-old or older engines would need to be replaced with newer trucks (2010 model year emissions equivalent, as defined in the regulation). Trucks with a GVWR greater than 26,000 pounds with 1995 model year or older engines must be replaced as of January 1, 2015. Trucks with 1996–2006 model year engines must install a Level 3 (85 percent control) diesel particulate filter starting on January 1, 2012, to January 1, 2014, depending on the model year, and then must be replaced after 8 years. Trucks with 2007–2009 model year engines have no requirements until 2023, at which time they must be replaced with 2010 model year emissions equivalent engines as defined in the regulation. Trucks with 2010 model year engines would meet the final compliance requirements. The ATCM provides a

phase-in option under which a fleet operator would equip a percentage of trucks in the fleet with diesel particulate filters, starting at 30 percent as of January 1, 2012, with 100 percent by January 1, 2016. Under each option, delayed compliance is granted to fleet operators who have complied or will comply with requirements before the required deadlines.

On September 19, 2011 (effective December 14, 2011), the Executive Officer approved amendments to the regulations, including revisions to the compliance schedule for vehicles with a GVWR of 26,000 pounds or less to clarify that *all* vehicles must be equipped with 2010 model year emissions equivalent engines by 2023. The amendments included revised and additional credits for fleets that have downsized; implement early particulate matter retrofits; incorporate hybrid vehicles, alternative- fueled vehicles, and vehicles with heavy-duty pilot ignition engines; and implement early addition of newer vehicles. The amendments included provisions for additional flexibility, such as for low-usage construction trucks, and revisions to previous exemptions, delays, and extensions. Other amendments to the regulations included minor administrative changes to the regulatory text, including recordkeeping and reporting requirements related to other revisions.

4.5.2.5 Toxic Air Contaminants

A project with the potential to expose sensitive receptors (including residential areas) or the general public to substantial levels of toxic air contaminants, as designated by ARB under CCR, Title 17, sections 93000 or 93001, would be deemed to have a significant impact. This includes projects that would locate receptors near existing sources of toxic air contaminants, as well as projects that would place sources of toxic air contaminants near existing receptors. A substance is considered toxic if it has the potential to cause adverse health effects in humans, including increasing the risk of cancer upon exposure, or acute and/or chronic non-cancer health effects. A toxic substance released into the air is considered a TAC. TACs are identified by federal and state agencies based on a review of available scientific evidence. In the state of California, TACs are identified through a two-step process that was established in 1983 under the Toxic Air Contaminant Identification and Control Act. This two- step process of risk identification and risk management and reduction was designed to protect residents from the health effects of toxic substances in the air. In addition, the California Air Toxics “Hot Spots” Information and Assessment Act, Assembly Bill (AB) 2588 (Stats. 1987, ch. 1252), was enacted by the legislature in 1987 to address public concern over the release of TACs into the atmosphere. The law, codified at part 6 of division 26 of the Health and Safety Code and subsequently amended several times, requires facilities emitting toxic substances to provide local air pollution control districts with information that will allow an assessment of the air toxics problem, identification of air toxics emission sources, location of resulting hotspots, notification of the public exposed to significant risk, and development of effective strategies to reduce potential risks to the public over 5 years.

Examples include certain aromatic and chlorinated hydrocarbons, certain metals, and asbestos. TACs are generated by a number of sources, including stationary sources, such as dry cleaners, gas stations, combustion sources, and laboratories; mobile sources, such as automobiles; and area sources, such as landfills. Adverse health effects associated with exposure to TACs may include carcinogenic (i.e., cancer-causing) and non-carcinogenic effects. Non-carcinogenic effects typically affect one or more target organ systems and may be experienced on either short-term (acute) or long-term (chronic) exposure to a given TAC.

Diesel Particulate Matter (DPM) is considered a toxic air contaminant in California. Due to the short-term use of diesel-powered vehicles and equipment in any particular location and broad geographic scope of the Proposed Project, emissions of DPM would not be sufficient to pose a significant risk to the public from off road equipment operations.

4.5.2.6 Senate Bill (SB) 656 – Particulate Matter

SB 656 (Stats. 2003, ch. 738) is a planning requirement that calls for a plan and strategy for reducing $PM_{2.5}$ and PM_{10}. This law, codified at section 39614 of the Health and Safety Code, requires the ARB to identify, develop, and adopt a list of control measures to reduce the emissions of $PM_{2.5}$ and PM_{10} from new and existing stationary, mobile, and area sources. Districts have developed particulate matter control measures and submitted plans to ARB that include lists of measures to reduce particulate matter. Under the plans, air districts are required to continue to assess $PM_{2.5}$ and PM_{10} emissions and their impacts.

For construction emissions of fugitive dust (as PM_{10}), California air districts have adopted a number of feasible control measures that can be reasonably implemented to significantly reduce fugitive dust emissions from construction. In general, most districts' approach to CEQA analyses of construction impacts is to emphasize implementation of effective and comprehensive dust control measures rather than detailed quantification of emissions.

4.5.2.7 Nuisance (Odors)

CEQA requires an assessment of a project's potential to cause a public nuisance by subjecting surrounding land uses (receptors) to objectionable odors. Nuisance is a fundamental air pollution control rule across the state in all air districts, which states that no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or the public; or which endangers the comfort, repose, health or safety of any such persons or the public, or which causes, or has a natural tendency to cause, injury or damage to business or property.

4.5.3 Analysis Methodology

Operation of off-road equipment, on-road vehicles, and portable equipment would result in emissions of criteria pollutants (NO_X, VOC, CO, SO_2, PM_{10}, $PM_{2.5}$) in engine exhaust and fugitive dust (PM_{10} and $PM_{2.5}$) from earthmoving tasks. The Proposed Project's anticipated construction-related criteria pollutant emissions associated with off-road equipment and on-road vehicle engine exhaust were quantified using the California Emissions Estimator Model (CalEEMod) Version 2016.3.1. This model uses widely accepted methodologies and data to quantify emissions estimates that include the: (1) U.S. Environmental Protection Agency (USEPA) AP-42 Emissions Factors, (2) CARB OFFROAD2011 emissions factors for off-road equipment and, (3) EMFAC2014 emissions factors for on-road vehicles. The Proposed Project's specific location information combined with the preliminary list of equipment and estimated usage established by PG&E (see Appendix D-1) were used to generate emissions rates and quantify the maximum daily criteria pollutant emissions. The Proposed Project is expected to require about 40 weeks of planned work activities over the course of a year. Deviations from this schedule would not affect the air quality analysis because it is based on maximum daily emissions (pounds per day) and total Proposed Project emissions (tons), which would remain unchanged.

4.5.3.1 Analytical Approach

Estimated Proposed Project emissions are compared against quantitative thresholds of significance shown in Table 4.5-3 as established by the Shasta County Planning Division and AQMD Rule R2-1.301 (Shasta County 2004g, ARB 2009). If a quantitative threshold is not exceeded, then the impact is deemed less than significant. Estimated maximum daily emissions for criteria pollutants are shown in Table 4.5-4 along with significance determinations with the CalEEMod estimated emissions summary reports included in Appendix D-2.

Table 4.5-3 CEQA Significance Thresholds - Shasta County

Applicability	VOC lbs/day	CO lbs/day	NO_X lbs/day	SO_X lbs/day	PM_{10} lbs/day	$PM_{2.5}$ lbs/day
Level "A" Thresholds	25	500	25	80	80	—
Level "B" Thresholds	137	—	137	—	137	—

Sources: Shasta County 2004g, ARB 2009 (AQMD Rule R2-1.301 - NSR BACT Thresholds)

Table 4.5-4 Estimated Maximum Daily Criteria Emissions for Proposed Project

Project Phase	VOC lbs/day	CO lbs/day	NOX lbs/day	SOX lbs/day	PM_{10} lbs/day	$PM_{2.5}$ lbs/day
Site Preparation and Road Work	0.7	3.0	9.8	0.01	18.5	0.3
Demolition of Canals and Appurtenant Features	1.6	10.9	18.4	0.02	1.0	0.8
Demolition of Dams and Appurtenant Structures	1.8	12.2	20.9	0.03	0.9	0.8
Maximum Day	1.8	12.2	20.9	0.03	18.5	10.2
Level "A" Significance	LTS	LTS	LTS	LTS	LTS	—
Level "B" Significance	LTS	—	LTS	—	—	—

Sources: CalEEMod Emissions Summary Reports in Appendix D-2.

Notes:

LTS = Less Than Significant

S = Significant

4.5.3.2 Criteria for Determining Significance

Pursuant to the CEQA Guidelines, Appendix G – Air Quality, where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. The project would result in impacts to air quality if it would:

- Conflict with or obstruct implementation of the applicable air quality plan
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation

- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)
- Expose sensitive receptors to substantial pollutant concentrations
- Create objectionable odors affecting a substantial number of people

Determinations with respect to the five CEQA air quality criteria are given below for the Kilarc and Cow Creek Developments.

4.5.4 Environmental Impacts and Mitigation

PG&E has not included any PM&E measures to address air quality-related impacts due to decommissioning activities. However, PM&E Measure WILD-7: Speed Limit on FERC Project and Temporary Access Roads would be implemented to reduce the potential to harm wildlife, but would also aid in the reduction of fugitive dust when driving on dirt access roads.

4.5.4.1 Kilarc Development

IMPACT 4.5-1 (Kilarc): Would the action conflict with or obstruct implementation of the applicable air quality plan?

Proposed Project

The Proposed Project would not create a permanent stationary source of air contaminants and would not require a permit from the AQMD on the condition that any portable equipment used for construction be registered with the statewide PERP administered by the ARB (ARB 2017c). As shown in Table 4.5-4, temporary construction emissions of criteria pollutants would not exceed significance thresholds. Due to the relatively small scale of construction activities and its upper-elevation mountain work sites, the Proposed Project would not harm air quality in lower-elevation valley areas, and is consistent with the 2012 AQAP (EEP 2012) and the 2004 General Plan (Shasta County 2004g) for the Project area, which contain allowances for general construction activities. Therefore, the Proposed Project would not conflict or obstruct implementation of an applicable air quality plan. No impact would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site because no construction activities would occur, and no conflict with implementation of the applicable air quality plan would result. There would be no additional impacts from these alternatives related to IMPACT 4.5-1 (Kilarc).

IMPACT 4.5-2 (Kilarc): Would the action violate an air quality standard or contribute substantially to an existing or projected air quality violation?

Proposed Project

Due to its remote upper-elevation mountain locations, Proposed Project construction would have a limited potential to contribute to existing violations of state air quality standards for ozone and PM_{10} in the lower-elevation Northern Sacramento Valley, primarily through diesel engine exhaust and fugitive dust generation during construction activities. Incremental impacts would be small, temporary, and would permanently cease upon Project completion. As shown in Table 4.5-4, no applicable quantitative emissions thresholds would be exceeded.

The use of newer, less-polluting Tier 2, 3, and 4 engines in most construction equipment used onsite is a mitigating factor for combustion emissions of NO_X, VOC, CO, PM_{10}, and $PM_{2.5}$. California ultra-low sulfur diesel fuel with a maximum sulfur content of 15 parts per million (ppm) by weight would be used in all diesel-powered equipment to minimize sulfur dioxide and particulate emissions. In addition, PG&E would implement PM&E Measure WILD-7, which requires reduced vehicular speeds that would result in lower fugitive dust. Therefore, the impact would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site because no construction activities would occur, no violation of air quality standards would result. There would be no additional impacts from these alternatives related to IMPACT 4.5-2 (Kilarc).

IMPACT 4.5-3 (Kilarc): Would the action result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

Proposed Project

The Proposed Project would be in conformance with the AQAP (EEP 2012), and would not result in operational impacts (i.e., no operational impacts whatsoever) that would significantly increase criteria pollutant emission s over the long-term. Furthermore, as shown in Table 4.5-4, short-term Project construction activities are not considered to be a significant source of criteria pollutants on an individual basis. CEQA Guidelines section 15064(h)(3) states that if a project may incrementally contribute to a cumulative environmental problem for which there is a previously approved plan or mitigation program, including but not limited to an air quality attainment or maintenance plan, the lead agency may determine that a project's incremental contribution is not cumulatively considerable if the project complies with the adopted plan or program. In addressing cumulative effects for air quality, the AQAP is the most appropriate document to use because the AQAP sets forth a comprehensive program that will lead the Northern Sacramento Valley, and by extension the Project area, into compliance with state air quality standards for ozone and PM_{10} and uses control measures and related emission reduction

estimates based on emissions projections for a future development scenario derived from land use, population, and employment characteristics defined in consultation with local governments. The Proposed Project is in conformance with the AQAP, would not result in long-term impacts, and would not result in significant impacts on an individual basis during construction activities. Therefore, the Proposed Project's incremental contribution to criteria pollutant emissions would not be cumulatively considerable. The impact would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site because no construction or operation activities would occur; no cumulatively considerable net increase of any criteria pollutant would result. There would be no additional impacts from these alternatives related to IMPACT 4.5-3 (Kilarc).

IMPACT 4.5-4 (Kilarc): Would the action expose sensitive receptors to substantial pollutant concentrations?

Proposed Project

Certain population groups are considered more sensitive to air pollution and odors than others; in particular, children, elderly, and acutely ill and chronically ill persons, especially those with cardio respiratory diseases such as asthma and bronchitis. Sensitive receptors (land uses) indicate locations where such individuals are typically found, namely schools, daycare centers, hospitals, convalescent homes, residences of sensitive persons, and parks with active recreational uses, such as youth sports.

The work sites are characteristically remote and in scarcely populated areas. The nearest sensitive receptor to the Kilarc Development is a residence approximately 500 feet (150 meters) north, with another residence approximately 1,000 feet (300 meters) northeast. As shown in Table 4.5-4, no criteria pollutant emissions thresholds would be exceeded. Since all construction activities would be short-term (40 weeks) compared to long-term exposure criteria (70 years), no significant exposures to diesel engine exhaust (DPM) or fugitive dust would occur (i.e., 1.1 percent of lifetime). Due to these factors, the Proposed Project would not expose sensitive receptors to substantial pollutant concentrations.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site because no construction activities would occur; no exposure of sensitive receptors to substantial pollutant concentrations would result. There would be no additional impacts from these alternatives related to IMPACT 4.5-4 (Kilarc).

IMPACT 4.5-5 (Kilarc): Would the action create objectionable odors affecting a substantial number of people?

Proposed Project

California ultra-low sulfur diesel fuel with a maximum sulfur content of 15 ppm by weight would be used in all diesel-powered equipment which minimizes emissions of sulfurous gases (sulfur dioxide, hydrogen sulfide, carbon disulfide, and carbonyl sulfide). There would be no other sources of odor associated with the Proposed Project. In addition, due to the characteristically remote locations of the work sites, which are in scarcely populated areas, the Proposed Project would not affect a substantial number of people. Therefore, no impact would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site because no construction activities would occur; no creation of objectionable odors would result. There would be no additional impacts from these alternatives related to IMPACT 4.5-5 (Kilarc).

4.5.4.2 Cow Creek

IMPACT 4.5-6 (Cow Creek): Would the action conflict with or obstruct implementation of the applicable air quality plan?

Proposed Project

The Proposed Project would not create a permanent stationary source of air contaminants and would not require a permit from the AQMD on the condition that any portable equipment used during construction be registered with the statewide PERP administered by the ARB (ARB 2017c). As shown in Table 4.5-4, temporary construction emissions of criteria pollutants would not exceed significance thresholds. Due to the relatively small scale of construction activities and its upper-elevation mountain work sites, the Proposed Project would not harm air quality in lower-elevation valley areas, and is consistent with the 2012 AQAP (EEP 2012) and the 2004 General Plan (Shasta County 2004g) for the Project area, which contain allowances for general construction activities. Therefore, the Proposed Project would not conflict or obstruct implementation of an applicable air quality plan. No impact would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. As with the Proposed Project, due to the relatively small scale of construction activities and the upper-elevation mountain work sites, implementation of these alternatives would not harm air quality in lower-elevation valley areas, and would be consistent with the applicable air quality plans which contain allowances for general construction activities. Further, construction activities would be temporary and short-term. There would be no additional impacts from these alternatives related to IMPACT 4.5-6 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, no conflict with implementation of the applicable air quality plan would result. There would be no additional impacts from this alternative related to IMPACT 4.5-6 (Cow Creek).

IMPACT 4.5-7 (Cow Creek): Would the action violate an air quality standard or contribute substantially to an existing or projected air quality violation?

Proposed Project

Due to its remote upper-elevation mountain locations, Project construction would have a limited potential to contribute to existing violations of state air quality standards for ozone and PM_{10} in the lower-elevation Northern Sacramento Valley, primarily through diesel engine exhaust and fugitive dust generation during construction activities. Incremental impacts would be small, temporary, and would permanently cease upon Project completion. As shown in Table 4.5-4, no applicable quantitative emissions thresholds would be exceeded.

The use of newer, less-polluting Tier 2, 3, and 4 engines in most construction equipment used onsite is a mitigating factor for combustion emissions of NO_X, VOC, CO, PM_{10}, and $PM_{2.5}$. California ultra-low sulfur diesel fuel with a maximum sulfur content of 15 parts per million (ppm) by weight would be used in all diesel-powered equipment to minimize sulfur dioxide and particulate emissions. In addition, PG&E would implement PM&E Measure WILD-7, which requires reduced vehicular speeds that would result in lower fugitive dust. Therefore, the impact would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. As with the Proposed Project, construction would have limited potential to contribute to existing violations of state air quality standards. In addition, PG&E would implement PM&E Measure WILD-7, which requires reduced vehicular speeds that would result in lower fugitive dust. Incremental impacts would be small, temporary, and would permanently

cease upon Project completion. There would be no additional impacts from these alternatives related to IMPACT 4.5-7 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, no conflict with implementation of the applicable air quality plan would result. There would be no additional impacts from this alternative related to IMPACT 4.5-7 (Cow Creek).

IMPACT 4.5-8 (Cow Creek): Would the action result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

Proposed Project

The Proposed Project would be in conformance with the 2012 AQAP (EEP 2012), and would not result in operational impacts (i.e., no operational impacts whatsoever) that would significantly increase criteria pollutant emissions over the long-term. Furthermore, as shown in Table 4.5-4, short-term Project construction activities are not considered to be a significant source of criteria pollutants on an individual basis. CEQA Guidelines section 15064(h)(3) states that if a project may incrementally contribute to a cumulative environmental problem for which there is a previously approved plan or mitigation program, including but not limited to an air quality attainment or maintenance plan, the lead agency may determine that a project's incremental contribution is not cumulatively considerable if the project complies with the adopted plan or program. In addressing cumulative effects for air quality, the AQAP is the most appropriate document to use because the AQAP sets forth a comprehensive program that will lead the Northern Sacramento Valley, and by extension the Project area, into compliance with state air quality standards for ozone and PM_{10} and uses control measures and related emission reduction estimates based on emissions projections for a future development scenario derived from land use, population, and employment characteristics defined in consultation with local governments. The Proposed Project is in conformance with the AQAP, would not result in long-term impacts, and would not result in significant impacts on an individual basis during construction activities. Therefore, the Proposed Project's incremental contribution to criteria pollutant emissions would not be cumulatively considerable. The impact would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. As with the Proposed Project, short-term construction activities are not considered to be a significant source of criteria pollutants on an individual basis. There would be no additional impacts from these alternatives related to IMPACT 4.5-8 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place, because no construction activities would occur, no cumulatively considerable net increase of any criteria pollutant would result. There would be no additional impacts from this alternative related to IMPACT 4.5-8 (Cow Creek).

IMPACT 4.5-9 (Cow Creek): Would the action expose sensitive receptors to substantial pollutant concentrations?

Proposed Project

Certain population groups are considered more sensitive to air pollution and odors than others; in particular, children, elderly, and acutely ill and chronically ill persons, especially those with cardio respiratory diseases such as asthma and bronchitis. Sensitive receptors (land uses) indicate locations where such individuals are typically found, namely schools, daycare centers, hospitals, convalescent homes, residences of sensitive persons, and parks with active recreational uses, such as youth sports.

The work sites are characteristically remote and in scarcely populated areas. The nearest sensitive receptor to Cow Creek is a residence approximately 1,800 feet (550 meters) southwest. As shown in Table 4.5-4, no criteria pollutant emissions thresholds would be exceeded. Since all construction activities would be short-term (40 weeks) compared to long-term exposure criteria (70 years), no significant exposures to diesel engine exhaust (DPM) or fugitive dust would occur (i.e., 1.1 percent of lifetime). Due to these factors, the Proposed Project would not expose sensitive receptors to substantial pollutant concentrations.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. As with the Proposed Project, the work sites are characteristically remote and in scarcely populated areas. In addition, PG&E would implement PM&E Measure WILD-7, which requires reduced vehicular speeds that would result in lower fugitive dust. Further, construction activities would be temporary and short-term, and would not expose sensitive receptors to substantial pollutant concentrations. There would be no additional impacts from these alternatives related to IMPACT 4.5-9 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place, because no construction activities would occur, no cumulatively considerable net increase of any criteria pollutant would result. There would be no additional impacts from this alternative related to IMPACT 4.5-9 (Cow Creek).

IMPACT 4.5-10 (Cow Creek): Would the action create objectionable odors affecting a substantial number of people?

Proposed Project

California ultra-low sulfur diesel fuel with a maximum sulfur content of 15 ppm by weight would be used in all diesel-powered equipment which minimizes emissions of sulfurous gases (sulfur dioxide, hydrogen sulfide, carbon disulfide, and carbonyl sulfide). Therefore, no objectionable odors are anticipated from construction activities. There would be no other sources of odor associated with the Proposed Project. In addition, due to the characteristically remote locations of the work sites, which are in scarcely populated areas, the Proposed Project would not affect a substantial number of people. Therefore, no impact would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. As with the Proposed Project, the work sites are characteristically remote and in scarcely populated areas. Further, construction activities would be temporary and short-term, and would not create objectionable odors. There would be no additional impacts from these alternatives related to IMPACT 4.5-10 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place, because no construction activities would occur, no creation of objectionable odors would result. There would be no additional impacts from this alternative related to IMPACT 4.5-10 (Cow Creek).

This Page Intentionally Left Blank

4.6 Aquatic and Fisheries Resources

This section analyzes the potential for the Proposed Project to result in adverse impacts on aquatic and fisheries resources, including special status fish species, aquatic invertebrates, and habitats. In addition, this section discusses the potential for the Proposed Project to conflict with policies designed to protect biological resources as defined with applicable general plans, conservation plans, or County policies, State, or federal agency with jurisdiction over the Project area.

4.6.1 Environmental Setting

4.6.1.1 Sources of Information

Several studies on fisheries resources have been conducted in the Old Cow Creek drainage within the Project area. In the 1970s, DFW conducted an electrofishing survey upstream of the existing intake for the Kilarc Development and species identified included rainbow trout, brown trout, and riffle sculpin. In 1997, sections of Old Cow Creek from the Upper Whitmore Falls to Lower Whitmore Falls were snorkel surveyed for adult Chinook salmon: two adult female Chinook salmon were found within this reach (DFW 1997 as cited in SHN 2001). A 2001 fish population survey conducted for the Olson Hydroelectric Project sampled an area approximately 4 miles downstream of the Kilarc Powerhouse and found rainbow trout and riffle sculpin (PG&E 2007a). In 2003, a fish distribution and abundance survey was conducted on reaches throughout the Kilarc Development, including below the Kilarc Powerhouse tailrace, in the Old Cow Creek bypass, above the Kilarc Main Diversion Dam, and within the Kilarc Main Canal and Forebay. Snorkel surveys were used in the main reaches, while a combination of electrofishing, gill netting, and fyke netting were used in canals and the forebay. This study found rainbow trout, brown trout, riffle sculpin, golden shiner, and Sacramento pikeminnow within the Kilarc Development area (PG&E 2007a). There have been two main fisheries surveys conducted on the South Cow Creek, one in 1974 and the other in 1985. During the one-time survey in 1974, DFW set a gill net in the Cow Creek Forebay for 17 hours and caught Sacramento sucker, rainbow trout, brown trout, green sunfish, and steelhead (SHN 2001). In 1985, an electrofishing survey of a reach approximately 4 miles upstream of the South Cow Creek Diversion Dam (between Morelli Ranch and South Cow Campground) found rainbow trout, brown trout, and Chinook salmon (SHN 2001). During the 2003 fish distribution and abundance survey of the Cow Creek Development, species found included Chinook salmon, steelhead, rainbow trout, brown trout, California roach, speckled dace, Sacramento pikeminnow, golden shiner, riffle sculpin, smallmouth bass, largemouth bass, green sunfish, and Pacific lamprey (PG&E 2007a). Sampling in Hooten Gulch detected rainbow trout, California roach, and riffle sculpin (PG&E 2007a).

4.6.1.2 Regional Setting

Based on the past surveys discussed above are included in Table 4.6-1, below, several fish species have been determined to inhabit the Project area based on past surveys. Special-status fish species considered in this section are those that are state or federally listed as threatened or endangered, proposed for state or federal listing as threatened or endangered, species classified as candidates for future state or federal listing, and California species of special concern. Table 4.6-1 also includes non-native, introduced fish species and native fish species which are recreationally important (e.g. Rainbow trout, *Oncorhynchus mykiss*) that are not listed as special-status, but are known to occur within the Project area.

Table 4.6-1 Fish Species Known to Occur within Project Area

Common Name	Scientific Name	Anadromous / Resident	Native / Introduced	Protection Status	Confirmed within Kilarc Development	Confirmed within Cow Creek Development
Central Valley fall-run Chinook salmon	*Oncorhynchus tshawytscha*	Anadromous	Native	SOC	Yes	Yes
steelhead Central Valley DPS	*Oncorhynchus mykiss*	Anadromous	Native	FT	No	Yes
Pacific lamprey	*Entosphenus tridentatus*	Anadromous	Native	BLMS/FSS/ CSC	No	Yes
Rainbow trout	*Oncorhynchus mykiss iridius*	Resident	Native	-	Yes	Yes
California roach	*Lavinia symmetricus*	Resident	Native	-	No	Yes
Speckled dace	*Rhinichthys osculus*	Resident	Native	-	No	Yes
Riffle sculpin	*Cottus gulosus*	Resident	Native	-	Yes	Yes
Sacramento pikeminnow	*Ptychocheilus grandis*	Resident	Native	-	Yes	Yes
Sacramento sucker	*Catostomus occidentalis*	Resident	Native	-	No	Yes
Brown trout	*Salmo trutta*	Resident	Introduced	-	Yes	Yes
Golden shiner	*Notemigonus crysoleucas*	Resident	Introduced	-	Yes	Yes
Green sunfish	*Lepomis cyanellus*	Resident	Introduced	-	No	Yes
Smallmouth bass	*Micropterus dolomieu*	Resident	Introduced	-	No	Yes
Largemouth bass	*Micropterus salmoides*	Resident	Introduced	-	No	Yes

Status Key:

BLMS - BLM sensitive species
CSC - CDFW Species of Special Concern
FC - Federal Candidate for listing
FE - Federal Endangered
FP - Federal Proposed as Threatened or Endangered
FT - Federally Threatened
SE - State Endangered
SOC - NMFS Species of Concern
ST - State Threatened

Evaluating potential impacts on fisheries resources within the Project area requires an understanding of fish species' life histories and life stage-specific environmental requirements. General information is provided below regarding the life histories of fish species of primary management concern occurring within the Project area. Time periods associated with individual species' life stages are derived from a review of the literature.

Anadromous Fish Species

Salmonidae

Central Valley Fall-run Chinook Salmon (*Oncorhynchus tshawytscha*)

Central Valley fall-run Chinook salmon exhibit an ocean-type life history. Adult fall-run Chinook salmon migrate through the Delta and into Central Valley rivers from July through December and spawn from October through December. Peak spawning activity usually occurs in October and November. Chinook salmon typically mature between 2 and 6 years of age (Williams 2006). The majority of Central Valley fall-run Chinook salmon spawn at age 3. Like other ocean-type Chinook salmon, Central Valley fall-run Chinook salmon remain near the coast throughout their ocean life (Levin and Schiewe 2001). Central Valley fall-run Chinook salmon remain in the ocean for 2 to 5 years. Fall-run Chinook salmon mature in the ocean before returning to freshwater to spawn.

Central Valley fall-run Chinook salmon historically spawned within the Central Valley floor and foothill reaches of major Central Valley rivers Fall-run Chinook salmon spawn in low-gradient portions of most Central Valley streams (typically, to an upper limit of 1,000-ft elevation or the base of the first rim dams). Chinook salmon spawn in clean, loose gravel in rivers, relatively shallow riffles; or along the margins of deeper river reaches where suitable water temperatures, depths, and velocities favor redd construction and oxygenation of incubating eggs. The embryos hatch following a 3- to 4-month incubation period, and the alevins (sac-fry) remain in the gravel for another 2 to 3 weeks. Central Valley fall-run Chinook salmon fry generally emerge from December through March, with peak emergence occurring by the end of January. Most fall-run Chinook salmon fry rear in freshwater from December through June, with emigration as smolts occurring from April through June. As Chinook salmon begin to smolt (i.e., make the physiological changes necessary for life in salt water), they are found rearing further downstream where ambient salinity reaches 1.5 to 2.5 parts per thousand (Levy and Northcote 1981).

Central Valley Chinook salmon begin their ocean life in the coastal marine waters of the Gulf of the Farallones from where they distribute north and south along the continental shelf primarily between Point Conception and Washington State (Healey 1991). Upon reaching the ocean, juvenile Chinook salmon feed on larval and juvenile fishes, plankton, and terrestrial insects. Chinook salmon grow rapidly in the ocean environment with growth rates dependent on water temperatures and food availability (Healey 1991). The first year of ocean life is considered a critical period of high mortality for Chinook salmon that largely determines survival to harvest or spawning (Quinn 2005).

Fall-run Chinook salmon occur in South Cow Creek through Wagoner Canyon (Yoshiyama et al. 2001) and have been observed upstream of the canyon. The absence of Chinook salmon redds upstream of the Canyon (based on CDFW surveys) indicates only a few individual Chinook salmon may make it through the canyon.

Central Valley Steelhead (*Oncorhynchus mykiss*)

Central Valley steelhead generally leave the ocean and migrate upstream from August through April and spawn from December through April. Peak spawning typically occurs from January through March in small streams and tributaries where cool, well-oxygenated water is available year-round (McEwan and Jackson 1996). Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death (McEwan 2001). Although one-time spawners are the great majority, Shapovalov and Taft (1954) reported that repeat spawners are relatively numerous (17.2 percent) in California streams.

After reaching a suitable spawning area, the female steelhead selects a site with good intergravel flow, digs a redd, and deposits eggs while an attendant male fertilizes them. The length of time it takes for eggs to hatch varies in response to water temperature. Hatching of steelhead eggs in hatcheries takes about 30 days at 51°F (10.6°C). Fry generally emerge from the gravel 4 to 6 weeks after hatching, but factors such as redd depth, gravel size, siltation, and water temperature can speed or retard the time to emergence (Shapovalov and Taft 1954). Newly emerged fry move to shallow, protected areas with lower water velocities associated with the stream margin, and soon establish feeding locations within the juvenile rearing habitat (Shapovalov and Taft 1954).

Steelhead rearing during the summer takes place primarily in higher velocity areas in pools, although young-of-the-year also are abundant in glides and riffles. Productive steelhead habitat is characterized by habitat complexity, primarily in the form of large and small woody debris. Cover is an important habitat component for juvenile steelhead both as velocity refugia and as a means of avoiding predation. Juvenile steelhead emigrate episodically from natal streams during fall, winter, and spring high flows. Juvenile Central Valley steelhead feed mostly on drifting aquatic organisms and terrestrial insects and will also take active bottom invertebrates (Moyle 2002). Juvenile steelhead in the Sacramento River basin migrate downstream during most months of the year, but the peak emigration period occurs in the spring, with a much smaller peak in the fall. Diversity and richness of habitat and food sources in the estuary allow juveniles to attain a larger size before entry into the ocean, thereby increasing their chances for survival in the marine environment. Central Valley steelhead spend from several months to 3 years (with a maximum of 6 years) in the Pacific Ocean before returning to freshwater.

No steelhead have been confirmed to use potential habitat within the Kilarc Development, presumably because of the migration barrier posed by Whitmore Falls. Steelhead have, however, been confirmed throughout the South Cow Creek watershed and the Cow Creek Development. They have been found from the confluence with Hooten Gulch to the South Cow Creek watershed. Suitable spawning gravel beds and steelhead redds have been found throughout the South Cow Creek watershed, particularly upstream of Wagoner Canyon (PG&E 2007a). Snorkeling surveys conducted by CDFW in 2002 and 2003 found steelhead, including steelhead adults, just downstream of the South Cow Creek diversion (PG&E 2007a).

Resident Fish Species

Salmonidae

Rainbow Trout (Oncorhynchus mykiss)

Rainbow trout are a resident form of anadromous steelhead trout that remain in fresh water throughout their lives. They are able to live under a wide range of temperature conditions and fare well in lakes, reservoirs, and streams. Preferred rainbow trout habitat is cool, clear, and swift-flowing permanent streams, where riffles tend to predominate over pools (Moyle 2002). Rainbow trout are able to tolerate water temperatures from 0 to 28°C; however, optimum temperature for growth is between 15 and 18°C (Moyle 2002).

Rainbow trout mature at an age of 1 to 5 years, but they usually mature by the second or third year (Moyle 2002). Spawning takes place in early spring from January through April. Rainbow trout spawn in gravel riffles or at the tail end of a pool (Moyle 2002). Rainbow trout spawn once a year but may skip a year between spawning events. At 10-15°C, rainbow trout egg incubation lasts about 3 to 4 weeks (Moyle 2002)). Rainbow trout fry emerge from the gravel 2 to 3 weeks after absorbing their yolk sacs and move to quiet edge water next to the shore (Moyle 2002). Rainbow trout feed primarily on macroinvertebrates throughout their lives. As the young fish grow, they move to deeper, faster water.

Rainbow trout have been found in both the Kilarc and Cow Creek Developments. Population surveys conducted by CDFW observed rainbow trout throughout Old Cow Creek within the Project area (PG&E 2007a). Rainbow trout were also found in the Old Cow Creek downstream of the Kilarc Powerhouse during licensing studies conducted for the Olson Hydroelectric Project. Studies of South Cow Creek have indicated dense populations of rainbow trout throughout the Cow Creek Development wherever habitat conditions were suitable (PG&E 2007a). CDFW has conducted stocking of rainbow trout through the Cow Creek watershed since 1930 (SHN 2001), and planting of catchable rainbow trout at the Kilarc Forebay has been conducted by CDFW since 1951 (PG&E 2007a).

Cyprinidae

California Roach (*Lavinia symmetricus*)

California roach are found throughout the Sacramento-San Joaquin drainage system (Moyle 2002). They are generally found in small, warm to cold water intermittent streams, and dense populations are frequently found in isolated pools (Moyle 2002). California roach are most abundant in mid-elevation streams in the Sierra foothills and in the lower reaches of some coastal streams (Moyle 2002). Roach are tolerant of relatively high temperatures (30 to 35°C) and low oxygen levels (1 to 2 ppm) (Moyle 2002). However, they are habitat generalists, also being found in cold, well-aerated clear “trout” streams (Moyle 2002), in human-modified habitats, and in the main channels of rivers (Moyle 2002).

Roach typically become mature after 2 to 3 years of age. Spawning occurs from March through early July, typically taking place when river temperatures exceed 61°F. Adults will spawn over shallow, flowing areas with small rocky substrates (3 to 5 cm in diameter). Females roach deposit sticky eggs which adhere to crevices within the rocky substrate (Moyle 2002). Hatching occurs after 2 to 3 days and fish larvae initially hide within the crevices of the rocks. Young roach eventually emerge into the water column once they are

finally able to actively swim, and begin to feed primarily on diatoms and small crustaceans (Moyle 2002).

Roach are not confirmed to inhabit the Kilarc Development; however, they are abundant within the Cow Creek Development. During the fish distribution and abundance survey in 2003, roach represented the most abundant species encountered below, within, and upstream of Wagoner Canyon (PG&E 2007a). Roach were also detected in Hooten Gulch, however they were absent in a gill net sampling of Cow Creek Forebay (PG&E 2007a).

Speckled Dace (Rhinichthys osculus)

Speckled dace occupy habitats that possess clear, well-oxygenated moving water with abundant cover (e.g. boulders, woody debris, and terrestrial vegetation). They typically are best-suited for small streams and thrive in shallow, rocky riffles and runs (Moyle 2002). Speckled dace are commonly found in small groups foraging among rocky substrates for small invertebrate prey, such as larvae of caddisflies, mayflies, and chironomids.

Speckled dace typically reach maturity after 2 years of age and spawn throughout the summer. Males clear algae and detritus from the bottom to expose rocky substrates where a female subsequently deposits her eggs. The eggs adhere to the rocks and larvae emerge about 6 days later (at 63 to 64°F). The larvae will typically hold in the gravel for about 7 to 8 days before emerging into the water column, often concentrating in shallow areas between boulders or among emergent vegetation (Moyle 2002).

Speckled dace were not detected in fish population surveys of Old Cow Creek and the Kilarc Development; however they were found within the Cow Creek Development. During a 2003 fish population study, a survey of the South Cow Creek bypass reach downstream of Wagoner Canyon found that speckled dace represented the second most abundant fish species after roach (PG&E 2007a). Additionally, speckled dace were observed in Hooten Gulch, but were not observed within or upstream of Wagoner Canyon nor in the Cow Creek Forebay (PG&E 2007a).

Sacramento Pikeminnow (*Ptychocheilus grandis*)

Sacramento pikeminnow prefer rivers in low- to mid-elevation areas with clear water, deep pools, low-velocity runs, undercut banks, and vegetation. Sacramento pikeminnow prefer summer water temperatures above 59°F with a maximum of 79°F (Moyle 2002). Sexually mature fish move upstream in April and May when water temperatures are 59 to 68°F. Sacramento pikeminnow spawn over riffles or the base of pools in smaller tributaries. Pikeminnow are slow growing and may live longer than 12 years.

Pikeminnow prey includes insects, crayfish, larval and mature fish, amphibians, lamprey ammocoetes, and occasionally small rodents (Moyle 2002).

Sacramento pikeminnow were observed downstream of the Kilarc Powerhouse tailrace. For the Cow Creek Development, pikeminnow were observed in the Old Cow Creek bypass reach downstream of Wagoner Canyon and below the Cow Creek tailrace (PG&E 2007a).

Cottidae

Riffle Sculpin (*cottus gulosus*)

The riffle sculpin is widely distributed throughout the Sacramento-San Joaquin River drainage system (Moyle 2002). Riffle sculpin are typically found in headwater or upper reaches of streams where riffles predominate (Moyle 2002). They are less numerous where temperatures exceed 25 to 26°C. Riffle sculpin mature by the end of their second year and spawn in late February to April. Eggs are deposited on the underside of rocks in swift riffles or inside cavities of woody debris (Moyle 2002). Riffle sculpin eggs hatch in 11 to 24 days, depending on water temperature (Moyle 2002). After absorbing the yolk sac, at about 6 mm TL (total length), the riffle sculpin fry assume a benthic existence (Moyle 2002). Most growth occurs in the spring and summer. Riffle sculpin seldom live longer than 4 years (Moyle 2002).

Riffle sculpin were observed near the Kilarc Powerhouse by CDFW (PG&E 2007a), Studies for the Olson Hydroelectric Plant detected riffle sculpin at sites approximately 4 miles downstream of the Kilarc Powerhouse. Riffle sculpin were also observed within the Cow Creek Development within the bypass reach of South Cow Creek downstream of Wagoner Canyon.

Catostomidae

Sacramento Sucker (Catostomus occidentalis)

Sacramento suckers have a wide distribution throughout California, likely because they have the ability to colonize new habitats readily (Moyle 2002). They are most commonly found in cold, clear streams and moderate-elevation lakes and reservoirs. Shifts in microhabitat use occur with smaller fish using shallow, low-velocity peripheral zones moving to areas of deeper water as they grow. Sacramento suckers can tolerate a wide range of temperature fluctuations, from streams that rarely exceed 59°F to those that reach up 86°F; they also have high salinity tolerances, having been found in reaches with salinities greater than 13 ppt. Sacramento suckers typically feed nocturnally on algae, detritus, and small benthic invertebrates. They spawn over riffles from February through June when temperatures are approximately 54 to 64°F. After embryos hatch in 2 to 4 weeks, larvae remain close to the substrate until they are swept into warm, shallow water or among flooded vegetation (Moyle 2002).

Sacramento sucker were not detected in the Kilarc Development, but were found in the Cow Creek Development. They were observed within the Cow Creek Development within the bypass reach of South Cow Creek downstream of Wagoner Canyon and within the Cow Creek Forebay during a gillnet survey (PG&E 2007a).

Petromyzontidae

Pacific Lamprey (*Lampetra tridentata*)

Pacific lamprey adults begin upstream migration between January and September, and may spend up to a year in freshwater until they are ready to spawn in late winter or spring. Upstream migration seems to take place largely in response to high flows, and adults can move substantial distances unless blocked by major barriers. Hatching occurs in approximately 17 days (at 57°F) and, after spending an approximately equal period in redd gravels. Ammocoetes (larvae) emerge and drift downstream to depositional areas where

they burrow into fine substrates and filter feed on organic materials. Ammocoetes remain in freshwater for 5 to 7 years before undergoing a metamorphosis into an eyed, smolt-like form (Moyle 2002). At this time, individuals migrate to the ocean between fall and spring, typically during high flow events, to feed parasitically on a variety of marine fishes (Moyle 2002). Pacific lampreys remain in the ocean for approximately 18 to 40 months before returning to freshwater as immature adults. Unlike anadromous salmonids, recent evidence suggests anadromous lampreys do not necessarily home to their natal streams. Pacific lampreys die soon after spawning, though there is some anecdotal evidence that this is not always the case (Moyle 2002).

Lamprey were not detected in the Kilarc Development during fish past fish surveys. In the Cow Creek Development, lamprey were observed in the South Cow Creek Canal, including a few lamprey ammocoetes, which indicates the presence of lamprey upstream of Wagoner Canyon.

4.6.2 Regulatory Setting

4.6.2.1 Federal

Endangered Species Act of 1973 (FESA)

Section 9 of the Federal Endangered Species Act (FESA) generally prohibits the "taking" of a species that is listed as endangered or threatened (16 U.S.C. § 1540). Under the FESA, the "take" of a species that is federally listed as threatened or endangered species is deemed to occur if an intentional or negligent act or omission results in any of the following: "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." (16 U.S.C. § 1532.) The term "harm" includes acts that actually kill or injure wildlife. Such acts may include significant habitat modification or degradation when it actually kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering (50 C.F.R. § 17.3).

Section 7 of the FESA requires federal agencies, in consultation with the Secretary of the Interior, to ensure that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of designated critical habitat for these species (16 U.S.C. § 1536).

The administering agency for the above sections, including federal consultation, is the USFWS for terrestrial, avian, and most aquatic species and National Oceanic and Atmospheric Administration Fisheries, also known as the National Marine Fisheries Service, (NMFS) for anadromous and marine species.

Fish and Wildlife Coordination Act (FWCA)

The FWCA (16 U.S.C. § 661 et seq.) amended 1946, 1958, 1978, and 1995 requires federal agencies to consult with the USFWS, or, in some instances, with NMFS, and with state fish and wildlife resource agencies before undertaking or approving water projects that control or modify surface water. The purpose of this consultation is to ensure that wildlife resources held in public trust receive appropriate consideration and be coordinated with the features of these water resource development projects. Federal agencies undertaking water projects are required to fully consider recommendations made by the USFWS, NMFS, and state fish and wildlife

resource agencies in project reports, such as documents prepared to comply with NEPA and CEQA, and to include measures to reduce impacts on wildlife in project plans.

Magnusson-Stevenson Fishery Conservation and Management Act 1996

This act (Public Law 94-265) provides for the conservation and management of all fish resources within the exclusive economic zone of the U.S. and supports and encourages the implementation and enforcement of international fisheries agreements for conservation and management of highly migratory species. It called for the establishment of Regional Fisheries Management Councils to develop, implement, monitor, and revise fish management plans to promote domestic commercial and recreational fishing. Specifically relevant to this project, it calls for the protection of essential fish habitat in review of projects conducted under federal permits, licenses, or other authorities that affect or have the potential to affect such habitat. NMFS is responsible for the administration of the act.

Clean Water Act (CWA)

The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.

CWA Section 404

Discharge of fill material into "waters of the United States," including "wetlands," is regulated by the USACE under Section 404 of the CWA (33 U.S.C. § 1344). USACE regulations implementing Section 404 define "waters of the United States" to include intrastate waters, including lakes, rivers, streams, wetlands, and natural ponds which are, were, or may be used in interstate or foreign commerce, or are adjacent to or have a significant nexus to interstate waters. (33 C.F.R. § 328.3.) "Wetlands" are defined for regulatory purposes as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions," including "swamps, marshes, bogs, and similar areas" (33 C.F.R. § 328.3). The placement of structures in "navigable water of the United States" is also regulated by the USACE under section 10 of the federal Rivers and Harbors Act (33 U.S.C. § 403). Projects are permitted under either individual or general (e.g., nationwide) permits. The specific applicability of the permit type is determined by the USACE on a case-by-case basis.

CWA Section 401

Section 401 of the CWA (33 U.S.C. § 1341) requires every applicant for a federal license or permit that may result in any discharge into waters of the United States to provide the federal licensing or permitting agency with certification from the State in which the discharge may originate that the project would be in compliance with specified provisions of the CWA, including federal and state water quality standards and implementation plans, and other relevant requirements of state law. Section 401 provides that conditions of certification shall become conditions of any federal license or permit for the project. For the Proposed Project, State Water Board is the California agency responsible for water quality certification pursuant to Section 401. The State Water Board will determine whether the Proposed Project adequately protects the beneficial uses and meets the water quality objectives for water bodies in the project area, as defined in the Basin Plan.

4.6.2.2 State

California Endangered Species Act (CESA)

The CESA (Fish & G. Code, § 2050 et seq.) declares that certain species of fish, wildlife, and plants will be given protection by the state because they are of ecological, educational, historical, recreational, aesthetic, economical, and scientific value of the people of the state. The CESA establishes that it is state policy to conserve, protect, restore, and enhance endangered species and their habitat. Under State law, wildlife species may be formally designated as threated or endangered by official listing by the California Fish and Game Commission. Such species are "fully protected." The Fish and Game Commission also maintains a list of "candidate species," which are species that have been formally noticed as being under review for addition to the list of endangered or threatened species.

Pursuant to the requirements of the CESA, an agency reviewing a Proposed Project within its jurisdiction must determine whether any state-listed endangered or threatened species may be present in the Project study area and determine whether the Proposed Project would have a potentially significant impact on such species. The California Department of Fish and Wildlife (CDFW) also encourages informal consultation on any Proposed Project that may affect a candidate species.

Under CESA, Project-related impacts to endangered or threatened species would be considered significant. Generally, no permit may authorize the take of these "fully protected" species. If a project is planned in an area where fully protected species occurs, the Project must be usually be designed to avoid all take. But Section 2081 of the Fish & Game Code allows CDFW to issue an incidental take permit for state-listed threatened, endangered, or candidate species only if specific criteria are met. These criteria can be found in CCR, Title 14, section 783.4 (a) and (b) and include that the take is merely "incidental" and that any impacts be "minimized and fully mitigated."

Other Fish and Game Code Sections

In addition to CESA, the Fish and Game Code provides specific listing and protection of several types of biological resources. Section 1580 of the Fish and Game Code presents the process and definition for Designated Ecological Reserves. Designated Ecological Reserves are significant wildlife habitats to be preserved in natural condition for the general public to observe and study.

Section 1602 of the Fish and Game Code requires that all diversion, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by CDFW.

4.6.2.3 Local

Shasta County General Plan

The Shasta County General Plan adopted in 2004 is an official planning document which sets for general, long-term policies regarding future development and land use. Among these objectives include the need to preserve unique aquatic, fish, and wildlife habitats for their biological resource values and their benefits to the community.

The Shasta County General Plan includes a list of sensitive and rare wildlife species known to occur within the County of Shasta (Shasta County 2004h); the General Plan deems the health of these species' populations to be an important indicator of the net effect of the human community on the natural environment. Fish species included on this list are: winter-run Chinook salmon, Spring-run Chinook salmon, fall-run Chinook salmon, late fall-run Chinook salmon, Steelhead trout, Rough sculpin, bigeye marbled sculpin, hardhead, McCloud river redband trout, pit roach. Other aquatic species on the General Plan list include Shasta crayfish, vernal pool fairy shrimp, and vernal pool tadpole shrimp, however these species are not known to occur within the Project area.

The Fish and Wildlife Habitat element of the Shasta County General Plan includes policies designed to protect wildlife resources. The applicable objectives and policies are provided below.

General Plan Objectives

FW-1 Protection of significant fish, wildlife, and vegetation resources.

FW-2 Provide for a balance between wildlife habitat protection and enhancement and the need to manage and use agricultural, mineral extraction, and timber land resources.

General Plan Policies

FW-a Significant wildlife habitat resources, as discussed in the Plan text, when not otherwise classified as Timberland (T), Cropland (A-C), or Grazing (A-G) shall be classified on the General Plan maps as Natural Resources Protection-Habitat (N-H).

In all areas designated N-H, except the Day Bench area, residential units may be permitted at a density of one dwelling unit per the acreage indicated on the land use map. If a project proponent agrees to cluster residential units, up to a 100 percent density bonus may be permitted if the parcels are clustered to the degree necessary to reduce the negative impacts on wildlife habitat to a level that does not exceed the level that would be created by the nonclustering option discussed above. When the clustering option is utilized, the clustered parcels shall be sited to reduce the impacts on critical habitat elements such as wildlife watering sites, mineral springs, key thermal cover areas, roost sites, and nest concentrations. The balance of the land shall remain in open space. Modifications to the open space areas shall only be allowed for habitat enhancement and forest management.

In the Day Bench area, designated NH-RB-C, the wildlife habitat is the primary designation, but the RB combining designation also recognizes that rural residential development may be permitted at a maximum density of one dwelling per five acres, as long as the residences are clustered. The Clustering (C) designation requires clustering. The residential clustering, along with other habitat protection criteria, is required to the degree necessary to mitigate the impacts that development may have on the habitat to below a level of significance. Recreation uses may also be conditionally permitted when identified significant adverse impacts on the habitat resource are mitigated.

FW-b Recognition that classification of some fish, wildlife, and vegetation resources designated and used as Timberlands, Mineral Resource, Croplands, or Grazing lands does, in most cases, protect habitat resources. However, if there is a conflict,

the timber, mineral extraction, or agricultural land use classifications mentioned above shall prevail in a manner consistent with State and Federal laws.

FW-c Projects that contain or may impact endangered and/or threatened plant or animal species, as officially designated by the California Fish and Game Commission and/or the U. S. Fish and Wildlife Service, shall be designed or conditioned to avoid any net adverse project impacts on those species.

FW-d The significant river and creekside corridors of Shasta County shall be designated on the General Plan maps. The primary purpose of this designation is to protect the riparian habitats from development and from adverse impacts from conflicting resources uses. The purpose is also to encourage open space and recreation (policy OSR-e). Mapping of significant waterway corridors in areas designated as resource protection lands is not required since it is assumed that resource land uses will also act to protect such waterway corridors. Riparian habitat protection along the significant river and creekside corridors, as designated on the plan maps shall be achieved, where appropriate, by the following measures

- *regulation of vegetation removal.*
- *design of grading and road construction to restrict sediment input to all streams.*
- *establishment of a development set-back.*
- *the siting of structures, including clustering.*
- *recreation plans for the Sacramento River, Clear Creek, and other feasible waterway resources.*

FW-e Salmon spawning gravel in the following rivers and creeks shall be protected:

- *Sacramento River: Keswick Dam to Shasta-Tehama County line.*
- *Battle Creek: Mouth to the mouth of South Fork Battle Creek.*
- *Cow Creek: Mouth to: Powerhouse on South Cow Creek; the mouth of Coal Gulch on Old Cow Creek; the mouth of Dry Clover Creek on Clover Creek; the mouth of Tracy Creek on Oak Run Creek; the mouth of Salt Creek on Little Cow Creek.*
- *Cottonwood Creek: Mouth to west line of Section 6, T.29N., R.5W., M.D.B. & M.*
- *Bear Creek: Mouth to the Highway 44 bridge.*
- *Clear Creek: Mouth to Whiskeytown Dam.*
- *Churn Creek: Mouth to Redding City limits.*
- *Stillwater Creek: Mouth to the Highway 299E bridge.*
- *Olney Creek: Mouth to mouth of Tadpole Creek.*
- *Anderson Creek: Mouth to Interstate 5.*

FW-f The County should encourage and support efforts by State and Federal agencies that implement the Upper Sacramento River Fisheries and Riparian Habitat Management Plan.

FW-g The County shall encourage the Department of Fish and Game to prepare periodic biological assessments regarding the overall effectiveness of waterway protection efforts under the Stream Corridor Protection Program.

FW-h The County shall encourage efforts to develop tree protection standards which focus on the County's differing land use types, namely; lowland urban, upland urban, rural residential and resource lands. Urban tree protection standards shall focus on landscaping that promotes energy conservation and design aesthetics, as opposed to preserving native vegetation.

FW-i An interagency plan should be encouraged for developing a parkway and wildlife habitat corridor along Clear Creek. The County should support and encourage planning and non-County funding sources which implement this parkway corridor.

FW-j Efforts to restore the Middle Creek drainage basin, Clear Creek watershed basin, Battle Creek, Cow Creek, and other Sacramento River tributary watersheds shall be supported by the County.

FW-k The County should support efforts to develop a Stream Corridor Protection Plan along the Sacramento River from the south Redding City limits to the Tehama County line.

4.6.3 Analysis Methodology

The analysis provided below considers direct and indirect effects from implementation of the Proposed Project. Potential impacts are analyzed using information identified in the project description, the environmental setting for aquatic and fisheries resources, the literature and field surveys, and the adequacy of on-site habitat for potentially occurring sensitive species, and comparing this information to the significance criteria outlined below.

For significant impacts, mitigation measures were designed to reduce the impacts to less-than-significant levels, wherever possible. For impacts that could not be reduced to less-than-significant levels, mitigation measures were designed to offset the impacts to the greatest extent possible.

4.6.3.1 Analytical Approach

The following methods were used to evaluate the potential effects on fish and aquatic resources resulting from implementation of the Proposed Project and include:

- Potential to impact water quality for identified fish and aquatic species
- Impact of alteration in flow patterns on migration corridors and connectivity for listed fish species.
- Change in amount and quality of aquatic habitat

Criteria for Determining Significance

Based on the State Water Board's Environmental Checklist in Appendix A of the Board's CEQA regulations, Appendix G of the CEQA Guidelines, and professional standards and practices,

Significance criteria were developed based on applicable regulations and management policies, a review of the available information, and the professional judgment of the authors. The mandatory findings of significance as explained in CEQA (Pub. Resources Code § 21083; CEQA Guidelines, § 15065) indicate that a project would have a significant effect on aquatic resources if it would:

- Cause 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 CDFW, NMFS, or USFWS.
- 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

4.6.4 Environmental Impacts and Mitigation

The following measures are included as part of the Project to minimize impacts to fisheries and aquatic resources from decommissioning activities.

- **PM&E Measure AQUA-1: Isolate Construction Area.** To minimize the deconstruction impacts at the five diversion dams and the Kilarc Tailrace (where instream construction would be required), the Licensee shall isolate the construction area from the active stream using coffer dams or other such barriers. The Licensee shall route water around the construction area in pipes or by removing the dam in two or more phases, allowing the flow to move down the other portion of the stream, while the isolated portion of the dam is removed.
- **PM&E Measure AQUA-2: Conduct Fish Rescue in Instream Work Area.** After a work area is isolated, the Licensee shall conduct a fish rescue to remove any fish trapped in the work area. The Licensee shall relocate these fish to an area of suitable habitat within Old Cow Creek or South Cow Creek downstream of the work area.
- **PM&E Measure AQUA-3**: Avoid Sensitive Periods for Steelhead and Chinook Salmon for the Removal of South Cow Creek Diversion Dam. The Licensee shall conduct decommissioning work at South Cow Creek Diversion Dam from July through September when adult anadromous salmonids are not present in South Cow Creek.
- **PM&E Measure AQUA-4: Meet NMFS Passage Guidelines for Anadromous Salmonids.** If the South Cow Creek Diversion Dam cutoff walls become fish passage barriers, the Licensee shall modify these cutoff walls or implement other appropriate measures to meet NMFS passage guidelines (drop, velocity, depth, roughened channel, and other site specific factors) for anadromous salmonids. The Licensee shall consult with NMFS on designs to provide adequate fish passage.
- **PM&E Measure AQUA-5: Monitor Passage Conditions Following Removal of Kilarc Main Canal and South Cow Creek Diversion Dams.** To assess the efficacy of PM&E

Measure GEOM-1 and monitor for any potential development of long-term barriers, the Licensee shall monitor fish passage conditions from upstream of the current sediment accumulations above the dam to a point approximately 10 channel widths downstream of the dam after the diversions are removed.

The Licensee shall conduct monitoring for 2 years after decommissioning of each diversion dam. In each year of monitoring, the Licensee shall conduct monitoring at least once after the first major runoff event (as access conditions and staff safety allows) and once again later in the year, during the low-flow season, when the condition of the streambed can be more easily assessed. A biologist with experience in assessing fish passage shall conduct the monitoring. The biologist shall walk the stream segment described above and visually assess for any passage challenges arising from sediment movement (i.e., shallow riffles or bars) and obtain depth and velocity measurements at critical high elevation points. The Licensee shall provide notification to resource agencies prior to monitoring so that agency staff may participate in this survey. The Licensee shall provide a summary of monitoring results at the conclusion of each year of monitoring to FERC, NMFS, CDFW, USFWS, and SWRCB.

If, during the monitoring, a long-term passage impediment is identified as a result of the diversions being removed, the Licensee will consult with CDFW and NMFS and the USACE under the Section 404 permit to determine appropriate measures to remedy the situation.

- **PM&E Measure AQUA-6: Consult with CDFW.** The Licensee shall consult with CDFW on fish management options (including reduced stocking, increased catch limits, and other measures) to reduce the number of fish in Kilarc Forebay prior to decommissioning, with the intent of minimizing the number of fish needing to be rescued.
- **PM&E Measure AQUA-7: Conduct Fish Rescue in Canals and Forebays, as Needed.** The Licensee shall conduct fish rescues in the Kilarc Main Canal and Forebay to rescue any fish that remain in these waters during the decommissioning process. These fish shall be relocated to suitable areas to be determined in consultation with CDFW and NMFS. The Licensee shall consult with CDFW and NMFS with regard to the need to conduct fish rescues in South Cow Creek Main Canal and Cow Creek Forebay. If consultation determines that a fish rescue is required for Cow Creek Canal or Forebay, the Licensee shall target salmonids and lamprey for rescue. Non-native fish, such as golden shiner, will not be rescued. The North Canyon Creek and South Canyon Creek diversions shall be decommissioned after diversions cease (these diversions have been out of service for several years), so that the channels are dry and cannot support fish. If the area is not dry, the Licensee shall conduct fish rescues as described for Kilarc Main Canal and relocate the rescued fish to an area to be determined in consultation with CDFW and NMFS.
- **PM&E Measure AQUA-8: Retain Fish Screen in South Cow Creek Main Canal.** The Licensee shall retain the fish screen in South Cow Creek Main Canal until after any fish rescue, if needed (see PM&E Measure AQUA-7), is complete and the canal is closed off so fish can no longer enter the canal. Once the fish rescue has been accomplished, the Licensee shall close off the head of the canal before the screens are removed.

- **PM&E Measure AQUA-9: Discontinue Cow Creek Powerhouse Operations in Spring.** The Licensee shall discontinue Cow Creek Powerhouse operations in the spring when natural flow is present upstream of the powerhouse.
- **PM&E Measure AQUA-10: Remove Hooten Gulch Gunite and Implement Bank Stability Measures during the Dry Season.** The Licensee shall remove the gunite in Hooten Gulch and install any replacement bank stabilization measures during the summer when the gulch is dry.

4.6.4.1 Kilarc Development

IMPACT 4.6-1 (Kilarc): Would the action improve spawning habitat for native fish species?

Proposed Project

Decommissioning the Kilarc Development would increase flows to the bypassed reaches of the North Canyon, South Canyon[25], and Old Cow Creeks. Although the precise amount of flow diverted for the Kilarc Development are unknown, modeling indicates that on average, flow would be increased in the bypassed reach of Old Cow Creek by 24 cfs compared to the No Project Alternative (refer to Figure 4.12-1 in the *Hydrology and Geomorphology* section). Although the absolute magnitude of flow diversions to the Kilarc Powerhouse is relatively constant throughout the year under existing conditions (based on cfs), the relative percentage of water diverted changes, based on seasonal baseflow patterns. Under the Proposed Project, the greatest relative increases in flow restored to the bypassed reaches would occur during the late summer and early fall. Flows would be increased up to two-fold since baseflows are typically low during this period. Decommissioning of the Kilarc Development would have little effect on the magnitude of peak flows, since the Kilarc Forebay is operated as a run-of-the-river facility and has minimal ability to store excess flows.

The return of flows into the bypassed reaches of the Kilarc Development would improve migration conditions for native fish species, and hence facilitate access to areas with suitable spawning habitat. Currently migration barriers prevent all but a few anadromous salmonids from accessing these areas. The most significant migration barrier is Whitmore Falls, located downstream of the Kilarc Powerhouse. CDFW has in the past identified pockets of potential spawning habitat for anadromous salmonids within the Kilarc Development upstream of the Kilarc tailrace; however, these areas are inaccessible to ocean-origin fish due to the presence of major natural passage barriers (PG&E 2007a). Whitmore Falls presents 12- to 14-foot high barriers that may preclude upstream migration of these species under almost all conditions. NMFS and CDFW have recently reclassified this barrier from a non-passable fish barrier to one that can be passed during high flow conditions when the falls distance is decreased and the downstream jump pool depth is deeper. There are currently no known recorded sightings of anadromous fish or their carcasses upstream of Whitmore Falls; however, based on determination from the CDFW and NMFS, Chinook salmon and steelhead can access this habitat during wet water years. Additionally, there is a 12-foot high fish migration barrier located 2.7 miles above the Kilarc powerhouse tailrace that is impassable.

[25] The North Canyon Creek and South Canyon Creek diversions have not been operated in over 15 years.

Improved flow conditions throughout the Kilarc Development would be expected to improve access to spawning habitat for native resident fish species. Based on a 2003 fish population survey, rainbow trout and riffle sculpin occur within the Kilarc Project Area (PG&E 2007a). Increased flows would also be expected to result in slight increases in wetted channel habitat, which would also increase the spatial extent of spawning habitat. The increase in the extent of spawning habitat would only benefit native fish species in the extent that their populations are constrained by limited spawning habitat under existing conditions.

Although the Proposed Project would result in dewatering of the canals associated with the Kilarc Development, these canals are artificial waterways designed for the sole purpose of water conveyance. They are generally devoid of suitable substrates of gravels and small cobbles required by native resident fish species for successful spawning. Overall, there would be no benefit to spawning habitat for anadromous species, but there would be a minor improvement to spawning conditions for native resident fish species, although the magnitude of the benefit is uncertain. Therefore, no adverse impacts would occur.

- **Level of Significance:** No Impact (Beneficial)
- **Mitigation Measures:** None required

Alternative 1

Alternative 1 would result in no change at the Kilarc Forebay site. Leaving the forebay in place would retain only moderate to poor quality habitat, and aquatic habitat in the bypassed reaches would not be enhanced with the restoration of more natural flow regimes. As compared with the Proposed Project, impacts related to implementation of this alternative would be less than significant, and would not result in improved spawning habitat.

No Project Alternative

Under the No Project Alternative, all flows would remain in the natural channels of Old Cow Creek and diversions to Kilarc Forebay would cease. Because no inflow would occur from the Kilarc Diversion Dam, water supply in Kilarc Forebay would be dependant on natural precipitation events. Spawning habitat quality would remain moderate to poor in Kilarc Forebay with the potential to degrade significantly without a consistent source of freshwater or Project operation and maintenance activites. As compared with the Proposed Project, impacts related to implementation of this alternative would be less than significant, and would not result in improved spawning habitat. **IMPACT 4.6-1 (Kilarc): Would the action improve migration conditions for native fish species?**

Proposed Project

Although flows would be increased to bypassed reaches of the Kilarc Development after the Proposed Project is completed, these changes are not expected to have an appreciable effect on migration conditions for anadromous salmonids. As noted previously, habitat in these bypassed reaches are largely inaccessible to anadromous salmonids, primarily because of the migration barrier posed by Whitmore Falls located downstream of the Kilarc Powerhouse tailrace. Furthermore, under existing conditions the Kilarc Forebay is operated as a run-of-the-river facility, thus decommissioning would also result in only minor changes in flow conditions in Old Cow Creek downstream of the Kilarc tailrace. Therefore, the Project would have a negligible effect on migration conditions for adult and juvenile anadromous salmonids.

Increases in flows are expected to facilitate improved migration conditions for native, resident fish, particularly during the dry season when flow diversions of the Kilarc Development divert a higher relative percentage of the in-stream flows. With removal of the diversion dams at the North Canyon Creek, the South Canyon Creek is expected to improve fish migration since it would facilitate more access to reaches upstream and downstream of where the diversion dams are currently situated. Additionally, numerous natural fish migration barriers were identified throughout the Kilarc Development (PG&E 2007a); the modest increase in flows through the bypassed reaches compared to existing conditions would facilitate improved passage past these barriers.

In summary, the Proposed Project would result in improved conditions for resident fish species in the Kilarc Development, but would not affect anadromous fish because these species are not expected to occur in the area. Therefore, no adverse impacts would occur.

- **Level of Significance:** No Impact (Beneficial)
- **Mitigation Measures:** None required

Alternative 1

Alternative 1 would result in no change at the Kilarc Forebay site. Leaving the forebay in place would retain only moderate to poor quality habitat, and aquatic habitat in the bypassed reaches would not be enhanced with the restoration of more natural flow regimes. As compared with the Proposed Project, impacts related to implementation of this alternative would be less than significant, and would not result in improved migration conditions.

No Project Alternative

Under the No Project Alternative, all flows would remain in the natural channels of Old Cow Creek and diversions to Kilarc Forebay would cease. Because no inflow would occur from the Kilarc Diversion Dam, water supply in Kilarc Forebay would be dependant on natural precipitation events. Migrating habitat quality would remain moderate to poor in Kilarc Forebay with the potential to degrade significantly without a consistent source of freshwater or Project operation and maintenance activites. As compared with the Proposed Project, impacts related to implementation of this alternative would be less than significant, and would not result in improved migrating habitat.IMPACT 4.6-3 (Kilarc): Would the action improve rearing conditions for native fish species?

Proposed Project

Anadromous fish species are not expected to occur within the Kilarc Development (refer to IMPACT 4.6-1), thus changes in flow operations would not have an effect on these species. However, operations under the Proposed Project are expected to provide some benefits for native, resident fish. Additional flow in the bypassed reaches is expected to increase the extent of complex, shallow habitat, where resident fish tend to occupy as juveniles to avoid predation. Riffle sculpin and Sacramento pikeminnow are the only native, resident fish observed within the Kilarc Development, although only Riffle sculpin were observed upstream of the Kilarc tailrace. Juveniles of these two species typically rear in shallow water habitat where flow velocities are reduced (Moyle 2002). Since flows would be increased in the bypassed reaches, it is expected that there would be a minor increase in potential rearing habitat for these species. The overall

effect is expected to be minor to negligible due to the relatively small change in flows (approximately 24 cfs) through the bypassed reaches.

Potential rearing habitat for native resident fish also exists in the constructed waterways of the Kilarc diversion canals and forebay. The Kilarc Main Canal is unscreened; therefore fish can enter it from the Old Cow Creek (PG&E 2007a). Only rainbow trout and non-native brown trout were captured during a 2003 fish population survey of this canal. The unlined sections of this canal provide some potential rearing habitat for smaller resident fish, since these areas provide some cover in the form of cobbles and boulders, as well as aquatic vegetation and overhanging riparian vegetation (PG&E2007a). However the lined sections of the canals represent poor habitat for fish as they are designed solely for water conveyance purposes. Assessment of habitat quality in the Kilarc Main Canal determined that aquatic habitat was better at the upstream end near the diversion dam than downstream near the Kilarc Forebay; however fish densities were higher at the downstream end (PG&E 2007a). The increased catch at the downstream end of the canal are likely a result of active trout stocking in the Kilarc Forebay by CDFW; sampling of the Kilarc Forebay during the same 2003 population survey also indicated that the majority of the rainbow trout were of hatchery origin (PG&E 2007a).

The removal of these artificial channels would ensure that fish remain within the natural channels where habitat is more beneficial for aquatic species. Therefore, although the total extent of potential rearing habitat would be reduced in the Kilarc Development, only moderate to poor quality habitat would be eliminated and the aquatic habitat in the bypassed reaches would be enhanced with the restoration of more natural flow regimes. Furthermore, with the decommissioning of the Kilarc Development, there would no longer be the opportunity for fish to be entrained into Kilarc diversion canals that contain poor aquatic habitat.

Overall, the Proposed Project is expected to have no adverse impact on rearing conditions for anadromous fish species, while having a minor to negligible benefit for juvenile rearing habitat of native, resident species.

- **Level of Significance:** No Impact (Beneficial)
- **Mitigation Measures:** None required

Alternative 1

Alternative 1 would result in no change at the Kilarc Forebay site. Leaving the forebay in place would retain only moderate to poor quality habitat, and aquatic habitat in the bypassed reaches would not be enhanced with the restoration of more natural flow regimes. As compared with the Proposed Project, impacts related to implementation of these alternatives would be less than significant, and would not result in the minor improvements to rearing conditions.

No Project Alternative

Under the No Project Alternative, all flows would remain in the natural channels of Old Cow Creek and diversions to Kilarc Forebay would cease. Because no inflow would occur from the Kilarc Diversion Dam, water supply in Kilarc Forebay would be dependant on natural precipitation events. Rearing habitat quality would remain moderate to poor in Kilarc Forebay with the potential to degrade significantly without a consistent source of freshwater or Project operation and maintenance activites. As compared with the Proposed Project, impacts related

to implementation of this alternative would be less than significant, and would not result in improved rearing habitat.

IMPACT 4.6-4 (Kilarc): Would construction-related water quality impacts result in adverse effects on fisheries resources?

Proposed Project

The Proposed Project could affect water quality in the short-term as a result of increased turbidity as a function of decommissioning activities, accidental spills of hazardous materials from construction vehicles (e.g. petrochemical spills), and increase in turbidity associated with storm water runoff. Decommissioning activities associated with the Kilarc Development include the removal of the North Canyon Creek, South Canyon Creek, and Old Cow Creek diversion dams, as well as the removal of the Kilarc Main Canal diversion dam. Ground disturbance associated with upgrading access routes and land clearing for vehicle staging areas increases the potential for storm water runoff that results in increased turbidity. The impacts to water quality would be temporary in nature. Over the long term, there would be no change in turbidity compared to current conditions. Furthermore, PM&E measures would be implemented to help prevent and reduce the impact of these effects (refer to IMPACT Impact 4.13-1 for further details). Therefore, the impact would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site because no decommissioning activities would occur; construction-related water quality impacts would not result. There would be no additional impacts from these alternatives related to IMPACT 4.6-4 (Kilarc).

IMPACT 4.6-5 (Kilarc): Would the action conflict with local policies protecting fisheries resources?

Proposed Project

The Shasta County General Plan contains policy meant to ensure the protection of sensitive wildlife species from adverse impacts related to the Proposed Project. The Proposed Project has the potential to impact aquatic and fisheries resources through stranding of aquatic resources, temporary impacts on water quality, and loss of aquatic habitat. However, the potential loss of habitat and increased risk of stranding following construction activities would be less than significant after implementation of PM&E measures.

The Shasta County General Plan also has an objective to protect salmonid spawning gravel. Restoration of a more natural flow regime to the bypassed reaches of the Kilarc Development would help restore geomorphological processes which facilitate natural downstream transport of spawning gravel, including sediment currently impounded behind diversion dams. Increasing flows in the bypassed reaches and removing the diversion dam structures would improve

migration conditions for anadromous salmonids and may allow them to reach suitable spawning gravel areas that have been identified further upstream in the Project Area.

Decommissioning actions would result in an improvement in conditions for salmonids. Therefore, the Proposed Project would not be in conflict with the objectives of the Shasta County General Plan.

- **Level of Significance:** No Impact
- **Mitigation Measures:** No additional mitigation is required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would retain only moderate to poor quality habitat, and aquatic habitat in the bypassed reaches would not be enhanced with the restoration of more natural flow regimes. As compared with the Proposed Project, impacts related to implementation of this alternative would be less than significant, and would not result in improved migration conditions.

4.6.4.2 Cow Creek Development

IMPACT 4.6-6 (Cow Creek): Would the action result in adverse effects on spawning habitat for native fish species?

Proposed Project

Decommissioning the Cow Creek Development would increase flows to the bypassed reaches of Mill Creek and South Cow Creek. Although the precise amount of flow diverted for the Cow Creek Development are unknown, modeling indicates that on average, flow would be increased in the bypassed reach of South Cow Creek by 36 cfs compared to the No Project Alternative (refer to Figure 4.12-2 in the Hydrology and Geomorphology section). Based on model data of average monthly flow diversions under existing conditions, the absolute magnitude of flow increases would be similar across all months compared to the No Project Alternative; however, the relative increase in flows would be the greatest during the late summer and early fall when baseflow in the South Cow Creek is low. Decommissioning of the Cow Creek Development would have little effect on the magnitude of high flows, since the Cow Creek Forebay is operated as a run-of-the-river facility and has minimal ability to store excess flows.

The return of flows into the bypassed reaches of the Cow Creek Development would improve migration conditions for both anadromous salmonids and native resident species, which would facilitate their access to areas with suitable spawning habitat. There are some areas of suitable spawning gravel available for anadromous steelhead and Chinook salmon within the bypassed reach of South Cow Creek (ENTRIX 2007a). Most of the suitable spawning habitat occurs within Wagoner Canyon (PG&E 2007a), including 1,550 sq ft of habitat for Chinook salmon and 1,500 sq ft for steelhead. In addition, good spawning gravels were identified near the South Cow Creek diversion dam (PG&E 2007a).

Improved flow conditions are also expected to improve spawning conditions for the various native, resident species known to occur within the Cow Creek Development, including California roach, speckled dace, Sacramento pikeminnow, riffle sculpin, Sacramento sucker, and rainbow trout. These species usually spawn over gravelly substrates in riffles or areas close to banks.

The increase in flows is expected to both increase the extent of potential spawning habitat for these species, as well as increase the frequency when flows are sufficient to prompt successful spawning events. The increase in the extent of spawning habitat though would only benefit native fish species in the extent that their populations are constrained by limited spawning habitat under existing conditions.

The Proposed Project would result in dewatering of the canals associated with the Cow Creek Development. Additionally, the Hooten Gulch would no longer be augmented with discharges from the Cow Creek Powerhouse and would return to its historic state as an ephemeral waterway that is completely dry a substantial portion of the year. Resident fish species are known to occur within the South Cow Creek main canal and Hooten Gulch. The canals of the Cow Creek Development are artificial waterways designed for the sole purpose of water conveyance and are generally devoid of suitable substrates of gravels and small cobbles required by native resident fish species for successful spawning. The channel of Hooten Gulch downstream of the Cow Creek powerhouse is dominated by gravel and cobbles, and thus may represent potential spawning habitat for various native fish species.

Although there may be a loss of some spawning habitat as a result of the Proposed Project, overall, the effect on spawning habitat is not expected to be significant since increased flows in the bypassed reaches would facilitate improved access to spawning habitat in the bypassed reach by both anadromous and resident fish species. Therefore, the impact would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 2A, 2B, 2C, and 2D

Alternative 2A would maintain flow in Hooten Gulch to ensure continued flow to the ADU's existing point of diversion. Those facilities of the Cow Creek Development required to maintain flow to Hooten Gulch would be improved to provide fish passage, fish screens, and to increase flow to the bypass reach. As with the Proposed Project, increased flows in the bypassed reaches would facilitate improved access to spawning habitat. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. As compared to the Proposed Project, implementation of these alternatives would result in continued flow to Hooten Gulch, which would be a benefit for native fish species.

No Project Alternative

Under the No Project Alternative, all flows would pass through the natural channels of South Cow Creek, increasing flows through the bypassed reaches. Because no discharges would occur from the Cow Creek powerhouse, Hooten Gulch would return to its natural, ephemeral condition as observed upstream of the powerhouse. As with the Proposed Project, the effect on spawning habitat is not expected to be adverse, since increased flows in the bypassed reaches would facilitate improved access to spawning habitat.

IMPACT 4.6-7 (Cow Creek): Would the action improve migration conditions for native fish species?

Proposed Project

Flows within the bypassed reaches of the Cow Creek Development would be increased after the Proposed Project is completed. These changes are expected to have a modest benefit on migration conditions for both native anadromous and resident fish species. Flow increases are expected to facilitate improved migration conditions for native, resident fish, particularly during the dry season when flow diversions of the Cow Development divert a higher relative proportion from Mill Creek and South Cow Creek. Removal of the Cow Creek Development diversion dams is expected to improve fish migration habitat since it would facilitate more access to reaches upstream and downstream of where the diversion dams are currently situated. Additionally, numerous natural fish migration barriers were identified throughout the Cow Creek Development (PG&E 2007a); the modest increase in flows through the bypassed reaches compared to existing conditions would facilitate improved passage past these barriers. In summary, the Proposed Project would result in improved conditions for both native anadromous and resident fish species in the Cow Creek Development.

- **Level of Significance:** No Impact (Beneficial)
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Alternative 2A would maintain flow in Hooten Gulch to ensure continued flow to the ADU's existing point of diversion. Those facilities of the Cow Creek Development required to maintain flow to Hooten Gulch would be improved to provide fish passage, fish screens, and to increase flow to the bypass reach. As with the Proposed Project, increased flows in the bypassed reaches would facilitate improved passage. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. As compared to the Proposed Project, implementation of these alternatives would result in continued flow to Hooten Gulch, which would be a benefit for native fish species.

No Project Alternative

Under the No Project Alternative, all flows would pass through the natural channels of South Cow Creek, increasing flows through the bypassed reaches, which would facilitate improved passage. Because no discharges would occur from the Cow Creek powerhouse, Hooten Gulch would return to its natural, ephemeral condition as observed upstream of the powerhouse. The No Project Alternative would not result in improved conditions for both native anadromous and resident fish species.

IMPACT 4.6-8 (Cow Creek): Would the action improve rearing conditions for native fish species?

Proposed Project

Juvenile salmonids generally require cool, clear, fast-moving, permanent streams with sufficient complex cover in which to take refuge (Moyle 2002). This type of habitat is expected to benefit

rearing resident fish species as well who typically use shallow-water habitat to escape predators. Native resident fish that are known to occur within the bypassed reaches of the South Cow Creek Development include rainbow trout, California roach, speckled dace, Sacramento pikeminnow, riffle sculpin, and Sacramento sucker (PG&E 2007a). Increased flows in the bypassed reaches of the Cow Creek Development are expected to increase the spatial extent of shallow, shoreline habitat.

Potential rearing habitat for native resident fish also exists in the constructed waterways of the South Cow Creek main canal and forebay. During the 2003 fish population survey, California roach and rainbow trout were observed in the South Cow Creek main canal, while Sacramento sucker and rainbow trout were observed in the Cow Creek Forebay (PG&E 2007a). The rainbow trout that occur within the South Cow Creek main canal presumably occur there because of the population of hatchery-raised rainbow trout stocked in the Cow Creek Forebay for recreational purposes. These waterways will eventually be de-watered though once the South Cow Creek Development decommissioning is completed. The removal of these artificial channels will ensure that fish remain within the natural channels where habitat is more beneficial for aquatic species. Therefore, although the total extent of aquatic habitat will be reduced in the Cow Creek Development, only moderate to poor quality habitat will be eliminated and the aquatic habitat in the bypassed reaches will be enhanced with the restoration of a natural flow volumes. Furthermore, with the decommissioning of the Cow Creek Development, there will no longer be the opportunity for fish to be entrained into the constructed areas that contain poor aquatic habitat.

Overall, the Proposed Project is expected to have minor to negligible benefit for juvenile rearing habitat of native, fish species within the Cow Creek Development.

- **Level of Significance:** No Impact (Beneficial)
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Alternative 2A would maintain flow in Hooten Gulch to ensure continued flow to the ADU's existing point of diversion. Those facilities of the Cow Creek Development required to maintain flow to Hooten Gulch would be improved to provide fish passage, fish screens, and to increase flow to the bypass reach. As with the Proposed Project, increased flows in the bypassed reaches would facilitate improved access to habitat. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. As compared to the Proposed Project, implementation of these alternatives would result in continued flow to Hooten Gulch, which would be a benefit for native fish species.

No Project Alternative

Under the No Project Alternative, all flows would pass through the natural channels of South Cow Creek, increasing flows through the bypassed reaches, and would ensure that fish remain within the natural channels where habitat is more beneficial for aquatic species. Because no discharges would occur from the Cow Creek powerhouse, Hooten Gulch would return to its natural, ephemeral condition as observed upstream of the powerhouse. The No Project Alternative would not create a benefit for juvenile rearing habitat of native, fish species within the Cow Creek Development.

IMPACT 4.6-9 (Cow Creek): Would construction-related water quality impacts result in adverse effects on native fish in the Cow Creek Development?

Proposed Project

The Proposed Project operations could affect water quality in the short-term as a result of increased turbidity as a function of decommissioning activities, accidental spills of hazardous materials from construction vehicles (e.g. petrochemical spills), and increase in turbidity associated with storm water runoff. Decommissioning activities associated with the Cow Creek Development include the removal of the Mill Creek and South Cow Creek diversion dams. Ground disturbance associated with upgrading access routes and land clearing for vehicle staging areas increases the potential for storm water runoff that results in increased turbidity. The impacts to water quality would be temporary in nature. Over the long term, there would be no change in turbidity compared to current conditions. Furthermore, BMPs would be implemented to help prevent and reduce the impact of these effects (refer to IMPACT 4.13-1 for further details). Therefore, the impact would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures**: No additional mitigation is required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A, the ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. Construction activities would be temporary and short-term, and no long-term change in turbidity would result. Further, BMPs would be implemented to help prevent and reduce the impact of these effects. There would be no additional impacts from these alternatives related to IMPACT 4.6-9 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place because no construction activities would occur; no construction-related water quality impacts would result. There would be no impacts from this alternative related to IMPACT 4.6-9 (Cow Creek).

IMPACT 4.6-10 (Cow Creek): Would the action conflict with local policies protecting fisheries resources?

Proposed Project

The Shasta County General Plan contains policy meant to ensure the protection of sensitive wildlife species from adverse impacts related to the Proposed Project. The Proposed Project has the potential to impact aquatic and fisheries resources through stranding of aquatic resources, temporary impacts on water quality, and loss of aquatic habitat. However, as referenced in Impact 4.6-6 (Cow Creek), the loss of habitat and increased risk of stranding following construction activities would be less than significant after implementation of PM&E measures.

The Shasta County General Plan also has an objective to protect salmonid spawning gravel. Restoration of a more natural flow regime to the bypassed reaches of the Cow Creek

Development will help restore geomorphological processes which facilitate natural downstream transport of spawning gravel, including sediment currently impounded behind diversion dams. Increasing flows in the bypassed reaches and removing the diversion dam structures will improve migration conditions and allow anadromous salmonids to reach suitable spawning gravel areas that have been identified further upstream in the Project area.

Therefore, the result of the decommissioning actions would result in an improvement in conditions for salmonids. The Project would not be in conflict with the objectives of the Shasta County General Plan.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A, the ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. Construction activities would be temporary and short-term; no conflict with local policies protecting fisheries resources would result. Further, implementation of PM&E measures would reduce construction impacts to less than significant. There would be no additional impacts from these alternatives related to IMPACT 4.6-10 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place because no construction activities would occur; no conflict with local policies protecting fisheries resources would result. There would be no impacts from this alternative related to IMPACT 4.6-10 (Cow Creek).

This Page Intentionally Left Blank

4.7 Terrestrial Biological Resources

This section describes the terrestrial biological resources that are known to occur within the vicinity of the Proposed Project and evaluates the significance of potential Project-related impacts on those biological resources, including vegetation communities, wildlife communities, sensitive species, and sensitive habitats. The information included in this section is based on a focused literature review, informal consultation with resource agencies, and observations made during field visits.

4.7.1 Environmental Setting

4.7.1.1 Sources of Information

Information about terrestrial biological resources used in this section was obtained from the following primary sources:

- Kilarc-Cow Creek Project – FERC No. 606 – Botanical, and Terrestrial and Aquatic Wildlife Resources Report (PG&E 2007b);
- Special-Status Plant Species Surveys for the Decommissioning of the Kilarc-Cow Creek Hydroelectric Project, FERC Project No. 606 (North State Resources 2011);
- Kilarc-Cow Creek Hydroelectric Project – FERC Project No. 606 – Final Draft Delineation of Waters of the United States (North State Resources 2011);
- Final Environmental Impact Statement for Hydropower License Surrender – Kilarc-Cow Creek Hydroelectric Project – FERC Project No. 606 (FERC 2011).

Other sources of information are referenced in the text.

4.7.1.2 Regional Setting

The Project Area is located in Shasta County in the foothills at the southern end of the Cascade Mountain Range. It is about 30 miles east of the City of Redding near the community of Whitmore. Shasta County is located in north-central California and includes the far northern end of the Sacramento Valley and portions of the Cascade Mountain Range and Coast Ranges. All of Shasta County is located in the Sacramento River watershed.

The Cow Creek watershed is shown in Figure 1-2, and is about 430 square miles and drains the area between the Pit River watershed to the north and the Bear Creek and Battle Creek watersheds to the south. The highest elevations in the Cow Creek watershed reach approximately 7,300 feet, and the watershed empties into the Sacramento River at an elevation of approximately 400 feet.

The Cow Creek watershed is divided into five sub-basins: North Cow Creek (aka, Little Cow Creek), Oak Run Creek, Clover Creek, Old Cow Creek, and South Cow Creek.

The area experiences hot, mostly dry summers with occasional thunderstorms, and cold, wet winters. The mean annual temperature at Whitmore is 58 degrees Fahrenheit (°F). Temperatures in the area may rise to over 110°F in July and fall to under 15°F in January. Mean annual precipitation is approximately 37.5 inches, with the highest monthly precipitation totals of 6.2 inches occurring in December and January. The Kilarc Powerhouse and Kilarc Reservoir receives significant snow accumulation in an average winter, but in the lower elevations of the

Project Area, virtually all precipitation falls as rain and only trace amounts of snow are expected in an average winter.

The topography varies from gently rolling low hills near the Cow Creek powerhouse to steep, narrow canyons in the upper Old Cow Creek drainage. The elevations within the Project Area range from about 856 feet mean sea level (ft msl) at the Cow Creek powerhouse to 3,940 ft msl at the North Canyon Creek diversion dam.

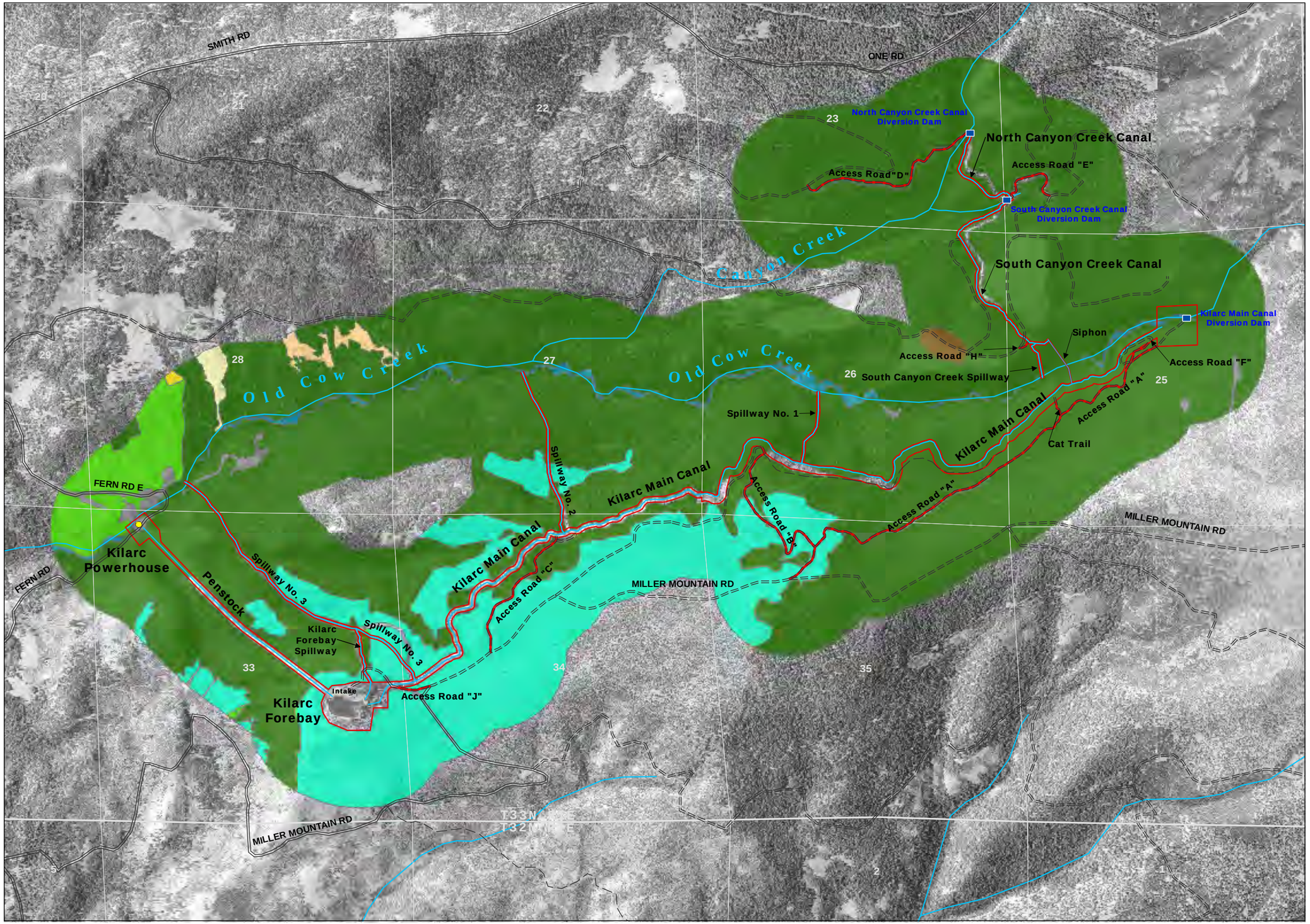
The vegetation communities in the Project Area range from annual grassland and oak trees in the lower watershed to coniferous forest in the upper watershed.

Plant Communities

Terrestrial plant communities in the Project Area are classified based on the nomenclature used in *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer 1988) and *Preliminary Descriptions of the Terrestrial Communities of California* (Holland 1986). Nomenclature for plants follows the Jepson Manual, Vascular Plant of California, Thoroughly Revised and Expanded (Baldwin et al. 2012).

The Project Area has a diverse flora and a variety of terrestrial vegetation communities, which are a result of the varied topography, substrate, and elevations found in the watershed. Vegetation communities present in the Project Area, as shown in Figures 4.7-1 and 4.7-2, include:

- Sierran mixed conifer forest
- Ponderosa pine plantation
- Interior live oak woodland
- Blue oak–foothill pine woodland
- White alder riparian forest
- Mixed riparian forest
- Northern mixed chaparral
- Non-native annual grassland (including pastureland)
- Wetland communities
- Developed and disturbed land



- Diversion
- PG&E Facility
- Watercourse
- FERC Boundary
- Revised Section Boundary

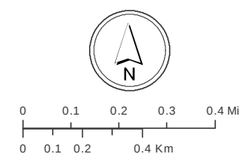
Vegetation Community

- Annual grassland-chaparral-young forest
- Bare ground
- Blue oak-foothill pine woodland
- Developed
- Interior live oak woodland
- Non-native annual grassland
- Northern mixed chaparral
- Pasture
- Ponderosa plantation
- Riparian forest (white alder and mixed)
- Sierran mixed coniferous forest
- Water

Roads *Defined per USGS topographic base map or PG&E road database*

- Trail
- Light Duty Road
- Unimproved Road
- Unimproved Road (in FERC boundary)

Source: PG&E 2009
Imagery: USDA National Agricultural Imagery Program, 2006.

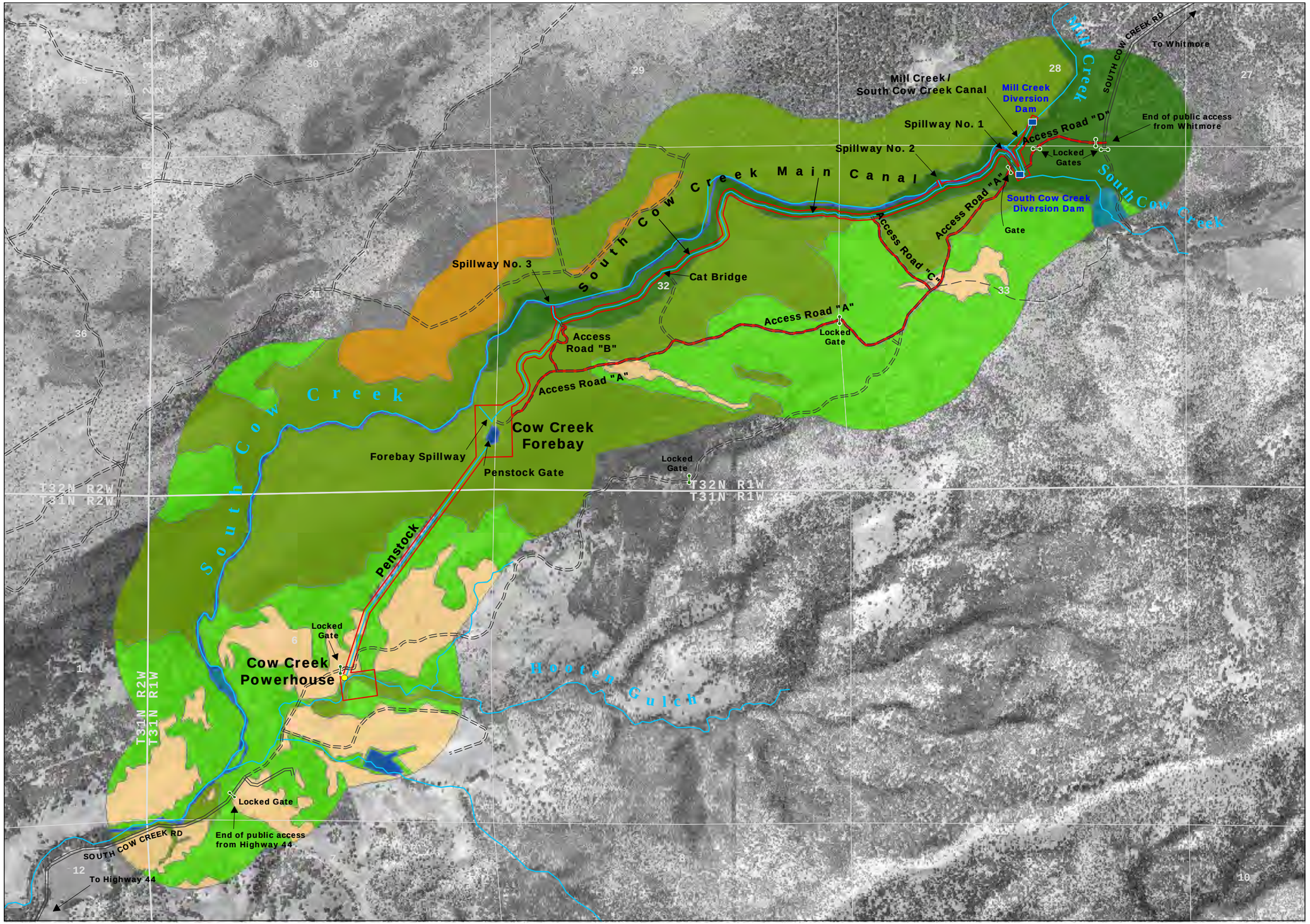


Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure 4.7-1
Kilarc Development
Vegetation Communities and Wildlife Habitats

T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\LSA_Feb09\kc_OldCow_VegetationCommunities171111_05.mxd 2/6/09

This Page Intentionally Left Blank



- Diversion
- PG&E Facility
- Gate
- Watercourse
- FERC Boundary
- Revised Section Boundary

Vegetation Community

- Annual grassland-chaparral-young forest
- Bare ground
- Blue oak-foothill pine woodland
- Developed
- Interior live oak woodland
- Non-native annual grassland
- Northern mixed chaparral
- Pasture
- Ponderosa plantation
- Riparian forest (white alder and mixed)
- Sierran mixed coniferous forest
- Water

Roads *Defined per USGS topographic base map or PG&E road database*

- Trail
- Light Duty Road
- Unimproved Road
- Unimproved Road (in FERC boundary)

Source: PG&E 2009
Imagery: USDA National Agricultural Imagery Program, 2006.

N

0 0.1 0.2 0.3 0.4 Mi
0 0.1 0.2 0.4 Km

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure 4.7-2
Cow Creek Development
Vegetation Communities and Wildlife Habitats

T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\LSA_Feb09\kc_SCow_VegetationCommunities17i11i_05.mxd 2/6/09

This Page Intentionally Left Blank

The following descriptions of vegetation cover types within the Project Area have been derived primarily from the Cow Creek Watershed Assessment (SHN 2001) and surveys completed in 2003 in support of relicensing (PG&E 2007b). Descriptions are supplemented from Holland (1986) for cover types not included in the watershed assessment. In general, the higher elevations support coniferous forests and the middle elevations support blue oak–foothill pine woodland and interior live oak forest. The lower elevations support non-native annual grassland blue oak–foothill pine woodland.

Sierran Mixed Conifer Forest

Sierran mixed conifer forest is the most common forest type in the watershed and is found at elevations from 3,000 to 6,000 feet (SHN 2001 as cited in PG&E 2007b). Historically, much of the area was dominated by open ponderosa pine forest, with mixed conifer forest confined to moist sites with well-drained soils on north-facing or east-facing slopes. However, exclusion of fire has resulted in the conversion of ponderosa pine forests to mixed conifer forests in much of the region. Ponderosa pine (*Pinus ponderosa*), incense cedar (*Calocedrus decurrens*), Douglas-fir (*Pseudotsuga menziesii*), and white fir (*Abies concolor*) are the shared dominant species in the tree overstory. Other associates include black oak (*Quercus kelloggii*).

Sierran mixed conifer forest is the dominant vegetative community in Old Cow Creek watershed (Kilarc Development) and is also present at the upper end of South Cow Creek and the South Cow Creek Main Canal (Cow Creek Development). Portions of Old Cow Creek and adjacent areas were burned in the Squirrel Fire in 2002. At the time of the surveys, these areas were varying mixtures of unaffected and burned vegetation. Vegetation at the northeast side of the Kilarc Forebay and along the penstock was also affected by this fire (PG&E 2007b)

Ponderosa Pine Plantation

Large parts of the Project Area were affected by the Fern Fire in 1988. Burned areas were re-planted with ponderosa pine seedlings. Part of the replanted area and adjacent areas were subsequently burned in the Squirrel Fire in 2002. At the time of the vegetation surveys in 2003, these areas were varied mixes of unaffected and burned vegetation (PG&E 2007b). As of 2018, these plantations are a matrix of 30-year-old and 15-year-old ponderosa pines with inclusions of brush and other tree species. Ponderosa pine plantation was surveyed within the Kilarc Development in the vicinity of the Kilarc Forebay and the lower end of the Kilarc Main Canal. A small area of plantation was also mapped on South Cow Creek, just upstream of the South Cow Creek Diversion Dam.

Interior Live Oak Woodland

Interior live oak woodland is a broad-leafed woodland that is usually found on north-facing hillsides below elevations of 8,500 feet (Holland 1986 as cited in PG&E 2007b). This woodland is dominated by interior live oak (*Quercus wislizeni*). Associated species include California bay (*Umbellularia californica*), black oak, foothill pine (*Pinus sabiniana*), tanoak (*Lithocarpus densiflorus*), whiteleaf manzanita (*Arctostaphylos viscida*), blue oak (*Quercus douglasii*), California buckeye (*Aesculus californica*), and poison-oak (*Toxicodendron diversilobum*). Interior live oak woodland is the most extensive cover type in the area surrounding the Cow Creek Development where it intergrades with blue oak-foothill pine and

Sierra mixed conifer woodlands throughout the Project Area. This cover type was not mapped in the Kilarc Development (PG&E 2007b).

Blue Oak–Foothill Pine Woodland

Blue oak–foothill pine woodland occurs on foothill slopes from the valley floor to over 3,500 feet in elevation. This cover type is dominated by blue oak and foothill pine, but may include various co-dominants such as whiteleaf manzanita, interior live oak, and buckbrush (*Ceanothus cuneatus*) (SHN 2001 as cited in PG&E 2007b).

The understory is now characterized by non-native annual grassland species. In the absence of fire, a dense shrub community may develop including interior live oak, California buckeye, whiteleaf manzanita, poison oak, and California redbud (*Cercis occidentalis*). Drier, harsher sites tend to support chaparral and grass understory, and mesic sites are characterized by locally abundant occurrences of black oak and poison oak (PG&E 2007b). A small area of blue oak–foothill pine woodland is located near the Kilarc Powerhouse. Within the Cow Creek Development, blue oak–foothill pine woodland is a dominant cover type where it intergrades with interior live oak woodland. This habitat type, dominated by blue oak, is also present on the uphill borders of pasturelands irrigated by Abbott Ditch.

Riparian Forest

Riparian communities within the Kilarc and Cow Creek Developments are composed of both white alder riparian forest, and mixed riparian forest communities. Descriptions of both communities are provided below (PG&E 2007b, FERC 2011).

As a result of the existing topography, bedrock, channels, and fast-flowing water, riparian vegetation communities tended to be narrow in extent in the upper limits of the Project area, with the exception of Hooten Gulch and portions of Old Cow Creek. Due to the very narrow linear extent of this vegetation community, it was not displayed as part of the vegetation mapping exercise except for a small area mapped upstream of South Cow Creek Diversion Dam.

The width of the riparian corridor ranged from 5 feet to 100 feet. The following widths were recorded during riparian surveys completed in 2003 (PG&E 2007b):

- Kilarc Development
  - Old Cow Creek (15 to 100 ft)
  - North Canyon Creek (5 to 10 ft)
- Cow Creek Development
  - South Cow Creek (10 to 60 ft)
  - Mill Creek (20 to 30 ft)
  - Hooten Gulch (15 to 35 ft)

White Alder Riparian Forest

White alder riparian forest is the primary riparian forest community found in the area surrounding the Project (SHN 2001). This riparian forest is found along Old Cow Creek, South Cow Creek, and their tributaries. Tree and shrub species are generally deciduous. White alder riparian is typically found along the edges of streams and creeks from the valley floor into the lower coniferous forest at elevations of 500 to 4,000 feet. The riparian corridor of this community is narrower than other riparian communities of the Sacramento Valley due to the steep canyons, bedrock channels, and fast-flowing water common in the upper limits of the watershed. Common species include white alder (*Alnus rhombifolia*), willow (*Salix* spp.), bigleaf maple (*Acer macrophyllum*), and valley oak (*Quercus lobata*). Associated species include Oregon ash (*Fraxinus latifolia*), blue oak, non-native annual grasses, and buckbrush. Individuals or small stands of Fremont cottonwood (*Populus fremontii* ssp. *fremontii*) are found scattered throughout the bypass reaches, and western sycamore (*Platanus racemosa*) and California black walnut (*Juglans californica*) trees are present in a small area downstream of the Cow Creek Powerhouse (PG&E 2007b).

Mixed Riparian Forest

Mixed riparian forest is the primary habitat type on South Cow Creek in the vicinity of lands irrigated by Abbott Ditch, downstream from the Cow Creek Development. On soils wetted by Abbott Ditch and lateral ditches, this habitat grades into valley oak woodland, dominated by valley oak. In mixed riparian forests, very tall oaks are less common than in valley oak woodland, and the frequency of sapling oaks is higher. A midstory canopy layer is present in mixed riparian forests in this, composed of medium sized trees and tall shrubs such as Oregon ash, white alder, and box elder (*Acer negundo*). The habitat contains a greater proportion of smaller shrubs than is present in valley oak woodlands, including Fremont cottonwoods and medium-sized willows. Where there are openings, dense patches of California mugwort (*Artemisia douglasiana*) form, and vines such as Himalayan blackberry (*Rubus armeniacus*) and California wild grape (*Vitis californica*) can produce huge thickets in the understory. In canopy openings, trees and shrubs can become engulfed in grape, and dense thickets of blackberries form. Mixed riparian forests include dense, closed canopy forests interspersed with openings, which adds to their complexity and potential resources for wildlife.

Northern Mixed Chaparral

Northern mixed chaparral is dominated by large shrubs, which can form dense, often nearly impenetrable thickets. In northern California, it is found at elevations below 3,000 feet (Holland 1986 as cited in PG&E 2007b). In the Project vicinity, this vegetation type is dominated by various species of manzanita (*Arctostaphylos* spp.) and various ceanothus species (*Ceanothus* spp.). A dense cover of annual herbs may appear during the first growing season after a fire, followed in subsequent years by perennial herbs and short-lived shrubs until the original shrub species re-establish dominance by stump-sprouting. Small areas of chaparral are found in scattered locations throughout the Old Cow and South Cow vegetation study areas, especially along the northern central boundary of the Cow Creek Development (PG&E 2007b).

Non-Native Annual Grassland

Non-native annual grassland occurs at lower elevations and extends into openings within blue oak–foothill pine woodland at elevations below 2,500 feet in the watershed (SHN 2001 as cited in PG&E 2007b).

Non-native annual grassland supports a variety of annual grasses and associated forbs. Dominant species include wild oats (*Avena* spp.), foxtail chess (*Bromus madritensis* ssp. *rubens*), soft chess (*Bromus hordeaceus*), dogtail grass (*Cynosurus echinatus*), and ripgut brome (*Bromus diandrus*). Annual and perennial forbs are common associates and include native species such as California poppy (*Eschscholzia californica*), butter n' eggs (*Triphysaria eriantha* ssp. *eriantha*), and Sierra foothill silverpuffs (*Microseris acuminata*), as well as non-native species such as several species of filaree (*Erodium* spp.).

Non-native annual grassland is frequently infested with noxious weeds such as yellow starthistle (*Centaurea solstitialis*), medusahead grass (*Elymus caput-medusae*), Klamath weed *(Hypericum perforatum*), and bull thistle (*Cirsium vulgare*) (PG&E 2007b). Non-native annual grasslands are found in throughout the Cow Creek Development, mostly associated with blue oak-foothill pine woodlands in the lower portion of the Project Area near the Cow Creek Powerhouse. Grasslands are less common in the Kilarc Development and just a few small areas are mapped north of Old Cow Creek. This is also the predominant open habitat type in the irrigated pasturelands between Abbott Ditch and South Cow Creek.

Wetland Communities

Within the Project Area, wetland vegetation communities include open water areas, freshwater marshes (i.e., fresh water emergent wetland) that occurs adjacent to standing or flowing water, and seeps or springs associated with shallow groundwater. Open water areas, such as Project-related forebays, are also present in the Project Area. Wetland delineations in the area of the Kilarc Development were performed only on lands within the Project boundary, as described below. The lands irrigated by Abbott Ditch have not been subject to a jurisdictional wetland delineation. An informal determination identified fresh emergent wetlands and riparian wetlands, much of which is likely subject to USACE jurisdiction (refer to Figures 4.7-10 through 4.7-14). (PG&E 2007b)

Open Water

Open water areas associated with the Kilarc Development include the 4.5 acre Kilarc Forebay, the open water of Old Cow Creek, and the 3.65 mile Kilarc Main Canal. Open water areas found within the Cow Creek Development include the one acre Cow Creek Forebay, the 2.1 mile South Cow Creek Main Canal, South Cow Creek, and Hooten Gulch/Abbott Ditch.

Seeps

Seeps or springs often occur in wet areas within non-native grasslands or meadows. These are usually associated with changes in geologic material, fractures, or faults (SHN 2001 as cited in PG&E 2007b). This wetland vegetation type is characterized by perennial herbaceous plant species that are associated with permanently moist or wet soil (Holland 1986 as cited in PG&E 2007b), and consists of sedges, rushes, and a variety of grass species.

Several seeps were observed in the Project Area including two small seeps within the Cow Creek Development and three small seeps within the Kilarc Development. The two small seeps (totaling 0.006 acre) were mapped next to an access road at the Cow Creek Development. One seep was dominated by rushes. Other seeps exist and were dominated by perennial grasses that are associated with moist or wet soils. The three small seeps mapped within the Kilarc Development include: one small seep (0.002 acre) adjacent to the Kilarc Main Canal, another small seep (0.01 acre) adjacent to the Kilarc Forebay, and a third seep/spring (0.04 acre) at the Kilarc Powerhouse. The seep/spring at the powerhouse meets all the criteria for a jurisdictional wetland (hydrology, soils, and vegetation). Seeps also occur below Abbott Ditch in areas where water persistently leaks from the unlined ditch.

Fresh Emergent Wetland

Fresh emergent wetland (including freshwater marshes) occurs throughout California at nearly all elevations below 7,500 feet (Mayer and Laudenslayer 1988). Saturated or periodically flooded soils support mesic plant species, including sedges and rushes. Wetter sites support cattail and bulrush. Common freshwater marsh species include broad-leaved cattail (*Typha latifolia*), tules *(Schoenoplectus* spp.; *Scirpus* spp.), rushes (*Juncus* spp.), and sedges (*Carex* spp.). The water often contains a low level of dissolved oxygen. This zone supports emergent vegetation and algae.

Freshwater marsh occurs along the edges of forebays and creeks within the Project Area. Emergent wetland vegetation occurs along the edges of ponds (i.e., Kilarc and Cow Creek Forebays) and low gradient creeks where the water becomes slow-flowing, warm, and shallow (SHN 2001, PG&E 2007b). There is a small area of fresh emergent wetland along the edge of the Cow Creek Forebay and the Kilarc Forebay. Fresh emergent wetlands occur in the Abbott Ditch area in the main and lateral ditches, and in areas where soil saturation and surface water are sufficient for water-tolerant plant species (sedges, rushes, cattails, and blackberries) to dominate.

Vernal Swale

A single vernal swale (0.005 acre) was identified on a terrace along an access road near the Cow Creek Development. This vernal swale was connected to an intermittent stream that drains the terrace. Wetland species observed in the swale include slender popcorn flower (*Plagiobothrys leptoclatus*), woolly marbles (*Psilocarphus* sp.), water starwort (*Callitriche palustris*), and Mediterranean barley (*Hordeum marinum* ssp. *gussonianum*).

Developed and Disturbed Land

Developed land in the Project vicinity includes residential areas and the area around the Kilarc Powerhouse. Disturbed land includes areas where slides have occurred on steep slopes as well as areas disturbed by human activities, particularly logging. Any vegetation present consists either of species from the surrounding vegetation or weedy species typical of disturbed areas. Areas in these categories that were large enough to map were all found along Old Cow Creek and were primarily related to logging activities.

Special-Status Plant Species

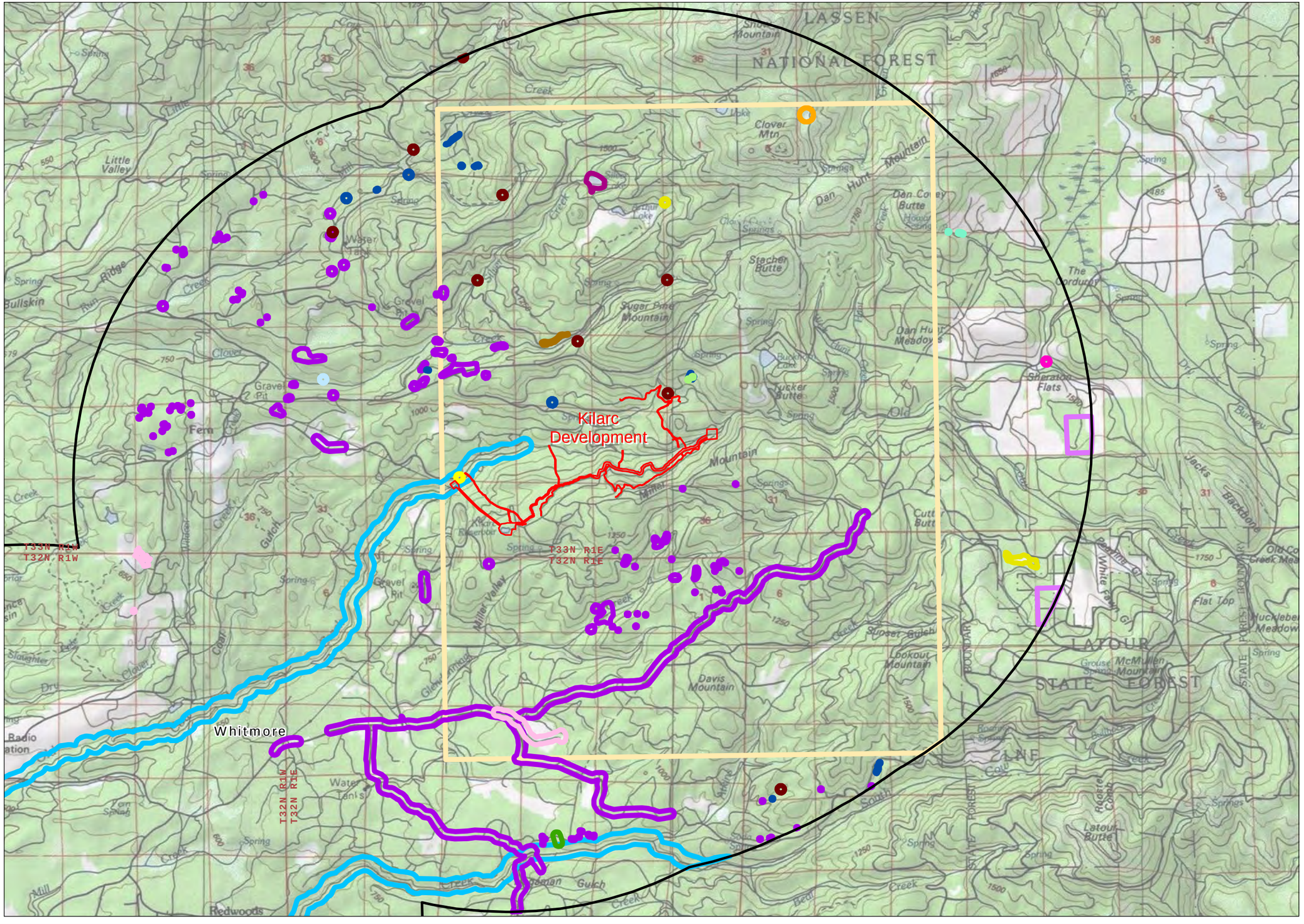
Special-status plant species are defined as species that are listed, proposed for listing, or under review for listing as rare, threatened, or endangered by the federal government or the State of California, and plants listed by the California Native Plant Society (CNPS) as California Rare Plant Rank (CRPR) 1B, 2, 3, and 4.

A literature review was conducted to determine the special status plant species that could occur within the existing Project Area and vicinity. Species lists and database queries reviewed included those provided by USFWS, the DFW California Natural Diversity Database (CNDDB), and the California Native Plant Society (CNPS). Online Inventory. An update of the CNDDB query (CDFW 2017a), CNPS Online Inventory (CNPS 2017) and the USFWS Information for Planning and Consultation (IPaC) online query (USFWS 2017) was completed in 2017. The CNDDB and CNPS Inventory database queries included a query of 24 quadrangles including: O'Brien; Project City Enterprise; Cottonwood; Minnesota Mountain; Bella Vista; Palo Cedro; Balls Ferry; Devils Rock; Oak Run; Clough Gulch; Tuscan Buttes N.E.; Montgomery Creek; Whitmore; Inwood; Shingletown; Hatchet Mountain Pass; Miller Mountain; Hagaman Gulch; Manton; Burney Mountain West; Jacks Backbone; Viola; and Grays Peak. Online IPaC resources provided by the Sacramento District of the USFWS included a query of Shasta County. The lists were used to cross-reference and/or supplement the target special-status species list.

CNDDB Special Status Species occurrences in the Project Area are shown in Figures 4.7-3 and 4.7-4. Appendix E, Table E-1, includes the complete list of plant species generated from the literature review as well as the listing status, bloom period, and potential to occur in the Project Area. Species are listed alphabetically by scientific name. Forty-eight (48) plant species were generated from the literature search (CDFW 2017a, CNPS 2017). Of these, nine are known to occur within 5-miles of the Project Area based on CNDDB mapped occurrences. These species include Butte County fritillary (*Fritillaria eastwoodiae*), Callahan's mariposa-lily (*Calochortus syntrophus*), northern clarkia (*Clarkia borealis* ssp. *borealis*), scalloped moonwort (*Botrychium crenulatum*), silky cryptantha (*Cryptantha crinita*), upswept moonwort (*Botrychium ascendens*), Ahart's paronychia, (*Paronychia ahartii*), Jepson's horkelia (*Horkelia daucifolia* var. *indicta*) and Shasta clarkia (*Clarkia borealis* ssp. *arida*) (CDFW 2017a).

Botanical surveys were conducted throughout the accessible parts of the Project Area. Surveys were initiated in May of 2003 and included the Cow Creek Development and the lower elevations of the Kilarc Development (forebay, penstock, powerhouse, diversion, and portions of the canal areas). Late spring snows prevented the completion of surveys at the higher elevations in the Kilarc Development during May. Botanical surveys were also conducted in the Project Area in June and August 2003 for summer and late summer bloom periods. Botanical surveys were conducted again in 2008.

Surveys were conducted within the entire Project Area that was safely accessible. However, most of the steep banks of Old Cow Creek and South Cow Creek, including most of the siphon areas between the canal and Old Cow Creek, were not accessible and were viewed only from above or below.



FERC Boundary

Five Mile Buffer of FERC Boundary

CNDDB Species Occurrence

- American peregrine falcon
- Butte County fritillary
- Callahan's mariposa-lily
- Cascades frog
- Cooper's hawk
- fisher - West Coast DPS
- foothill yellow-legged frog
- northern clarkia
- northern goshawk
- rattlesnake fern
- scalloped moonwort
- silky cryptantha
- silver-haired bat
- southern long-toed salamander
- steelhead - Central Valley DPS
- upswept moonwort
- western pond turtle

Source: CNDDB, Nov 2017

N

0 0.5 1 2 Mi

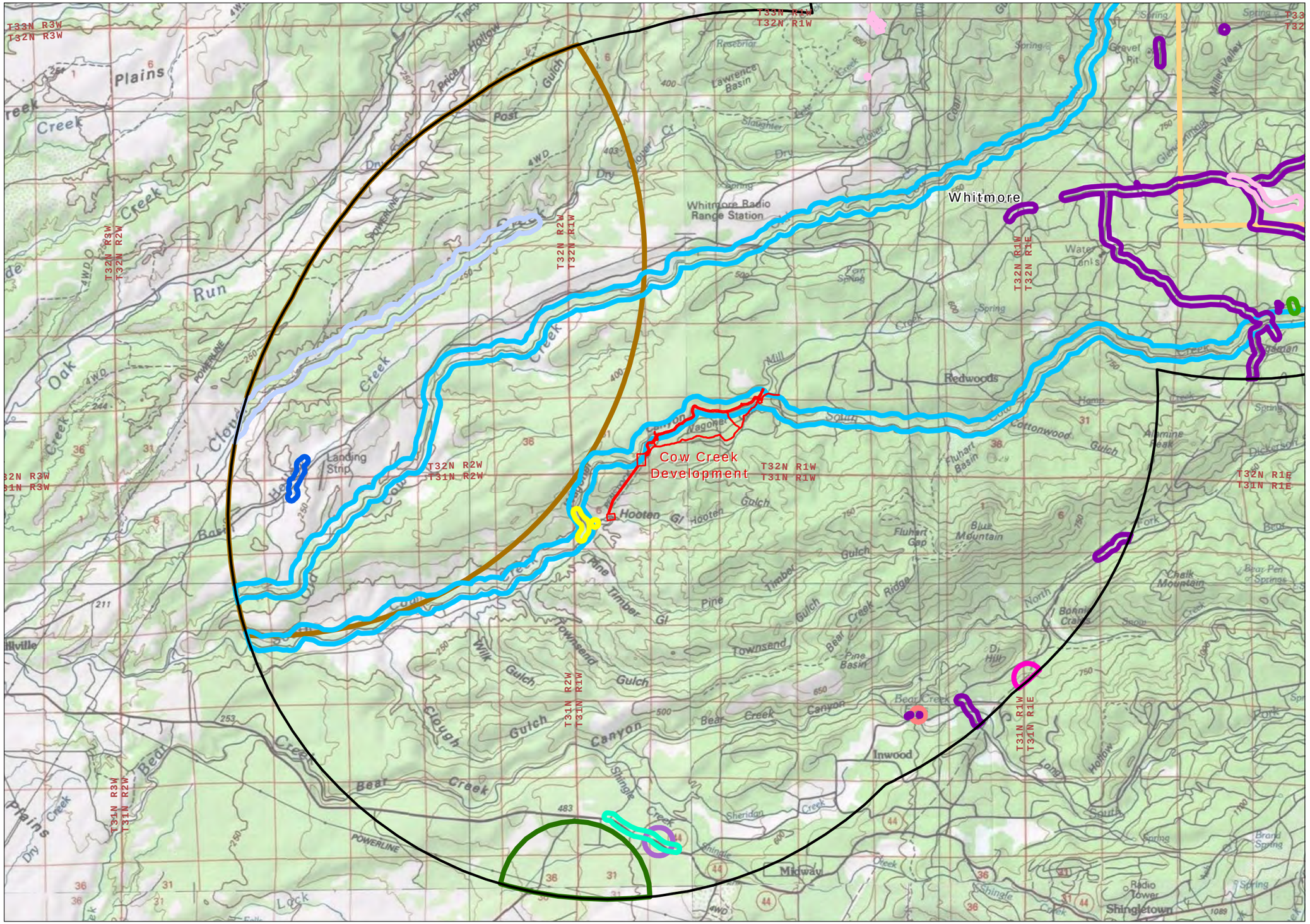
0 0.5 1 2 3 Km

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure 4.7-3
Killarc Development
CNDDB Special Status
Species Occurrences

T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\DLSA_Dec08\kc_SCow_CNDDB171111_03.mxd 12/17/08

This Page Intentionally Left Blank



Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure 4.7-4
Cow Creek Development
CNDDB Special Status
Species Occurrences

T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\DLSA_Dec08\kc_SCow_CNDDB171111_03.mxd 12/17/08

This Page Intentionally Left Blank

None of the species on the initial list was observed within the FERC Project boundary during the botanical surveys. While Bogg's Lake hedge-hyssop (*Gratiola heterosepala*) and Ahart's paronychia are annual species that might not be identifiable by July (when the first botanical surveys along the diverted reaches were conducted), neither of these species is expected to occur in the forest and riparian habitats found along these reaches.

Of the species identified during the literature review, only one species, Butte County fritillary was potentially observed during the botanical surveys. Two additional special-status species that did not come up during the (pre-survey) literature review, mountain lady's slipper (*Cypripedium montanum*) and big-scale balsam-root (*Balsamorhiza macrolepis*), were discovered during the 2003 and 2008 surveys.

A common species, scarlet fritillary (*Fritillaria recurva*), was observed in several locations both in the Kilarc Development and in the Cow Development during the May 2003 surveys. Fritillaries were observed along Kilarc Development penstock and at several locations along the Cow Development canal and the slopes above South Fork Cow Creek. Many similar plants were not identifiable to species due to inaccessibility or undeveloped flowers. By June, most of these plants were no longer visible or had lost their flowers and fruit. Fritillaries in fruit were also observed on the steep slopes above the diverted reaches when the July and August botanical surveys were conducted on these reaches. It is possible that some of the fritillaries are the CNPS CRPR 3.2 species, Butte County fritillary, which is similar to scarlet fritillary.

One species with a CNPS CRPR of 4.2, mountain lady's slipper (*Cypripedium montanum*), was found adjacent to the Kilarc canal. This population consisted of two plants growing at the base of the canal, at the top of a steep, eroding slope.

At the same time the rare plant surveys were conducted, surveys were also conducted for elderberry shrubs (*Sambucus* spp.), which are host plants for the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*). Two elderberry shrubs were found in the vicinity of the South Cow Creek canal and trail.

Kilarc Development

Special-status plant surveys within the Kilarc Development were conducted in the vicinities of the Kilarc Forebay, penstock, powerhouse, main canal diversion dam, and parts of the Kilarc Main Canal.

Mountain lady's slipper is CRPR 4.2. Species with a CRPR of 4 are limited in distribution and may become rarer. Mountain lady's slipper is a rhizomatous perennial herbaceous species that grows in broad-leafed and coniferous woodlands and forests at elevations from 600 to 7,300 feet (CNPS 2000). This species is widely distributed, but most occurrences are small. Mountain lady's slipper flowers from March to August. Two stems of this species were growing at the base of an above-ground reach of the canal, at the top of a steep, bare slope failure. The surrounding vegetation was Sierran mixed coniferous forest.

Butte County fritillary is a perennial herbaceous species found in chaparral, montane woodlands, and montane coniferous forest between 130 and 4,925 feet in elevation. This plant can grow in a variety of soils, including serpentine, clay, and sandy loam, and although it prefers dry slopes, it can also be found in wet areas. CNPS classifies this species as CRPR 3.2. Species with a ranking of 3 are species that require more data to determine rarity. A relatively common fritillary, the scarlet fritillary, was observed along the Kilarc

penstock, at several locations along the South Cow Creek main channel, and on the slopes above South Fork Cow Creek in 2003 and 2008. Because many plants were not identifiable to species due to the existing plant conditions (undeveloped or lost flowers, lost fruit) or inaccessibility, it was thought that some of the plants might be Butte County fritillary.

Cow Creek Development

Special-status plant surveys in the Cow Creek Development were conducted in the vicinities of the Project access roads, Mill Creek diversion dam, South Cow Creek diversion dam, Mill Creek-South Cow Creek canal, South Cow Creek main canal, Cow Creek penstock, and Cow Creek Powerhouse.

Big-scale balsam-root was found along a proposed temporary access road for the Cow Creek Development. The area is surrounded by blue oak–foothill pine woodland. Big-scale balsam-root is a native, endemic, perennial herbaceous species that grows in montane woodlands and valley and foothill grasslands (often on serpentine) from 115 to 3,280 feet in elevation (CNPS 2009a). This species is ranked CRPR 1B, for species that are rare, threatened, or endangered in California and elsewhere.

Special-Status Plant Communities

Eight special communities were identified during the 2017 CNDDB query. These included: one herbaceous wetland, one aquatic community, two forest communities, and four riparian communities. These are listed below.

- Alkali Seep - Meadow & seep/Wetland (Herbaceous)
- Lower Pit River/Canyon River (Hardhead/Tule Perch River) – Aquatic (Inland Waters)
- Bristlecone Pine Forest - Forest (Subalpine coniferous forest)
- Northern Interior Cypress - Forest (Closed-cone coniferous forest)
- Great Valley (GV) Cottonwood Riparian Forest – Riparian (Riparian forest)
- GV Mixed Riparian Forest – Riparian (Riparian forest)
- GV Valley Oak Riparian Forest - Riparian (Riparian forest)
- GV Willow Scrub – Riparian (Riparian scrub)

Of the eight communities generated by the literature search, only one, Northern Interior Cypress forest is mapped within 5-miles of the Project Area. However, this community was not documented during mapping within the Project Area. None of the other seven communities are likely to occur in the Project Area.

Special-Status Wildlife Species

Rare, threatened, and endangered species that are protected under the federal Endangered Species Act or California Endangered Species Act or are candidates for listing under either Act are discussed in the section entitled *Rare, Threatened and Endangered Terrestrial Species*. Candidate species for listing, and species that have been removed from federal or state listing (i.e., delisted) but are still protected by state or other legislation are also discussed in that

section. Consideration of these species is consistent with the Department of the Interior's comment that they remain concerned about federally delisted species.

Information on the special-status wildlife with potential to occur in the Project Area was obtained through a search of the CNDDB (CDFW 2017), the USFWS IPaC online resource (USFWS 2017), Cow Creek Watershed Assessment (SHN 2001), Kilarc-Cow Hydroelectric Project FERC No. 606 First Stage Consultation Package (PG&E June 2002a) and other biological studies completed in the Project vicinity. Relevant technical information from these documents is incorporated into this document and referenced as appropriate. All species generated from the literature review were compiled in a table and evaluated for their potential to occur in the Project area.

Appendix E, Table E-2, provides a tabulation of 43 special-status wildlife species with potential to occur in the Project vicinity; species are listed in taxonomic order, and then alphabetically by scientific name. Of these 43 species, 22 are unlikely to occur, 15 have a moderate to high potential to occur in the Project Area, and six species are known to occur.

Surveys were conducted in representative habitat for special-status wildlife species. Special status terrestrial species observed during 2003 and 2008 surveys are shown in Figures 4.7-5 through 4.7-9. Areas potentially supporting special-status species including California red-legged frog (*Rana draytonii*), foothill yellow-legged frog (*Rana boylii*), western pond turtle (*Emys marmorata*), bald eagle (*Haliaeetus leucocephalus*), California spotted owl (*Strix occidentalis caurina*), American peregrine falcon (*Falco peregrinus*), willow flycatcher (*Empidonax traillii*), California thrasher (*Toxostoma redivivum*), ringtail (*Bassariscus astutus*), and several species of bats were specifically targeted.

Amphibians and Reptiles

A list of seven special-status amphibian species and two special-status reptile species that potentially occur in the Project Area was developed from literature searches. California red-legged frog, foothill yellow-legged frog, and western pond turtle all either had suitable habitat or were documented within the Project Area. Foothill yellow-legged frog (*Rana boylii*) and California red-legged frog (*Rana draytonii*) are discussed in the section entitled *Rare, Threatened and Endangered Terrestrial Species*.

Six species were determined "unlikely to occur" within the Project Area because there is no habitat or because the Project Area falls outside of the range of the species. This includes southern long-toed salamander (*Ambystoma macrodactylum sigillatum*), Pacific tailed frog (*Ascaphus truei*), Shasta salamander (*Hydromantes shastae*), western spadefoot toad (*Spea hammondii*), Cascades frog (*Rana cascadae*), and California horned lizard (*Phrynosoma coronata*). There were no recorded observations of these species within a 5-mile radius of the Kilarc and Cow Creek Developments. These species are therefore not discussed further in this document.

Western pond turtle (*Emys marmorata*) is discussed below.

Western Pond Turtle (Emys marmorata) –Species of Special Concern (CSC)

The western pond turtle is uncommon to common in suitable aquatic habitat throughout California west of the Sierra-Cascade crest from sea level to 6,000 feet. The western pond turtle requires basking sites such as partially submerged logs, rocks, mats of floating vegetation, or open mud banks. Three (3) to 11 eggs are laid from March to August depending on local conditions. The incubation period for eggs ranges from 73 to 80 days. Sexual maturity is attained in about 8 years (Mayer and Laudenslayer 1988).

A western pond turtle was observed in Hooten Gulch during the focused amphibian surveys. Appropriate habitat is also present in the Kilarc and Cow Creek forebays, upstream from the diversion on South Cow Creek, and in Old Cow Creek. There is one CNDDB occurrence of western pond turtle approximately 2 miles from the Project Area (CDFW 2017).

Birds

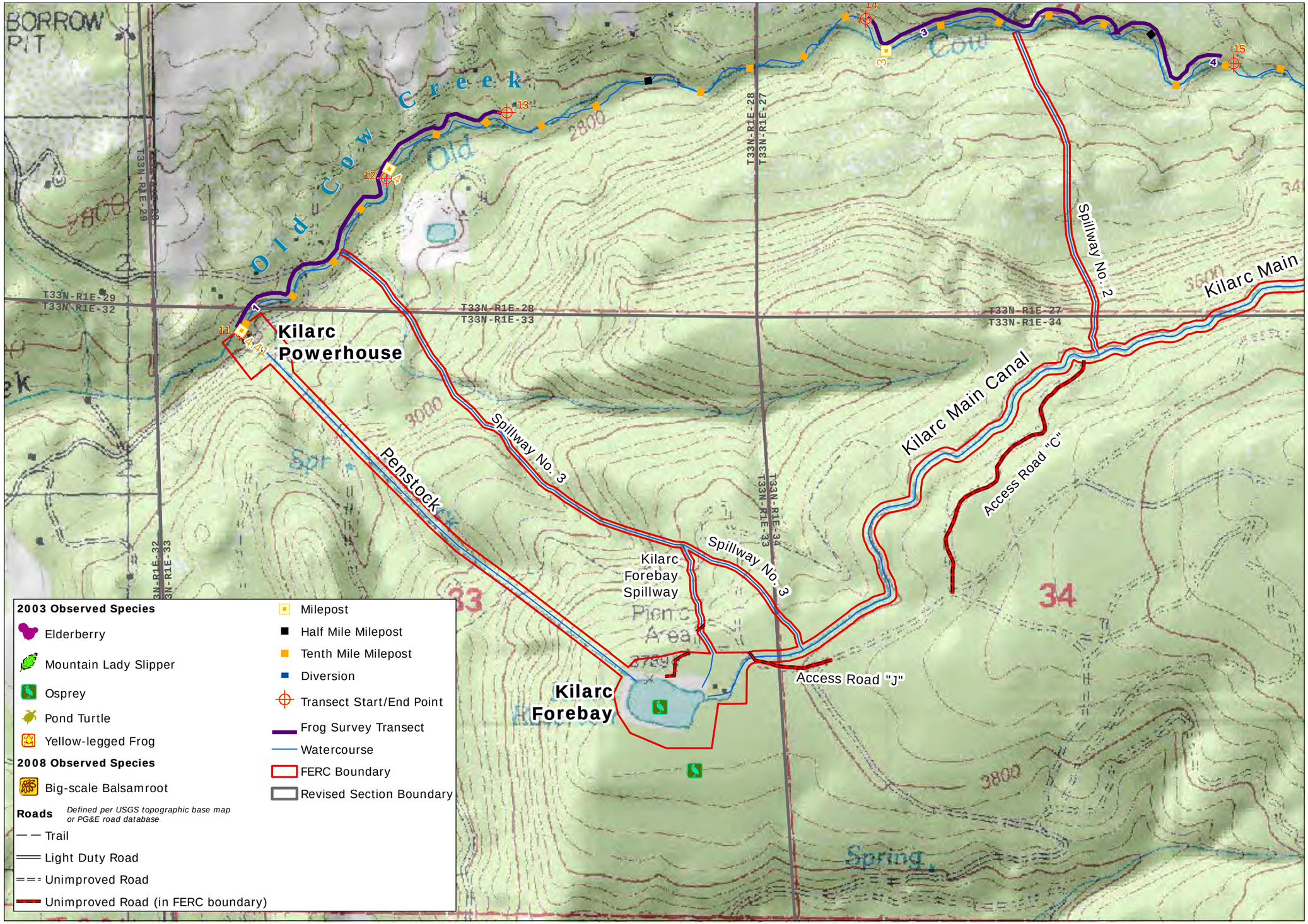
A list of 19 species of birds that occur or have the potential to occur within the Kilarc and Cow Creek Developments was developed based on a literature review, field surveys, and presence of available habitat. Based on reconnaissance-level surveys and habitats present within the Project Area, only six of these species are known to or could potentially occur within the Project Area. These include white-tailed kite (*Elanus leucurus)*, northern goshawk (*Accipiter gentilis*), golden eagle (*Aquila chrysaetos*), western burrowing owl (*Athene cunicularia*), Vaux's swift (*Chaetura vauxi)*, and loggerhead shrike (*Lanius ludovicianus)*.

Bald eagle, Swainson's hawk (*Buteo swainsoni*), American peregrine falcon, northern spotted owl (*Strix occidentalis caurina*), and willow flycatcher are discussed in the Rare, Threatened, and Endangered Terrestrial Species section.

White-Tailed Kite (Elanus leucurus) – California Fully Protected (CFP)

White-tailed kite is a common to uncommon, yearlong resident in coastal and valley lowlands and is rarely found away from agricultural areas. This species inhabits herbaceous and open stages of most habitats in cismontane California, and uses herbaceous lowlands with variable tree growth and dense populations of voles. Substantial groves of dense, broad-leaved deciduous trees are used for nesting and roosting. The white-tailed kite forages in undisturbed, open grasslands, meadows, farmlands, and emergent wetlands. The white-tailed kite eats small rodents, especially the California vole, as well as birds, snakes, lizards, frogs and large insects. Nests are built of twigs and sticks with an inner layer of grass or leaves in trees that are usually located on habitat edges. Nest building occurs from January through August (Dunk 1995). Egg laying begins in February and probably peaks in March and April. Peak fledging probably occurs in May and June, with most fledging complete by October (Erichsen 1995). Four eggs are typically laid in a clutch (Zeiner et al. 1990).

This species may use the riparian trees in the Project Area as nest sites, and may forage on the uplands within the Project Area. No white-tailed kites were observed during Project surveys, and there are no known occurrences within a 5-mile radius of the Project Area (CDFW 2017).



2003 Observed Species

- Elderberry
- Mountain Lady Slipper
- Osprey
- Pond Turtle
- Yellow-legged Frog

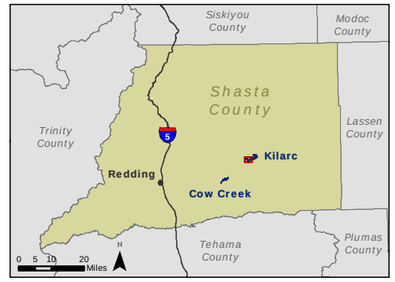
2008 Observed Species

- Big-scale Balsamroot

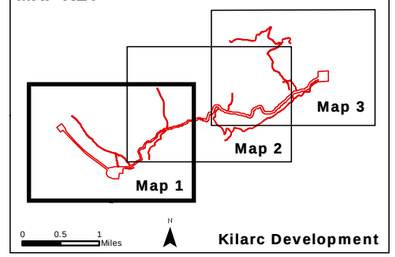
Roads *Defined per USGS topographic base map or PG&E road database*

- Trail
- Light Duty Road
- Unimproved Road
- Unimproved Road (in FERC boundary)

- Milepost
- Half Mile Milepost
- Tenth Mile Milepost
- Diversion
- Transect Start/End Point
- Frog Survey Transect
- Watercourse
- FERC Boundary
- Revised Section Boundary



MAP KEY



Source: PG&E 2009
Imagery: USGS Digital Raster Graphic, 7.5-minute Quadrangle: Miller Mountain, CA. 1995.

N

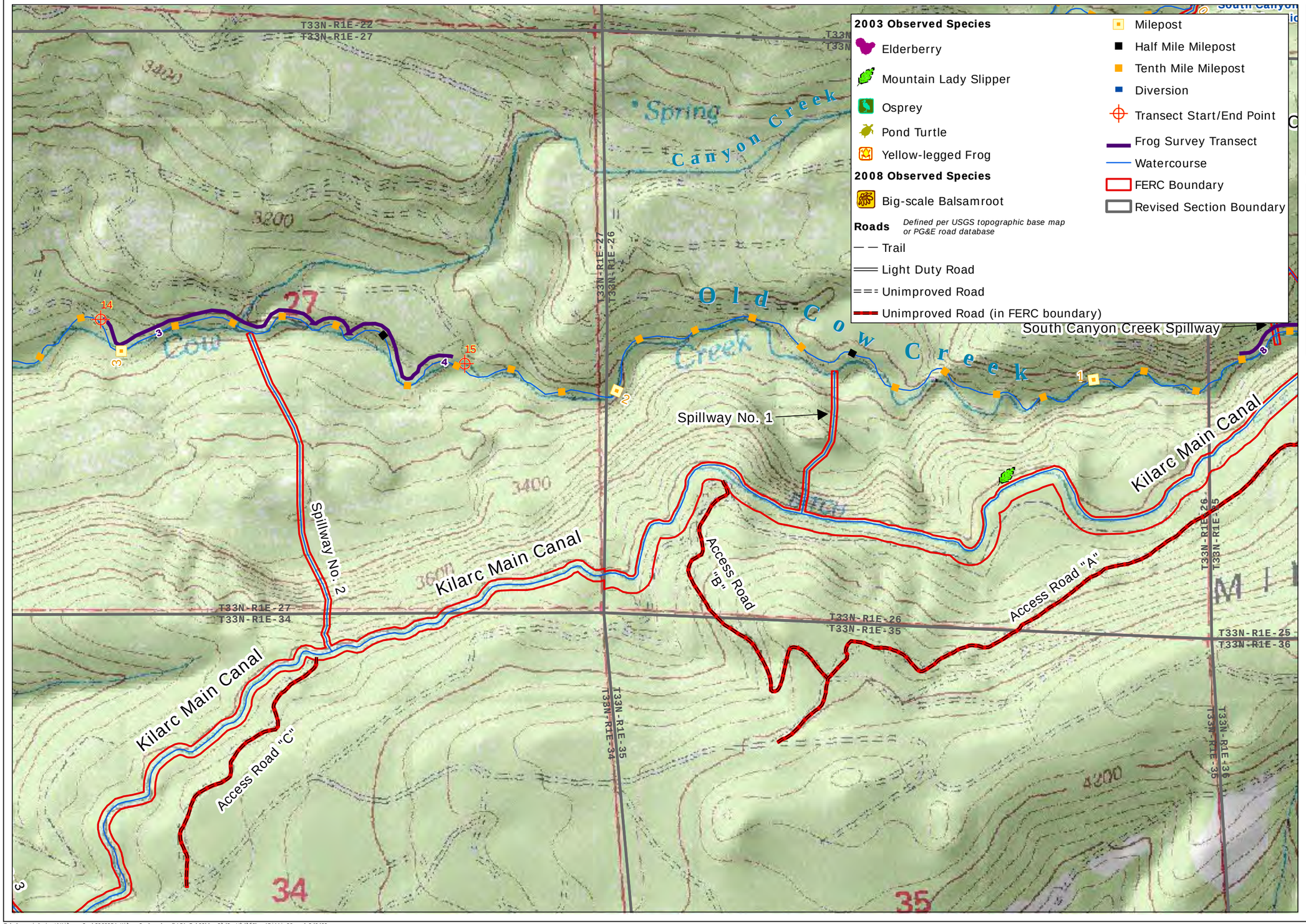
0 250 500 1,000 1,500 Feet
0 50 100 200 300 400 Meters

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure 4.7-5
Map 1
Kilarc Development
Special Status Terrestrial Species Observed during 2003 and 2008 Surveys

T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\LSA_Feb09\kc_OldCowWldlfObs_17i11i_06.mxd 2/6/09

This Page Intentionally Left Blank



2003 Observed Species

- Elderberry
- Mountain Lady Slipper
- Osprey
- Pond Turtle
- Yellow-legged Frog

2008 Observed Species

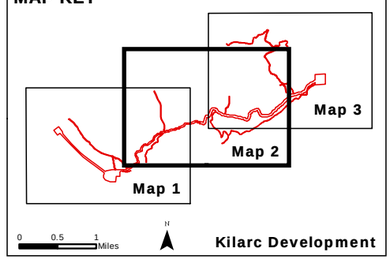
- Big-scale Balsamroot

Roads *Defined per USGS topographic base map or PG&E road database*

- Trail
- Light Duty Road
- Unimproved Road
- Unimproved Road (in FERC boundary)

- Milepost
- Half Mile Milepost
- Tenth Mile Milepost
- Diversion
- Transect Start/End Point
- Frog Survey Transect
- Watercourse
- FERC Boundary
- Revised Section Boundary

MAP KEY



Source: PG&E 2009
Imagery: USGS Digital Raster Graphic, 7.5-minute Quadrangle: Miller Mountain, CA. 1995.

N

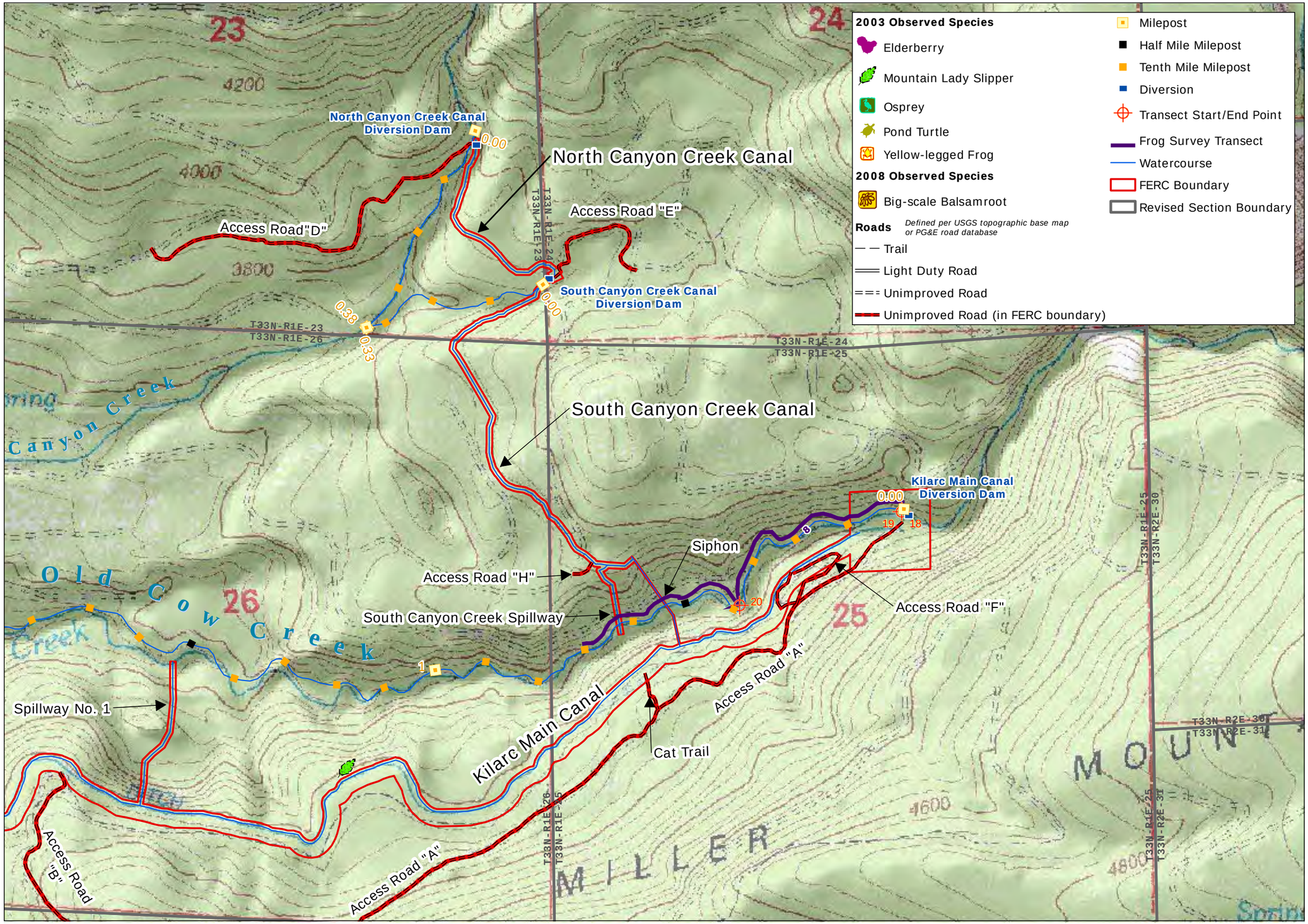
0 250 500 1,000 1,500 Feet
0 50 100 200 300 400 Meters

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure 4.7-6
Map 2
Kilarc Development
Special Status Terrestrial Species Observed during 2003 and 2008 Surveys

T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\LSA_Feb09\kc_OldCowWldlfObs_17i11i_06.mxd 2/6/09

This Page Intentionally Left Blank



2003 Observed Species

- Elderberry
- Mountain Lady Slipper
- Osprey
- Pond Turtle
- Yellow-legged Frog

2008 Observed Species

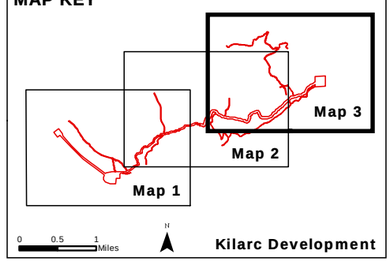
- Big-scale Balsamroot

Roads *Defined per USGS topographic base map or PG&E road database*

- Trail
- Light Duty Road
- Unimproved Road
- Unimproved Road (in FERC boundary)

- Milepost
- Half Mile Milepost
- Tenth Mile Milepost
- Diversion
- Transect Start/End Point
- Frog Survey Transect
- Watercourse
- FERC Boundary
- Revised Section Boundary

MAP KEY



Kilarc Development

Source: PG&E 2009
Imagery: USGS Digital Raster Graphic, 7.5-minute Quadrangle: Miller Mountain, CA. 1995.

N

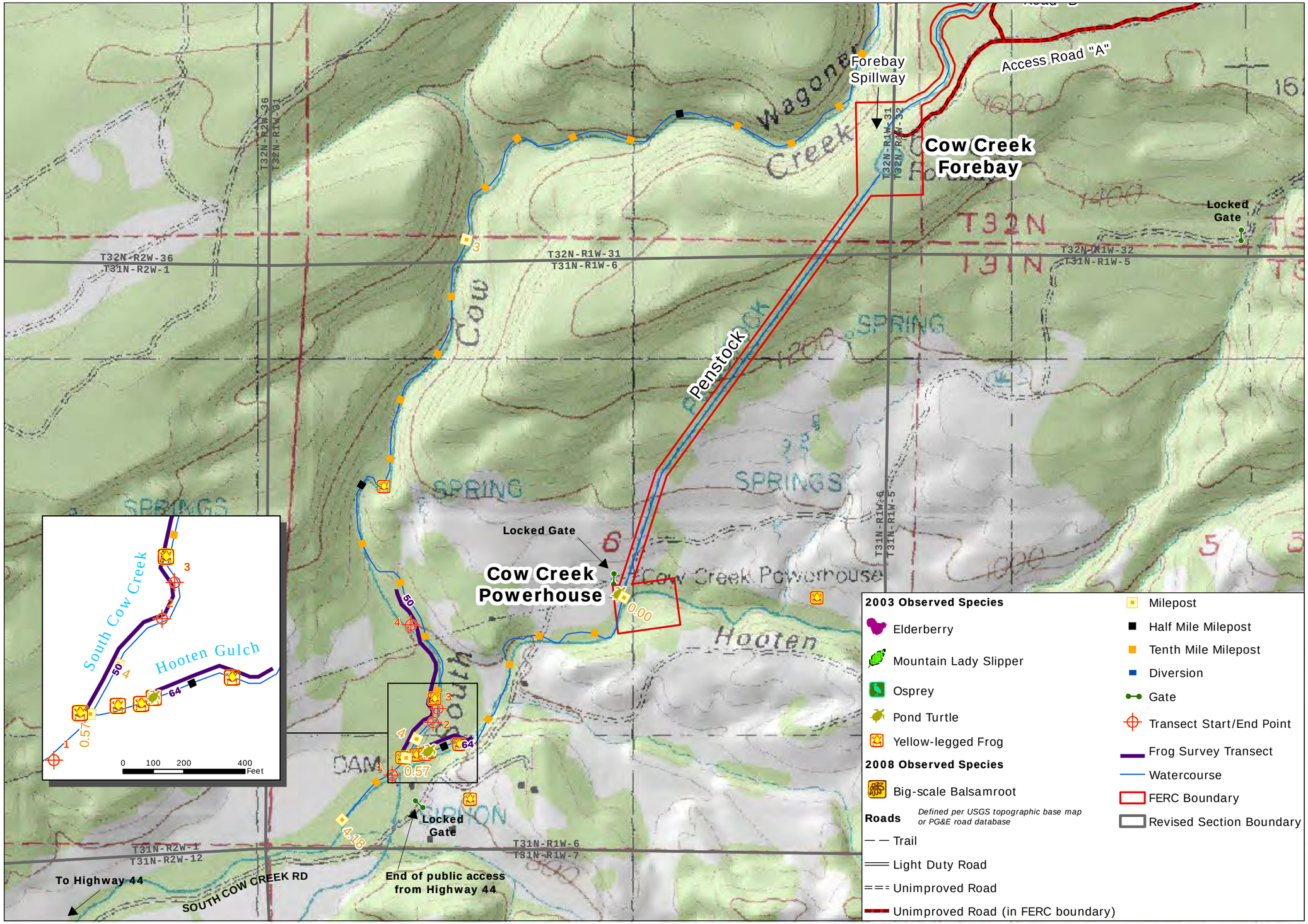
0 250 500 1,000 1,500 Feet
0 50 100 200 300 400 Meters

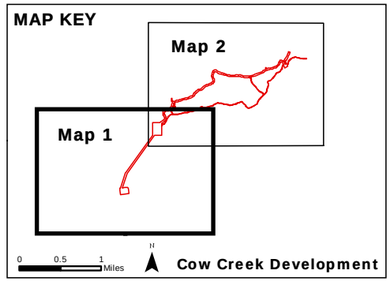
Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure 4.7-7
Map 3
Kilarc Development
Special Status Terrestrial Species Observed during 2003 and 2008 Surveys

T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\LSA_Feb09\kc_OldCowWldlfObs_17i11i_06.mxd 2/6/09

This Page Intentionally Left Blank





2003 Observed Species

- Elderberry
- Mountain Lady Slipper
- Osprey
- Pond Turtle
- Yellow-legged Frog

2008 Observed Species

- Big-scale Balsamroot

Roads *Defined per USGS topographic base map or PG&E road database*

- Trail
- Light Duty Road
- Unimproved Road
- Unimproved Road (in FERC boundary)
- Milepost
- Half Mile Milepost
- Tenth Mile Milepost
- Diversion
- Gate
- Transect Start/End Point
- Frog Survey Transect
- Watercourse
- FERC Boundary
- Revised Section Boundary

Source: PG&E 2009
Imagery: USGS Digital Raster Graphic, 7.5-minute Quadrangles: Clough Gulch, CA. 1985. Inwood, CA. 1985.

N

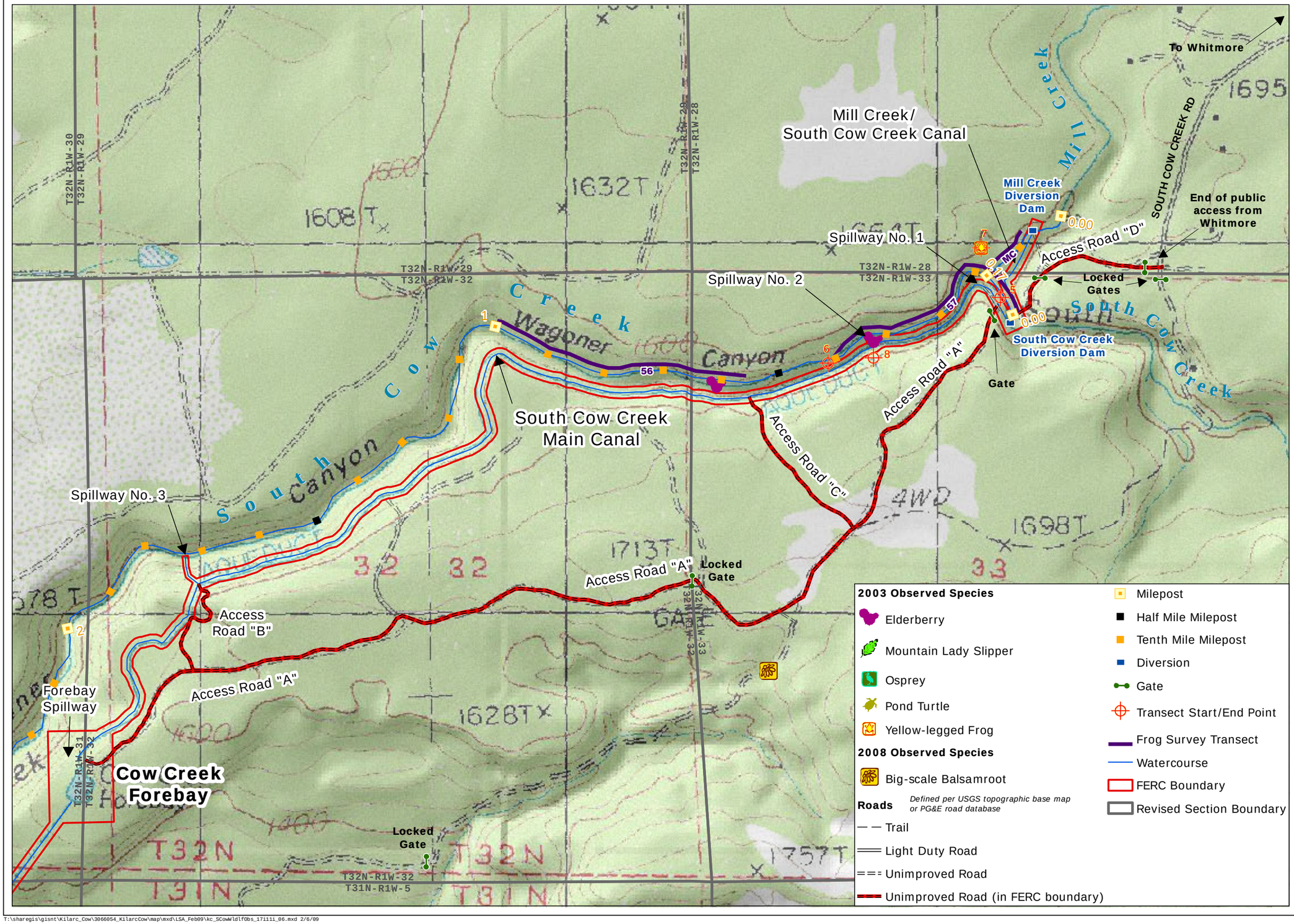
0 250 500 1,000 1,500 Feet
0 50 100 200 300 400 Meters

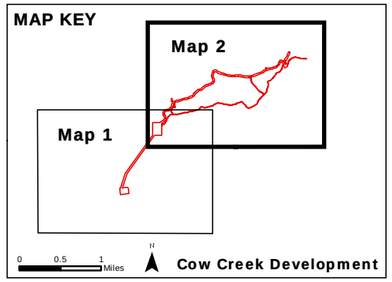
Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure 4.7-8
Map 1
Cow Creek Development
Special Status Terrestrial Species Observed during 2003 and 2008 Surveys

T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\LSA_Feb09\kc_SCowWldlfObs_17i11i_06.mxd 2/6/09

This Page Intentionally Left Blank





2003 Observed Species

- Elderberry
- Mountain Lady Slipper
- Osprey
- Pond Turtle
- Yellow-legged Frog

2008 Observed Species

- Big-scale Balsamroot

Roads *Defined per USGS topographic base map or PG&E road database*

- Trail
- Light Duty Road
- Unimproved Road
- Unimproved Road (in FERC boundary)

- Milepost
- Half Mile Milepost
- Tenth Mile Milepost
- Diversion
- Gate
- Transect Start/End Point
- Frog Survey Transect
- Watercourse
- FERC Boundary
- Revised Section Boundary

Source: PG&E 2009
Imagery: USGS Digital Raster Graphic, 7.5-minute Quadrangles:
Clough Gulch, CA. 1985.
Inwood, CA. 1985.

N

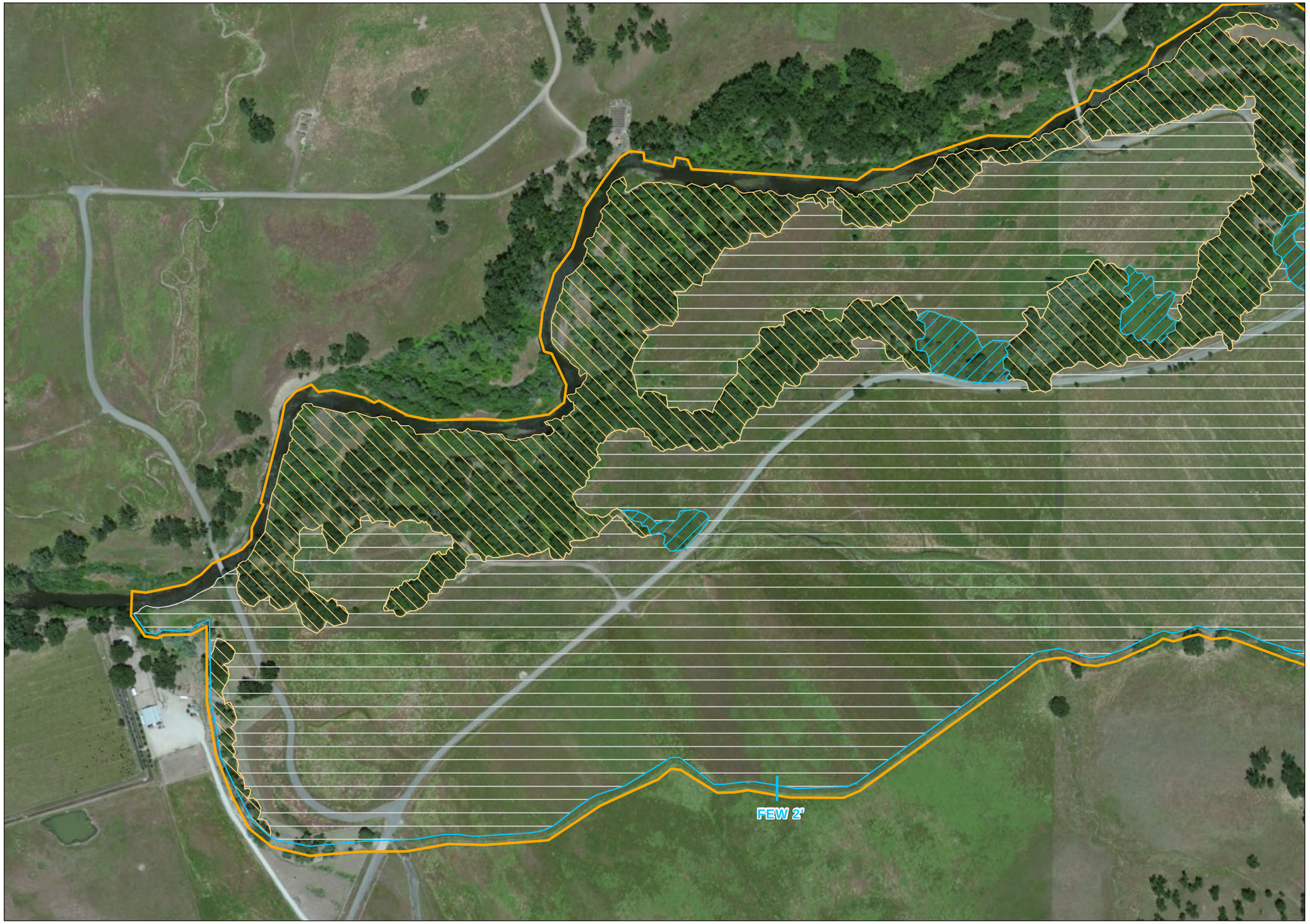
0 250 500 1,000 1,500 Feet
0 50 100 200 300 400 Meters

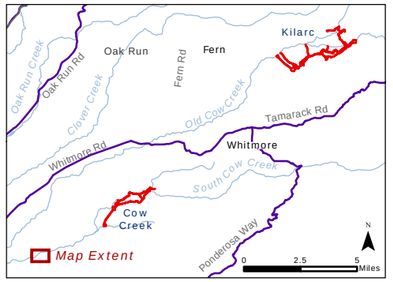
Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure 4.7-9
Map 2
Cow Creek Development
Special Status Terrestrial Species Observed during 2003 and 2008 Surveys

T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\LSA_Feb09\kc_SCowWldlfObs_17i11i_06.mxd 2/6/09

This Page Intentionally Left Blank





- Diversion Creek
- Pasture
- Project Area
- Annual Grassland (ANG)
- Valley-Foothill Riparian (VFR)
- Fresh Emergent Wetland (FEW)

Project Located Within USGS 7.5' Quad
Clough Gulch, CA
NAD 1983: UTM Zone 10N

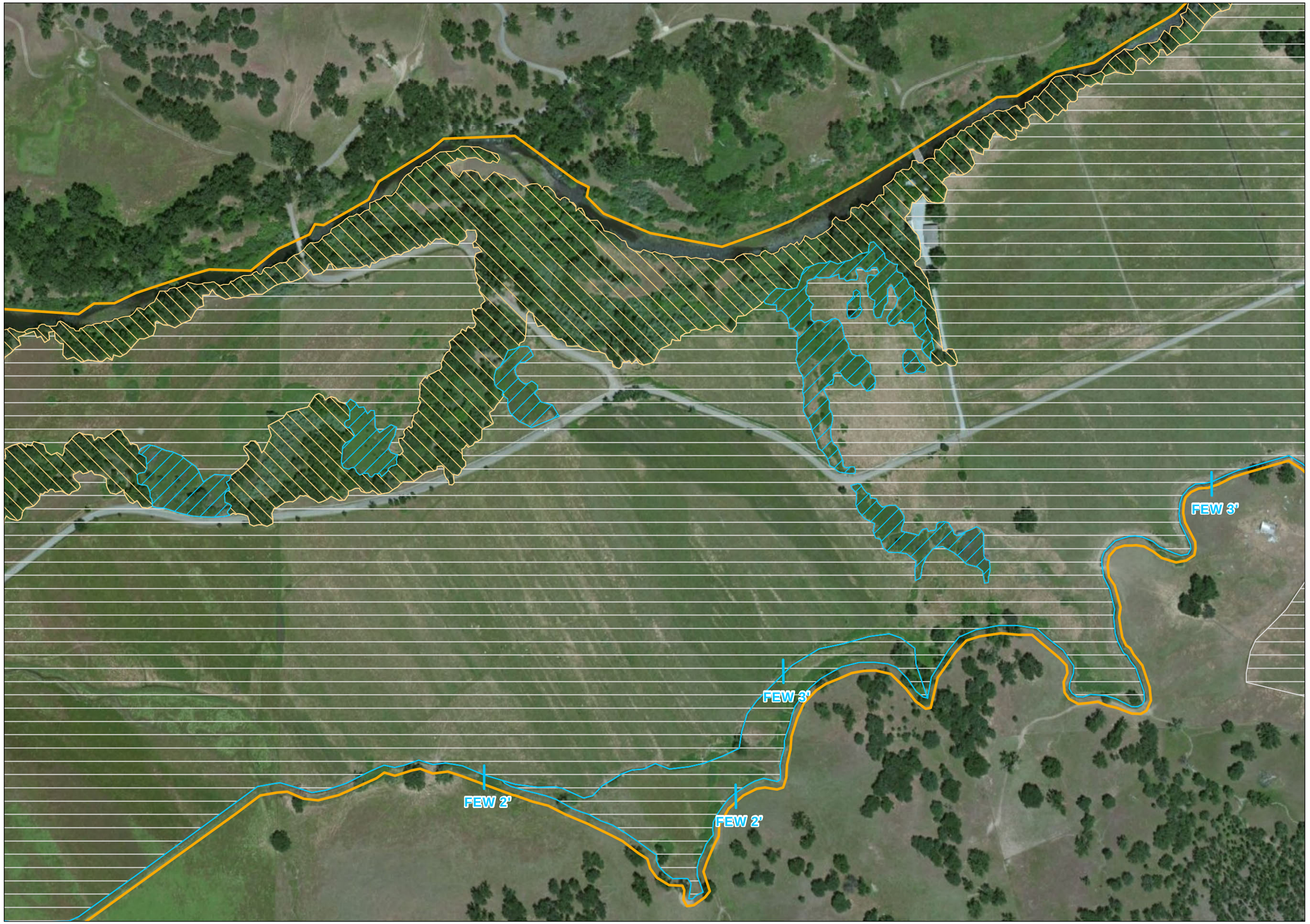
0 100 200 300 400 500 Feet
0 50 100 150 Meters

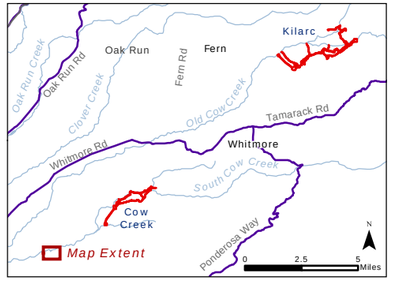
Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.7-10**
Cow Creek Development
Abbott Ditch Wildlife Habitat Map
Map 1 of 5

Date: 11/15/2013 Document Path: C:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\PG&E\Fig 3-7-10 Abbott Ditch Wildlife Habitat - map1.mxd

This Page Intentionally Left Blank





Diversion Creek
Pasture
Project Area
Annual Grassland (ANG)
Valley-Foothill Riparian (VFR)
Fresh Emergent Wetland (FEW)

Project Located Within USGS 7.5' Quad
Clough Gulch, CA
NAD 1983: UTM Zone 10N

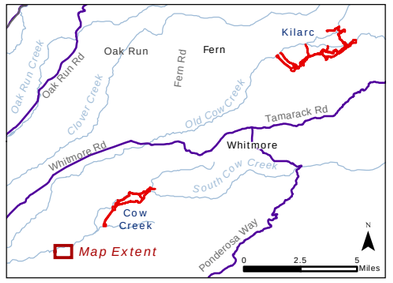
N
0 100 200 300 400 500 Feet
0 50 100 150 Meters

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.7-11**
Cow Creek Development
Abbott Ditch Wildlife Habitat Map
Map 2 of 5

Date: 11/15/2013 Document Path: C:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\PG&E\Fig 3-7-11 Abbott Ditch Wildlife Habitat - map2.mxd

This Page Intentionally Left Blank



Diversion Creek

Pasture

Project Area

Annual Grassland (ANG)

Valley-Foothill Riparian (VFR)

Fresh Emergent Wetland (FEW)

Project Located Within USGS 7.5' Quad
Clough Gulch, CA
NAD 1983: UTM Zone 10N

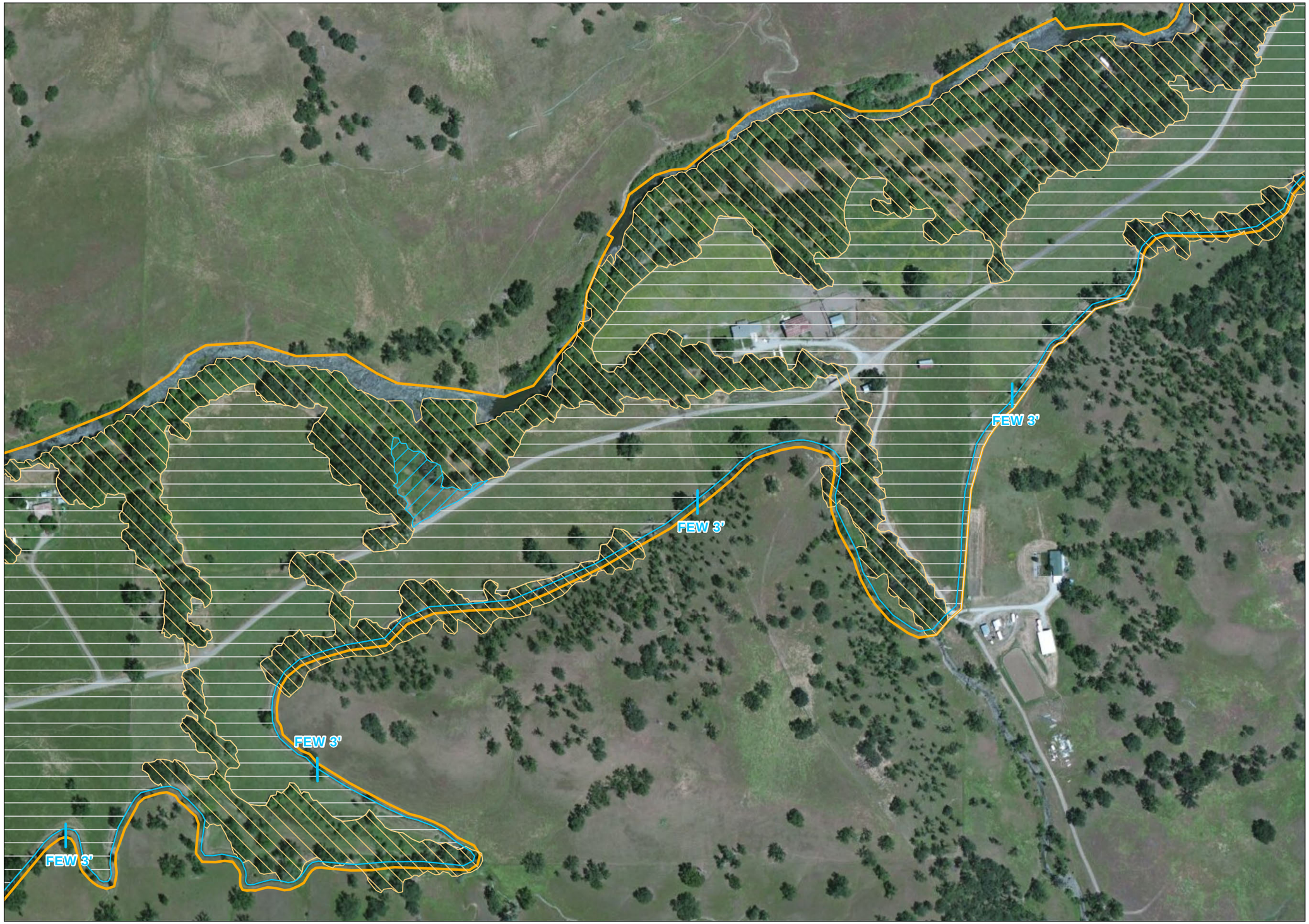
0 100 200 300 400 500 Feet
0 50 100 150 Meters

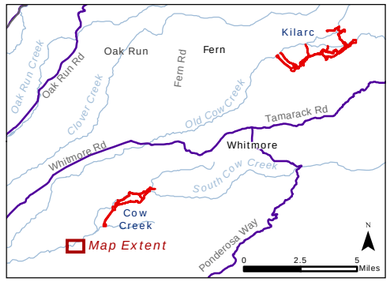
Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.7-12**
Cow Creek Development
Abbott Ditch Wildlife Habitat Map
Map 3 of 5

Date: 11/15/2013 Document Path: C:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\PG&E\Fig 3-7-12 Abbott Ditch Wildlife Habitat - map3.mxd

This Page Intentionally Left Blank





Diversion Creek
Pasture
Project Area
Annual Grassland (ANG)
Valley-Foothill Riparian (VFR)
Fresh Emergent Wetland (FEW)

Project Located Within USGS 7.5' Quad
Clough Gulch, CA
NAD 1983: UTM Zone 10N

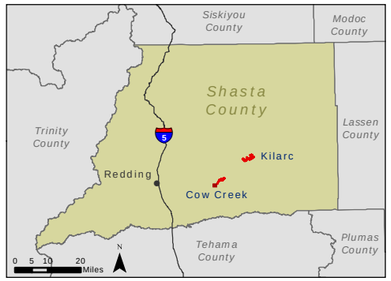
N
0 100 200 300 400 500 Feet
0 50 100 150 Meters

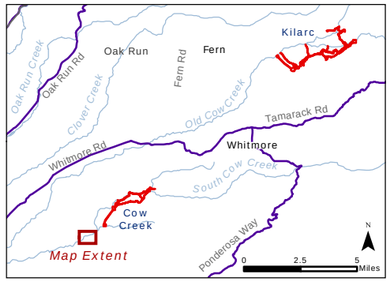
Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.7-13**
Cow Creek Development
Abbott Ditch Wildlife Habitat Map
Map 4 of 5

Date: 11/15/2013 Document Path: C:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\PG&E\Fig 3-7-13 Abbott Ditch Wildlife Habitat - map4.mxd

This Page Intentionally Left Blank





Diversion Creek
Pasture
Project Area
Annual Grassland (ANG)
Valley-Foothill Riparian (VFR)
Fresh Emergent Wetland (FEW)

Project Located Within USGS 7.5' Quad
Clough Gulch, CA
NAD 1983: UTM Zone 10N

0 100 200 300 400 500 Feet
0 50 100 150 Meters

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.7-14**
Cow Creek Development
Abbott Ditch Wildlife Habitat Map
Map 5 of 5

Date: 11/15/2013 Document Path: C:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\PG&E\Fig 3-7-14 Abbott Ditch Wildlife Habitat - map5.mxd

This Page Intentionally Left Blank

Northern Goshawk (Accipiter gentilis) – CSC

Northern goshawk inhabits middle to high-elevation, mature, dense coniferous forests. During winter, it occurs in the foothills, in northern deserts in pinyon-juniper woodland, and in low-elevation riparian habitats. This species breeds in the northern Coast Ranges through the Sierra Nevada, Klamath, Cascade, and Warner mountains and possibly in the Mount Pinos, San Jacinto, San Bernardino, and White mountains. It remains yearlong in breeding areas as a scarce to uncommon resident. Optimal habitat contains trees for nesting, a closed canopy of greater than 50 percent for protection and thermal cover, and open spaces allowing maneuverability. It prefers middle and higher elevations and mature, dense conifer forests and feeds mostly on birds, using snags and dead treetops as observation platforms. Northern goshawks usually nest on north slopes near water in the densest parts of stands, but close to openings. Breeding occurs from April to June. Average clutch size is three eggs. Incubation lasts 36 to 41 days. Young usually fledge by 45 days (Zeiner et al. 1990).

This species may forage in riparian, blue oak–foothill pine woodland, or mixed conifer habitat in the Project Area and may also breed in forest habitats in the Project Area. No northern goshawks were observed during Project surveys. There is one CNDDB record for this species approximately 5 miles east of the Project Area (CDFW 2017).

Golden Eagle (Aquila chrysaetos) – CFP

Golden eagles are protected under the same federal legislation as bald eagles and are also fully protected in California. This species is an uncommon permanent resident and migrant throughout California up to 11,500 feet, except the center of the Central Valley. Golden eagles use a wide variety of habitats for foraging, including rolling foothills, mountain areas, sage-juniper flats, and desert. They nest from late January through August on cliffs and in large trees in open canyons and escarpments. Golden eagles feed primarily on rabbits and rodents, though other mammals, carrion, and birds and reptiles are eaten. Breeding occurs from late January through August with a peak from March through July. The clutch size averages two eggs, which are laid from early February to mid-May. Incubation lasts 43 to 45 days, and the nestling period usually lasts 65 to 70 days (Zeiner et al. 1990).

No golden eagles or golden eagle nests were observed in the Project Area during focused raptor surveys. Golden eagles were observed during other surveys for the Project on two occasions: 1) on June 17, 2003, an adult was observed in flight over the Kilarc Forebay, and 2) on June 18, 2003, two adults were observed at the same location. This species may breed or forage in oak woodland or mixed conifer forest, it also may forage in grasslands in the Project Area. There are no other known occurrences within a 5-mile radius of the Project Area (CDFW 2017).

Western Burrowing Owl (Athene cunicularia) – CSC

This species is a yearlong resident of open, dry grassland and desert habitats and in grass, forb, and open shrub stages of pinyon-juniper and ponderosa pine habitats up to 5,300 feet. It was formerly common in appropriate habitats throughout the state, excluding the humid northwest coastal forests and high mountains. It usually nests in old burrows of ground squirrels or other small mammals, but may dig its own burrow in soft soil. The nest chamber is lined with excrement, pellets, debris, grass, and feathers. Pipes, culverts, and nest boxes are used where burrows are scarce. Breeding occurs from March through August, with peak

activity in April and May. Clutch size averages 5 to 6 eggs. Young emerge from the burrow at about two weeks and fledge by about 4 weeks. Burrowing owls are semi-colonial (Zeiner et al. 1990).

Suitable nesting, burrowing, and foraging habitat exist within grasslands in the Project Area. No burrowing owls were observed during Project surveys, and there are no known occurrences within a 5-mile radius of the Project Area (CDFW 2017).

Vaux's Swift (Chaetura vauxi) – CSC

Vaux's swift is a summer resident of northern California. It breeds in the Coast Ranges, in the Sierra Nevada, and possibly in the Cascade Range. It prefers redwood and Douglas-fir habitats with nest-sites in large hollow trees and snags, especially tall, burned-out stubs. It is a fairly common migrant throughout most of the state in April, May, August, and September. Vaux's swift feeds high in the air over most terrain and habitats and also feeds commonly at lower levels in forest openings, above burns, and especially above rivers and lakes. It nests in redwood, Douglas-fir, and occasionally other coniferous forests. The nest is typically built on the vertical inner wall of a large, hollow tree or snag, especially tall stubs charred by fire. This species enters the nesting tree from the top or through cracks in the side, and almost always locates the nest near the bottom of a cavity, regardless of the height of the entrance. The Vaux's swift occasionally nests in chimneys and buildings. Breeding occurs from early May to mid-August. Clutch size is three to seven eggs, and incubation lasts 18 to 20 days. The altricial young are tended by both parents and leave the nesting tree at about 28 days (Zeiner et al. 1990).

This species may forage and breed in mixed conifer forest near streams and forebays in the Project Area. No Vaux's swifts were observed during Project surveys, and there are no known occurrences within a 5-mile radius of the Project Area (CDFW 2017).

Loggerhead Shrike (Lanius ludovicianus) – CSC

The loggerhead shrike is a common resident and winter visitor in lowlands and foothills throughout California. It prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. Its highest density occurs in open-canopied valley foothill hardwood, valley foothill hardwood-conifer, valley foothill riparian, pinyon-juniper, juniper, desert riparian, and Joshua tree habitats. It occurs only rarely in heavily urbanized areas, but is often found in open cropland. It usually builds its well-concealed nest on a stable branch in a dense shrub or tree. Nest height is 1 to 50 feet above ground. It lays eggs from March into May, and young become independent in July or August. The loggerhead shrike is a monogamous, solitary nester with a clutch size of 4 to 8. Incubation lasts 14 to 15 days. Altricial young are tended by both parents and leave the nest at 18 to 19 days (Zeiner et al. 1990).

This species may forage in oak woodlands or riparian habitat in the Project Area. It may also breed in oak woodlands in the Project Area. No loggerhead shrikes were observed during Project surveys, and there are no known occurrences within a 5-mile radius of the Project Area (CDFW 2017).

Mammals

A review of literature, state and federal species lists, and field surveys determined that 10 species of special-status mammals have the potential to occur in the Kilarc and Cow Creek Developments. Of these 10 species, four are bats. Grey wolf (*Canis lupus*), Sierra Nevada red fox (*Vulpes vulpes necator*), and California wolverine (*Gulo gulo*) are not considered likely to occur in the Kilarc-Cow Creek Developments as the developments are not within the documented distribution of the species. Three other species, fisher (*Pekania pennanti*), American badger (*Taxidea taxus*) and ring-tailed cat, may occur in the Project Area where appropriate habitat is available. No reported occurrences of the ring-tailed cat or American badger have been documented within a 5-mile radius, however several occurrences of the fisher have been recorded (in 2013 and 2015) within 5-miles of the Project Area. Fisher is discussed in the section entitled Rare, Threatened, and Endangered Terrestrial Species, ringtail, American badger and the three species of bats are discussed below.

Spotted Bat (Euderma maculatum) – CSC

This species, considered to be one of North America's rarest mammals, has been found at a small number of localities, mostly in foothills, mountains, and desert regions of southern California. Little is known about the species in California. Habitats occupied range from arid deserts and grasslands through mixed conifer forests. The highest recorded elevation is 10,600 feet in New Mexico. Apparently the spotted bat prefers to roost in rock crevices and on cliffs, but is occasionally found in caves and buildings as well. Mating occurs in autumn, and most births occur before mid-June. One young is produced per year and is tended until August. It feeds over water and along marshes. Moths are their principal food (Zeiner et al., 1990).

This species may occur in the Project Area on Project facilities including powerhouses and tunnels. No spotted bats were observed during Project surveys, and there are no known occurrences within a 5-mile radius of the Project Area (CDFW 2017).

Pale Townsend's Big-Eared Bat (Corynorhinus townsendii) – CSC

This species is found throughout California, but the details of its distribution are not well known. It is found in all but subalpine and alpine habitats and may be found at any season throughout its range. It is most abundant in mesic habitats and requires caves, mines, tunnels, buildings, or other human-made structures for roosting. Most mating occurs from November to February, but many females are inseminated before hibernation begins. Sperm is stored until ovulation occurs in spring. Gestation lasts 56 to 100 days, depending on temperature, size of the hibernating cluster, and time in hibernation. Births occur in May and June, peaking in late May. A single litter of one is produced annually. Young are weaned in 6 weeks and fly in 2.5 to 3 weeks after birth. The maternity group begins to break up in August (Zeiner et al. 1990).

This species may occur in the Project Area on Project facilities including powerhouses and tunnels. No pale Townsend's big-eared bats were observed during Project surveys, and there are no known occurrences within a 5-mile radius of the Project Area (CDFW 2017).

Western Red Bat (Lasiurus blossevillii) – CSC

The red bat is locally common in some areas of California, occurring from Shasta Co. to the Mexican border, west of the Sierra Nevada/Cascade crest and deserts. The winter range includes western lowlands and coastal regions south of San Francisco Bay. There is migration between summer and winter ranges, and migrants may be found outside the normal range. Roosting habitat includes forests and woodlands from sea level up through mixed conifer forests. Feeds over a wide variety of habitats including grasslands, shrublands, open woodlands and forests, and croplands (Zeiner et al. 1990).

This species may occur in the Project Area on within dry, open areas occupied by forested areas, especially mixed conifer forests near open areas for foraging. No pale western red bats were observed during Project surveys, and there are no known occurrences within a 5-mile radius of the Project Area (CDFW 2017).

American Badger (Taxidea taxus) – CSC

Uncommon, permanent resident found throughout most of the state, badgers are abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils*.* Badgers are carnivorous. They eat fossorial rodents: rats, mice, chipmunks, and especially ground squirrels and pocket gophers. Also eat some reptiles, insects, earthworms, eggs, birds, and carrion. Diet shifts seasonally and yearly in response to availability of prey. Badgers dig burrows in friable soil for cover. They frequently reuse old burrows, although some may dig a new den each night (Zeiner et al. 1990).

This species may occur in the Project Area on within forests, shrublands, and/or grasslands where openings with friable soils are available. No badgers, or evidence of their burrowing or hunting were observed during Project surveys, and there are no known occurrences within a 5-mile radius of the Project Area (CDFW 2017).

Ring-tailed Cat (Bassariscus astutus) – CFP

The ring-tailed cat is a widely distributed, common to uncommon permanent resident. It occurs in various riparian habitats, and in brush stands of most forest and shrub habitats, at low to middle elevations. Little additional information is available on distribution and relative abundance among habitats. It nests in rock recesses, hollow trees, logs, snags, abandoned burrows, or woodrat nests. Young are born in May and June, with one litter per year. A litter averages three young and ranges from one to five. Gestation lasts 40 to 50 days. Females may drive males away 3 to 4 days prior to giving birth (Zeiner et al. 1990).

The ring-tailed cat may occur in forested areas in the Project Area. No ringtails were observed during Project surveys, and there are no known occurrences within a 5-mile radius of the Project Area (CDFW 2017).

Rare, Threatened, and Endangered Terrestrial Species

State and federally listed species that occur or may potentially occur in appropriate habitats within the Kilarc and Cow Creek Developments include one invertebrate, two amphibians, five birds, and one mammal species. There are no known occurrences of state or federally listed plant species in the vicinity of the Project. Unless otherwise noted, the information in this section is derived from the Kilarc-Cow Creek Project Botanical, and Terrestrial and Aquatic Wildlife Resources Report (PG&E 2007b).

The CNDDB search indicated that gray wolf (*Canis lupus*), wolverine, and Sierra Nevada red fox could potentially occur in the Project Area, but all of these species would be highly unlikely. All three of these species are residents of high mountain wilderness areas, with the exception of gray wolf, which may disperse into other habitats when not breeding.

It is believed that gray wolves in California were extirpated in the 1920s. In December of 2011, a radio-collared gray wolf entered California from Oregon, and spent 16 months roaming the mountains of northeastern California. This wolf has since returned to Oregon, and it is not believed that there are currently any other wolves in the state of California.

Wolverine was considered extirpated from the state until 2008, when a wolverine was photographed at a bait station near Lake Tahoe. Since then, there have been other documented sightings, but the number of wolverines in the state is certainly in the low single digits.

The nearest Sierra Nevada red fox population, which is in the area of Lassen Volcanic National Park, is estimated to consist of about 25-50 breeding individuals. Furthermore, the fox population at Lassen does not occur below 4,500 feet, so the Project facilities would be too low in elevation for vagrant individuals to travel to the area. Recent DNA studies have determined that red fox populations in the Sacramento Valley are indigenous to the state, but they are only considered to occur on the valley floor and not in the foothills near the Project Area.

Given the habitat requirements for and known information about these species, none would be expected to occur in the Project Area, with the exception of the fisher.

Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus) –Federally Threatened (FT)

The valley elderberry longhorn beetle is associated with various species of elderberry throughout the Central Valley and surrounding foothills up to 3,000 feet in elevation. Shasta County is within the valley elderberry longhorn beetle's range, although no critical habitat designated for this threatened species exists in the county. The valley elderberry longhorn beetle lives in riparian vegetation communities where, in both its adult and larval stages, it feeds exclusively on elderberry shrubs. Larvae feed internally on the pith of the trunk and larger branches and it appears that they require stems that are greater than 1-inch diameter at ground level. Prior to becoming adults, the valley elderberry longhorn beetle larvae chew an exit hole in the elderberry trunk as an exit for the emerging adult. Adult valley elderberry longhorn beetles appear to feed externally on the flowers and foliage of the elderberry shrubs.

This species is associated with various species of elderberry. The valley elderberry longhorn beetle generally occurs along waterways and in floodplains that support remnant stands of riparian vegetation. Both larvae and adult valley elderberry longhorn beetle feed on elderberries. Larvae feed internally on the pith of the trunk and larger branches, while adult

beetles appear to feed externally on elderberry flowers and foliage. Prior to metamorphosing into the adult life stage, valley elderberry longhorn beetle larvae chew an exit hole in the elderberry trunk, through which the adult beetle later exits the plant.

Elderberry surveys were conducted to determine the extent of potential habitat for the valley elderberry longhorn beetle within the Project Area. Elderberry shrubs were found at two locations in the Cow Creek Project Area. One elderberry was observed on the south side of the canal, on the side opposite the canal trail. This elderberry had three stems: one less than one inch in diameter, one that was approximately one inch in diameter, and one that was approximately 1.5 inches in diameter. A second elderberry was observed near the trail on the steep, inaccessible slope between the canal and South Cow Creek. This elderberry had one stem, less than one inch in diameter. No holes were observed on either plant in the parts of the stems that were visible from the trail. Appropriate habitat is present in the two elderberry shrubs observed within the Project Area although no beetles were observed on these plants. There are no known occurrences of valley elderberry longhorn beetle within a 5-mile radius of the Project Area (CDFW 2017).

Foothill Yellow-legged Frog (Rana boylii) – Petitioned Findings Under Review/State Candidate Threatened

The foothill yellow-legged frog is found in foothill and mountain streams with a variety of associated upland and streamside vegetation types. It generally prefers swifter water than other foothill frog species. This species is usually found below 3,500 feet in elevation. Although individuals usually remain within a small area, some frogs may move several hundred meters to find suitable spawning sites. Spawning occurs when water temperatures reach 53.7°F to 59°F, which usually happens between mid-March and May. The breeding season lasts about 2 weeks, and eggs hatch in about 5 days. Tadpoles transform in 3 to 4 months, and disperse from spawning habitat to calm, shallow water. Juvenile and adult frogs bask on mid-stream boulders or in adjacent terrestrial habitat.

Foothill yellow-legged frogs inhabit foothill and mountain streams from sea level to about 6,000 feet elevation in the Coast Ranges from the Oregon border south to the Transverse Mountains in Los Angeles County, in most of northern California west of the Cascade crest, and along the western flank of the Sierra Nevada south to Kern County. Most records are below 3,500 feet. The foothill yellow-legged frog is found in a variety of habitats, including valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, and wet meadow types (Mayer and Laudenslayer 1988).

Home ranges are small, but these frogs may move several hundred meters to spawning habitat. Adult frogs congregate at suitable spawning sites as spring runoff declines, when water temperatures reach 12 to 15ºC, usually any time from mid-March to May, depending on local water conditions. The breeding season at any locality is usually about 2 weeks for most populations. Spawning frogs favor low to moderately steep gradient streams (0 to 8 degrees). Females deposit eggs in shallow edgewater areas with water velocities less than 10 centimeters per second (PG&E 2002). Egg masses are often attached to the downstream sides of cobbles and boulders, or to gravel, wood, or other materials. Eggs hatch in approximately five days. Tadpoles transform in 3 to 4 months and stay for a time in spawning habitat but eventually disperse. They feed on diatoms or algae on the surface of

the substrate (Stebbins 1951). Tadpoles favor calm, shallow water. Juvenile and adult frogs bask on midstream boulders or in terrestrial sites along riffles, cascades, main channel pools, and plunge-pools, often in dappled sunlight near low overhanging vegetation. They are relatively strong swimmers and prefer faster water habitat than do other foothill frog species such as the bullfrog (*Rana catesbeiana*) or the California red-legged frog. Adults generally avoid deep shade.

Survey site selection was based on information obtained from all available resources including literature on habitat requirements and life history of foothill yellow-legged frogs, a CNDDB search, topographic maps, aerial photographs, historical records from major northern California museums, preliminary information obtained during habitat mapping surveys and vegetation surveys, and an aerial (helicopter) survey.

Two sets of visual encounter surveys were conducted from July 7 through July 12, 2003 and from September 2 through September 6, 2003, as specified in protocols developed by PG&E. A tadpole survey was conducted in July 2003, after late spring flows had subsided. A second survey for juveniles, subadults, and adults was conducted in the first week of September 2003. Detailed notes, GPS coordinates, and habitat information were recorded during all frog surveys.

Within the Project Area, foothill yellow-legged frogs are found in the Cow Creek Development. Locations where individuals were observed include South Cow Creek at the downstream end of the bypassed reach, in the downstream portion of Hooten Gulch where the Cow Creek Powerhouse tailrace augments summer flow, and upstream of the Cow Creek Powerhouse. Occurrences have also been documented by the CDFW from South Cow Creek, downstream of the confluence with Hooten Gulch.

Foothill yellow-legged frog adults and juveniles were found in South Cow Creek at the downstream end of the bypass reach. They were also found in the downstream portion of Hooten Gulch where the powerhouse tailrace augments summer flow. They were also observed in Hooten Gulch, upstream of the powerhouse, during general wildlife surveys. Bullfrog tadpoles were observed in the downstream portion of the South Cow bypass reach. The upper portion upstream of the bypass reaches where foothill yellow-legged frogs were found was a steeper, boulder/cobble-dominated creek, with mostly fast water and little edgewater. Suitable breeding habitat was not observed in this area.

Preliminary habitat mapping data and ground surveys suggest that Old Cow Creek contains little suitable spawning habitat. Frog colonization could be limited further by insufficient forage or basking sites. It is possible that Old Cow Creek has only small, isolated spots with sufficient sunlight and forage for foothill yellow-legged frogs. No foothill yellow-legged frogs were found in the Old Cow Creek bypass within the 5,157 meters surveyed in the lower, middle, and upper reaches.

Mill Creek is a small, heavily vegetated stream that offers little or no foothill yellow-legged frog basking, spawning, or tadpole habitat. Most of North Canyon Creek was dry, and the downstream portion that enters Old Cow Creek was also smaller and heavily shaded. The diversion canals had swiftly flowing water and no habitat complexity and are not likely to provide primary habitat.

California Red-Legged Frog (Rana draytonii) – FT/CSC

A Site Assessment for California red-legged frog was conducted according to USFWS protocols (1997, revised 2005). Information on the California red-legged frog was obtained from available resources, including literature concerning habitat requirements and life history, a CNDDB search, a search of the catalogs of the two major western museum collections (Museum of Vertebrate Zoology, University of California, Berkeley, and California Academy of Sciences, San Francisco), topographic maps, aerial photographs, and preliminary information obtained during habitat mapping surveys and vegetation surveys conducted as part of other Project relicensing studies. Habitat information was also collected during helicopter surveys and ground surveys of representative sites in Project-affected reaches.

Potential California red-legged frog spawning habitat within the site assessment area was identified from a helicopter survey and from topographic maps, aerial photographs, and information obtained during habitat mapping surveys and vegetation surveys conducted as part of other Project relicensing studies. Project Area or Project-affected reaches (bypass reaches) in Old Cow Creek, South Cow Creek, diverted tributaries, Hooten Gulch, and diversion canals were divided into half-mile reaches on a topographic map and each half-mile reach was numbered. Half-mile reaches were used because they were short enough to document photographically yet long enough to detect habitat changes that might occur along the streams. Springs and ponds in the site assessment area not affected by the Project that could potentially support California red-legged frogs were also identified and numbered.

A helicopter reconnaissance survey was conducted on July 8, 2003 to document potential red-legged frog habitat within the site assessment area, the helicopter survey was conducted during early summer so that seasonal waterways capable of functioning as red-legged frog spawning habitat still contained sufficient water. Photographs of potential habitat were taken and waypoints of these sites were recorded during the flight. Time and accessibility constraints made complete ground site assessments of the entire site assessment area or the Project Area impossible, so three representative reaches of Old Cow Creek and two reaches of South Cow Creek were selected for ground site assessments based on their seeming similarity to the remaining portions of the creeks from the helicopter surveys. Ground site assessments for potential California red-legged frog spawning or summer habitat identified during the helicopter surveys were conducted concurrently with daytime ground surveys for foothill yellow-legged frogs and habitat in Project-affected reaches. Biologists conducted the ground surveys between July 7 and 12 and September 5 and 6.

During the ground surveys, factors that may affect California red-legged frogs were recorded, these factors included general habitat characteristics, the presence of pools and backwater areas, vegetation, cover, the presence of other aquatic species such as fish, aquatic garter snakes and bullfrogs, the availability of insects that may provide forage for frogs, the presence of algae that may contribute to primary productivity, and water temperatures. The start and end points of the surveys were documented with photographs and, where signal strength was sufficient, with GPS coordinates. Additional photographs were taken of representative habitats. Photographs were also taken of sites that contained habitat characteristics favorable for California red-legged frogs.

California red-legged frogs spend most of their time in or near water. However, they can move considerable distances (up to a mile) within a drainage and through terrestrial habitats. Most documented California red-legged frog sightings have occurred at elevations below 3,500 feet, although historical sightings were noted up to 5,200 feet (USFWS 2002).

California red-legged frogs breed during the winter and early spring between late November and April. Eggs are laid in a loose, baseball-sized mass (500 to 2,000 eggs) attached to submerged vegetation in ponds, or backwater pools in creeks. Breeding occurs in coastal lagoons, marshes, springs, permanent and semi-permanent ponds, ponded and backwater portions of streams, and artificial impoundments such as dammed sites and stock ponds. Suitable spawning pools are almost always 0.7 to 1.0 meters in depth for at least 2.0 meters from the wetted edge, with dense bordering marshland/riparian vegetation (cattails, sedges, tules, and willows). Floating vegetation (*Potamogeton*, *Ludwigia*) is often present, providing especially favorable basking habitat for adult frogs and foraging cover for tadpoles. Red-legged frog eggs hatch in 6 to 14 days. Tadpoles remain in these habitats until metamorphosis, which generally occurs within 3-1/2 to 7 months. Juveniles are found in slow-moving, shallow riffles in creeks or along margins of ponds.

In the summer, larger frogs are found close to spawning ponds or along deep, quiet pools in creeks with vegetative or other cover, such as emergent vegetation, undercut banks, or rootwads, as well as in burrows in or above the banks. Bordering vegetation may be completely absent from such “summer habitat,” but secure shelters such as root masses are always available. California red-legged frogs are presumed to disperse along waterways such as streams and lake borders, but little information is available on the timing or extent of that activity. California red- legged frogs spawn in ephemeral ponds, an advantage because such waterways to not support predatory fish. Springs and seeps that may not provide breeding habitat may provide habitat for foraging or refugia.

The historical range of California red-legged frog included Shasta County. Shasta County is not included in the current range of the frog, although Shasta County occurs within the boundaries of the California red-legged frog Recovery Unit 1, Sierra Nevada Foothills and Central Valley, and Recovery Unit 2, North Coast Range Foothills and Western Sacramento River Valley (USFWS 2002). The Project Area is located approximately 30 miles northeast of USFWS designated Core Area No. 8, Cottonwood Creek, for this species. The database search yielded no records of California red-legged frogs within 5 miles of the Project Area. PG&E has no records of California red-legged frog surveys conducted within the Project boundaries prior to this study.

No habitat deemed capable of supporting California red-legged frog spawning activity was found within the Project Area during the site assessment, but several ponds on private land within the site assessment area may be suitable. In the Kilarc and Cow Creek Developments, there is no habitat capable of supporting California red-legged frogs, though potential summer habitat exists along Hooten Gulch within 38 feet of its confluence with South Cow Creek. This potential summer habitat would be considered appropriate habitat only if confirmed spawning habitat is documented within 1 mile of the site on Hooten Gulch (PG&E 2004).

American Peregrine Falcon (Falco peregrinus americana) –Federally Delisted (FD)/State Delisted (SD)/CFP

This species is a very uncommon breeding resident and uncommon migrant. Active nesting sites are known along the coast north of Santa Barbara, in the Sierra Nevada, and in other mountains of northern California. In winter, it is found inland throughout the Central Valley and occasionally on the Channel Islands. Migrants occur along the coast and in the western Sierra Nevada in spring and fall. Breeding mostly occurs in woodland, forest, and coastal habitats near wetlands, lakes, rivers, or other water or on high cliffs, banks, dunes, and mounds. Riparian areas and coastal and inland wetlands are important habitats yearlong, especially in non-breeding seasons. The nest of an American peregrine falcon is often a scrape on a depression or ledge in an open site, but the species will also nest on human-made structures and occasionally uses tree or snag cavities or old nests of other raptors. It feeds on a variety of birds and occasionally mammals, insects, and fish. Breeding occurs from early March to late August. Clutch size averages three to four eggs, and incubation lasts about 32 days (Zeiner et al. 1990).

No American peregrine falcon or falcon nests were observed in the Project Area during focused raptor surveys. However, there is documented nesting of American peregrine falcons in the Cow Creek watershed (Watershed Assessment 2001). This species may forage in or near the Kilarc or Cow Creek forebays and in stream habitat in the Project Area. There are no other known occurrences within a 5-mile radius of the Project Area (CDFW 2017).

Swainson's Hawk (Buteo swainsoni) – State Threatened (ST)

Swainson's hawk is restricted to portions of the Central Valley and Great Basin regions where suitable nesting and foraging habitat is available. Central Valley populations are centered in Sacramento, San Joaquin, and Yolo counties. Over 85 percent of Swainson's hawk territories in the Central Valley are in riparian systems adjacent to suitable foraging habitats. Swainson's hawk often nests in valley riparian forests as well as in lone trees or groves of trees in agricultural fields. Valley oak, Fremont cottonwood, walnut, and large willow are the most commonly used nest trees in the Central Valley.

Swainson's hawk requires large, open grasslands with abundant prey and suitable nest trees. Suitable foraging areas include native grasslands or lightly grazed pastures, alfalfa and other hay crops, and certain grain and row croplands. Breeding occurs late March to late August, with peak activity in late May through July. Clutch size is two to four eggs (Zeiner et al. 1990).

Suitable foraging and nesting habitat for this species occurs within grassland (foraging) and woodland (nesting) habitats of the Project Area, particularly in the southern portion of the South Cow Creek Project Area. No Swainson's hawks were observed during Project surveys, and there are no known occurrences within a 5-mile radius of the Project Area (CDFW 2017).

Bald Eagle (Haliaeetus leucocephalus) – FD/State Endangered (SE)/CFP

Bald eagle is a permanent resident and uncommon winter migrant in California. Its core breeding population in California is in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity counties. About half of the wintering population is in the Klamath Basin. The bald eagle is typically found in coniferous forest habitats with large, old growth trees near permanent water sources such as lakes, rivers, or ocean shorelines. It requires large bodies of water with abundant fish and adjacent snags or other perches for foraging. The bald eagle preys mainly on fish and occasionally on small mammals or birds, by swooping from a perch or from mid-flight. Nests are found in large trees and are usually 50 to 200 feet above the ground. It breeds from February through July, with peak activity from March to June. There are usually two eggs per clutch, and incubation usually lasts 34 to 36 days (Zeiner et al. 1990).

No bald eagles or eagle nests were observed in the Project Area during focused raptor surveys, although the bald eagle is known to occur at Kilarc Forebay (PG&E, pers. com.). Adult bald eagles have been observed roosting on a snag adjacent to the forebay. Juveniles have also been observed nearby. There are no other known occurrences within a 5-mile radius of the Project Area (CDFW 2017).

Northern Spotted Owl (Strix occidentalis caurina) – FT/ST/CSC

The northern spotted owl occurs in dense, old-growth, multi-layered mixed conifer, redwood, Douglas-fir, and oak woodland habitats, from sea level up to approximately 7,600 feet. It prefers large trees and high canopy cover for nesting and foraging. Nesting habitat contains a dense canopy cover of greater than 70 percent, with medium to large trees and a multi-storied structure. Nests are located in cavities or broken treetops. This species breeds from early March through June, with a peak in April and May. It generally has one brood per year, with a clutch size of one to four, and an average of two (Zeiner et al. 1990).

The northern spotted owl may forage and breed in mixed conifer and blue oak–foothill pine woodland in the Project Area. No northern spotted owls were observed during Project surveys, and there are no known occurrences within a 5-mile radius of the Project Area (CDFW 2017).

Little Willow Flycatcher (Empidonax traillii brewsteri) – SE

The little willow flycatcher is a rare to locally uncommon summer resident in wet meadow and montane riparian habitats from 2,000 to 8,000 feet in the Sierra Nevada and Cascade Range. It most often occurs in broad, open river valleys or large mountain meadows with lush growth of shrubby willows. It is a common spring (mid-May to early June) and fall (mid-August to early September) migrant at lower elevations, primarily in riparian habitats throughout the state except the north coast. Nests are an open cup shape placed in an upright fork of a willow or other shrub, or occasionally on a horizontal limb at a height of one to 10 feet. Peak egg laying occurs in June. Incubation lasts 12 to 13 days, and clutch size averages three to four eggs. It is probably single-brooded. Both sexes care for altricial young. Fledging age is 13 to 14 days (Zeiner et al. 1990).

This subspecies may forage in riparian habitats in the Project Area, and nesting and marginal breeding habitat occurs within reaches of South Cow Creek. No willow flycatchers were observed during Project surveys, and there are no known occurrences within a 5-mile radius of the Project Area (CDFW 2017).

Fisher (Pekania pennanti) – State Candidate Threatened/CSC

The fisher is an uncommon permanent resident of the Sierra Nevada, Cascades, and Klamath Mountains, and is also found in a few areas in the northern Coast Ranges. Suitable habitat for fishers consists of large areas of mature, dense forest stands with snags and a canopy closure greater than 50 percent. Females breed a few days after parturition, and the implantation of the embryo is delayed until the following winter. Post-implantation active growth lasts approximately 30 days, and young are born February through May. Litter size ranges from one to four. The young remain with the female until late autumn. Males and females become sexually mature in the first or second year (Zeiner et al. 1990).

This species was not observed during 2003 surveys. Although fishers are potentially present in the Project Area in mature, dense forest stands with snags, they are likely to avoid Project facilities and other areas with human activity. Nine occurrences of fisher have been recorded since 2013 with remote (baited) camera stations within 5-miles of the Project Area.

Other Wildlife Species

Because animals are mobile and the Project Area contains large tracts of undeveloped habitat that can act as corridors for wildlife, rare animal species can occur in appropriate habitats anywhere within the Project Area. Therefore, the discussion of wildlife resources for the Kilarc and Cow Creek Developments is presented by wildlife associated with habitat found within the Project Area rather than by each specific development in the Project Area.

Unless otherwise noted, the information in this section originates in the Kilarc-Cow Creek Project Botanical, and Terrestrial and Aquatic Wildlife Resources Report (PG&E 2007b).

The many vegetation communities in the area of the Kilarc and Cow Creek Developments (see Section 3.7.1.2 *Regional Setting*) provide habitat for many different wildlife species, including common, resident, and migratory species.

Many upland game species occur within the Kilarc and Cow Creek Developments, including mammals such as elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), black bear (*Ursus americanus*), wild boar (*Sus scrofa*), western grey squirrel (*Sciurus griseus*), and several rabbit species. Game birds such as wild turkey (*Meleagris gallopavo*), California quail (*Callipepla californica*), and mountain quail (*Oreortyx pictus*) are also found in the area. In general, upland game bird hunting season is from late summer to the end of winter. Mourning doves (*Zenaida macroura*) and several species of waterfowl are occasional in the Project Area, but their occurrence is far too limited to provide a significant hunting resource.

Sierran mixed conifer forests provide habitat for small mammals, such as chipmunks (*Tamias* spp.), western gray squirrel, deer mouse (*Peromyscus maniculatus*), and bats (*Myotis* spp.). Larger mammals typically found in these communities include gray fox (*Urocyon cinereoargenteus*), black bear, and mule deer. Large trees and snags can also provide nesting areas for raptors, such as red-tailed hawk (*Buteo jamaicensis*). Reptiles, such as the western fence lizard (*Sceloporus occidentalis*), may also be present. Typical birds of coniferous forests

in the Project Area include dark-eyed junco (*Junco hyemalis*), mountain chickadee (*Parus gambeli*), Steller's jay (*Cyanocitta stelleri*), western wood-pewee (*Contopus sordidulus*), and northern flicker (*Colaptes auratus*).

Ponderosa pine plantation sometimes serves as a wildlife corridor for deer and can be extremely important to deer nutrition in migration holding areas (Mayer and Laudenslayer 1988). Early and late successional stages of this forest type provide habitat for several wildlife species. Wildlife species observed or expected to occur in this habitat include mountain quail, white-crowned sparrow (*Zonotrichia leucophrys*), and western gray squirrel. Large trees and snags can also provide nesting areas for raptors such as red-tailed hawks.

The interior live oak habitat found along South Cow Creek provides habitat for species that are reliant on acorns as food. Many species of birds such as western scrub jay use acorns as a primary food source. Deer forage on hardwood foliage and several species of reptiles, birds, and mammals use the forest floor of this habitat including racer (*Coluber constrictor*), gopher snake (*Pituophis catenifer*), king snake (*Lampropeltis getula*), raptors, owls, and yellow-pine, Sonoma, and Allen's chipmunk (*Tamias amoenus, T. sonomae,* and *T. senex*).

Blue oak–foothill pine woodland provides breeding habitats for a large variety of species. Wildlife species that enhance oak habitats through acorn dissemination include western scrub-jay (*Acephalocoma californica*), yellow-billed magpie (*Pica nuttalli*), western gray squirrel, and California ground squirrel (*Spermophilus beecheyi*).

Mixed chaparral occurs near the oak woodlands in the South Cow Creek area of the Cow Creek Development. Bird species found in this habitat include California quail, California towhee (*Melozone crissalis*), and bushtit (*Psaltriparus minimus*). Mammal species include grey fox, black-tailed jackrabbit (*Lepus californicus*), and Belding's ground squirrel, and reptile species include western rattlesnake (*Crotalus viridis*) and northern alligator lizard (*Elgaria coerulea*).

Annual grassland occurs in scattered places around the Project Area and intergrades with oak woodlands and Sierran mixed conifer forest, creating savannah habitat. Common wildlife species that are typical of this habitat include western fence lizard, western rattlesnake, turkey vulture (*Cathartes aura*), American kestrel (*Falco sparverius*), California ground squirrel, Botta's pocket gopher (*Thomomys bottae*), western harvest mouse (*Reithrodontomys megalotis*), California vole (*Microtus californicus*), black-tailed jackrabbit, and coyote (*Canis latrans*).

White alder riparian forest is the primary riparian forest type in the Project Area and is found in low areas as well as along streams and creek edges. In general, riparian habitat within the Project Area is limited to narrow, linear strips due to steep slopes, bedrock channels, and fast-flowing water. Wildlife species using riparian habitat include amphibians such as Pacific treefrog (*Pseudacris regilla*) and California newt (*Taricha torosa*), birds such as yellow warbler (*Setophaga petechia*), warbling vireo (*Vireo gilvus*), and song sparrow (*Melospiza melodia*), and mammals including gray fox, long-tailed weasel (*Mustela frenata*), long-tailed vole (*Microtus longicaudus*), and western harvest mouse.

Fresh emergent wetlands are among the most productive wildlife habitats in California and are important to wildlife for water and food. Common wildlife species in this habitat include Pacific treefrog, western aquatic garter snake (*Thamnophis couchii*), great egret (*Ardea alba*), great blue heron (*Ardea herodias*), Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*),

red-winged blackbird (*Agelaius phoeniceus*), ornate shrew (*Sorex ornatus*), deer mouse, and muskrat (*Ondatra zibethicus*).

Open water habitat provides resting and foraging habitat for several waterbirds, including the American coot (*Fulica americana*), common merganser (*Mergus merganser*), and great blue heron. The forebays may provide foraging habitat for the osprey (*Pandion haliaetus*), bald eagle, and peregrine falcon. The perimeter of the Kilarc Cow and Cow Creek Forebays may provide basking areas for amphibians and aquatic reptiles. Other characteristic species found in open water habitats include the eared grebe (*Podiceps nigricollis*), pied-billed grebe (*Podilymbus podiceps*), common goldeneye (*Bucephala clangula*), cliff swallow (*Petrochelidon pyrrhonota*), tree-swallow (*Tachycineta bicolor*), and several bat species (Mayer and Laudenslayer 1988). Open water also provides a water source for many common mammal species.

Jurisdictional Wetlands

Within the Project Area, wetland vegetation communities include freshwater marsh, seeps, and swales that occur adjacent to Old Cow and South Cow Creeks. Freshwater marsh occurs along the edges of ponds and creeks at lower elevations within the Project Area. The extent of fringe wetlands varies with water level and periodic inundation and drought and as a result, fringe wetlands are not quantified in this discussion. Seeps or springs occur in wet areas within non-native grasslands or meadows and are often associated with geological fractures or faults.

Aquatic sites, also referred to as “wetland resources” or “waters” are potentially subject to state and federal jurisdiction. Wetlands, adjacent to waters or those wetlands with a significant biological nexus to a jurisdictional water are often considered jurisdictional. Wetlands, a subset of “waters of the United States” for purposes of the CWA, are defined as “areas that are inundated or saturated by surface or ground water at a frequency sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” (See, e.g., 33 C.F.R. § 328.3; see also Section 4.7.2)

In 1987, the USACE published a manual, *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) that standardized the manner in which waters, including wetlands, were to be delineated nationwide. The USACE 1987 Wetland Manual was supplemented in 2010 with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (WMVC Regional Supplement)* (USACE 2010). To determine whether areas that appear to be wetlands are subject to USACE jurisdiction (i.e., are “jurisdictional” wetlands), a wetland delineation must be performed. Under normal circumstances, positive indicators from three parameters, (1) wetland hydrology, (2) hydrophytic vegetation, and (3) hydric soils, must be present to classify a feature as a jurisdictional wetland.

In 2015, the USACE and USEPA promulgated the “Clean Water Rule,” which defined and clarified the scope of “waters of the United States” that are protected under the CWA. (80 Fed. Reg. 37053.) The 2015 Clean Water Rule has been the subject of complex federal litigation and proposed suspension and rescission under the current federal administration but remains in effect in California.

“Waters of the state” are defined more broadly than “waters of the United States“ and are defined in Water Code section 13050 (e) as “any surface water or groundwater, including saline waters, within the boundaries of the state.” The jurisdiction of the state also extends to the top of

bank and/or the upslope edge of the riparian corridor, and those areas subject to authorizations under the Streambed Alteration Program.

Kilarc Development

The wetland delineations in the area of Kilarc Development were limited to lands within the Project boundary for the development. Freshwater marsh occurs along edges of ponds and creeks and along edges of the Kilarc Forebay, and includes emergent vegetation species such as broadleaf cattail, tules, rushes, and sedges. Open water areas include the 4.5-acre Kilarc Forebay, the open water of Old Cow Creek and the 3.65 mile Kilarc Main Canal. Three small seeps were mapped within the Kilarc Development: one small seep (0.002 acre) adjacent to the Kilarc Main Canal (0.002 acre), another small seep (0.01 acre) adjacent to the Kilarc Forebay (0.01 acre), and a third seep/spring (0.04 acre) at the Kilarc powerhouse (0.04 acre). The seep/spring at the powerhouse meets all the criteria for a jurisdictional wetland (hydrology, soils, and vegetation) under the federal Clean Water Act.

Cow Creek Development

The Cow Creek Development wetland delineation study included both lands within the Project boundary and lands outside the Project boundary that may be encroached upon during the Proposed Project. Seeps observed during the vegetation surveys were mostly too small to map. Two small seeps (totaling 0.006 acre) were mapped adjacent to an access road at the Cow Creek Development. One seep was dominated by rushes. Other seeps exist and were dominated by perennial herbaceous grasses that are associated with moist or wet soils. Open water areas include the 1-acre Cow Creek forebay and the open waters of South Cow Creek, Hooten Gulch, and the 2.1-mile South Cow Creek Main Canal.

A single vernal swale (0.005 acre) was identified on a terrace along an access road to the Cow Creek Development. This vernal swale was connected to an intermittent stream that drains the terrace. Wetland species observed in the swale included slender popcorn flower, woolly marbles, water star-wort, and Mediterranean barley.

Freshwater marsh occurs along edges of ponds and creeks at lower elevations and along edges of the Cow Creek Forebay. Species of emergent vegetation in the freshwater marsh fringing the open water areas within the Cow Creek Development include similar species to those found in the Kilarc Development, such as cattails, tules, rushes, and sedges.

The lands irrigated by Abbott Ditch have not been subject to a jurisdictional wetland delineation. An informal determination identified fresh emergent wetlands and riparian wetlands, much of which is likely subject to USACE jurisdiction (refer to Figures 4.7-10 through 4.7-14). In addition, leakage from the ditch has allowed wetland seeps to develop that exhibit jurisdictional characteristics.

Wildlife Movement Corridors

Wildlife corridors are defined as areas that connect suitable habitat in a region otherwise fragmented by rugged terrain, changes in vegetation, or human development. Natural features, such as drainages, ridgelines, or areas with dense vegetation cover can provide corridors for wildlife movement. Wildlife corridors (1) provide access to shelter, mates, food, and water; (2) allow the dispersal of individuals away from high population density areas; and (3) allow immigration and emigration of individuals to other populations for gene flow between

populations. Wildlife corridors are considered sensitive by resource and conservation agencies. Within the Project area, stream corridors, ridgelines, and vegetated areas represent potential movement corridors for wildlife.

4.7.2 Regulatory Setting

This section lists specific environmental review and consultation requirements and identifies permits and approvals that must be obtained from local, state, and federal agencies before construction of the Proposed Project.

4.7.2.1 Federal

Endangered Species Act of 1973 (FESA)

Section 9 of the Federal Endangered Species Act (FESA) generally prohibits the "taking" of a species that is listed as endangered or threatened (16 U.S.C. § 1540). Under the FESA, the "take" of a species that is federally listed as threatened or endangered species is deemed to occur if an intentional or negligent act or omission results in any of the following: "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." (16 U.S.C. § 1532.) The term "harm" includes acts that actually kill or injure wildlife. Such acts may include significant habitat modification or degradation when it actually kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering (50 C.F.R. § 17.3).

Section 7 of the FESA requires federal agencies, in consultation with the Secretary of the Interior, to ensure that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of designated critical habitat for these species (16 U.S.C. § 1536).

The administering agency for the above sections, including federal consultation, is the USFWS for terrestrial, avian, and most aquatic species and National Oceanic and Atmospheric Administration Fisheries, also known as the National Marine Fisheries Service, (NMFS) for anadromous and marine species.

Migratory Bird Treaty Act

Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. § 703-711). The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 CFR Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). Most of the birds found in the study area are protected under the MBTA, and Project construction has the potential to directly take nests, eggs, young, or individuals of protected species. Further, construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to the abandonment of nests, which would be a violation of the MBTA. Measures that may be instituted to help ensure compliance with the MBTA include the following:

- Grading and other construction activities should be scheduled to avoid the nesting season to the extent possible. The nesting season for most birds in Shasta County extends from March through August.

- If construction is to occur during the breeding season, a qualified biologist should conduct pre-construction surveys no more than 1 week prior to the initiation of construction in any given area to ensure that no nests of species protected by the MBTA would be disturbed during Project implementation.
- If vegetation is to be removed by the Project and all necessary approvals have been obtained, potential nesting substrate (e.g., bushes, trees, grass, buildings, and burrows) that will be removed by the Project should be removed before the onset of the nesting season (March) to help preclude nesting. Pre-removal surveys are required for some species. Removal of vegetation or structures slated for removal by the Project should be completed outside of the nesting season (i.e., between September 1 and March 1).
- If an active nest more than half completed is found, a construction-free buffer zone should be established around the nest. The size of the buffer zone should be determined by a qualified biologist, in consultation with CDFW.

Clean Water Act (CWA)

The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.

CWA Section 404

Discharge of fill material into "waters of the United States," including "wetlands," is regulated by the USACE under Section 404 of the CWA (33 U.S.C. § 1344). USACE regulations implementing Section 404 define "waters of the United States" to include intrastate waters, including lakes, rivers, streams, wetlands, and natural ponds which are, were, or may be used in interstate or foreign commerce, or are adjacent to or have a significant nexus to interstate waters. (33 C.F.R. § 328.3.) "Wetlands" are defined for regulatory purposes as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions," including "swamps, marshes, bogs, and similar areas" (33 C.F.R. § 328.3). The placement of structures in "navigable waters of the United States" is also regulated by the USACE under section 10 of the federal Rivers and Harbors Act (33 U.S.C. § 403). Projects are permitted under either individual or general (e.g., nationwide) permits. The specific applicability of the permit type is determined by the USACE on a case-by-case basis.

CWA Section 401

Section 401 of the CWA (33 U.S.C. § 1341) requires every applicant for a federal license or permit that may result in any discharge into waters of the United States to provide the federal licensing or permitting agency with certification from the State in which the discharge may originate that the project would be in compliance with specified provisions of the CWA, including federal and state water quality standards and implementation plans, and other relevant requirements of state law. Section 401 provides that conditions of certification shall become conditions of any federal license or permit for the project. For the Proposed Project, State Water Board is the California agency responsible for water quality certification pursuant to Section 401. The State Water Board will determine whether the Proposed Project adequately

protects the beneficial uses and meets the water quality objectives for water bodies in the project area, as defined in the Basin Plan.

4.7.2.2 State

California Endangered Species Act (CESA)

The CESA (Fish & G. Code, § 2050 et seq.) declares that certain species of fish, wildlife, and plants will be given protection by the state because they are of ecological, educational, historical, recreational, aesthetic, economical, and scientific value of the people of the state. The CESA establishes that it is state policy to conserve, protect, restore, and enhance endangered species and their habitat. Under State law, wildlife species may be formally designated as threated or endangered by official listing by the California Fish and Game Commission. Such species are "fully protected." The Fish and Game Commission also maintains a list of "candidate species," which are species that have been formally noticed as being under review for addition to the list of endangered or threatened species.

Pursuant to the requirements of the CESA, an agency reviewing a Proposed Project within its jurisdiction must determine whether any state-listed endangered or threatened species may be present in the Project study area and determine whether the Proposed Project would have a potentially significant impact on such species. The California Department of Fish and Wildlife (CDFW) also encourages informal consultation on any Proposed Project that may affect a candidate species.

Under CESA, Project-related impacts to endangered or threatened species would be considered significant. Generally, no permit may authorize the take of these "fully protected" species. If a project is planned in an area where fully protected species occurs, the Project must be usually be designed to avoid all take. But Section 2081 of the Fish & Game Code allows CDFW to issue an incidental take permit for state-listed threatened, endangered, or candidate species only if specific criteria are met. These criteria can be found in CCR, Title 14, section 783.4 (a) and (b) and include that the take is merely "incidental" and that any impacts be "minimized and fully mitigated."

Native Plant Protection Act

The Native Plant Protection Act (Fish & G. Code, §§ 1900-1913) prohibits the take, possession, or sale within the state of any plants with a state designation of rare, threatened, or endangered (as defined by the CDFW). An exception to this prohibition allows landowners, under specified circumstances, to take listed plant species, provided that the owners first notify the CDFW and give CDFW at least 10 days to salvage the plants before they are plowed under or otherwise destroyed. Fish and Game Code, section 1913 also exempts from the "take" prohibition "the removal of endangered or rare native plants from a canal, lateral ditch, building site, or road, or other right of way." Impacts to these species are not considered significant unless the species are known to have a high potential to occur within the area of disturbance associated with construction of the Project.

Birds of Prey

Under section 3503.5 of the Fish and Game Code, it is unlawful to take, possess, or destroy any birds in the orders of *Falconiformes* or *Strigiformes* (birds of prey) or to take, possess, or

destroy the nest or eggs of any such bird expect as otherwise provided by this code or any regulation adopted pursuant thereto. Species protected under this Code that may occur within the Project study area include numerous species of eagles, hawks, and falcons.

California "Fully Protected" Species

California statutes also accord "fully protected" status to a number of specifically identified birds, mammals, reptiles, and amphibians. These species cannot be "taken," even with an incidental take permit. Section 3505 of the Fish and Game Code makes it unlawful to "take . . . any aigrette or egret, osprey, bird of paradise, goura, numidi, or any part of such a bird." Section 3511 of the Fish and Game Code protects from "take" the following "fully protected birds": American peregrine falcon (*Falco peregrinus anatum*), brown pelican (*Pelecanus occidentalis*), California black rail (*Laterallus jamaicensis coturniculus*), California clapper rail (*Rallus longirostris obsoletus*), California condor (*Gymnogyps californianus*), California least tern (*Sterna albifrons browni*), golden eagle (*Aquila chrysaetos*), greater sandhill crane (G*rus canadensis tabida*), light-footed clapper rail (*Rallus longirostris levipes*), southern bald eagle (*Haliaeetus leucocephalus leucocephalus*), trumpeter swan (*Cygnus buccinator*), white-tailed kite (*Elanus leucurus*), and Yuma clapper rail (*Rallus longirostris yumanensis*). Section 3513 of the Fish and Game Code makes it "unlawful to take or possess any migratory nongame bird as designated in the [MBTA]…, except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the [MBTA]."

Fish and Game Code section 4700 identifies the following "fully protected mammals" that cannot be "taken": Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*), bighorn sheep (*Ovis canadensis*), except Nelson bighorn sheep (subspecies *Ovis canadensis nelsoni*), Guadalupe fur seal (*Arctocephalus townsendi*), ring-tailed cat (*Bassariscus astutus*), Pacific right whale (*Eubalaena sieboldi*), salt-marsh harvest mouse (*Reithrodontomys raviventris*), southern sea otter (*Enhydra lutris nereis*), and wolverine (*Gulo gulo*).

Fish and Game Code section 5050 protects from "take" the following "fully protected reptiles and amphibians": blunt-nosed leopard lizard (*Crotaphytus wislizenii silus*), San Francisco garter snake (*Thamnophis sirtalis tetrataenia*), Santa Cruz long-toed salamander (*Ambystoma macrodactylum croceum*), limestone salamander (*Hydromantes brunus*), and black toad (*Bufo boreas exsul*).

Peregrine falcon, golden eagle, bald eagle, and ring-tailed cat are California fully protected species that have the potential to occur in the Project study area.

SB 1334 – Oak Woodlands

SB 1334 (Stats. 2004, ch. 732), which added section 21083.4 to the Public Resources Code, took effect on January 1, 2005. This amendment to CEQA requires that counties (it does not apply to other public agencies) make a specific effort to determine whether projects they consider may lead to a significant environmental impact as a result of the conversion of oak woodlands. First, counties must determine whether or not a project may result in a conversion of oak woodlands that will have a significant effect on the environment. Second, if a project may result in a significant effect, the counties must employ one or more of the following mitigation measures:

- Conserving oaks through the use of conservation easements

- Planting and maintaining an appropriate number of trees either on site or in restoration of a former oak woodland (tree planting is limited to half the mitigation requirement)
- Contributing funds to the Oak Woodlands Conservation Fund for the purpose of purchasing conservation easements
- Other mitigation measures developed by the county

This requirement does not apply to projects undertaken pursuant to a Natural Communities Conservation Plan (NCCP) that include oaks as a covered species or that conserve oak habitat consistent with the bill, affordable housing projects for lower income households within an urbanized area or sphere of influence, conversion of oak woodlands on agricultural land "that includes land that is used to produce or process plant and animal products for commercial purposes" (including grazing lands), and projects undertaken pursuant to a certified regulatory program.

4.7.2.3 Local

Shasta County Oak Management Guidelines

Although Shasta County does not have an ordinance in place that protects trees, voluntary measures are described in the Shasta County Oak Woodland Management Guidelines (Shasta County 1995). Land owners are encouraged to maintain a canopy of 30 percent, retain trees of all sizes and species, leave wildlife trees, limbs, and brush when harvesting oaks for fuel or range improvement, and seek professional advice when contemplating extensive harvesting. When building in oak woodlands, landowners should cluster houses, protect existing oaks during construction, avoid root compacting by limiting heavy equipment, and planning roads, cuts, fills, foundations and septic systems. Landscaping that requires irrigation should be avoided within 10 feet of the trunk of an oak. Trees damaged during construction should be replaced.

Shasta County General Plan

The Fish and Wildlife Habitat element of the Shasta County General Plan includes the following objectives and policies relevant to terrestrial resources.

General Plan Objectives

FW-1 Protection of significant fish, wildlife, and vegetation resources.

FW-2 Provide for a balance between wildlife habitat protection and enhancement and the need to manage and use agricultural, mineral extraction, and timberland resources.

General Plan Policies

FW-a Significant wildlife habitat resources, as discussed in the Plan text, when not otherwise classified as Timberland (T), Cropland (A-C), or Grazing (A-G) shall be classified on the General Plan maps as Natural Resources Protection-Habitat (N-H).

FW-b Recognition that classification of some fish, wildlife, and vegetation resources designated and used as Timberlands, Mineral Resource, Croplands, or Grazing lands does, in most cases, protect habitat resources. However, if there is a conflict, the timber, mineral extraction, or agricultural land use classifications mentioned above shall prevail in a manner consistent with State and Federal laws.

FW-c Projects that contain or may impact endangered and/or threatened plant or animal species, as officially designated by the California Fish and Game Commission and/or the U. S. Fish and Wildlife Service, shall be designed or conditioned to avoid any net adverse project impacts on those species.

FW-d The significant river and creekside corridors of Shasta County shall be designated on the General Plan maps. The primary purpose of this designation is to protect the riparian habitats from development and from adverse impacts from conflicting resources uses. The purpose is also to encourage open space and recreation (policy OSR-e). Mapping of significant waterway corridors in areas designated as resource protection lands is not required since it is assumed that resource land uses will also act to protect such waterway corridors. Riparian habitat protection along the significant river and creekside corridors, as designated on the plan maps shall be achieved, where appropriate, by the following measures:

- *Regulation of vegetation removal*
- *Design of grading and road construction to restrict sediment input to all streams*
- *Establishment of a development set-back*
- *The siting of structures, including clustering*
- *Recreation plans for the Sacramento River, Clear Creek, and other feasible waterway resources.*

FW-f The County should encourage and support efforts by State and Federal agencies that implement the Upper Sacramento River Fisheries and Riparian Habitat Management Plan.

FW-g The County shall encourage the Department of Fish and Game to prepare periodic biological assessments regarding the overall effectiveness of waterway protection efforts under the Stream Corridor Protection Program.

FW-h The County shall encourage efforts to develop tree protection standards which focus on the County's differing land use types, namely, lowland urban, upland urban, rural residential and resource lands. Urban tree protection standards shall focus on landscaping that promotes energy conservation and design aesthetics, as opposed to preserving native vegetation.

FW-i An interagency plan should be encouraged for developing a parkway and wildlife habitat corridor along Clear Creek. The County should support and encourage planning and non- County funding sources which implement this parkway corridor.

FW-j Efforts to restore the Middle Creek drainage basin, Clear Creek watershed basin, Battle Creek, Cow Creek, and other Sacramento River tributary watersheds shall be supported by the County.

FW-k The County should support efforts to develop a Stream Corridor Protection Plan along the Sacramento River from the south Redding City limits to the Tehama County line.

PG&E's Land Conservation Commitment

As stated in FERC's EIS, in 2003 the California Public Utilities Commission (CPUC) issued its bankruptcy decision in a final order as a Settlement Agreement that required PG&E commit to preserving or enhancing 140,000 acres of lands in California and associated with its hydroelectric system in a Land Conservation Commitment (LCC). The properties are located in 22 counties and 11 watersheds, primarily in the Sierra Nevada and Cascade Mountain Range watersheds. Approximately half of the lands are associated with PG&E hydroelectric facilities.

As part of its LCC, PG&E has stated that it is working with the Pacific Forest and Watershed Lands Stewardship Council (Stewardship Council), a private non-profit foundation, to permanently protect the watershed lands (PG&E 2009). The Stewardship Council Board[26] adopted a Land Conservation Plan (LCP) in 2007 to provide a framework for how the protected lands are to be beneficially managed for the community and the environment, consistent with the following six values: protection of natural habitat for wildlife, fish, and plants; preservation of open space; sustainable forestry; agricultural uses; outdoor recreation by the public; and historical values.

The LCP requires the Stewardship Council, along with PG&E and other stakeholders, to develop land conservation and conveyance plans (LCCPs) and use recommendations for PG&E watershed lands associated with the Project. The LCP is intended to contribute to the management of certain lands in the Project area (FERC 2011). The LCC identified the Cow-Battle Creek Watershed, the watershed that includes the Project, as containing two planning units. These units consist of approximately 11,085 acres and are identified as the Kilarc Reservoir Planning Unit (111 acres in Shasta County; 16 acres outside FERC boundary; and 95 acres within FERC boundary) and the Cow Creek Planning Unit (2,310 acres in Shasta County; 2,292 acres outside the FERC boundary; and 18 acres within the FERC boundary). PG&E has stated that it intends to donate conservation easements or fee title for the 11,085 acres to public agencies or qualified non-profit conservation organizations for permanent preservation and enhancement (Stewardship Council 2007).

For each planning unit, the Stewardship Council has identified an overall management objective, as well as objectives to preserve and/or enhance specific Beneficial Public Values (BPVs) relevant to the planning unit. These objectives guide future land conservation plans and will be referenced in future real estate transactions for specific parcels (Volume III of the LCP). Volume II of the LCP identifies a number of preservation and/or enhancement measures that may contribute to the conservation management program for each planning unit. These measures are intended to be illustrative in nature, not prescriptive, and will be amended, deleted, or augmented over time in coordination with future land owners and managers to best meet the objective for each planning unit. Extensive community input and coordination with future land stewards (donee organizations) preceded implementation of the Stewardship Council's recommendations, and the disposition packages created for Volume III fully describe the actual preservation and/or enhancement measures to be undertaken or overseen by future land stewards.

[26] The Stewardship Council Board of Directors is comprised of representatives from the California Farm Bureau Federation, California Resources Agency, CDFW, Central Valley RWQCB, Association of California Water Agencies, Rural County Representatives of California, California Hydropower Reform Coalition, Trust for Public land, CPUC, Office of Ratepayer Advocates, PG&E, State Water Board, California Forestry Association, an Appointee Representing California Tribal Interests, and the US Forest Service.

The objectives for the Kilarc Reservoir Planning Unit and Cow Creek Planning Unit include:

- Preserve and enhance habitat in order to protect special biological resources;
- Preserve open space in order to protect natural and cultural resources and the recreation setting;
- Assess recreation potential in order to provide additional education and recreation opportunities;
- Develop and implement forestry practices in order to ensure appropriate fuel load management; and
- Document and manage cultural resources in order to ensure their protection if discovered in the future.

The Proposed Project would require PG&E's LCC, as it relates to the Stewardship Council's recommendations for the Kilarc Reservoir Planning Unit and the Cow Creek Planning Unit, to be revisited and reassessed and make recommendations for the LCCP that reflect the status and outcome of the Proposed Project, and the terms of any FERC order, in coordination with stakeholders and all interested parties (Stewardship Council 2007).

4.7.3 Analysis Methodology

4.7.3.1 Analytical Approach

The following section provides a brief overview of the analytic methodologies used in assessing the potential impacts of the Proposed Project on vegetation, wildlife, and wetland resources. These methodologies include a comprehensive literature search and focused field surveys.

Evaluation of the possible presence of special-status plant and wildlife species, and sensitive plant communities within the Project study area were conducted using database searches (the CNDDB and CNPS Online Inventory), informally consulting with resource agencies, and reviewing environmental documents and technical studies prepared for projects in the vicinity. The CNDDB contains occurrence records for special-status plant and animal species as well as sensitive natural vegetation communities by USGS quadrangle. The CNPS Inventory allows users to query the *Inventory of Rare and Endangered Vascular Plants of California* using a set of search criteria. The result of the search is a list of special-status plant species. CNDDB and CNPS queries of the *Clough Gulch, Bella Vista, Oak Run, Whitmore, Miller Mountain, Palo Cedro, Hagaman Gulch, Inwood, O'Brien, Minnesota Mountain, Devils Rock, Viola, Montgomery Creek, Burney Mountain West, Hatchet Mountain Pass, Jacks Backbone, Grays Peak, Manton, Shingle Town, Tuscan Buttes N.E., Balls Ferry, Cottonwood, Enterprise, Project City* quadrangles was conducted. In addition to the database searches, a request for a list of special-status species with potential to occur in the Project Area was solicited from the Sacramento Fish and Wildlife Office via the online IPaC resource. Agency representatives from the USACE, CDFW, NMFS, and USFWS were contacted to discuss specific biological resource issues associated with the Proposed Project, including potential impacts and suggested mitigation measures (PG&E 2007b, North State Resources 2008a). CNDDB and CNPS Inventory queries were repeated in November 2013 and 2017 to ensure that the results of the database searches were current (2013; CDFW 2017a, CNPS 2013, 2017).

Results of numerous site visits conducted between 2003 and 2013 were used in the analysis. These included habitat inventories and suitability analyses, focused plant and wildlife surveys, wetland delineations, and other studies. Details of these field studies are described in the technical documents listed above under *Sources of Information.* In addition, site visits in the summer of 2013 addressed habitats influenced by irrigation waters conveyed by Abbott Ditch, as well as the area that might be affected by efforts to maintain water supplies to the ADU. The 2013 field visits entailed mapping of the potentially effected habitat types.

The Proposed Project is evaluated for its potential to affect biological resources based on local, state, and federal agency regulations, policies, and guidelines, as summarized previously in Section 4.7.2. This analysis considers both direct and indirect impacts. Each potential Project impact was evaluated qualitatively and, in some cases, quantitatively, by estimating Project-related impacts to the terrestrial biological resources and comparing changes to existing conditions using the significance criteria described in the following section.

Direct impacts on biological resources would result from ground-disturbing activities undertaken in the course of Project construction or maintenance. Direct impacts are defined as impacts that would be caused by the Project and that would occur at the same time and place as the Project activity from which they resulted. For example, the removal of vegetation during grading would be considered a direct impact on vegetation resources.

Indirect impacts on biological resources would be caused by, or result from, Project-related activities including the ongoing operations of Project facilities and infrastructure. Indirect impacts are defined as reasonably foreseeable impacts that would occur either later in time or at some distance from the activity from which they resulted. Examples of indirect impacts include the effects of artificial lighting on the behavior of nocturnal species and the effects of construction-related damage to the long-term health and viability of blue oak trees.

Both direct and indirect impacts can be permanent, as in the replacement of riparian/wetland vegetation with upland vegetation, or temporary, which may occur during removal of vegetation during removal of Project facilities, followed by restoration of the affected area.

4.7.3.2 Criteria for Determining Significance

Based on the State Water Board's Environmental Checklist in Appendix A of the Board's CEQA regulations, Appendix G of the CEQA Guidelines, and professional standards and practices, the Proposed Project would have a significant effect on the environment if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies or regulations, or by the 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 federally protected wetlands as defined by section 404 of the Clean Water Act and state protected wetlands as defined under the Potter-Cologne Water Quality Control Act through the 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; or
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

The following additional guideline included in Appendix G of the CEQA Guidelines is not relevant to the Proposed Project:

- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan

4.7.4 Environmental Impacts and Mitigation Measures

PG&E has included the following measures to address impacts due to decommissioning activities.

- **PM&E Measure WILD-1:** Conduct Pre-Construction Surveys for Amphibians, Pond Turtles and Nesting Birds and Implement Avoidance and Protection Actions for Species Present. The Licensee shall conduct pre-construction surveys for amphibians (foothill yellow-legged frog and California red-legged frog) reptiles (pond turtles), and any other individual at risk prior to construction activities at the diversions, forebays, and powerhouse tailraces, using standard protocols, including USFWS species-specific protocols. The Licensee shall capture and relocate to suitable habitat any individuals of these species observed in the construction area. The Licensee shall install exclusion fencing around the construction area. The Licensee shall have a biological monitor on-call throughout the construction phase to identify and relocate, if necessary, any individual animals found in the construction area. If a California red-legged frog is found, the Licensee shall stop construction work and notify USFWS; construction activity will recommence upon USFWS approval.

  The Licensee shall conduct pre-construction surveys for nesting birds if vegetation removal is scheduled during the breeding period (generally March 1 - September 1). The Licensee shall use biologists with experience in conducting breeding bird surveys to conduct the surveys. These biologists shall conduct the surveys between dawn and 10 am. If an active nest occupied by a special-status species or by other species protected by the Migratory Bird Treaty Act is found, the Licensee shall avoid the area and construction activities shall be restricted to an appropriate distance to avoid nest disturbance until nestlings have fledged.

- **PM&E Measure WILD-2: Conduct Environmental Training for Construction Personnel.** The Licensee shall conduct environmental tailboard sessions with construction personnel to provide information on special-status-species potentially present in the area and the avoidance/minimization measures to be implemented. The Licensee's biological monitor shall be responsible for conducting worker environmental awareness training for all construction personnel (including new, added, and/or replaced workers) prior to the onset of active construction. The training shall include a brief description of the special-status species that potentially occur at the site and distribution of a brochure or pamphlet that describes the species to all workers. Workers shall be instructed to drive carefully and look for amphibians, reptile, or mammal in the path of their vehicles. In the event that an amphibian of any species is observed, workers shall

stop their equipment immediately until such a time that the onsite biological monitor has identified it, relocated it if necessary or it moves from the active construction area by its own initiative.

- **PM&E Measure WILD-3:** Conduct Pre-Construction Surveys for Raptors and Implement Avoidance and Protection Actions for Species Present. The Licensee shall conduct pre-construction surveys for raptors at protocol or standard distances (0.5 mile for peregrine falcons, 0.75 mile for goshawk, 660 feet for the bald eagle, and 300 feet for other raptors) from the deconstruction area (Call 1978, Fuller and Mosher 1987, Cade et. al. 1996, PBRG 2007, USFWS 2007). For peregrine falcon, the Licensee shall conduct pre-construction surveys no earlier than 14 days prior to start of construction during the protocol survey period (March 15 to August 15). For northern goshawk, the Licensee shall conduct dawn acoustical surveys if the surveys must be done from February to April or implement intensive search surveys from late June to fall. If goshawks are detected, the Licensee shall conduct a brief search of the detection area during the late incubation or nestling stage to determine the location of an active nest. For the bald eagle, the Licensee shall conduct an initial survey from late February through March (Jackman and Jenkins 2004). If necessary, the Licensee shall conduct additional surveys in mid-nesting season (late April through May) and late in the season (early June to early July). Surveys may be conducted on foot, or with terrestrial vehicles, or aircraft. If an active raptor nest is found within the survey area, the Licensee shall avoid the nest and deconstruction activities shall be restricted to an appropriate distance to avoid nest disturbance until nestlings have fledged.
- **PM&E Measure WILD-4: Conduct Pre-Construction Surveys for Elderberry Shrubs and Implement Existing Mitigation Measures.** The Licensee shall conduct protocol pre-construction elderberry surveys within 100 feet of any deconstruction activities that could affect vegetation. If an elderberry shrub with one or more stems greater than 1 inch in diameter could be directly or indirectly affected by the activities, the measures provided in the Biological Opinion covering the Licensee's service area in the range of the VELB (USFWS 2003) shall be implemented.
- **PM&E Measure WILD-5: Conduct Pre-Construction Surveys for Bats.** If deconstruction activities are initiated between March 1 and September 30, the Licensee shall conduct pre-construction surveys for bats at the tunnels and powerhouses. For the surveys, during the day, the Licensee shall search these facilities for bats or bat sign such as guano, staining, and culled insect parts. Internal surveys shall consist of surveying the interiors of tunnels and powerhouses. External surveys shall consist of surveying the external features of structures that could be used for roosting. Nighttime surveys in or near the facilities shall consist of counting bats as they exit to forage in the evening, assessing use of facilities to roost in at night, and acoustic monitoring with ultrasonic equipment in conjunction with computer software and visual observation. At its discretion, the Licensee may conduct limited capture of bats using nets to facilitate species identification (captures shall be conducted by a qualified bat biologist). If deconstruction activities occur between October 1 and February 28 (non-breeding season) the Licensee shall not be required to conduct pre-construction surveys for bats unless existing facilities with known (previously documented through monitoring surveys or historic observations) or potential hibernation roost sites will be disturbed.

- **PM&E Measure WILD-6: Exclude Wildlife from Tunnels.** The Licensee shall seal off Project tunnels at both ends for public safety, which will exclude wildlife (i.e., bats) from entry or habitation. The Licensee shall verify that the tunnels are uninhabited through pre-construction surveys (see PM&E Measure WILD-5). If bats are present, the Licensee shall install one-way exclusion devices prior to the breeding season before construction begins, in order to allow bats to leave the tunnels, but not return. The exclusion devices shall be placed at all active entry points and shall remain in place for at least 5 to 7 days. These devices shall be removed after the bats are excluded, and then exclusion points shall be sealed (BCI 2008).
- **PM&E Measure WILD-7: Speed Limit on FERC Project and Temporary Access Roads.** The Licensee shall implement a speed limit of 15 miles per hour on FERC Project roads and temporary access roads while decommissioning activities are conducted.
- **PM&E Measure BOTA-1: Prepare and Implement a Mitigation and Monitoring Plan (MMP).** The Licensee shall prepare and implement a Mitigation and Monitoring Plan (MMP) for impacts to riparian and wetland vegetation as part of the permitting process. The MMP shall be developed in consultation with the USACE, CDFW, and SWRCB. The Licensee's MMP shall include mitigation areas (e.g., South Cow Creek Diversion Dam, Kilarc and Cow Creek forebays), goals, the species to be assessed, as well as methods and performance criteria in the MMP. Riparian and wetland vegetation requiring restoration or mitigation shall be monitored by the Licensee under FERC's authority for 2 years following decommissioning.

  The Licensee shall include restoration of abandoned or temporary roadbeds as part of the MMP, including compaction issues, seeding, mulching, and planting, and shall develop the MMP in consultation with the private landowners, where appropriate. The Licensee shall re-seed other disturbed areas, including temporary work areas, filled and graded areas, and roads requiring rehabilitation, and consult with private landowners, where appropriate. If straw is used for temporary erosion control, it shall be certified weed-free. Native plants shall be used for re-seeding and other revegetation on the Licensee's property, and on private property unless the private landowner specifies the use of other materials. If the use of native seed is intended, but sufficient supplies are not available, then cereal seed shall be used for temporary erosion control. Cereal seed used for erosion control shall be seed for sterile cereal, if available. If seed for sterile cereal is not available, then other cereal seed may be used.
- **PM&E Measure BOTA-2: Conduct Pre-Construction Surveys.** The Licensee shall conduct pre-construction surveys for special-status plants in all areas that will be disturbed by decommissioning activities.
- **PM&E Measure BOTA-3: Avoid Special-Status Plants to the Extent Possible and Restore Habitat Conditions.** The Licensee shall avoid any identified populations of special-status plants to the extent practical. If decommissioning activities will result in temporary disturbance of a population, the Licensee shall stockpile the top 10 inches of soil from the disturbed area, protect the soil from exposure to weed seeds, and replace the soil when the decommissioning activities are complete.

- **PM&E Measure AQUA-9: Discontinue Cow Creek Powerhouse Operations in Spring.** The Licensee shall discontinue Cow Creek Powerhouse operations in the spring when natural flow is present upstream of the powerhouse.

4.7.4.1 Kilarc Development

IMPACT 4.7-1 (Kilarc): Would the action result in impacts on upland habitats?

Proposed Project

Approximately 11.5 acres of land (including 4.5 acres of the Kilarc Forebay and the unvegetated canals) would be disturbed within the Kilarc Development under the Proposed Project. Removal of the Kilarc Main Canal diversion dam, including mechanisms and concrete, would disturb Sierran mixed conifer forest as a result of proposed activity and any required access improvements to the diversion sites. The removal of the Kilarc Forebay would include dismantling and removing intake and control equipment, filling the forebay, and demolishing and filling the overflow spillway. Upland vegetation surrounding the Kilarc Forebay consists of Ponderosa pine plantation and would not be significantly affected by activity associated with the removal of the Kilarc Forebay; however, limited areas of Ponderosa pine plantation would be affected by road construction to improve access to the forebay for deconstruction work.

Short-term, minor, adverse impacts would occur to existing upland vegetation communities as a result of the Proposed Project. Implementation of BOTA-1 requires development of an MMP that includes restoration of disturbed areas, including addressing compactions issues, seeding, mulching, and development of a planting plan, where appropriate. Over time, upland vegetation is expected to re-establish from the existing seed bank and pioneering by surrounding vegetation species. Initially, PG&E would back-fill the forebay with excavated bank material and seed to stabilize the area to prevent erosion. Pioneering species would establish from the seed bank contained within the bank material and from natural pioneering of surrounding plant species. Filling of the forebay would result in the creation of about 4.5 acres of new vegetated uplands.

The Kilarc penstocks would be left in place, but plugged at the head of the penstock at the forebay. Activities at the Kilarc powerhouse resulting from the Proposed Project would include filling of the tailrace and areas adjacent to the tailrace with local materials. The powerhouse structure and switchyard would remain in place. Therefore disturbance to existing herbaceous ground cover would be localized and impacts would be minor and short term.

The Kilarc Main Canal would be dewatered over its 3.65-mile length as a result of the Proposed Project. The Kilarc Main Canal is composed of 2.03 miles of earthen concrete and shotcrete-lined canal, 1.44 miles of metal and wood flume, and 0.18 mile of wood-lined tunnel. Removal methods would vary according to the type of flowline structure and accessibility. Flumes would be removed from their foundations, and foundations left in place, resulting in little to no impact to surrounding vegetation. Inaccessible portions of the canal would be abandoned in place (with strategic breaching to address storm runoff) while accessible portions would be filled with the adjacent canal berm. Vegetation along the main canal would be disturbed as a result of proposed construction activity and access during canal removal. Sierran mixed conifer forest and less than 1 acre of Ponderosa pine plantation would be disturbed. Over time upland vegetation would re-establish into natural native woodlands from the existing seed bank, natural pioneering of surrounding vegetation species, and the proposed reseeding. Additionally, the

wetted canal, would, overtime become native upland vegetation under the Proposed Project. Therefore, impacts to existing upland vegetation resources from removal of the Kilarc Main Canal would be minor and short term.

Most roads to be used for the Proposed Project are existing roads on private property. Several short, new road segments are being considered to facilitate work on the Kilarc Development canals. The proposed road segments would constitute about 0.5 mile (0.7 acre) of ground disturbance in areas previously logged, resulting in minor effects. Implementation of BOTA-1 requires development of an MMP that includes restoration of disturbed areas, including addressing compactions issues, seeding, mulching, a development of a planting plan, where appropriate. Reseeding or planting of abandoned road beds, as proposed, would re-establish vegetative cover. After the completion of activities associated with the Proposed Project, natural pioneering by adjacent species and establishment of plants from the existing seed bank is expected, allowing natural succession and eventually resulting in natural woodlands. Implementation of PM&E BOTA-1 addresses restoration of abandoned or temporary roadbeds, and GEOL-1 and GEOL-2 includes implementation of soil erosion and sedimentation control BMPs, and storm water pollution prevention BMPs. These measures would avoid and minimize the effects of the Project on upland vegetation. In general impacts to upland vegetation are limited spatially (approximately 11.5 acres) and would be temporary. In some cases, developed areas, the forebay, and canals would go through natural successional processes and return to upland vegetation communities resulting in a net benefit. Therefore, impacts related to upland habitats would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would eliminate effects on limited areas of Ponderosa pine plantation and would also eliminate the potential creation of about 4.5 acres of new vegetation from back-filling the forebay. There would be no additional impacts from these alternatives related to IMPACT 4.7-1 (Kilarc).

IMPACT 4.7-2 (Kilarc): Would the action result in impacts on wetlands and riparian habitats?

Proposed Project

An existing riparian wetland adjacent to the North Canyon Creek canal is not expected to be affected by the Proposed Project. The riparian wetland is located upslope of the North Canyon Creek canal and is associated with two intermittent streams that drain into the canal. The water supply to this wetland does not occur as a result of Project operation; therefore, the wetland function would not be affected by the Proposed Project.

Small seeps and springs created by leakage from various Project features (canals, forebays, etc.) would be permanently lost when dewatering occurs. The small seep (0.002 acre) adjacent to the Kilarc Main Canal and a seep/spring wetland area (0.04 acre) at the Kilarc powerhouse may be affected as a result of dewatering the canal or ceasing operation of the powerhouse.

Kilarc Main Canal. However, though unlikely, the seep/spring may continue to exist if a water source (a possible spring in the vicinity) remains.

The freshwater wetland fringing the shoreline of the Kilarc Forebay, a small seep (0.01 acre) adjacent to the Kilarc Forebay, and another would be adversely affected by the proposed dewatering and back-filling of the Kilarc Forebay. The Kilarc Forebay would be backfilled with excavated bank material and reseeded with an appropriate seed mix.

Under the Proposed Project, mitigation and restoration of riparian and wetland areas would minimize effects through the implementation of PM&E measure BOTA-1, which requires the development and implementation of an MMP. Mitigation areas included in the MMP will include, but are not limited to diversion dams and forebays. The MMP will include goals, methodologies, and performance criteria for mitigation and restoration that include a 2-year monitoring program to ensure that riparian habitat is re-established in areas where construction activities result in clearing or disturbance. Reseeding with seed mixtures or planting species appropriate to the surrounding vegetation communities and use of sterile seed would allow areas disturbed and cleared to develop into natural plant communities consistent with the surrounding area over time. The implementation of BMPs (PM&E GEOL-1) that restore natural drainage paths and re-contour slopes to reduce erosion and sedimentation would improve soil conditions and stability and allow vegetation to reestablish. Bank erosion monitoring and erosion control measures implemented in consultation with CDFW would also include vegetation plantings consistent with the MMP. Also included in the MMP would be the condition that any riparian and wetland vegetation monitoring may be implemented under the authority of permitting or resource agencies such as USACE or State Water Board for a total of 5 years.

Temporary impacts to wetland and riparian habitats could occur during construction activities and facility removal. However, vegetation is expected to re-establish where conditions remain appropriate. The Pre-project hydrologic conditions that support riparian and wetland areas within the Kilarc Development would be restored, returning the riparian and wetland systems to a more natural seasonal and cyclic hydrologic regime. Depending on remaining hydrologic conditions after the Kilarc Forebay has been drained, filled, and reseeded, there is potential for habitat succession to result in a riparian area within the former footprint (4.5 acres) of the reservoir. A riparian area that develops within the former Kilarc Forebay area may gradually succeed to a species composition of upland vegetation consistent with surrounding vegetation communities.

These measures would help preserve wetland and riparian habitat during and after implementation of the Proposed Project by minimizing the loss of these communities and facilitating the long-term regeneration of disturbed areas. With implementation of PG&E's PM&Es, impacts related to riparian and wetland resources are expected to be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would eliminate affects to freshwater wetland on the shoreline and adjacent to the forebay. There would be no additional impacts from these alternatives related to IMPACT 4.7-2 (Kilarc).

IMPACT 4.7-3 (Kilarc): Would the action result in impacts on special-status plant species?

Proposed Project

The population of mountain lady's slipper (CRPR 4) growing at the base of an above-ground reach of the Kilarc Main Canal is expected to be directly affected by canal removal activities. To the extent practical, the population would be avoided; PM&E BOTA-2 and BOTA-3 require implementation of pre-construction surveys in all areas that would be disturbed to determine locations of sensitive species and develop an avoidance approach. However, if not avoidable, PM&E BOTA-3, requires that the top 10 inches of soil from the disturbed area to be stockpiled, protected from exposure to weeds, and the topsoil returned to the area of disturbance after the proposed activities have ceased. Consultation with CDFW or CNPS staff knowledgeable in the life requisites of mountain lady's slipper, including appropriate propagation methods prior to disturbance, and the restoration process, would ensure that the seed bank and/or rhizomes would be salvaged and distributed within the appropriate habitat and under the necessary conditions to maximize the potential for success of plant restoration. With implementation of PM&E measures, the impact would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 1 and No Project Alternative

Alternative 1 and No Project Alternative would result in no change at the Kilarc Forebay site., Leaving the forebay in place would reduce special status plant disturbance areas in the forebay area. There would be no additional impacts from these alternatives related to IMPACT 4.7-3 (Kilarc).

IMPACT 4.7-4 (Kilarc): Would the action influence the spread of invasive/noxious plants?

Proposed Project

Invasive non-native and noxious plant species are well-established in the Project Area as noted by the identification of 12 species during the botanical surveys. Under the Proposed Project, it is likely that invasive non-native and noxious species would spread. PM&E Measure BOTA-1 proposes development of an MMP to address impacts to riparian and wetland areas. Restoration of disturbed or cleared areas by reseeding would hasten growth of native vegetation cover and minimize soil erosion. PM&E Measure BOTA-1, and recommendations by resource agencies, are consistent and in favor of using native seed in the restoration process, and the use of sterile cereal seed, if native seed is not available. Priority would be given to the use of native seed. The MMP would also include contingency measures for implementation of remedial actions such as eradication of invasive noxious plant species and/or re-seeding with native species, if final performance criteria are not met.

Implementation of the MMP for restoration of disturbed or cleared areas, would reduce the potential spread and introduction of noxious weeds. However, heavy equipment that is brought to the area from outside of the watershed could result in the spread or introduction of

invasive/noxious plants. Therefore the impact is considered significant, but would be reduced to less than significant with mitigation.

- **Level of Significance:** Potentially Significant
- **Mitigation Measure 4.7-4:** The following shall be included in PM&E Measure BOTA-1: Clean Equipment and Establish Weed Wash Stations.
  - All contractor equipment previously used on non-paved surfaces outside of the watershed will be thoroughly cleaned before entering the Project area.
  - The Licensee will ensure that heavy equipment is free of material that may contain seeds of noxious weeds prior to leaving an area infested with weeds. All heavy equipment will be inspected for weed seeds stuck in tire treads or mud on the vehicle. The Licensee will designate appropriate cleaning sites, and all such equipment will be cleaned (power or high-pressure cleaning) before entering weed-free areas.
- **Impact Determination after Mitigation:** Less than Significant

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would reduce the amount of disturbed or cleared areas. There would be no additional impacts from these alternatives related to IMPACT 4.7-4 (Kilarc).

IMPACT 4.7-5 (Kilarc): Would the action result in impacts on birds and mammals?

Proposed Project

Noise, ground-shaking, lighting, and other construction-related disturbances during the active construction phase of decommissioning would result in temporary disturbance to and/or displacement of wildlife species utilizing the immediate Project Area and vicinity. Mobile species would be expected to flee or avoid areas under active construction and relocate to adjacent habitat until activity subsides. Construction activities associated with the Proposed Project may also result in the direct injury or mortality of non- or minimally mobile wildlife species (e.g., burrowing animals).

Habitat loss would be temporary and limited to areas directly affected by construction activities. Permanent habitat loss would be avoided and/or mitigated by implementation of PM&Es; however, temporary loss of vegetated areas (approximately 11.5 acres) could extend for several years, or until natural vegetation recolonization is successful. Conversely, temporary impacts to riparian areas could be offset by benefits to the riparian corridor of Old Cow Creek resulting from the return of diverted flows to the bypass reach of Old Cow Creek.

Some open-water wildlife habitat would be lost from draining and filling of the Kilarc Forebay. This could reduce the foraging habitat for wading birds; raptors such as the American peregrine falcon, bald eagle, and osprey; and aerial foragers such as swallows, swifts, and bats. Although the loss of 4.5 acres of open-water habitat within the Project Area would be permanent, most of these species would forage in other habitats, and adequate foraging over perennial creeks would be available for swallows, swifts, and bats. Ospreys and bald eagles are known to travel widely to find food and appear to only be infrequent users of habitat in the Kilarc Development. The restoration of Old Cow Creek to natural flow patterns could provide alternative foraging habitat for

these species in the Project Area. Therefore, no long-term adverse effects are expected from the loss of open water foraging habitat for bird and mammal species, including special-status species.

PM&E measures WILD-1, WILD-2, WILD-3, WILD-5, WILD-6 and WILD-7 would minimize adverse effects resulting from the Proposed Project. PM&E measures are consistent with recommendations by CDFW. Per PM&E Measures WILD-1 and WILD-3, the Licensee would conduct pre-construction surveys for nesting birds (including raptors) and establish avoidance areas around active nests. WILD-5 provides for pre-construction surveys for bats if deconstruction activities area initiated between March 1 and September 20. And WILD-6 requires that the Licensee seal off Project tunnels at both ends for exclusion of wildlife. This measure also provides for the installation of one-way exclusion devices if bats are present.

In addition, PM&E WILD-2 provides for a biological monitor and environmental training for personnel involved in activities associated with the Proposed Project. Training would provide personnel with information on special status species potentially present and avoidance or disturbance minimization actions to implement. The biological monitor would be available to identify and relocate (if necessary) any wildlife within work areas. PM&E WILD-7 implements a speed limit on Project roads and temporary access roads while activities are being conducted to minimize injury or mortality to wildlife in roadways.

PM&E measures also provide for restoration and rehabilitation of vegetation communities so that wildlife habitat would be available as quickly as possible after the cessation of activity. Implementation of PM&E Measure BOTA-1 requires the development and implementation of an MMP that would include goals, methodologies, and performance criteria for mitigation and restoration that include a two-year monitoring program to ensure that riparian habitat is re-established in disturbed and cleared areas.

In summary direct and/or indirect impacts from decommissioning activities would be temporary and/or limited in extent and not severe enough to affect the survival of a species or population. With implementation of the above referenced PM&Es, impacts on birds and mammals would be less than significant.

- **Level of Significance**: Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would reduce the potential for noise, ground-shaking, lighting, and other construction-related disturbances that would result in temporary disturbance to wildlife species. There would be no additional impacts from these alternatives related to IMPACT 4.7-5 (Kilarc).

IMPACT 4.7-6 (Kilarc): Would the action, specifically dewatering of canals, forebays, and related watercourses, result in impacts on amphibians and pond turtles?

Proposed Project

The removal of the Kilarc Main Canal diversion would result in a release of sediment from behind the dam, and a short-term loss of aquatic species habitat directly below the dam. Permanent dewatering of the Kilarc Main Canal and forebay would result in the permanently reduction of aquatic habitat available to amphibians and western pond turtles in the Project Area. However, Old Cow Creek contains little suitable spawning habitat for foothill yellow-legged frogs and colonization of this reach is likely limited by insufficient forage and basking sites.

PM&E Measures WILD-1 and WILD-2 directly address potential impacts to amphibians (foothill yellow-legged frog) and aquatic reptiles (western pond turtles) and are consistent with recommendations made by CDFW (FERC 2011). PM&E Measure WILD-1 includes conducting pre-construction surveys, capture and relocation (to suitable habitat), and the installation of exclusion fencing around construction areas. In addition, PM&E Measures WILD-1 and WILD-2 would provide for a biological monitor and construction personnel training to avoid and minimize any actions affecting wildlife including special status amphibians and reptiles.

Permanent loss of aquatic habitat in Old Cow Creek and Kilarc Forebay is not expected to have a significant impact on amphibians and pond turtles. In addition, under the Proposed Project, Old Cow Creek streamflow would be restored to the natural average monthly flows throughout the year which would increase average and minimum flows during the low flow season potentially increasing breeding habitat for foothill yellow-legged frogs. Therefore, with implementation of the above referenced PM&Es, impacts related to amphibians and pond turtles would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site, Leaving the forebay in place would eliminate the effects of reduced areas of potential habitat available to native frogs and western pond turtles in the Project Area. There would be no additional impacts from these alternatives related to IMPACT 4.7-6 (Kilarc).

IMPACT 4.7-7 (Kilarc): Would the action result in impacts on rare, threatened, and endangered terrestrial species?

Proposed Project

As discussed below, it is not expected that the Proposed Project would impact terrestrial rare, threatened, or endangered (RTE) species. However, PM&E Measures WILD-1 and WILD-2 would be implemented to minimize the potential for adverse effects. Pre-construction surveys would provide current information on the possible location of RTE species within the development. If identified, appropriate measures to reduce potential effects would be implemented for specific species as discussed below. WILD-2 would provide an increased awareness of trained construction personnel, include the presence of a biological monitor to assist with identification of

RTE species, implement stop work orders, and notify appropriate agency personnel as necessary. PM&E Measures WILD-1 and WILD-2 are consistent with recommendations by CDFW, and are consistent with the California Wildlife Action Plan (PG&E 2009a).

Valley Elderberry Longhorn Beetle

Potential effects from decommissioning activities to elderberry shrubs, the host plant for VELB, would be minimized by the implementation of PM&E Measure WILD-4, which provides pre-construction surveys for elderberry shrubs, and if shrubs providing appropriate habitat for VELB are found, measures provided in the Biological Opinion (NMFS 2011) covering the Licensee's service area would be implemented.

California Red-Legged Frog

PM&E WILD-1 would minimize potential effects on the California red-legged frog. Pre-construction surveys for California red-legged frogs would provide current information on the presence of the frogs and minimize effects by implementing protection measures that may include relocation of individuals as necessary. In addition, PM&E Measure WILD-2 would provide a biological monitor to provide training to construction personnel on environmental awareness, including identification of special status species, avoidance or minimization measures to be implemented including notification of the biological monitor and stop work orders.

Northern Spotted Owl

Although the northern spotted owl is not known to occur in the Project Area, PM&E WILD-3 would provide for pre-construction surveys to determine possible presence of northern spotted owl prior to initiation of any proposed activities. PM&E WILD-2 requires a biological monitor to provide training to construction personnel on environmental awareness, including identification of special status species, and avoidance or minimization measures, including notification of the biological monitor and stop work orders.

Fisher

PG&E proposed PM&E WILD-2 implements a biological monitor to provide training and guidance to construction personnel to ensure that all personnel are educated and aware of the potential for special status species to occur within the project area, their descriptions, and the actions to take upon identification of special status species. In addition, PM&E Measure WILD-7 would implement a posted 15 mile-per-hour speed limit on access and construction roads within the Kilarc Development that would reduce the potential for fisher mortality from fast-moving construction traffic.

In conclusion, no direct impacts to terrestrial RTE species are expected under the Proposed Project since none of the above RTE species have been documented within the Project Area. Although short-term adverse effects could occur to potential habitat, with implementation of PM&E Measures WILD-1 through WILD-4 and WILD-7, which are consistent with recommendations by CDFW, impacts to the potential habitat or occurrence for RTE species in the Project Area would be minimized and impacts would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. As a result of leaving the forebay in place, and similar to the Proposed Project, no direct impacts to terrestrial RTE species are anticipated. There would be no additional impacts from these alternatives related to IMPACT 4.7-7 (Kilarc).

4.7.4.2 Cow Creek Development

IMPACT 4.7-8 (Cow Creek): Would the action result in impacts on upland habitats?

Proposed Project

As discussed in the FERC EIS and the LSA (FERC 2011, PG&E 2009), under the Proposed Project approximately 10 acres of land would be disturbed, which mostly includes canals and the Cow Creek Forebay. A combination of removal and abandonment in place is proposed at the Cow Creek diversion dam. Upland vegetation in the area of the diversion dam includes Sierran mixed conifer forest, while upland vegetation in the vicinity of the Cow Creek Forebay is live oak woodland. Activities associated with the Proposed Project at the Cow Creek Forebay would not significantly affect the interior live oak woodland that dominates the area, though access road improvements and construction work areas necessary for the draining and back-filling of the forebay would disturb small areas of interior live oak woodland. Access to canals, flumes, tunnels, and siphons present within the Cow Creek Development would disturb Sierran mixed conifer forest and interior live oak woodland (less than 1 acre) along the Cow Creek canal.

Vegetation surrounding the Cow Creek powerhouse is characterized as interior live oak woodland, blue oak-foothill pine woodland, and non-native annual grassland, with the area immediately surrounding the powerhouse primarily non-native grassland. Disturbance as a result of activities associated with the closing of the powerhouse would not significantly affect vegetation in the vicinity of the powerhouse. No new access roads are proposed at the Cow Creek Development.

PM&E Measure BOTA-1 would implement re-seeding of disturbed areas including temporary work areas, filled and graded areas, and areas associated with rehabilitated/abandoned and temporarily constructed roads. After the completion of the Proposed Project, natural pioneering by adjacent vegetation community species and establishment of plants from the existing seed bank would allow for natural succession, and eventual re-establishment into native woodlands. In addition, PM&E Measure BOTA-1 requires the development and implementation of an MMP. The MMP includes goals, methodologies, and performance criteria for mitigation and restoration. The MMP also includes a two-year monitoring program to ensure that vegetation is re-established in areas where construction activities result in clearing or disturbance.

The implementation of PM&E Measure GEOL-1 would restore natural drainage paths and re-contour slopes to reduce erosion and sedimentation, which would improve soil conditions and stability, and improve conditions for vegetation re-establishment. PM&E Measure GEOL-2 implements storm water pollution prevention BMPs that identify and manage potential pollutant sources and provide for monitoring and maintenance of BMPs for sediment control, spill containment and topsoil protection. Bank erosion monitoring and erosion control measures implemented in consultation with CDFW would also include vegetation plantings consistent with the MMP. The proposed re-seeding would use native seed types or sterile cereal seed.

In general, impacts to upland vegetation would be limited spatially (less than 10 acres) and be temporary. In some cases, developed areas and canals would go through natural successional processes and return to upland vegetation communities resulting in a net benefit. Therefore, impacts on upland areas in the Cow Creek Development would be less than significant.

- **Level of Significance**: Less than Significant
- **Mitigation Measures**: No additional mitigation required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Ditch, and therefore could result in impacts on upland habitat. Creating additional areas of disturbance in areas of upland habitat could result in additional environmental effects. With implementation of PM&E measures, impacts resulting from implementation of these alternatives would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place because no construction activities would occur; no impacts on upland habitat would result. There would be no additional impacts from this alternative related to IMPACT 4.7-8 (Cow Creek).

IMPACT 4.7-9 (Cow Creek): Would the action result in impacts on wetlands and riparian habitats?

Proposed Project

Approximately 0.15 acre of riparian vegetation adjacent to the South Cow Creek diversion dam would be disturbed during the Proposed Project. Two seeps and a vernal swale at the Cow Creek Development were mapped adjacent to access roads and would be adversely affected by proposed road construction/preparation activities. The freshwater emergent wetland fringe along the shoreline of the Cow Creek forebay would be adversely affected by the Proposed Project, under which the forebay would be dewatered, backfilled, and reseeded with an appropriate seed mixture. Depending on remaining hydrologic conditions after the Cow Creek forebay has been drained, filled, and reseeded, there is potential for the succession to a riparian area within the former footprint (1.0 acre) of the reservoir. A riparian area that develops within the former Cow Creek Forebay area may gradually succeed to a species composition of upland vegetation consistent with surrounding vegetation communities, offsetting the loss of riparian/wetland vegetation communities.

As a result of the Proposed Project, adverse effects to riparian and wetland vegetation within the Cow Creek Development would be minor and range from short-term to long-term or permanent depending on location and extent of disturbance. Under the Proposed Project, mitigation and restoration of riparian and wetland areas would minimize effects through the implementation of PM&E Measure BOTA-1, which would require the development and implementation of the MMP. The MMP includes goals, methodologies, and performance measurement criteria for mitigation and restoration that include a two-year monitoring program

to ensure that riparian habitat is re-established in areas where construction activities result in clearing or disturbance. These measures would preserve wetland and riparian habitat by minimizing the loss of riparian and aquatic habitat, facilitating the regeneration of disturbed areas, and ensuring native soils within cleared and disturbed areas are not subject to erosion. Reseeding or planting species appropriate to surrounding vegetation and use of sterile seed would allow areas to develop into natural plant communities. Bank erosion monitoring and erosion control measures implemented in consultation with CDFW would include vegetation plantings consistent with the MMP.

The implementation of BMPs (PM&E GEOL-1) that restore natural drainage paths and re-contour slopes to reduce erosion and sedimentation would improve soil conditions and stability and allow vegetation to re-establish. Also included in the MMP would be the condition that any riparian and wetland monitoring may be implemented under the authority of permitting or resource agencies such as USACE or State Water Board for a total of two years. Riparian and wetland areas within the Cow Creek Development would return to systems more naturally adapted to seasonal and cyclic hydrologic conditions that prevailed prior to the existence of the project.

Hooten Gulch

The Cow Creek Powerhouse discharges water into Hooten Gulch upstream of its confluence with South Cow Creek. As such, the reach between the powerhouse and the confluence has historically received augmented flows from the Cow Creek Development. Hooten Gulch upstream of the Cow Creek tailrace is ephemeral. Therefore, the existing riparian area within the augmented reach of Hooten Gulch may be reduced in extent as augmentation of flows downstream of the Cow Creek powerhouse would end under the Proposed Project, receiving only storm water runoff. In addition to a reduction in extent, riparian condition (e.g., tree health and vigor, density, percent cover, diversity) could also be reduced.

PM&E Measure BOTA-1 requires development and implementation of an MMP, which will include goals, methodologies, and performance criteria for mitigation and restoration of wetland and riparian areas affected by the Proposed Project. PM&E Measure BOTA-1 also requires a 2-year monitoring program to ensure that riparian habitat is re-established. These measures would minimize the loss of riparian and aquatic habitat, facilitate the regeneration of disturbed areas and ensure native soils within cleared and disturbed areas are not subject to erosion. Reseeding with native seed appropriate to surrounding vegetation and/or the use of sterile seed would allow areas to develop into natural plant communities Bank erosion monitoring and erosion control measures implemented in consultation with CDFW would include vegetation plantings consistent with the MMP.

The implementation of BMPs (PM&E GEOL-1) would further address soil erosion and sedimentation control by providing restoration of natural drainage paths and re-contouring of slopes to reduce erosion and sedimentation. This would improve soil conditions and stability and allow vegetation to re-establish. Also included in the MMP would be the condition that any riparian and wetland monitoring may be implemented under the authority of permitting or resource agencies such as USACE or State Water Board for a total of two years. Riparian and wetland areas within the Cow Creek Development would return to systems more naturally adapted to seasonal and cyclic hydrologic conditions that prevailed prior to the existence of the Project.

In addition, as presented in PM&E Measure AQUA-9, and further recommended by CDFW and NMFS, ceasing Cow Creek Powerhouse operations should occur in spring when natural seasonal flows are present. This measure would continue to provide water to riparian vegetation during the growing season and benefit natural riparian and wetland vegetation by returning Hooten Gulch to a more natural system; this measure is consistent with agency recommendations prepared by CDFW. In subsequent years channel forming flows would continue to be dominated by peak flows resulting from major precipitation events.

However, in subsequent years the reach of Hooten Gulch between the Cow Creek powerhouse and South Cow Creek would return to being an intermittent drainage with no summer surface flow, and likely would revert to exhibiting the sparse riparian vegetation more characteristic of the reach upstream of the powerhouse.

Abbott Ditch

The Abbott Ditch Diversion spans Hooten Gulch a few feet above its confluence with South Cow Creek. The diversion consists of an 8- to 10-foot tall concrete weir topped with removable wooden flashboards. The diversion is not part of the Kilarc-Cow Creek Project and belongs to private land owners (FERC 2011). The lands irrigated by Abbott Ditch have not been subject to a jurisdictional wetland delineation. An informal determination based on aerial photos identified fresh emergent wetlands and riparian wetlands, much of which is likely subject to USACE jurisdiction. In addition, leakage from the ditch has allowed wetland seeps to develop that exhibit jurisdictional characteristics.

The areas irrigated and thus under hydrological influence by Abbott Ditch include approximately 110 acres of mixed riparian habitat and approximately 8 acres of fresh emergent wetland (including freshwater marshes, seeps formed below leaks in the ditch, and emergent vegetation lining Abbott Ditch and its laterals). Abbott Ditch habitat is shown in Figures 4.7-10 through 4.7-14. Abbott Ditch also provides irrigation water to approximately 320 acres of irrigated pasture (refer to Impact 4.4-10), much of which is characteristic of wet meadow habitat.

The Proposed Project does not include a means of maintaining water flows to Abbott Ditch, which currently relies almost completely on releases from the Cow Creek Project into Hooten Gulch. There are five additional seasonal water flows that drain into Abbott Ditch, but would not supply a year-round source of water. Therefore, under the Proposed Project, much of the land irrigated and otherwise watered by Abbott Ditch would cease to have a summer supply of water. Riparian and wetland habitats on these lands would be subject to reduced flows and revert to the surrounding blue oak-digger pine and dry non-native annual grassland habitat types.

As discussed for Impact 4.4-10 related to conversion of farmland, construction of a new diversion would enable current agricultural practices to continue, as well as preserve wetlands and riparian habitat. CDFW, in response to FERC's September 2009 Notice of Scoping Meetings and Environmental Site Review, expressed support for a new Abbott Ditch diversion, at a location about 3.5 miles downstream of PG&E's current diversion, on South Cow Creek. At this time it is unknown whether an alternate point of diversion is in fact feasible. However, replacement of augmented flows to Hooten Gulch or the construction of an alternative new diversion, are not included with the Proposed Project. The selection and

ultimate construction of an alternative diversion location would be subject to a separate state authorization and permitting process with associated environmental review.

Absent a new diversion, Project impacts would occur to wetlands and riparian habitat along Abbott Ditch. PG&E has proposed measures to preserve wetland and riparian habitat throughout the FERC Project Area by minimizing the loss of riparian and aquatic habitat, facilitating the regeneration of disturbed areas, and ensuring native soils within cleared and disturbed areas are not subject to erosion. PM&E Measure BOTA-1 includes consultation with USACE, CDFW, and the SWRCB in the development and implementation of an MMP for impacts to riparian and wetland areas as part of the permitting process. However, these measures are not proposed for areas outside the FERC boundary including the Abbott Ditch, and these measures are intended to address ground disturbance during decommissioning activities and not potential impacts associated with cessation of flows to Abbott Ditch. In addition, it is unknown whether the FERC Project Area provides the opportunity for adequate mitigation at such a scale to address offsite riparian and wetland impacts associated with reduced flows to Abbott Ditch. Therefore, impacts on wetlands and riparian habitat along Abbott Ditch would be potentially significant.

- **Level of Significance:** Significant
- **Mitigation Measure 4.7-9:** Prior to commencing activities that will reduce augmented flows in Hooten Gulch, PG&E shall complete a delineation of all potentially jurisdictional aquatic features in areas to be directly impacted by changes to the amount of water flowing in the Abbott Ditch. The delineation shall address all features potentially jurisdictional to waters of the United States or waters of the state, wetlands, or riparian areas. PG&E shall, as early as possible, identify and communicate its process to the affected private land owners. To ensure “no-net-loss” of wetlands, PG&E shall prepare, in accordance with applicable agency guidelines and requirements, compensation/mitigation measures for the preservation and/or creation of wetlands and/or purchase of credits at an approved mitigation bank or payment into an in lieu fee program with the final wetland mitigation ratios approved by the applicable resource agencies. An agency approved monitoring program will be implemented by PG&E to ensure the success of compensation/mitigation areas.
- **Impact Determination after Mitigation:** Less than Significant

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and therefore could result in impacts on wetlands and riparian habitat. As with the Proposed Project, these areas would be surveyed for special status plant species prior to any construction activities. With implementation of PM&E measures, impacts resulting from implementation of these alternatives would be less than significant.

All of the Abbott Ditch alternatives would prevent the loss of wetlands and riparian habitat in the areas irrigated and thus under hydrological influence by Abbott Ditch, and the significant impact would be lessened to no impact under these alternatives.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place because no construction activities would occur; no impacts on wetlands and riparian habitat would result. There would be no additional impacts from this alternative related to IMPACT 4.7-9 (Cow Creek).

IMPACT 4.7-10 (Cow Creek): Would the action result in impacts on special-status plant species?

Proposed Project

Big-scale balsam-root (CRPR 1B) may be adversely affected by access road improvements at the Cow Creek Development. Effects on big-scale balsam-root would be avoided by conducting pre-construction surveys for special-status plant species in all areas that would be disturbed (PM&E Measure BOTA-2), and avoiding any identified populations to the extent practical (PM&E Measure BOTA-3). As described in PM&E Measure BOTA-3, if temporary disturbance occurs to a portion of the population, CDFW recommends that PG&E "stockpile" the top 10 inches of soil from the area to be disturbed, protect the soil from exposure to weed seeds, and return the stockpiled soil when activities are complete. This action would safely protect the seed bank and allow the plants to re-establish in the area after decommissioning is completed.

In addition, consultation with CDFW or CNPS staff knowledgeable in the life requisites of big-scale balsam-root, including appropriate propagation methods prior to disturbance and the restoration process, would ensure that the seed bank and/or rhizomes would be salvaged and distributed within the appropriate habitat and under necessary conditions to maximize the potential for success. Therefore, impacts to special-status plant species would be less than significant.

Abbott Ditch

The lands irrigated and thus under hydrological influence of Abbott Ditch have not been surveyed for special-status species. Therefore, impacts to special-status plant species potentially present along the Abbott Ditch would be significant.

- **Level of Significance:** Significant
- **Mitigation Measure 4.7-10:** Prior to commencing activities that will reduce augmented flows in Hooten Gulch, PG&E shall complete a survey for special-status species in areas to be directly impacted by changes to the amount of water flowing in the Abbott Ditch. PG&E shall capture and relocate to suitable habitat any individuals of these species observed in the surveyed area. PG&E shall consult with USFWS and CDFW as appropriate for capture and relocation efforts. PG&E shall, as early as possible, identify and communicate their process to the affected private land owners.
- **Impact Determination after Mitigation:** Less than Significant

Alternative 2A, 2B, 2C, and 2D:

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and therefore could result in impacts on special status plant species. As with

the Proposed Project, these areas would be surveyed for special status plant species prior to any construction activities. With implementation of PM&E measures, impacts resulting from implementation of these alternatives would be less than significant.

No Project Alternative:

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place because no construction activities would occur; no impacts on special status plant species would result. There would be no additional impacts from this alternative related to Section 4.7-10 (Cow Creek).

IMPACT 4.7-11 (Cow Creek): Would the action influence the spread of invasive/noxious plants?

Proposed Project

Invasive non-native and noxious plant species are well-established in the Project Area as noted by the identification of 12 species during the botanical surveys. Under the Proposed Project, it is likely that invasive non-native and noxious species would spread. PM&E Measure BOTA-1 proposes development of an MMP to address impacts to riparian and wetland areas. Restoration of disturbed or cleared areas by reseeding would hasten growth of native vegetation cover and minimize soil erosion. PM&E Measure BOTA-1, and recommendations by resource agencies, are consistent and in favor of using native seed in the restoration process, and the use of sterile cereal seed, if native seed is not available. Priority would be given to the use of native seed. The MMP would also include contingency measures for implementation of remedial actions such as eradication of invasive noxious plant species and/or re-seeding with native species, if final performance criteria are not met.

Implementation of the MMP for restoration of disturbed or cleared areas, would reduce the potential spread and introduction of noxious weeds. However, heavy equipment that is brought to the area from outside of the watershed could result in the spread or introduction of invasive/noxious plants. Therefore the impact is considered significant, but would be reduced to less than significant with mitigation.

- **Level of Significance:** Significant
- **Mitigation Measure 4.7-11:** Implement Mitigation Measure 4.7-4. Clean Equipment and Establish Weed Wash Stations.
- **Impact Determination after Mitigation:** Less than Significant

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. This could result in the spread of invasive/noxious plants. As with the Proposed Project, with implementation of appropriate mitigation and PM&E measures, impacts resulting from implementation of these alternatives would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place because no construction activities would occur; spread of invasive/noxious plants would not result. There would be no additional impacts from this alternative related to IMPACT 4.7-11 (Cow Creek).

IMPACT 4.7-12 (Cow Creek): Would the action result in impacts on birds and mammals?

Proposed Project

Noise, ground-shaking, lighting, and other construction-related disturbances during the active construction phase of decommissioning would result in temporary disturbance to and/or displacement of wildlife species utilizing the immediate Project Area and vicinity. Mobile species would be expected to flee or avoid areas under active construction and relocate to adjacent habitat until activity subsides. Construction activities associated with the Proposed Project may also result in the direct injury or mortality of non- or minimally mobile wildlife species (e.g., burrowing animals).

Habitat loss would be temporary and limited to areas directly affected by construction activities. Permanent habitat loss would be avoided and/or mitigated by implementation of PM&Es, however, temporary loss of vegetated areas (less than 10 acres) could extend for several years, or until natural vegetation recolonization is successful. Conversely, temporary impacts to riparian areas could be offset by benefits to the riparian corridor of South Cow Creek resulting from the return of Project water to the bypass reach of South Cow Creek.

Some open-water wildlife habitat would be lost from draining and filling of the Cow Creek Forebay, and creek habitat may be altered through the restoration of natural flows in Hooten Gulch. This could reduce the foraging habitat for wading birds; raptors such as the American peregrine falcon, bald eagle and osprey; and aerial foragers such as swallows, swifts, and bats. Although the loss of 1 acre of open-water habitat within the Project Area would be permanent, most of these species would forage in other habitats, and adequate habitat along perennial creeks would be preserved, though flows in Hooten Gulch are likely to revert to natural seasonal patterns. Ospreys and bald eagles are known to travel widely to find food and appear to be infrequent users of foraging habitat in the Cow Creek Development. The restoration of South Cow Creek to natural flow patterns could provide alternative foraging habitat for these species in the Project Area because average and minimum flows may increase during the low flow season. Therefore, no long-term adverse effects are expected from the loss of open water foraging habitat for bird and mammal species, including special-status species.

PM&E Measures WILD-2, WILD-3, and WILD-7 would minimize adverse effects resulting from the Proposed Project. PM&E Measures WILD-1 and WILD-3require pre-construction surveys to determine the presence or absence of special status wildlife species, capture and relocate special status species as applicable; avoid or restrict activities as necessary and provide exclusion fencing around construction areas. These measures are consistent with recommendations by CDFW.

PG&E proposes to provide environmental training for personnel involved in activities associated with the Proposed Project (PM&E Measure WILD-2). Training would provide personnel with information on special-status species potentially present and avoidance or disturbance

minimization actions to implement. Training would include descriptions of special status species and the distribution of a brochure or pamphlet containing instruction on careful driving and avoidance of amphibians, reptiles, or mammals in the path of construction vehicles. PM&E Measure WILD-7 implements a speed limit on Project roads and temporary access roads while activities are being conducted to minimize injury or mortality to wildlife in roadways.

PM&E measures also provide for restoration and rehabilitation of vegetation communities so that wildlife habitat would be available as quickly as possible after the cessation of activity. Implementation of PM&E Measure BOTA-1 requires the development and implementation of an MMP that would include goals, methodologies, and performance criteria for mitigation and restoration that include a 2-year monitoring program to ensure that riparian habitat is re-established in disturbed and cleared areas.

In summary direct and/or indirect impacts from decommissioning activities would be temporary and/or limited in extent and not severe enough to affect the survival of a species or population. With implementation of the above referenced PM&Es, impacts on birds and mammals would be less than significant.

Abbott Ditch

Habitat restoration in the Project Area would help offset potential impacts on bird and mammal species. However, the lands irrigated and thus under hydrological influence of Abbott Ditch have not been surveyed for birds and mammals. Therefore, impacts on bird and mammal species potentially present along the Abbott Ditch would be significant.

- **Level of Significance:** Significant
- **Mitigation Measure 4.7-12:** Implement Mitigation Measures 4.7-9 and 4.7-10.
- **Impact Determination:** Less than Significant with Mitigation

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and therefore could result in impacts on birds and mammals. As with the Proposed Project, these areas would be surveyed for nesting birds and raptors prior to any construction activities. With implementation of PM&E measures, impacts resulting from implementation of these alternatives would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place because no construction activities would occur; no impacts on birds and mammals would result. There would be no additional impacts from this alternative related to IMPACT 4.7-12 (Cow Creek).

IMPACT 4.7-13 (Cow Creek): Would the action, specifically dewatering of canals, forebays, and related watercourses result in impacts on amphibians and pond turtles?

Proposed Project

The removal of the South Cow Creek diversion dam would result in a release of sediment from behind the dam, and a short-term loss of aquatic species habitat directly below the dam. Permanent dewatering of the Cow Creek Forebay would result in the permanent reduction of aquatic habitat available to amphibians and western pond turtles in the Project Area.

Foothill yellow-legged frogs are known to occur in South Cow Creek at the downstream end of the bypass reach where streamflows would be increased to the unimpaired levels. The ratio of proposed versus existing streamflows in the bypassed reach would vary by month (Figure 4.12-6). The changes to South Cow Creek streamflow would restore the natural average monthly flows throughout the year, which would increase average and minimum flows during the low flow season that would potentially increase breeding habitat for foothill yellow-legged frogs.

In addition, PM&E Measures WILD-1 and WILD-2 directly address potential impacts to amphibians (foothill yellow-legged frog) and aquatic reptiles (western pond turtles). PM&E Measure WILD-1 includes conducting pre-construction surveys, capture and relocation (to suitable habitat), and the installation of exclusion fencing around construction areas. Per PM&E Measures WILD-1 and WILD-2, PG&E would provide for a biological monitor and construction personnel training to avoid and minimize any actions affecting wildlife including special status amphibians and reptiles. If California red-legged frogs are located at any time, USFWS would be consulted prior to the continuation of work.

Therefore, with implementation of the above referenced PM&Es, the impact would be less than significant.

Hooten Gulch

The removal of the South Cow Creek diversion dam would reduce flows in Hooten Gulch, which may adversely affect western pond turtles, foothill yellow-legged frogs, and the potential summer habitat for California red-legged frogs. Per PM&E Measure AQUA-9, the discontinuation of Cow Creek Powerhouse operations during spring, would return Hooten Gulch to its natural ephemeral flow regime, during the season when natural flows are present. These flows would subside naturally, allowing aquatic species (amphibians, pond turtles) to relocate to adjacent available habitat. This would minimize potential effects on amphibians and turtles from rapid loss of aquatic habitat.

Additionally, implementation of PG&E AQUA-10 would require that the Licensee remove gunite in Hooten Gulch and install any replacement bank stabilization measure during the summer when the gulch is dry. This would minimize the potential for turbidity and/or the potential for contaminants from entering the water when aquatic species are present, and would avoid any direct impacts to amphibians or pond turtles using the area. Therefore, with implementation of the above referenced PM&Es, the impact would be less than significant.

Abbott Ditch

Elimination of augmented flows from the Cow Creek Powerhouse into Hooten Gulch would result in reduced water supply to Abbott Ditch, its lateral ditches, and intermittent drainages

below the ditch that are currently charged during the summer irrigation season by siphon leakage on the ditch. These aquatic features would no longer provide potential habitat for native frogs and pond turtles. Although this impact would be somewhat offset by the retention of irrigation water in South Cow Creek, the lands irrigated and thus under hydrological influence of Abbott Ditch have not been surveyed for amphibians and reptiles. Therefore, impacts on amphibian and reptile species potentially present along the Abbott Ditch would be significant.

- **Level of Significance:** Significant
- **Mitigation Measure 4.7-13:** Implement Mitigation Measures 4.7-9 and 4.7-10.
- **Impact Determination:** Less than Significant with Mitigation

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and therefore could result in impacts on amphibians and pond turtles. As with the Proposed Project, these areas would be surveyed for amphibians and pond turtles prior to any construction activities. With implementation of PM&E measures, impacts resulting from implementation of these alternatives would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place because no construction activities would occur; no impacts on amphibians and pond turtles would result. There would be no additional impacts from this alternative related to IMPACT 4.7-13 (Cow Creek).

IMPACT 4.7-14 (Cow Creek): Would the action result in impacts on rare, threatened, and endangered terrestrial species?

Proposed Project

As discussed below, it is not expected that the Proposed Project would impact terrestrial rare, threatened, or endangered (RTE) species. However, PM&E Measures WILD-1 and WILD-2 would be implemented to minimize the potential for adverse effects. Pre-construction surveys would provide current information on the possible location of RTE species within the development. If identified, appropriate measures to reduce potential effects would be implemented for specific species as discussed below. WILD-2 would provide an increased awareness of trained construction personnel, include the presence of a biological monitor to assist with identification of RTE species, implement stop work orders, and notify appropriate agency personnel as necessary. PM&E Measures WILD-1 and WILD-2 are consistent with recommendations by CDFW, and are consistent with the California Wildlife Action Plan (Cal Fish and Game 2007 as cited in PG&E 2009a).

Valley Elderberry Longhorn Beetle

Potential effects from decommissioning activities to elderberry shrubs, the host plant for VELB, would be minimized by the implementation of PM&E Measure WILD-4, which

provides pre-construction surveys for elderberry shrubs, and if shrubs providing appropriate habitat for VELB are found, measures provided in the Biological Opinion (NMFS 2011) covering the Licensee's service area would be implemented.

California Red-Legged Frog

Although the California red-legged frog has not been found to occur within the Cow Creek Development, PM&E WILD-1 would minimize potential effects on the California red-legged frog. Pre-construction surveys for California red-legged frogs would provide current information on the presence of the frogs and minimize effects by implementing protection measures that may include relocation of individuals as necessary. In addition, PM&E Measure WILD-2 would provide a biological monitor to provide training to construction personnel on environmental awareness, including identification of special status species, avoidance or minimization measures to be implemented including notification of the biological monitor and stop work orders.

Northern Spotted Owl

Although the northern spotted owl is not known to occur in the Project Area, PM&E WILD-3 would provide for pre-construction surveys to determine possible presence of northern spotted owl prior to initiation of any proposed activities. PM&E WILD-2 requires a biological monitor to provide training to construction personnel on environmental awareness, including identification of special status species, and avoidance or minimization measures, including notification of the biological monitor and stop work orders.

Fisher

PG&E proposed PM&E WILD-2 implements a biological monitor to provide training and guidance to construction personnel to ensure that all personnel are educated and aware of the potential for special status species to occur within the Project Area, their descriptions, and the actions to take upon identification of special status species. In addition, PM&E Measure WILD-7 would implement a posted 15 mile-per-hour speed limit on access and construction roads within the Cow Creek Development that would reduce the potential for fisher mortality from fast-moving construction traffic.

No direct impacts to terrestrial RTE species are expected under the Proposed Project, though short-term adverse effects could occur to potential habitat. Potential summer habitat is available for the California red-legged frog in Hooten Gulch, and VELB habitat (elderberry shrubs) exists near the South Cow Creek main canal at the Cow Creek Development. However, no California red-legged frogs or VELB have been documented within the Project Area. With implementation of PM&E Measures WILD-1 through WILD-4 and WILD-7, which are consistent with recommendations by CDFW, impacts to the potential habitat or occurrence for RTE species in the Project Area would be minimized and impacts would be less than significant.

Abbott Ditch

The lands irrigated and thus under hydrological influence of Abbott Ditch have not been surveyed for special-status species. Therefore, impacts on rate, threatened, and endangered terrestrial species potentially present along the Abbott Ditch would be significant.

- **Level of Significance:** Significant
- **Mitigation Measure 4.7-14:** Implement Mitigation Measures 4.7-9 and 4.7-10.
- **Impact Determination After Mitigation:** Less than Significant with Mitigation

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and therefore could result in impacts on RTE species. As with the Proposed Project, these areas would be surveyed for RTE species prior to any construction activities. With implementation of PM&E measures, impacts resulting from implementation of these alternatives would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place because no construction activities would occur; no impacts on RTE species would result. There would be no additional impacts from this alternative related to IMPACT 4.7-14 (Cow Creek).

This Page Intentionally Left Blank

4.8 Cultural Resources

This section describes the existing regulatory and environmental conditions and the consequences of implementing the Proposed Project on cultural resources. Where impacts are identified, mitigation measures are proposed to reduce those impacts to less-than-significant levels.

Cultural resources are defined as buildings, sites, structures, or objects, each of which may have historical, architectural, archaeological, cultural, or scientific importance. The California Office of Historic Preservation (OHP) defines a cultural resource as "any physical evidence of human activities over 45 years old…" (1995:2).

"Cultural resources" also embodies the National Historic Preservation Act's (NHPA) "historic property" and the CEQA historic and unique archaeological resources (see Section 4.9.3.2, State, for definition of historic and archaeological resource).

4.8.1 Environmental Setting

4.8.1.1 Sources of Information

Information about cultural resources used in this section was obtained from the following primary sources:

- Review of the Cultural Resources Inventory and Evaluation for the Kilarc-Cow Creek Hydroelectric Decommissioning Project (GANDA 2009)
- Review of associated site records
- Review of project site plans
- Review of state and local ordinances and regulations pertaining to historical resources and unique archaeological resources, including the Shasta County General Plan: Heritage Resources Element (Shasta County 2004i)
- Review of CEQA, including PRC sections 5097.5, 15064.5 (f), 21083.2, 15064.5 (b)(3), 5024.1, and CEQA Guidelines section 4850

In addition, a new record search at the Northeast Information Center (NEIC) of the California Historic Resource Inventory System (CHRIS) at California State University, Chico, was conducted in April 2018 to update the findings of PG&E's License Surrender Application Environmental Report (see Appendix B-3). This updated record search provided information on studies and cultural resources not discussed in the GANDA 2009 Inventory and Evaluation Report.

4.8.1.2 Cultural Setting

Prehistoric

Northeastern California is generally divided into the following prehistoric chronological periods: Early Holocene (10000 – 5000 B.C.), Post-Mazama (5000 – 3000 B.C.), Early Archaic (3000 – 1500 B.C.), Middle Archaic (1500 B.C. – A.D. 700), Late Archaic (A.D. 700 – 1400) and Terminal Period (A.D. 1400 – Contact). As evidenced throughout other regions throughout California, there is a general trend toward increased sedentism, a greater reliance on plant processing as opposed to mobile hunting, and trend to a more elaborate material culture.

The Early Holocene material culture is dominated by large lanceolate points from a variety of obsidian sources. People during this time were mobile hunters, who exploited a variety of game. Plants were not a dominant food source. The material culture of the Post-Mazama period is characterized by northern side-notched points and an increase in food process/milling equipment from the Early Holocene period. Subsistence practices continued to emphasize mobile hunting.

The Early Archaic period saw a continuing trend towards plant processing; this is reflected in the material record by an increase in ground stone milling equipment, pestles, and heavy core tools. Longer term occupation is also evident during this time, as more sedentary structures such as pit houses are present. Basalt bifaces and darts are also prolific in the archaeological record for this period. The Middle Archaic is characterized by a semi-sedentary to sedentary lifestyle, indicated by the presence of increasingly elaborate villages and base camps, with common hearths and ovens. Additionally, trade and exchange networks became more elaborate and obsidian quarrying increased; however, the obsidian that was quarried came from less diverse sources.

The Late Archaic period was defined by changing settlement patterns as populations were affected by the Medieval Climatic Anomaly and Numic-speaking groups moving into the area. Rose Spring and Gunther barbed projectile points are common, and in the northern northeastern California region, settlements began to reflect multifamily residential camps, with a variety of tools evidenced, numerous storage pits and defined work areas. Perhaps due to factors relating to climate change or the incursion of Numic-speaking groups, subsistence patterns appear to be oriented toward hunting at this time. Exchange networks and material culture became increasingly elaborate during the Terminal period. This was also a period of population growth and increasing sedentism (McGuire 2007).

Ethnographic

At the time of contact, the Central Yana, a Hokan-speaking group, occupied the study area. Native groups, who spoke Hokan or a derivative of Hokan, were located in pockets throughout a widespread area, from the modern day Mexican border to the Oregon border. Linguistic evidence suggests that Hokan has preceded many other language groups in California, as other language groups, such as Athabaskan and Uto-Aztecan, were clearly influenced by Hokan (Golla 2007).

The Yana inhabited the upper Sacramento River valley, and the foothills east of the Sacramento River and south of the Pit River and north of Pine and Rock Creeks (primarily along the Deer Creek drainage). The crest of the southern Cascades passing through Lassen Peak formed the eastern boundary (Kroeber 1925). The Yanas' numbers probably never exceeded 2,000 individuals. Much of what is known about Yana culture was provided by Ishi, a Yahi Yana, who was brought to the University of California in 1911 after his family group died and he was left alone to survive.

The Yana lived in small bands that seasonally occupied villages and campsites along the perennial streams of the region. Gathering, fishing, and hunting provided subsistence and material resources. Acorn was a dominant food source. Manufacturing was restricted to stone, bone, and wood tools, and the weaving of baskets, nets and bags (Johnson 1978; Kroeber 1925).

Historic

The historical chronology in the study area corresponds with the general historical chronology of California: Mission Period (A.D. 1769 – 1822), Rancho Period (A.D. 1822 – 1850), and American Period (A.D. 1850 – present). The Mission Period was the period of Spanish influence in California, as Spain initiated their trifecta of colonization: presidiums, pueblos, and missions. This support system of forts, towns, and churches/missions was established to not only colonize the area, but was intended to help the Indians become integrated into Spanish society. Spanish influence was not as prevalent in the study area, as the closest missions were Mission Dolores (c. 1776), Mission San Rafael Arcangel (c. 1817), and Mission San Francisco Solano in Sonoma (c. 1823). Although the Yana were not in direct contact with the missions, they were surely affected by the spread of unfamiliar diseases. The earliest contact the Yana might have had with EuroAmericans was at the end of the Mission Period when in 1821; Captain Luis Arguello led an expedition from San Francisco to Redding.

The Rancho Period was spearheaded by Mexico's Independence from Spain in 1821. This was followed by an increased presence of both French and American traders and trappers within the region, most notably in the study area by the Hudson's Bay Company, from 1828 to 1846. A significant epidemic occurred from 1831 to 1833, following the growing EuroAmerican presence within the area, resulting in the decimation of many Native Americans. In 1834, the missions became secularized and the land was divided up into land grants. In 1848, gold was discovered in Sutter's Mill in Coloma, and near the study area, at Readings Clear Creek in Shasta County. As explorers arrived to seek their fortunes, squatting often ensued; this ensured the continuing erosion of land grant owners' rights and could eventually lead to violent confrontations over land, both physically and in the courtroom. The Nobles Road, which was oriented along the south fork of Cow Creek and continued to the north fork of Battle Creek, was established in 1851, and was a primary means of conveyance for people coming west to what is now Shasta County. Mining camps were set up all over the region, and within the study area near Kilarc and Cow Creek.

The American Period saw the admittance of California to the Union on September 9, 1850. The land claims commission and the court system reviewed Spanish and Mexican land grants and made rulings to disperse land. Shasta County was established as one of the original 27 California Counties in 1850. At that time, Shasta County included Modoc, Lassen, Siskiyou, Plumas, and Tehama Counties. The seat for Shasta County was originally established on Major Pierson Reading's original Mexican land grant of Buena Ventura, then called Readings Ranch. Eventually the seat moved to Shasta and finally to Redding in 1888. As towns such as Fall City, Millville, and Shingletown developed within the region in the 1850s, forts also were established to protect settlers from Native incursions. However, Native groups, such as the Yana, would also seek protection from the forts, as violence between EuroAmerican settlers and Native groups continued throughout the latter half of the 1800s.

After the gold rush, EuroAmerican immigrants continued to move into the area to farm and ranch. As a result, irrigation systems, constructed by such companies as the South Cow Creek Irrigation Company, who constructed the German Ditch, became prevalent. Although gold mining reached its zenith in the 1880s, it experienced a resurgence of dredge mining in the 1930s. However, within Shasta County, copper mining began to be a significant industry after the establishment of copper smelters at Keswick, Coram, Kennett, Bully Hill, and Ingot in 1906. Smelters within the Cow Creek watershed included Afterthought, Donkey Mine, and Ingot. Due

to significant environmental degradation, the smelters eventually closed by 1920 (GANDA 2009; Hoover et al. 2002; Johnson 1978).

Hydroelectric Power Systems Historical Context

In the 1870s, California was experiencing a need for additional power as a result of the continuing population increase and the prevalence of such industries as mining. To meet this need, hydroelectric systems were developed. These systems took advantage of California's topography and relief, numerous watersheds, and remnants of water conveyance system from mining and irrigation. By 1902, hydroelectric power was prevalent throughout the region. In 1895, the Folsom Powerhouse on the American River became California's first hydroelectric plant. In 1897, the Keswick Electric Power Company was created by Lord Keswick of London and Hamden Holmes Noble, who was a San Francisco stockbroker and financier, in order to provide power for the booming copper mining occurring in Shasta County. In 1902, Keswick Electric Power Company incorporated with Edward Coleman and Antoine Barrel to become Northern California Power Company (NCPC). The Kilarc Powerhouse was constructed by NCPC to serve the Bully Hill copper smelter. The powerhouse was online by 1904, and was named after high-voltage switch oil.

By 1910, due to a significant drop in demand, the NCPC was increasingly less successful, which led to Pacific Gas and Electric Company (PG&E) purchasing NCPC in 1919. The Cow Creek Powerhouse was built by NCPC's competitor, Northern Light and Power Company of Redding, in 1907. It was running by 1908 and in 1912, NCPC bought Northern Light and Power Company, which became part of the PG&E purchase in 1919. In 1929, the Big Creek Hydroelectric System was established, which accounted for numerous facilities, and which generated 424,500 kilowatts of electricity. The Central Valley Project, established in the 1930s by the Bureau of Reclamation, also was a significant source of energy for California. In 1945, the California State Water Resources Act and post-war demand for additional energy, led to the continued development of hydroelectric power throughout California. During the 1940s and 1950s, significant updates and repairs were made to hydroelectric systems across the state (GANDA 2009; PCWA 2010).

4.8.2 Regulatory Setting

The following state, regional, and local requirements for the Proposed Project are described below.

4.8.2.1 Federal

National Environmental Policy Act

NEPA establishes the federal policy of protecting important historic, cultural, and natural aspects of our national heritage during federal project planning. All federal or federally assisted projects requiring action pursuant to section 102 of NEPA must take into account impacts on cultural resources (42 U.S.C. §§ 4321–4347).

The Council on Environmental Quality (CEQ) Guidelines provided a standard for determining the significance of impacts analyzed under NEPA. Significance as used in NEPA requires considering impacts in terms of both context and intensity (40 CFR 1508.27).

Context means that the action must be analyzed in terms of society as a whole, the affected region and interests, and the local setting. The span of the context should be scaled to match the action. For larger actions a wider context is appropriate. For smaller site-specific actions the local context may be sufficient. Both the short- and long-term impacts of an action are relevant to this analysis (40 CFR 1508.27[a]).

Intensity means the severity of an impact. The CEQ Guidelines direct federal agencies to consider cultural resources when evaluating intensity. Specific factors that may affect the intensity of an impact include the proximity to historical or cultural resources, the potential for impacts on NRHP-eligible or listed properties and the potential for loss or destruction of significant scientific, cultural, or historical resources (40 CFR 1508.27[b]).

Collectively, these considerations mean that NEPA analysis should identify the potential for an action to adversely affect resources that are or may be eligible for listing on the NRHP.

Section 106 of the National Historic Preservation Act of 1966

Section 106 of the National Historic Preservation Act (NHPA) (Section 106) requires that every federal agency "take into account" how each of its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties (TCPs), and objects significant in American history, architecture, engineering, and culture that are eligible for or listed in the National Register of Historic Places (NRHP). Historic properties are resources listed on or eligible for listing on the NRHP (36 C.F.R. 800.16(l)(1)). A property may be listed in the NRHP if it meets criteria provided in the NRHP regulations (36 C.F.R. 60.4).

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association (further discussed below in Section 18.2.2.1) and:

(A) That are associated with events that have made a significant contribution to the broad patterns of our history; or

(B) That are associated with the lives of persons significant in our past; or

(C) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess artistic value, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(D) That have yielded, or may be likely to yield, information important in prehistory or history.

Some property types do not typically qualify for the NRHP, however these properties may qualify if they fall into one or more of the following criteria considerations. These considerations consist of the following (36 C.F.R. 60.4).

- A religious property deriving primary significance from architectural or artistic distinction or historical importance; or
- A building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event; or

- A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building directly associated with his productive life.
- A cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events; or
- A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived; or
- A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own exceptional significance; or
- A property achieving significance within the past 50 years if it is of exceptional importance.

The Section 106 review process typically consists of the following major steps:

- Identify the federal agency undertaking.
- Initiate Section 106 process.
- Identify historic properties.
- Assess adverse effects.
- Resolve adverse effects.

The Section 106 regulations define an adverse effect as an effect that alters, directly or indirectly, the qualities that make a resource eligible for listing in the NRHP (36 C.F.R. 800.5(a)(1)). Consideration must be given to the property's location, design, setting, materials, workmanship, feeling, and association, to the extent that these qualities contribute to the integrity and significance of the resource. Adverse effects may be direct and reasonably foreseeable, or may be more remote in time or distance (36 C.F.R. 800.5(a)(1)).

Under section 304(a) of the National Historic Preservation Act, "[t]he head of a Federal agency … shall withhold from disclosure to the public, information about the location, character, or ownership of a historic resource if the Secretary and the agency determine that disclosure may … risk harm to the historic resources …"

Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act (NAGPRA) provides a process for federal agencies to return certain Native American cultural items to lineal descendants and culturally affiliated Indian tribes. NAGPRA defines the ownership of Native American human remains and funerary materials excavated on lands owned or controlled by the federal government. NAGPRA establishes a hierarchy of ownership rights for Native American remains and objects identified on these lands (25 U.S.C. § 3002):

- Where the lineal descendants can be found, the lineal descendants own the remains or objects.
- Where the lineal descendants cannot be found, the remains or objects belong to the Indian tribe or Native Hawaiian organization on whose land the remains were found.

- If the remains are discovered on other lands owned or controlled by the federal government and the lineal descendants cannot be determined, the remains belong to the Indian tribe or Native Hawaiian organization that is culturally affiliated with the remains, or the tribe that aboriginally occupied the land where the remains were discovered.

Intentional excavation of Native American human remains or objects on lands owned or controlled by the federal government may occur only under the following circumstances ((25 U.S.C. § 3002 (c)):

- With a permit issued under the Archaeological Resources Protection Act (16 U.S.C. § 470cc); and;
- After documented consultation with the relevant tribal or Native American groups.
- Ownership and disposition follows NAGPRA for all human remains and associated artifacts.

NAGPRA also provides guidance on inadvertent discoveries of Native American or Hawaiian human remains on lands owned or controlled by the federal government. When an inadvertent discovery on these lands occurs in association with construction, construction must cease. The party that discovers the remains must notify the relevant federal agency, and the remains must be transferred according the ownership provisions above (25 U.S.C., § 3002(d)).

The Archaeological Resources Protection Act

The Archaeological Resources Protection Act (ARPA) requires a permit for intentional excavation of archaeological materials on federal lands (16 U.S.C. § 470ee(a)). The federal agency that owns or controls the land may dispense permits for excavation as provided in the ARPA regulations (43 C.F.R. 7.5). The permit may require notice to affected Indian tribes (43 C.F.R. 7.7), and compliance with the terms and conditions provided in the ARPA regulations (43 C.F.R. 7.9).

4.8.2.2 State

California Environmental Quality Act (CEQA)

Under CEQA, public agencies must consider the effects of their actions on both “historical resources” and “unique archaeological resources.” As stated in PRC section 21084.1, a “project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment.” PRC section 21083.2 requires agencies to determine whether Proposed Projects would have effects on “unique archaeological resources.”

“Historical resource” is a term with a defined statutory meaning (PRC, § 21084.1 and CEQA Guidelines, § 15064.5(a)). The term embraces any resource listed in or determined to be eligible for listing in the California Register of Historical Resources (CRHR). The CRHR includes resources listed in or formally determined eligible for listing in the NRHP, as well as some California State Landmarks and Points of Historical Interest.

Properties of local significance that have been designated under a local preservation ordinance (local landmarks or landmark districts) or that have been identified in a local historical resources inventory may be eligible for listing in the CRHR and are presumed to be “historical resources” for purposes of CEQA (PRC, § 5024.1 and CCR, Title 14, § 4850). Unless a resource listed in a

survey has been demolished, lost substantial integrity, or a preponderance of evidence indicates that it is otherwise not eligible for listing, a lead agency should consider the resource to be potentially eligible for the CRHR.

In addition to assessing whether historical resources potentially impacted by a Proposed Project are listed or have been identified in a survey process (PRC, § 5024.1(g)), lead agencies have a responsibility to evaluate them against the CRHR criteria prior to making a finding as to a Proposed Project's impacts to historical resources (PRC, § 21084.1 and CCR, Title 14, § 15064.5(a)(3)). Under CEQA Guidelines, section 15064.5, subdivision (a), a historical resource is defined as any object, building, structure, site, area, place, record, or manuscript that:

- Is historically or archeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political or cultural annals of California; and

Meets any of the following criteria:

- Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
- Is associated with the lives of persons important in our past;
- Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
- Has yielded, or may be likely to yield, information important in prehistory or history.

PRC, section 5024 also requires consultation with the OHP when a project may impact historical resources located on state-owned land.

For historic structures, CEQA Guidelines, section 15064.5, subdivision (b)(3) states that a project that follows the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings, or the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings (1995) will mitigate impacts to a less-than-significant level. Potential eligibility also rests upon the integrity of the resource. Integrity is defined as the retention of the resource's physical identity that existed during its period of significance. Integrity is determined through considering the setting, design, workmanship, materials, location, feeling, and association of the resource.

As noted above, CEQA also requires lead agencies to consider whether projects will impact "unique archaeological resources." PRC, section 21083.2, subdivision (g) states that a "unique archaeological resource" means an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, a high probability exists that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information;
- Has a special and particular quality such as being the oldest of its type or the best available example of its type; and/or

- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

Treatment options under PRC, section 21083.2 include activities that preserve such resources in place in an undisturbed state. Other acceptable methods of mitigation under PRC section 21083.2 include excavation and curation or study in place without excavation and curation (if the study finds that the artifacts would not meet one or more of the criteria for defining a "unique archaeological resource").

Advice on procedures to identify cultural resources, evaluate their importance, and estimate potential effects is given in several agency publications such as the series produced by the Governor's Office of Planning and Research. The technical advice series produced by this office strongly recommends that Native American concerns and the concerns of other interested persons and corporate entities, including, but not limited to, museums, historical commissions, associations and societies, be solicited as part of the process of cultural resources inventory. In addition, California law protects Native American burials, skeletal remains, and associated grave goods regardless of their antiquity and provides for the sensitive treatment and disposition of those remains.

Health and Safety Code, section 7050.5, subdivision (b) specifies protocols when human remains are discovered as follows:

> *In the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there will be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the coroner of the county in which the human remains are discovered has determined, in accordance with Chapter 10 (commencing with Section 27460) of Part 3 of Division 2 of Title 3 of the Government Code, that the remains are not subject to the provisions of Section 27492 of the Government Code or any other related provisions of law concerning investigation of the circumstances, manner and cause of death, and the recommendations concerning treatment and disposition of the human remains have been made to the person responsible for the excavation, or to his or her authorized representative, in the manner provided in Section 5097.98 of the Public Resources Code.*

CEQA Guidelines, section 15064.5, subdivision (e) requires that excavation activities be stopped whenever human remains are uncovered and that the county coroner be called in to assess the remains. If the county coroner determines that the remains are those of Native Americans, the Native American Heritage Commission (NAHC) must be contacted within 24 hours. At that time, the lead agency must consult with the appropriate Native Americans, if any, as timely identified by the NAHC. PRC, section 15064.5 directs the lead agency (or applicant), under certain circumstances, to develop an agreement with the Native Americans for the treatment and disposition of the remains.

In addition to the mitigation provisions pertaining to accidental discovery of human remains, the PRC also requires a lead agency to make provisions for the accidental discovery of historical or archaeological resources. According to PRC, section 15064.5, subdivision (f), these provisions should include "an immediate evaluation of the find by a qualified archaeologist. If the find is determined to be an historical or unique archaeological resource, contingency funding and a time allotment sufficient to allow for implementation of avoidance measures or appropriate mitigation should be available. Work could continue on other parts of the building site while

historical or unique archaeological resource mitigation takes place." PRC, section 5024 requires consultation with the OHP when a project may impact historical resources located on state-owned land.

Paleontological resources are classified as nonrenewable scientific resources and are protected by state statute (PRC, § 5097.5; CEQA Guidelines Appendix G). No state or local agencies have specific jurisdiction over paleontological resources. No state or local agency requires a paleontological collecting permit to allow for the recovery of fossil remains discovered as a result of construction-related earth moving on state or private land in a project site.

Mitigation Requirements for Archaeological Resources Qualifying As Historical Resources

As set forth in CEQA Guidelines, section 15064.5, subdivision (c), special rules apply where a lead agency is not certain at first whether an archaeological resource qualifies as either an "historical resource" or a "unique archaeological resource." That section provides that "[w]hen a project will impact an archaeological site, a lead agency shall first determine whether the site is an historical resource[.]" "If a lead agency determines that the archaeological site is an historical resource," the resource shall be subject to the rules set forth above regarding historical resources. In addition, according to CEQA Guidelines, section 15126.4, subdivision (b):

> *[p]ublic agencies should, whenever feasible, seek to avoid damaging effects on any historical resource of an archaeological nature. The following factors shall be considered and discussed in an EIR for a project involving such an archaeological site:*
>
> *(A) Preservation in place is the preferred manner of mitigating impacts to archaeological sites. Preservation in place maintains the relationship between artifacts and the archaeological context. Preservation may also avoid conflict with religious or cultural values of groups associated with the site.*
>
> *(B) Preservation in place may be accomplished by, but is not limited to, the following:*
>
> 1. *Planning construction to avoid archaeological sites;*
> 2. *Incorporation of sites within parks, greenspace, or other open space;*
> 3. *Covering the archaeological sites with a layer of chemically stable soil before building tennis courts, parking lots, or similar facilities on the site.*
> 4. *Deeding the site into a permanent conservation easement.*

Thus, although PRC, section 21083.2, in dealing with "unique archaeological sites," provides for specific mitigation options "in no order of preference," CEQA Guidelines, section 15126.4, subdivision (b), in dealing with "historical resources of an archaeological nature," provides that "[p]reservation in place is the preferred manner of mitigating impacts to archaeological sites."

For archaeological resources that qualify as historical resources, "data recovery" is a disfavored form of mitigation compared with "preservation in place." Yet "[w]hen data recovery through excavation is the only feasible mitigation, a data recovery plan, which makes provisions for adequately recovering the scientifically consequential information from and about the historical resource, shall be prepared and adopted prior to any excavation being undertaken. Such studies shall be deposited with the California Historical Resources Regional Information Center." Moreover, "[i]f an artifact must be removed during project excavation or testing,

curation may be an appropriate mitigation" (CEQA Guidelines, § 15126.4, subd. (b)(3)(C)). "Data recovery shall not be required[, however,] for an historical resource [as with a unique archaeological resource] if the lead agency determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the archaeological or historical resource, provided that the determination is documented in the EIR and that the studies are deposited with the California Historical Resources Regional Information Center" (CEQA Guidelines, § 15126.4, subd. (b)(3)(D)).

With respect to both historical resources and unique archaeological resources, "a lead agency should make provisions for… resources accidentally discovered during construction. These provisions should include an immediate evaluation of the find by a qualified archaeologist. If the find is determined to be an historical or unique archaeological resource, contingency funding and a time allotment sufficient to allow for implementation of avoidance measures or appropriate mitigation should be available. Work could continue on other parts of the building site while historical or unique archaeological resource mitigation takes place." (CEQA Guidelines, § 15064.5, subd. (f).)

Mitigation for Unique Archaeological Resources

If a lead agency determines that "an archaeological site does not meet the criteria" for qualifying as an historical resource "but does meet the definition of a unique archeological resource…, the site shall be treated in accordance with the provisions of [PRC] section 21083.2." (CEQA Guidelines, § 15064.5, subd. (c)(3).) Section 21083.2 of the PRC contains the special rules for mitigation for "unique archaeological resources." These rules do not apply if the archaeological resource is an historical resource (CEQA Guidelines, § 15064.5, subd. (c)(1)). Section 21083.2 of CEQA states:

> (b) If it can be demonstrated that a project will cause damage to a unique archaeological resource, the lead agency may require reasonable efforts to be made to permit any or all of these resources to be preserved in place or left in an undisturbed state. Examples of that treatment, in no order of preference, may include, but are not limited to, any of the following:
>
> 1. Planning construction to avoid archaeological sites.
> 2. Deeding archaeological sites into permanent conservation easements.
> 3. Capping or covering archaeological sites with a layer of soil before building on the sites.
> 4. Planning parks, greenspace, or other open space to incorporate archaeological sites.
>
> [. . . .]
>
> Excavation as mitigation shall be restricted to those parts of the unique archaeological resource that would be damaged or destroyed by the project. Excavation as mitigation shall not be required for a unique archaeological resource if the lead agency determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the resource, if this determination is documented in the environmental impact report.

If, however, "an archaeological resource is neither a unique archaeological nor an historical resource, the effects of the project on those resources shall not be considered a significant

effect on the environment. It shall be sufficient that both the resource and the effect on it are noted in the Initial Study or EIR, if one is prepared to address impacts on other resources, but they need not be considered further in the CEQA process" (CEQA Guidelines, § 15064.5, subd. (c)(4)).

California Public Resources Code, Duties of State Agencies

California state agencies must provide the Office of Historic Preservation an inventory of all state-owned structures older than 50 years of age under its jurisdiction that are listed in or that may be eligible for inclusion in the NRHP or are registered or that may be eligible for registration as a state historical landmark (PRC, § 5024 (a)). The Office of Historic Preservation compiles these lists into a master list (PRC, § 5024 (d)).

State agencies must provide notice to the State Historic Preservation Officer early in the planning process if the agency intends to alter or demolish resources on the master list (PRC, § 5024.5 (a)). The State Historic Preservation Officer has 30 days to respond after receiving notice. If the State Historic Preservation Officer determines that the action will have an adverse effect on a listed historical resource, the agency must adopt prudent and feasible measures to mitigate or eliminate the adverse effects (PRC, § 5024.5 (b)).

Discoveries of Human Remains under California Environmental Quality Act Public Law

California law sets forth special rules that apply where human remains are encountered during project construction. These rules are set forth in CEQA Guidelines, section 15064.5, subdivision (e) as follows:

> (e) In the event of the accidental discovery or recognition of any human remains in any location other than a dedicated cemetery, the following steps should be taken:
>
> (1) There shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until:
>
> (A) The coroner of the county in which the remains are discovered must be contacted to determine that no investigation of the cause of death is required [see Health & Saf. Code, § 7050.5], and
>
> (B) If the coroner determines the remains to be Native American:
>
> 1. The coroner shall contact the Native American Heritage Commission within 24 hours.
>
> 2. The Native American Heritage Commission shall identify the person or persons it believes to be the most likely descended from the deceased Native American.
>
> 3. The most likely descendent may make recommendations to the landowner or the person responsible for the excavation work, for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods (as provided in Public Resources Code Section 5097.98), or
>
> (2) Where the following conditions occur, the landowner or his authorized representative shall rebury the Native American human remains and associated grave goods with

appropriate dignity on the property in a location not subject to further subsurface disturbance.

(A) The Native American Heritage Commission is unable to identify a most likely descendent or the most likely descendent failed to make a recommendation within 24 hours after being notified by the commission.

(B) The descendant identified fails to make a recommendation; or

(C) The landowner or his authorized representative rejects the recommendation of the descendant, and the mediation by the Native American Heritage Commission fails to provide measures acceptable to the landowner.

California Native American Graves Protection and Repatriation Act

Sections 8010–8011 of the Health and Safety Code establish a state repatriation policy that is consistent with and facilitates implementation of NAGPRA. The policy requires that all California Indian human remains and cultural items be treated with dignity and respect and encourages voluntary disclosure and return of remains and cultural items by publicly funded agencies and museums in California. The policy provides for mechanisms to aid California Indian tribes, including non–federally recognized tribes, in filing repatriation claims and getting responses to those claims.

Confidentiality Considerations

CEQA and the California Public Records Act (Gov. Code, § 6250 et seq.) restrict the amount of information regarding cultural resources that can be disclosed in an EIR in order to avoid the possibility that such resources could be subject to vandalism or other damage (*Clover Valley Foundation v. City of Rocklin* (2011) 197 Cal.App.4th 200, 219). The State CEQA Guidelines prohibit an EIR from including "information about the location of archaeological sites and sacred lands, or any other information that is subject to the disclosure restrictions of Section 6254 of the Government Code." (CEQA Guidelines, § 15120, subd. (d).) In turn, Government Code section 2654 lists as exempt from public disclosure any records "of Native American graves, cemeteries, and sacred places and records of Native American places, features, and objects described in Sections 5097.9 and 5097.933 of the Public Resources Code maintained by, or in the possession of, the Native American Heritage Commission, another state agency, or a local agency." (Gov. Code, § 6254, subd. (r)).

Public Resources Code sections 5097.9 and 5097.993 list the Native American places, features, and objects, the records of which are not to be publically disclosed under the California Public Records Act: "any Native American sanctified cemetery, places of worship, religious or ceremonial site, or sacred shrine located on public property" (Pub. Resources Code, § 5097.9) and any "Native American historic, cultural, or sacred site, that is listed or may be eligible for listing in the California Register of Historic Resources …, including any historic or prehistoric ruins, any burial ground, any archaeological or historic site, any inscriptions made by Native Americans at such a site, any archaeological or historic Native American rock art, or any archaeological or historic feature of a Native American historic, cultural, or sacred site …" (Pub. Resources Code, § 5097.993, subd. (a)(1)).

The Public Records Act also generally prohibits disclosure of archaeological records. Government Code section 6254.10 provides: "Nothing in [the Public Records Act] requires disclosure of records that relate to archaeological site information and reports maintained by, or in the possession of … a local agency, including the records that the agency obtains through a consultation process between a California Native American tribe and a state or local agency."

These authorities prohibit the disclosure of records and information concerning certain of the region's archeological, cultural, and historic resources in this Draft EIR. Confidentiality of the site locations of certain archaeological, cultural, and historic resources found in the region is necessary to prevent vandalism to the resources. Public release of information on the sites may allow their discovery by trespassers, leading to potential looting. As a result, specific descriptions of certain of the archeological, cultural, and historic resources are not provided in this chapter. For the preservation of the sites, specific information on the locations and nature of findings at the resources cannot be included in the CEQA documents. Site-specific content and location information will be reviewed by appropriate federal and state agency officials on a need-to-know basis, thereby protecting the confidential information regarding location and content of the sites.

4.8.3 Analysis Methodology

The methodology section describes the resource-specific assessment methods, approach, and analytical models used to identify and evaluate the environmental impacts for the resource. It also describes any specific significance criteria used in the assessments to determine the level of significance of an impact. The thresholds section describes thresholds of significance used for the resource to determine the significance of impacts as required. The thresholds for determining the significance of impacts for this analysis are based on the State Water Board's Environmental Checklist in Appendix A of its regulations for implementation of CEQA (CCR, Title 23) and the Environmental Checklist in Appendix G of the CEQA Guidelines.

4.8.3.1 Analytical Approach

According to the CEQA Guidelines, a project with an effect that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant impact on the environment (Pub. Resources Code, § 15064.5 (b)). The CEQA Guidelines further state that a substantial adverse change in the significance of a resource means the "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historical resource would be materially impaired." (CEQA Guidelines, § 15064.5, subd. (b)(1).)

Actions that would materially impair the significance of a historic resource are those that would demolish or adversely alter those physical characteristics that convey its historical significance and qualify it for inclusion in the CRHR or in a local register or survey that meet the requirements of sections 5020.1 (k) and 5024.1 (g) of the Public Resources Code.

The focus of the assessment is on physical changes to the environment that may affect cultural resources. The following methods were used to evaluate the potential impacts to cultural resources in the study area:

- Analyze the results of previous studies to identify potential effects

- Set a level of significance of the individual cultural resources within the Project to use as the basis for the effects analysis

4.8.3.2 Criteria for Determining Significance

The Regulatory Context section addresses the method for assessing significance of the cultural resource itself. The following is criteria for addressing the environmental effects to that resource.

Based on the State Water Board's Environmental Checklist in Appendix A of the Board's CEQA regulations, Appendix G of the CEQA Guidelines, and professional standards and practices, a Proposed Project would have a significant impact if it would:

- Cause a substantial adverse change in the significance of a historical resource as defined in 15064.5
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to 15064.5
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature
- Disturb any human remains, including those interred outside of formal cemeteries

4.8.4 Environmental Impacts and Mitigation

PG&E has included the following measures to address impacts due to decommissioning activities.

- **PM&E Measure HIST-1: Documentation.** The Licensee shall prepare a Memorandum of Agreement (MOA) to address the unanticipated discovery of human remains and the long-term management and treatment of the architecturally and historically significant powerhouses. As will be stipulated in the MOA, the Licensee shall prepare photographic, architectural, and written documentation that meets Historic American Building Survey (HABS) and Historic American Engineering Record (HAER) standards prior to commencing decommissioning activities.
- **PM&E Measure HIST-2: Securing Buildings.** The Licensee shall secure the two powerhouse structures from unwanted entry, provide adequate ventilation to the interiors, shut down or modify the existing utilities and mechanical systems, and employ maintenance and monitoring measures for the buildings.
- **PM&E Measure ARCH-1: Archaeological Resources Summary.** The Licensee shall avoid all ground disturbing activities in the vicinity of the five archaeological sites. A qualified Licensee or consulting archaeologist shall monitor Project activities if they occur within 50 feet of these identified resources. If the Licensee cannot avoid ground disturbing activities at or near the five sites, the Licensee shall conduct formal evaluations of the sites' eligibility for listing in the NRHP and CRHR.
- **PM&E Measure ARCH-2: Unanticipated Archaeological Sites.** If archaeological resources are accidentally disturbed during decommissioning activities, the Licensee shall stop all work within the immediate vicinity until a qualified Licensee or consulting archaeologist can evaluate the discovery and provide recommendations, if an archaeological monitor is not already present.

- **PM&E Measure ARCH-3: Encountering Human Remains.** If human remains are encountered as a result of decommissioning activities, the Licensee shall stop all work in the vicinity and immediately contact the County Coroner. In addition, a qualified Licensee or consulting archaeologist shall be contacted immediately to evaluate the discovery, if a monitor is not already present. If the human remains are Native American in origin, then the Licensee shall request that the Coroner notify the NAHC within 24 hours of this identification.

4.8.5 PG&E's 2014 MOA With FERC and SHPO

As stated in FERC's EIS, PG&E requested concurrence from the SHPO on the evaluations and recommendations associated with the Proposed Project, by letter dated September 17, 2008, regarding the following: (1) the Kilarc and Cow Creek powerhouses are eligible for the National Register; (2) the Kilarc and Cow Creek hydroelectric systems (canals, bridges, dams, flumes, siphons, tunnels, spillways, berms, forebays, and penstocks) are not eligible individually or as components of historic districts due to their lack of integrity; and (3) avoidance of the five unevaluated prehistoric sites is appropriate for the purposes of decommissioning the systems.

Concurrence with the evaluations, recommendations, and intent to develop an MOA for mitigation purposes was received from the SHPO by letter dated November 4, 2008. Additionally, FERC notified and solicited comments from the Advisory Council on Historic Preservation (ACHP), SHPO, and interested Indian tribes on PG&E's proposed measures contained in its filed application for surrender of the Project license and proposed MOA by letter dated March 22, 2010. In July 2011, the MOA was signed by FERC and sent to SHPO for concurrence. SHPO and PG&E signed the MOA in April 2014 (FERC 2014). The MOA supersedes, but is consistent with, the proposed PM&Es listed above.

The 2014 MOA states the following:

Treatment of Historic Properties

1. *Take large-format Historic American Engineering Record (HAER) black and white photographs of the historic properties identified as the Kilarc and Cow Creek powerhouses, as mitigation for surrender. The photographs are to include general contextual views in their respective settings; close-up views of each elevation of both powerhouses; and detailed views of the powerhouses' historic architectural and engineering features, including their interior power generating equipment.*
2. *Process the above photographs using fine-grain black and white film for archival permanence. One 35-mm roll of film is to be developed into 5" x 7" prints on acid-free paper.*
3. *Prepare a report consisting of: (a) a written historical and descriptive account of the powerhouses, in accordance with the narrative format of the National Park Service's (NPS) guidelines for HAER documentation; (b) a site plan, drawn to a scale that fits on 81/2 x 11-inche paper, showing the powerhouses in relation to the other principal features of the project; (c) detailed copies of the original construction drawings of the powerhouses; and (d) one set of negatives and prints of the above powerhouse photographs and an index identifying each photograph by subject.*

4. *File with the Commission documentation that the SHPO has accepted the above final report.*
5. *Implement the plan in Appendix (A) of this MOA for the treatment of identified archaeological resources and for the treatment of any unanticipated discoveries.*

The following is excerpted from Appendix A of the MOA:

Training and Identification

Prior to the start of surrender activities, an archaeologist will train contractor supervisors on proper procedures for the protection of previously identified as well as those archaeological resources and human remains that may be unexpectedly discovered during surrender activities. The primary goals of the briefing are to familiarize key contractor personnel with the procedures to follow in the event of unanticipated discovery of cultural material or human remains and to provide contact protocol.

Unanticipated Discovery of Archaeological Resources or Human Remains

The following steps will be followed in the event that archaeological resources or human remains are discovered during construction.

1. *The contractor will stop work immediately in the vicinity of the find. The contractor will not resume work in the area of the find until Pacific Gas &Electric Company (PG&E) has complied with the provisions of this plan.*
2. *The contractor will immediately notify PG&E's on-site supervisor of the find*
3. *The PG&E supervisor will immediately notify PG&E's cultural resource specialist of the find.*
4. *The PG&E cultural resources specialist will determine if the find consists of archaeological resources or human remains, and will immediately notify the California SHPO and Native American Heritage Commission (NAHC) of the discovery.*

If the Find Consists of Archaeological Resources

The following procedures will be followed if the find is determined eligible or non-eligible for listing in the NRHP.

1. *If PG&E determines, in consultation with the SHPO, that the find is ineligible for listing in the NRHP, PG&E's cultural resource specialist will SHPO and will request the SHPO's approval to resume surrender activities in the discovery area.*
2. *If PG&E determines the find to be potentially eligible for listing in the NRHP, the following procedures will be followed:*
    a. *PG&E's cultural resource specialist will flag or fence off the site.*
    b. *PG&E's cultural resource specialist will assess the significance of the find and the potential effect(s) of construction on the find.*
    c. *PG&E's cultural resource specialist will consult with the SHPO, and any Native American Tribes that might attach religious or cultural importance to the find, to determine what steps need to be taken to assess the significance of the find and any potential effect(s) of surrender activities.*

3. *For any find that is determined to be eligible for listing in the NRHP, and would be adversely effected by surrender activities, PG&E's cultural resource specialist will develop a mitigation plan in consultation with the SHPO and Tribes, including appropriate mitigation measures for site treatment.*
4. *Once the provisions of this plan have been fulfilled, and the SHPO has concurred with PG&E on necessary treatment measures for the discovery, work may resume.*

   PG&E will file with the Commission a report for any discovery determined to be NRHP eligible and adversely affected, including the proposed mitigation plan and documentation of concurrence from the SHPO and any interested Tribes.

If the Find Consists of Human Remains

The following procedures will be followed if the find consists of human remains:

1. *PG&E's cultural resource specialist will flag or fence off the site to protect it from damage or vandalism.*
2. *PG&E's cultural resource specialist will immediately notify the coroner's office, the SHPO, and any interested Tribes. If the remains are found to not be archaeological in nature or Native American in origin, the cultural resource specialist will ask that the coroner contact the legal authorities (i.e., the local police department).*
3. *If the remains are determined to be Native American, PG&E will consult with the SHPO, NAHC and any interested Tribes to develop appropriate mitigation measures and a site treatment plan. PG&E would instruct the County Coroner to contact the NAHC within 24 hours of the discovery.*

Once the provisions of this plan have been fulfilled, and the SHPO has concurred with PG&E on necessary treatment measures for the discovery, work may resume. PG&E will commission a report for any discovery determined to be NRHP eligible and adversely affected, including the proposed mitigation plan and documentation of concurrence from the SHPO and any interested Tribes.

4.8.5.1 Kilarc Development

IMPACT 4.8-1 (Kilarc): Would the action result in adverse effects to unidentified cultural and paleontological resources due to ground disturbing activities?

Proposed Project

Project Activity	Construction Impact Level
All ground-disturbing activities within the Project APE	LTS

The decommissioning process includes removing diversion dams to allow for the free passage of fish and sediment, grading and filling forebays, breaching or filling canal segments, removing below ground flume structures, and retiring access roads. These ground-disturbing activities could impact undiscovered cultural or paleontological resources or human remains. As provided above, PG&E's MOA with FERC and SHPO specifically addresses the unanticipated discovery of archeological or human remains, including conducting training to familiarize contractor personnel with the procedures to follow in the event of a discovery. In the event of a discovery, the MOA requires that all work stop within the immediate vicinity until a qualified Licensee or consulting archaeologist can evaluate and provide recommendations. Compliance with the 2014 MOA would reduce potentially significant impacts to undiscovered cultural or paleontological resources or human remains to less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site, Leaving the forebay in place would eliminate the potential for construction-related impacts to unidentified cultural and paleontological resources. There would be no additional impacts from these alternatives related to -IMPACT 4.8-1 (Kilarc).

IMPACT 4.8-2 (Kilarc): Would the action result in impacts to known cultural resources?

Proposed Project

Project Activity	Construction Impact Level
North Canyon Creek Diversion and Canal Disposition (P-45-003241 GANDA 484-12-10H)	LTS
South Canyon Creek Diversion and Canal Disposition (P-45-003241/GANDA 484-12-10H)	LTS
Kilarc Main Canal Disposition (GANDA 482-12-07H)	LTS
Kilarc Forebay Disposition (GANDA 482-12-06H)	LTS
Kilarc Penstock Disposition (GANDA 482-12-06H, 482-12-11H, and 482-12-08H)	LTS

Project Activity	Construction Impact Level
Kilarc Powerhouse and Switchyard Disposition (GANDA 482-12-06H)	LTS
Access Roads for Decommissioning	LTS

Notes:
*B = beneficial under NEPA
LTS = less than significant
LTSM = less than significant with mitigation
NI = no impact
S = significant

Cultural resources investigations have identified a total of 9 prehistoric and historic-era cultural resources within and/or immediately adjacent to the study area. Three of these resources have been recommended eligible for listing on the National Register and the California Register. One resource has been recommended not eligible due to its character as an isolated artifact. The remaining four resources have not been evaluated for either National or California registers. (Table 4.8-1). No previously recorded TCPs, sacred sites, or cemeteries were identified within the APE for the Kilarc Development. Consultation with Indian tribes and individuals that are historically associated with the area has been conducted by PG&E (FERC 2010).

Table 4.8-1 Known Cultural Resources within the Kilarc Development APE

GANDA Temporary Number	Trinomial/ Primary Number	Site Type	Name	No. of Features	NRHP/CRHR recommendation
482-12-06H	None	Historic	Kilarc Powerhouse	None	Recommended eligible under NRHP criteria A, C and CRHR criteria 1, 3
482-12-07H	None	Historic	Kilarc Canal system/ Kilarc hydroelectric system	44	Considered eligible under CRHR
482-12-08/H	None	Multi	Diffuse prehistoric and historic scatter (1930s-1940s), single obsidian flake	None	Prehistoric component is eligible under D, 4; evaluated
482-12-10H	P-45-003241	Historic	North and South Canyon Creek Diversion and Canal System	8	Considered eligible under CRHR
482-12-11/H	No record exists at IC	Multi	Diffuse lithic scatter and historic era spring	None	Unevaluated
None	P-45-00350	Prehistoric	Sparse lithic scatter	None	Unevaluated
None	None	Prehistoric	Isolated mano	None	Not eligible
None	None	Historic	Rock wall	None	Unevaluated
None	None	Historic	Abandoned wood bridge	None	Unevaluated

Decommissioning activities within the Kilarc Development and near known cultural resources could result in alterations to those features. However, compliance with the 2014 MOA would minimize impacts. As provided above, PG&E's MOA with FERC and SHPO specifically addresses known historic resources and requires implementation of mitigation measures at previously identified sites including: (a) avoid ground-disturbance in areas where archeological resources have been identified; (b) require the presence of an archeological monitor for all project activities that occur within 50 feet of identified sites; and (c) require formal evaluation for NRHP-eligibility and mitigation of any site where avoidance is not possible. Compliance with the 2014 MOA would reduce impacts to known cultural resources to less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would eliminate the potential for construction-related impacts to known cultural resources. There would be no additional impacts from these alternatives related to IMPACT 4.8-2 (Kilarc).

IMPACT 4.8-3 (Kilarc): Would the action result in impacts to known cultural resources considered eligible for the NRHP and/or CRHR?

Proposed Project

Project Activity	Construction Impact Level
Kilarc Forebay Disposition (GANDA 482-12-06H)	LTS
Kilarc Penstock Disposition (GANDA 482-12-06H)	LTS
Kilarc Powerhouse and Switchyard Disposition (GANDA 482-12-06H)	LTS
Kilarc Main Canal Disposition (GANDA 482-12-07H)	LTS
Access Roads for Decommissioning (GANDA 482-12-08H and 482-12-11H)	LTS
North Canyon Creek Diversion and Canal Disposition (P-45-003241 (GANDA 484-12-10H)	LTS

Decommissioning activities within the Kilarc Development and near known cultural resources eligible for the NRHP and/or CRHR could result in alterations to those features. As provided above, PG&E's MOA with FERC and SHPO specifically addresses near known cultural resources eligible for the NRHP and/or CRHR. The MOA states mitigation measures will be used at previously identified sites and include: (a) avoid ground-disturbance in areas where archeological resources have been identified; (b) require the presence of an archeological monitor for all project activities that occur within 50 feet of identified sites; and (c) require formal evaluation for NRHP-eligibility and mitigation of any site where avoidance is not

possible. Compliance with the 2014 MOA would reduce impacts to known cultural resources eligible for the NRHP and/or CRHR to less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required**.** Implement Mitigation Measures 4.8-1(a) (Kilarc) and 4.8-1(b) (Kilarc).

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would eliminate the potential for construction-related impacts to known cultural resources. There would be no additional impacts from these alternatives related to IMPACT 4.8-3 (Kilarc).

4.8.5.2 Cow Creek Development

IMPACT 4.8-4 (Cow Creek): Would the action impact unidentified cultural and paleontological resources due to ground disturbing activities?

Proposed Project

Project Activity	Construction Impact Level
All ground-disturbing activities within the Project APE	LTS

The decommissioning process includes removing diversion dams to allow for the free passage of fish and sediment, turbines, and other equipment, grading and filling forebays, breaching or filling canal segments, removing below ground flume structures, and retiring access roads. These ground-disturbing activities could impact undiscovered cultural or paleontological resources or human remains. As provided above, PG&E's MOA with FERC and SHPO specifically addresses the unanticipated discovery of archeological or human remains, including conducting training to familiarize contractor personnel with the procedures to follow in the event of a discovery. In the event of a discovery, the MOA requires that all work stop within the immediate vicinity until a qualified Licensee or consulting archaeologist can evaluate and provide recommendations. Compliance with the 2014 MOA would reduce potentially significant impacts to undiscovered cultural or paleontological resources or human remains to less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures**: No additional mitigation required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and therefore could result in impacts to unidentified cultural and paleontological resources due to ground disturbing activities. As with the Proposed Project, compliance with the 2014 MOA would be required for these alternatives. Therefore, impacts under these alternatives related to IMPACT 4.8-4 (Cow Creek) would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place because no construction activities would occur; no impacts on unidentified cultural and paleontological resources would result. There would be no additional impacts from this alternative related to IMPACT 4.8-4 (Cow Creek).

IMPACT 4.8-5 (Cow Creek): Would the action impact known cultural resources?

Proposed Project

Project Activity	Construction Impact Level
Mill Creek Diversion - Dam and Canal Intake Disposition (CA-SHA 1764H/ GANDA 482-12-09H)	LTS
Mill Creek – South Cow Creek Canal Disposition (CA-SHA-1764H/GANDA 482-12-02H)	LTS
South Cow Creek Diversion Dam and Appurtenant Structures Disposition (CA-SHA-1764H and GANDA 482-12-02H)	LTS
South Cow Creek Canal and Tunnel Disposition (CA-SHA-1764H and GANDA 482-12-02H)	LTS
Cow Creek Forebay Disposition (CA-SHA-1764H and GANDA 482-12-02H)	LTS
Cow Creek Penstock Disposition (CA-SHA-1764H and GANDA 482-12-02H)	LTS
Cow Creek Powerhouse and Switchyard Disposition (CA-SHA-1764H and GANDA 482-12-01H)	LTS
Access Roads for Decommissioning (GANDA 482-12-04H and 482-12-05H)	LTS

A cultural resources inventory of the entire Project APE has been completed. Known cultural resource sites in the Cow Creek Development APE are presented in Table 4.8-2.

Table 4.8-2 Known Cultural Resources within the Cow Creek Development APE

GANDA Temporary Number	Trinomial/ Primary Number	Site Type	Name	No. of Features	NRHP/CRHR recommendation
482-12-01H	CA-SHA-1764H	Historic	Cow Creek Powerhouse and Switchyard Disposition	None	Eligible under Criteria A and C (NRHP), 1 and 3 (CRHR)
482-12-02H	CA-SHA-1764H	Historic	Mill Creek – South Cow Creek Canal Disposition South Cow Creek Diversion Dam and Appurtenant Structures Disposition South Cow Creek Canal and Tunnel Disposition Cow Creek Forebay Disposition Cow Creek Penstock Disposition	15	Considered eligible for CRHR
482-12-03H	None	Historic	Cow Creek Homestead or Caretaker House and Worker's Camp	17	Unevaluated
482-12-04H	None	Prehistoric	Access Roads - Diffuse lithic scatter	None	Unevaluated
482-12-05H	None	Multi	Access Roads - Basalt and obsidian scatter and domestic and non-domestic historic artifact scatter	None	Unevaluated
484-12-09H	CA-SHA 1764H	Historic	Mill Creek Diversion - Dam and Canal Intake Disposition	None	Considered eligible for CRHR

Notes:

NRHP Criterion D: A property has yielded, or may be likely to yield, information important in prehistory or history (36 CFR 60.4).

CRHR Criterion 4: A historical resource has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation (CCR, tit. 14, § 4852, subd. (a)).

Source: PG&E 2009

Decommissioning activities within the Cow Creek Development and near known cultural resources could result in alterations to those features. However, compliance with the 2014 MOA would minimize impacts. As provided above, PG&E's MOA with FERC and SHPO specifically addresses known resources and requires implementation of mitigation measures at previously identified sites including: (a) avoid ground-disturbance in areas where archeological resources have been identified; (b) require the presence of an archeological monitor for all project activities that occur within 50 feet of identified sites; and (c) require formal evaluation for NRHP-eligibility and mitigation of any site where avoidance is not possible. Compliance with the 2014 MOA would reduce impacts to known cultural resources to less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and therefore could result in impacts to known cultural resources due to ground disturbing activities. As with the Proposed Project, compliance with the 2014 MOA would be required for these alternatives. Therefore, impacts under these alternatives related to IMPACT 4.8-5 (Cow Creek) would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place because no construction activities would occur; no impacts on known cultural resources would result. There would be no additional impacts from this alternative related to IMPACT 4.8-5 (Cow Creek).

IMPACT 4.8-6 (Cow Creek): Would the action impact known cultural resources considered eligible for the NRHP and/or CRHR?

Proposed Project

Project Activity	Construction Impact Level
Mill Creek Diversion - Dam and Canal Intake Disposition (CA-SHA 1764H/ GANDA 482-12-09H)	LTS
Cow Creek Powerhouse and Switchyard Disposition (CA-SHA-1764H and GANDA 482-12-01H)	LTS
South Cow Creek Canal and Tunnel Disposition (482-12-02H/ CA-SHA-1764H)	LTS
Cow Creek Forebay Disposition (482-12-02H/ CA-SHA-1764H)	LTS
Access Roads for Decommissioning (482-12-04H; 482-12-05H)	LTS

Notes:
*B = beneficial under NEPA
LTS = less than significant
LTSM = less than significant with mitigation
NI = no impact
S = significant

Decommissioning activities within the Cow Creek Development and near known cultural resources eligible for the NRHP and/or CRHR could result in alterations to those features. As provided above, PG&E's MOA with FERC and SHPO specifically addresses near known cultural resources eligible for the NRHP and/or CRHR. The MOA states mitigation measures will be used at previously identified sites and include: (a) avoid ground-disturbance in areas where archeological resources have been identified; (b) require the presence of an archeological monitor for all project activities that occur within 50 feet of identified sites; and (c) require

formal evaluation for NRHP-eligibility and mitigation of any site where avoidance is not possible. Compliance with the 2014 MOA would reduce impacts to known cultural resources eligible for the NRHP and/or CRHR to less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required.

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and therefore could result in impacts to known cultural resources due to ground disturbing activities. As with the Proposed Project, compliance with the 2014 MOA would be required for these alternatives. Therefore, impacts under these alternatives related to IMPACT 4.8-6 (Cow Creek) would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place because no construction activities would occur; no impacts on known cultural resources would result. There would be no additional impacts from this alternative on IMPACT 4.8-6 (Cow Creek).

4.9 Geology and Soils

This section assesses the Proposed Project's potential impacts related to the existing geological and soil conditions on the Project sites, concentrating particularly on any potential hazards that could result from decommissioning activities in the Project Area.

4.9.1 Environmental Setting

4.9.1.1 Sources of Information

The following sources of information were utilized in the preparation of this section:

- Seismic and Geologic Hazards Element of the Shasta County General Plan includes objectives and policies to reduce risks from seismic and other geologic hazards (Shasta County 2004j);
- Shasta County Grading Ordinance, included in the Shasta County Code, sets forth regulations concerning grading, excavating, and filling (Shasta County 2003b); and
- FERC's 2011 Final EIS.

4.9.1.2 Regional Setting

The Proposed Project is located in Northern California near the town of Whitmore, in Shasta County. The two developments are located approximately 11 miles from each other with the Cow Creek southwest of Kilarc Forebay. The town of Whitmore is located between the two, approximately 7 miles northeast of the Cow Creek Development and 4 miles southwest of Kilarc Forebay. Due to the proximity of the two developments regional geology is applicable to both locations.

Regional Geology

The California Division of Mines and Geology divides the state in 12 geologic provinces based on geologic differences, including rock type, structure, and mineral deposits. The Proposed Project is in the Cascade Range geomorphic province, which occupies the eastern half of the Cow Creek Watershed, including the headwaters of South Cow Creek and Old Cow Creek.

The Cascade Range is an active volcanic chain that extends from northern California northward through Oregon and Washington, and into British Columbia. The range consists of extensive accumulations of volcanic flows, pyroclastic rocks, and associated plugs that cover sedimentary rocks of the Great Valley.

Prominent peaks of the California portion of the Cascade Range include Mount Lassen and Mount Shasta, located approximately 24 miles and 50 miles, respectively, from the Kilarc and Cow Creek Developments. The most widespread rock type in the Cascade Range province is the Tuscan Formation. The Tuscan formation and marine sedimentary rocks of the Chico Formation are exposed near the Cow Creek Powerhouse and Forebay. The Tuscan Formation consists of resistant andesitic, dacitic, and basaltic volcanic breccia, tuff breccia, and interlayered flows, sand, gravel, and tuff (Bailey 1966 as cited in PG&E 2009). Groundwater occurs within the volcanic and marine sedimentary rocks of the area typically as seeps or springs. Groundwater typically accumulates within shallow alluvial deposits below rivers and creeks, but can also occur as hot springs from deep faults and fractures (PG&E 2009).

Seismicity

The Project Area is located in a seismically active region of California characterized by active volcanism of the Cascade Range. The Project Area is located within a seismic zone extending from Mount Lassen to Mount Shasta. The only indications remaining of previous volcanic activity are hot springs and fumaroles (gas vents) and occasional small magnitude earthquake swarms below the mountain (Shasta County 2004j). Records indicate earthquakes in the range of magnitude 5.0 on the Richter scale occurred within the Lassen Peak area in 1936, 1945, 1946, 1947, and 1950. Recorded seismic activity in the region appears linked to extension in the Basin and Range province, but could also be attributed to magmatic injection (Norris et al. 1997)). The California Geological Survey (CGS) estimates a 10 percent chance of a maximum credible earthquake producing between 0.1 to 0.2 acceleration of gravity within the next 50 years for the region encompassing the Project Area (CGS 2003). There are no known or mapped active faults within the Project Area as defined by the Alquist-Priolo Earthquake Fault Zoning Act.

Soils

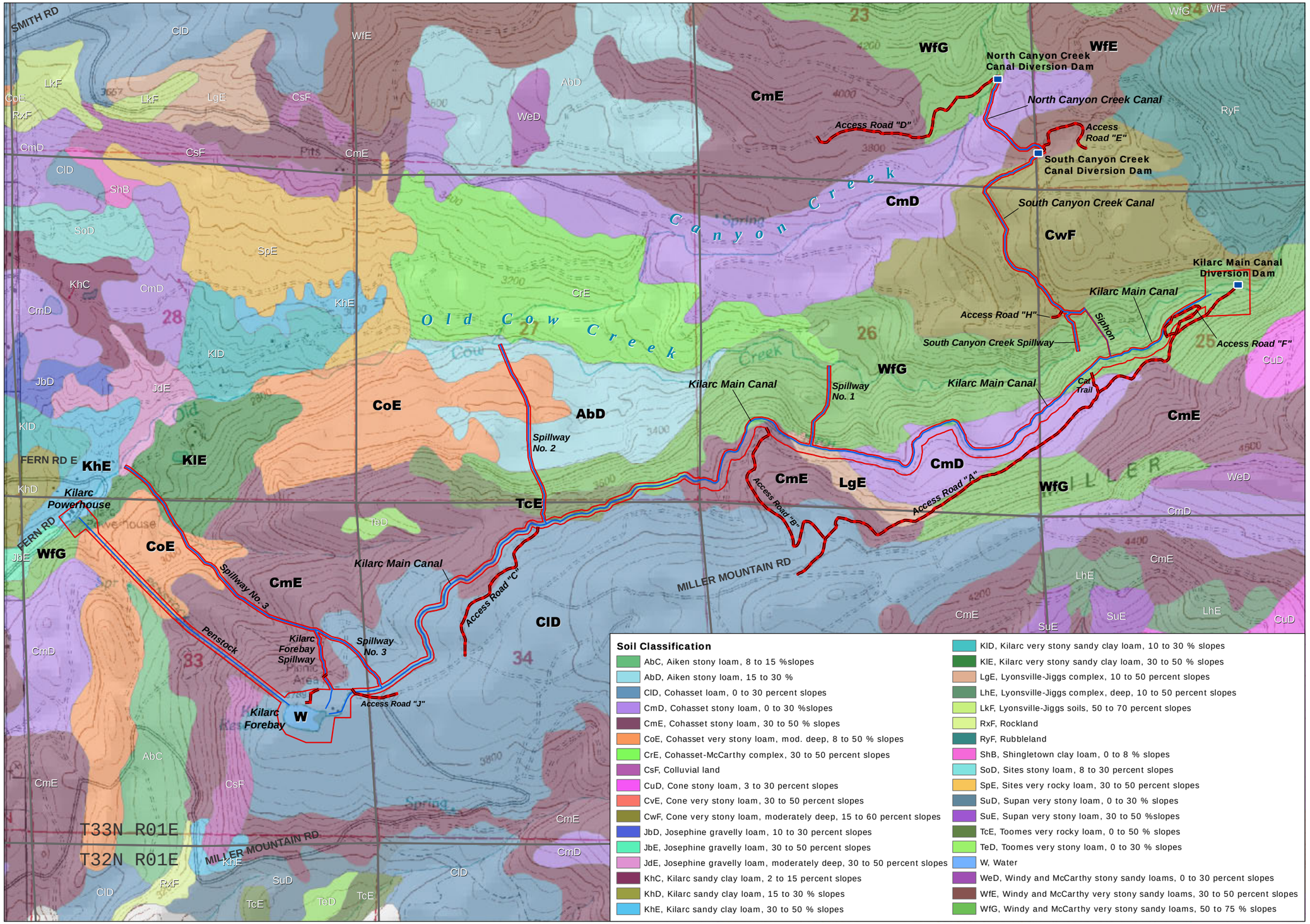
The United State Department of Agriculture Natural Resources Conservation Service (NRCS) maintains an online database of soil survey data. Figures 4.9-1 and 4.9-2 are based on these data and show the soil resources in the Project Area in the Kilarc and Cow Creek Developments, respectively. In general, the soils in the Project vicinity are stony and rocky loam; loam is characterized as a mixture of clay, silt, and sand.

Under certain conditions, sand and finer grained sediments, such as silts and clays, can degrade aquatic habitats; these materials have lower hydraulic conductivity, which results in lower infiltration rates, higher rates and volume of runoff, and increased turbidity. Under similar vegetative and rainfall conditions, water quality degradation potential is higher from silt and clay more than coarser materials, and soils on steep slopes are more easily eroded than soils on gently sloping areas.

The soils in the area typically range from low to moderately high hydraulic conductivity and moderate available water capacity. The thickness of soil covering the upper bedrock surface varies, but is generally less than 5 feet (PG&E 2009).

Kilarc Development Soils

Soils within the Kilarc Development, summarized in Table 4.9-1, generally consist of stony or gravelly loams with varying degrees of sand and clay. Based on a general evaluation of soil resources with the potential to erode and/or adversely affect water quality, the erosion potential is lowest at low elevations with low hydraulic conductivity. In the vicinity of the Kilarc Forebay Spillway from the Kilarc Main Canal to Old Cow Creek (Aiken stony loam) the potential for erosion is low, although conductivity is moderately high. Higher erosion potential of fine materials, which can adversely impact water quality, is found at higher elevations and areas with high hydraulic conductivity. Cohasset very stony loam, which underlies the Kilarc Penstock and Kilarc Forebay Spillway, has a high potential for erosion according to the Shasta County Soil Survey (USDA 1974).



LEGEND

- Diversion Dam
- Watercourse
- FERC Boundary
- Revised Section Boundary

Roads *Defined per USGS topographic base map or PG&E road database*

- Trail
- Light Duty Road
- Unimproved Road
- Unimproved Road (in FERC boundary)

Soil Classification

- AbC, Aiken stony loam, 8 to 15 %slopes
- AbD, Aiken stony loam, 15 to 30 %
- ClD, Cohasset loam, 0 to 30 percent slopes
- CmD, Cohasset stony loam, 0 to 30 %slopes
- CmE, Cohasset stony loam, 30 to 50 % slopes
- CoE, Cohasset very stony loam, mod. deep, 8 to 50 % slopes
- CrE, Cohasset-McCarthy complex, 30 to 50 percent slopes
- CsF, Colluvial land
- CuD, Cone stony loam, 3 to 30 percent slopes
- CvE, Cone very stony loam, 30 to 50 percent slopes
- CwF, Cone very stony loam, moderately deep, 15 to 60 percent slopes
- JbD, Josephine gravelly loam, 10 to 30 percent slopes
- JbE, Josephine gravelly loam, 30 to 50 percent slopes
- JdE, Josephine gravelly loam, moderately deep, 30 to 50 percent slopes
- KhC, Kilarc sandy clay loam, 2 to 15 percent slopes
- KhD, Kilarc sandy clay loam, 15 to 30 % slopes
- KhE, Kilarc sandy clay loam, 30 to 50 % slopes
- KlD, Kilarc very stony sandy clay loam, 10 to 30 % slopes
- KlE, Kilarc very stony sandy clay loam, 30 to 50 % slopes
- LgE, Lyonsville-Jiggs complex, 10 to 50 percent slopes
- LhE, Lyonsville-Jiggs complex, deep, 10 to 50 percent slopes
- LkF, Lyonsville-Jiggs soils, 50 to 70 percent slopes
- RxF, Rockland
- RyF, Rubbleland
- ShB, Shingletown clay loam, 0 to 8 % slopes
- SoD, Sites stony loam, 8 to 30 percent slopes
- SpE, Sites very rocky loam, 30 to 50 percent slopes
- SuD, Supan very stony loam, 0 to 30 % slopes
- SuE, Supan very stony loam, 30 to 50 %slopes
- TcE, Toomes very rocky loam, 0 to 50 % slopes
- TeD, Toomes very stony loam, 0 to 30 % slopes
- W, Water
- WeD, Windy and McCarthy stony sandy loams, 0 to 30 percent slopes
- WfE, Windy and McCarthy very stony sandy loams, 30 to 50 percent slopes
- WfG, Windy and McCarthy very stony sandy loams, 50 to 75 % slopes

Source: PG&E 2009
Imagery: USGS Digital Raster Graphic, 7.5-minute Quadrangle: Miller Mountain, CA. 1995.

N

0 0.1 0.2 0.3 0.4 Mi
0 0.1 0.2 0.3 0.4 Km

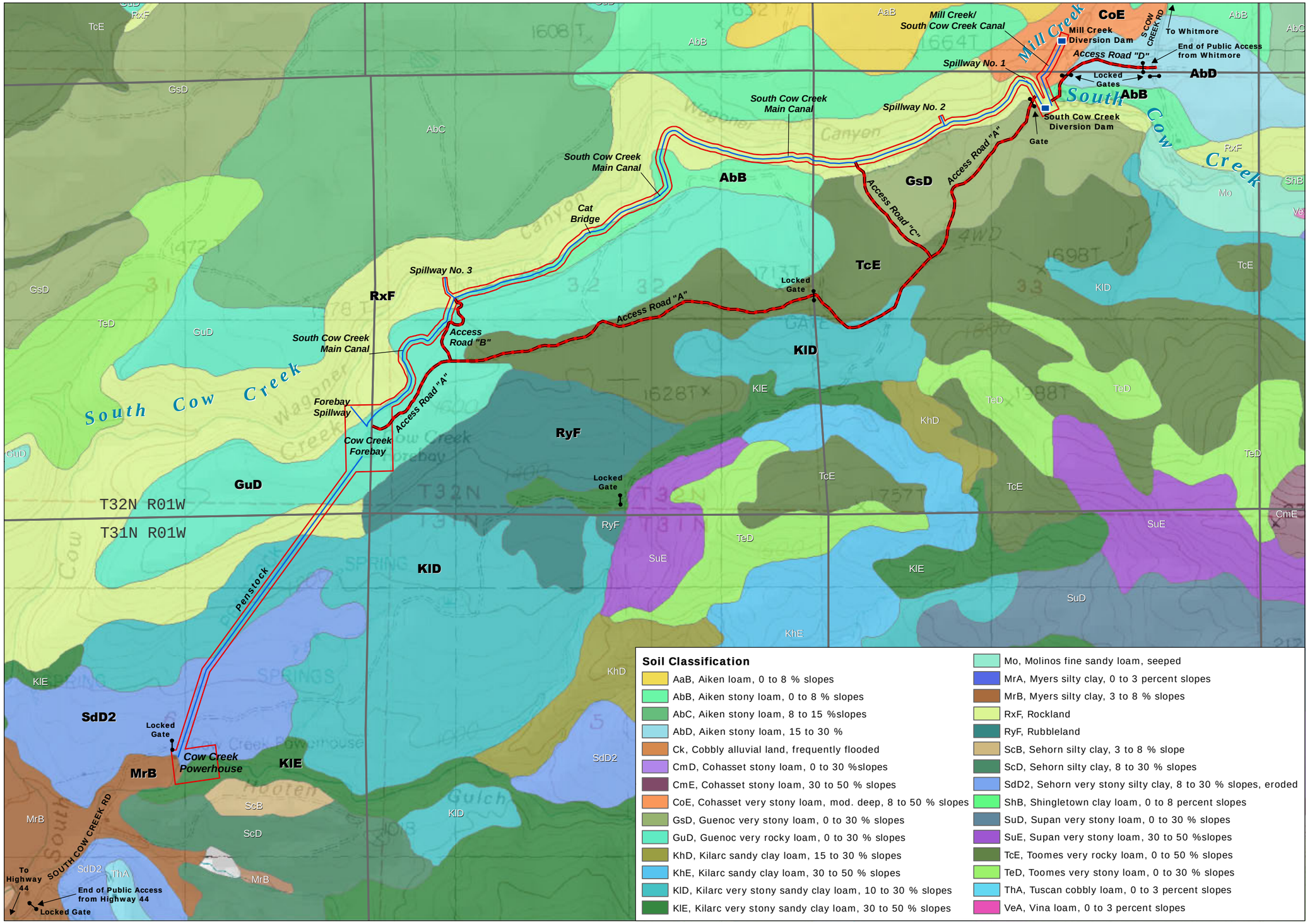
Data Source: Natural Resource Conservation Service, 2008b. United States Department of Agriculture. Custom Soil Resource Report for Shasta County Area, California - Kilarc.

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure 4.9-1
Kilarc Development
NRCS Soils Map

T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\LSA_Feb09\KC_NRCS_Soils_Kilarc_11i17i_03.mxd 2/6/09

This Page Intentionally Left Blank



Source: PG&E 2009
Imagery: USGS Digital Raster Graphic, 7.5-minute Quadrangles:
Clough Gulch, CA. 1985.
Inwood, CA. 1985.

N

0 0.1 0.2 0.3 Mi
0 0.1 0.2 0.3 Km

Data Source: Natural Resource Conservation Service, 2008a. United States Department of Agriculture. Custom Soil Resource Report for Shasta County Area, California - Cow Creek.

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure 4.9-2
Cow Creek Development
NRCS Soils Map

T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\LSA_Feb09\KC_NRCS_Soils_Cow_11i17i_03.mxd 2/6/09

This Page Intentionally Left Blank

Table 4.9-1 Kilarc Development Soil Characteristics at Kilarc Facilities

Soil Type	Soil Name	Slope %	Elevation (ft msl)	Hydraulic Conductivity	Penstock	Forebay	Canal	Spillways
AbD	Aiken stony loam	15-30	1,200 – 1,500	Moderately high				X
ClD	Cohasset loam	0-30	2,000 – 5,000	Very low to moderately low	X	X	X	X
CmD	Cohasset stony loam	0-30	2,000 – 5,000	Low to moderately low			X	
CmE	Cohasset stony loam	30-50	2,000 – 5,000	Very low to moderately low	X		X	X
CoE	Cohasset very stony loam	8-50	1,000 – 5,500	Very low to moderately low	X			X
CwF	Cone very stony loam, moderately deep	15-60	2,000 – 4,000	High to very high			X	
KlE	Kilarc very stony sandy clay loam	30-50	1,000 – 3,600	Moderately low to moderately high	X			X
LgE	Lyonsville-Jiggs complex	10-50	3,000 – 6,500	Low to high			X	
TcE	Toomes very rocky loam	0-50	600 – 3,500	Moderately high to high			X	
WfG	Windy and McCarthy very stony sandy loams	50-75	2,000 – 9,000	Low to high			X	X

Source: NRCS 2013, PG&E 2009

Note:

ft MSL = feet mean sea level

Cow Creek Development Soils

Table 4.9-2 lists soils found within the Cow Creek Development. Based on general considerations of soil resources in the Cow Creek Development Area with the potential to erode and/or adversely affect water quality, the erosion potential is lowest at low elevations and low hydraulic conductivity. The Rockland unit underlies much of the South Creek Main Canal and consists mostly of bedrock and weathered bedrock. The Rockland unit has a very low potential to deliver fine sediments to streams as well as having a very low erosion potential. Higher erosion potential of fine materials, which can adversely impact water quality, are found at higher elevations such as the Sehorn silty clay found along a portion of the penstock and in the vicinity of the Cow Creek Powerhouse (USDA 1974).

Table 4.9-2 Cow Creek Development Soil Characteristics at Cow Creek Facilities

Soil Type	Soil Name	Slope %	Elevation (ft msl)	Hydraulic Conductivity	Penstock	Forebay	Canal	Spillway	Access Road
AbB	Aiken stony loam	0-8	1,200 – 1,500	Moderately high			X		X
AbD	Aiken stony loam	15-30	2,000 – 5,000	Moderately high			X		X
CoE	Cohasset stony loam	30-50	2,000 – 5,000	Very low to moderately low			X		
GsD	Guenoc very stony loam	0-30	2,000 – 5,000	Low to moderately high	X		X		X
GuD	Guenoc very rocky loam	0-30	1,000 – 5,500	Low to moderately high	X	X	X	X	
KlD	Kilarc very stony sandy clay loam	10-30	2,000 – 4,000	Moderately low to moderately high	X			X	
RxF	Rockland		1,000 – 3,600	Low to very high	X		X	X	X
SdD2	Sehorn very stony silty clay	8-30	3,000 – 6,500	Very low to moderately high	X				
TcE	Toomes very rocky loam	0-50	600 – 3,500	Moderately high to high					X

Source: NRCS 2013, PG&E 2009

Note:

ft MSL = feet mean sea level

4.9.2 Regulatory Setting

The following section discusses the relevant policies and regulations that are specific to the analysis of geology and soil impacts from the Proposed Project.

4.9.2.1 Federal

The CWA regulates the discharge of pollutants into waters of the United States, including the discharge of sediment and other pollutants to surface water as a result of erosion. The Soil Conservation Service National Engineering Handbook presents standards for planning, design, and construction of soil conservation practices to be implemented during construction projects.

4.9.2.2 State

Alquist-Priolo Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 was drafted to avoid or reduce damage to structures from earthquakes. In compliance with the Alquist-Priolo Earthquake Fault Zoning Act (A-P Act), the California Geological Survey has established Earthquake Fault Zones (EFZs) along known active faults in California. It prohibits development within 50 feet of an active fault zone. Cities and counties affected by the zones must regulate development near active faults in order to mitigate the hazard of surface fault rupture. Principal faults zoned under the A-P Act include the San Andreas, Calaveras, Hayward, and San Gregorio Fault (Hart et al, 2007). The San Andreas is the closest active fault as specified by the A-P Act and trends in a northwestern-southeastern direction east of the Project area. The actual Project area is not within an EFZ and no mapped active fault traces are known to traverse the site. Additionally, the Project Area is not located in an Alquist-Priolo Earthquake Fault Zone, so this Act does not apply.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act, passed in 1990, addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically-induced landslides. Under the Act, seismic hazard zones are to be mapped by the State Geologist to assist local governments in land use planning. As of July 2013, the Shasta County area had not been mapped under the Seismic Hazards Mapping Act.

4.9.2.3 Local

Shasta County General Plan

The Seismic and Geologic Hazards Element of the Shasta County General Plan includes the following objectives and policies to reduce risks from seismic and other geologic hazards.

General Plan Objectives

SG-4 Protection of waterways from adverse water quality impacts caused by development on highly erodible soils.

General Plan Policies

SG-b In order to minimize development that would be endangered by landslides, geological investigations by a registered geologist or a geological engineer will be required on all subdivision and/or developments where the preliminary staff report

indicates the possibility of landslides on or adjacent to the development. A landslide map shall be developed and maintained as these reports are accumulated for reference by the development sponsors.

SG-e When soil tests reveal the presence of expansive soils, engineering design measures designed to eliminate or mitigate their impacts shall be employed.

Shasta County Grading Ordinance

The Shasta County Grading Ordinance, included in the Shasta County Code, sets forth regulations concerning grading, excavating, and filling. The Shasta County Grading Ordinance, amongst other thresholds, prohibits movement of earth materials in excess of 250 cubic yards or which disturbs 10,000 square feet of surface area without a grading permit from the County. The grading permit must include an approved grading plan provided by the project applicant, and it must set forth terms and conditions of grading operations that conform to the County's grading standards. The permit also requires the project applicant to provide a permanent erosion control plan that must be implemented upon completion of the project. Ongoing maintenance of erosion control measures is required for the duration of the project and for 3 years after completion of the project, unless the project is released earlier by the enforcing officer designated by the County Board of Supervisors (Shasta County 2003b).

4.9.3 Analysis Methodology

The methodology section describes the resource-specific assessment methods used to identify and evaluate the environmental impacts for the resource. It also describes any specific significance criteria used in the assessments to determine the level of significance of an impact. The thresholds section describes thresholds of significance used for the resource to determine the significance of impacts as required. The thresholds for determining the significance of impacts for this analysis are based on the State Water Board's Environmental Checklist in Appendix A of the State Water Board's CEQA regulations and the Environmental Checklist in Appendix G of the State CEQA Guidelines which are the same.

4.9.3.1 Analytical Approach

An evaluation of the Project's Geology and Soils impacts was performed based upon an assessment of the Project location, geology, and soils setting and in consideration of the engineering design, construction, and operations and maintenance of the Project against the significance criteria identified below. The analysis of geology and soils impacts also includes consideration of applicable policies, plans, and programs.

Impact analysis was based on the following assumptions:

- Removal of instream structures may release sediments or create higher velocity, erosive peak flows.
- Increase in vehicle traffic resulting from construction, including heavy machinery on forest roads could result in the potential for damage to, or erosion from road surfaces.
- Demolition and deconstruction of structures along existing roads may create conditions favorable to slope instability (loosened earth materials, placement of fill, etc.).

4.9.3.2 Criteria for Determining Significance

Based on Appendix G of the State CEQA Guidelines, the Proposed Project would result in a significant impact if it would:

- Expose people or structures to potential substantial adverse effects, including risk of loss, injury or death involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.
  - Strong seismic ground shaking.
  - Seismic-related ground failure, including liquefaction.
  - Landslides.
- Result in substantial soil erosion or loss of topsoil.
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.

The following additional guideline is included in Appendix G of the CEQA Guidelines but is not relevant to the Proposed Project as no permanent waste disposal needs will be associated with the Proposed Project:

- Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.

4.9.4 Environmental Impacts and Mitigation

PG&E has included the following measures to address impacts due to decommissioning activities.

- **PM&E Measure GEOL-1: Implement Soil Erosion and Sedimentation Control Best Management Practices.** The Licensee shall identify and implement Soil Erosion and Sedimentation Control BMPs that address soil erosion impacts that may occur both during and after decommissioning construction work. The Licensee shall adhere to standard erosion control procedures, including applicable measures developed by the U.S. Forest Service (USDA-FS) and published in the Water Quality Management for Forest System Lands in California Best Management Practices (USDA-FS, 2000).[27]

[27] Water Quality Management for Forest System Lands in California (USDA-FS, 2000) provides a set of standardized BMPs to protect water quality during the planning and construction of projects. The BMPs are organized into eight land use activity categories including Road and Building Site Construction and Watershed Management.

Prior to construction, the Licensee shall identify all natural drainage paths along the canals and tunnel during pre-construction surveys. Slopes prone to instability shall be identified, and site specific BMPs shall be implemented to avoid potential slope erosion and increased sedimentation in streams during and after construction activities.

During the construction period, the Licensee shall install BMPs in all areas where soil is disturbed and could result in an increase in sedimentation and/or erosion. The Licensee shall perform inspections after storm events and perform any necessary repairs, replacements, and/or addition of BMPs.

At the end of construction, the Licensee shall identify potential future erosion sites and install long-term BMPs.[28] Specific areas to be addressed are listed below:

- After removal of the canals, diversions, and impoundment structures, the Licensee shall implement BMPs such as restoration of natural drainage paths, and recontouring of slopes to match pre-existing slope morphology, as feasible. Revegetation shall be implemented to increase bank stability (See PM&E Measure BOTA-1).
- The Licensee shall implement BMPs to address potential erosion of access roads and staging areas throughout the Kilarc and Cow Creek Developments. Artificial swales, culverts, and/or other structures shall be designed to direct runoff away from disturbed areas based on the natural drainage features of the area. For any temporary access roads that are removed, the Licensee shall implement measures in accordance with BMP 2-26 Obliteration or Decommissioning of Roads, as defined in the USDA-FS Water Quality Management for Forest System Lands in California Best Management Practices (USDA-FS 2000).

To ensure the effectiveness of the long term BMPs, post-construction monitoring will be conducted for 2 years within the stream channel (See PM&E Measure GEOM-2) and for one year in all other construction areas.[29] The post-construction inspections will be to ensure that BMPs installed at the end of construction are effective and/or to identify areas where installation of additional BMPs is necessary.

- **PM&E Measure GEOL-2: Implement Soil Erosion and Sedimentation Control Best Management Practices.** The Licensee shall identify all potential pollutant sources, including sources of sediment (e.g., areas of soil exposed by grading activities, soil/sediment stockpiles) and hazardous pollutants (e.g., from petroleum products leaked by heavy equipment or stored in maintenance areas). Also, the Licensee shall identify any non-storm water discharges and implement BMPs[30] to protect streams from potential pollutants and minimize erosion of topsoil. The Licensee shall include a monitoring and

[28] If, for example, stabilization measures are warranted, the Licensee shall design BMPs to protect the banks at dam abutments and diversion canal intakes during high flow events.

[29] The erosion control measures will be designed to develop and maintain geomorphically-stable stream channels above, below, and at the diversions, and the erosion control measures will also be designed to prevent contributions of sediment to drainages and streams.

[30] These measures may include: (1) requiring that fueling or maintenance of equipment (including washing) only be performed in specified areas outside an approved protective strip of predominately undisturbed and vegetated soil; (2) not allowing refueling of construction equipment within 100 feet from riparian or aquatic habitats; (3) reporting any release of oil or hazardous materials immediately upon detection in accordance with all applicable laws and regulations; and (4) requiring all contractors to have materials on hand to control and contain a spill of oil or hazardous materials.

maintenance schedule to ensure BMP effectiveness for sediment control, spill containment, and post-construction measures.

The Licensee shall include a monitoring and reporting program, including pre- and post-storm inspections, to determine if BMPs are sufficient to protect streams and to identify any areas where storm water can be exposed to pollutants. The monitoring program will include provisions for sampling and analysis to evaluate whether pollutants that cannot be visually observed are contributing to degradation of water quality.

- **PM&E Measure GEOL-3: Professional Engineering Design Plans and Specifications.** The Licensee shall develop detailed design plans and specifications after FERC orders the Project to be decommissioned. These plans shall consider the potential for landslides and shall include provisions to minimize this potential. The Licensee shall prepare engineering plans for new access roads or staging areas to minimize grades and cut and fill volumes, as well as to minimize any potential for landslides as a result of the grading work.
- **PM&E Measure GEOM-1: Professional Engineering Design Plans and Specifications.** Following removal of the South Cow Creek and Kilarc Main Diversion dams, the Licensee shall reshape the downstream face of the sediment wedge left in place at each diversion structure to an appropriate angle of repose. The Licensee shall also form a pilot thalweg to ensure temporary fish passage until the stored sediments have been transported by flow from the former impoundment sites and to help advance the processes of natural channel formation at the nickpoint created by the dam removal, by performing the following measures:
  - Excavate a pilot thalweg through the sediment wedge that connects with the existing thalweg at a nearby upstream point to the thalweg immediately downstream of the dam.
  - Shape the pilot thalweg on-site during the dam removal process.
  - Dimension the pilot thalweg so that it has at minimum a 6-foot bottom width, which is approximately 20 percent of the 30 foot bankfull channel width downstream from the dam.
  - Lay back the side slopes of the pilot thalweg to a natural, stable angle of repose.
  - Construct the thalweg channel so that the starting depth at the downstream end of the channel is approximately equivalent to the water surface elevation of the plunge pools immediately downstream from each of the respective dams.
  - Incorporate into the pilot thalweg channel, coarse bed-elements, or other techniques, to ensure appropriate depth and velocities for fish passage, as needed.

The final design will be based on the best available information at the time prior to implementation, in consultation with NMFS and CDFW. The Licensee shall make adjustments to the thalweg dimensions and elevation if site-specific conditions make it infeasible to construct the pilot channel to the recommended dimensions at either of the dam sites.

The Licensee shall allow the sediments remaining behind the diversions after excavation of the pilot channel to redistribute downstream during natural high flow events.[31]

The Licensee shall place sediments excavated from the South Cow Creek and Kilarc Main Canal diversion impoundments along channel margins for future recruitment during high flow events to downstream areas. The Licensee shall place these native sediments so they do not interfere with riparian vegetation.[32] The Licensee shall not place non-native angular rock material (which may be found between the bin walls of South Cow Creek Dam) in the stream, but shall dispose of it locally at a suitable site (e.g., as canal fill).

The Licensee shall monitor fish passage conditions along the pilot thalweg channels and for 10 channel widths downstream of the dams for 2 years following removal. The monitoring program is discussed under PM&E Measure AQUA-5.

- **PM&E Measure GEOM-2: Bank Erosion Measures.** To minimize potential impacts associated with bank erosion, the Licensee shall conduct the following monitoring and mitigation:
  - The Licensee shall conduct a monitoring assessment after removal of the Kilarc Main Canal and South Cow Creek diversion dams. The monitoring shall consist of a visual assessment with photographic documentation of the impounded sediment wedge and streambanks adjoining the perimeter of the former sediment impoundment area. The monitoring shall be conducted after spring runoff, as soon as weather permits access to the sites and flows are low enough that the streambanks can be easily observed. The Licensee shall utilize the visual assessment to identify any areas of active erosion or undercutting, or areas that appear to be susceptible to erosion. The Licensee shall conduct the monitoring assessment for 2 years.
  - If during the monitoring assessment, the Licensee observes significant erosion or bank undercutting, then the Licensee shall implement and install erosion control measures, as feasible, in the channel. The Licensee shall adhere to standard erosion control procedures, including applicable measures developed by the USDA-FS and published in the Water Quality Management for Forest System Lands in California Best Management Practices (USDA-FS 2000).[33]

[31] It is estimated that up to approximately 150 cubic yards (0.09 acre feet) of sediment behind South Cow Creek Diversion Dam would need to be removed in order to remove the dam itself, to help shape the sediment wedge against the upstream dam face, and to create a pilot thalweg channel. This would leave approximately 1,150 cubic yards (0.70 acre-feet) stored behind the dam, all of which will be mobilized over time by natural sediment transport processes. Approximately 50 cubic yards (0.03 acre-feet) of sediment would need to be removed from behind Kilarc Main Canal Diversion Dam to accomplish dam removal, shape the sediment wedge, and to create a pilot thalweg connecting the upstream and downstream channels. This would leave approximately 530 cubic yards (0.31 acre-feet) behind the diversion dam. Of the 530 cubic yards, about 250 cubic yards of predominantly gravel and cobble material will be entrained over time and transported through the diversion and dispersed to the downstream reach by natural fluvial processes. About 230 cubic yards (approximately 40 percent of the 530 cubic yards) is boulder sized material, most of which will likely remain in place.

[32] This assumes that on-site inspection during dam removal indicates that the excavated sediments are comprised of mostly gravel to cobble size material. The particle size composition obtained from bulk samples of the sediments stored behind the diversions (Appendices G and H) indicates that most material is within the gravel-cobble size range.

[33] The Water Quality Management for Forest System Lands in California (USDA-FS 2000) provides a set of standardized BMPs to protect water quality during the planning and construction of projects.

4.9.4.1 Kilarc Development

Potential impacts from decommissioning the Kilarc Development are discussed below. The primary source of potential impacts consists of construction-related activities. With the implementation of the PM&E measures impacts are anticipated to be less than significant.

IMPACT 4.9-1 (Kilarc): Would the action expose people and structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, strong seismic ground shaking, ground failure, or landslides?

Proposed Project

Project activities could cause soil to become unstable resulting in on- or off-site landslides. Specifically, the increased use of access roads or the construction of new access roads near the Kilarc Development could result in small landslides. Streambank erosion may lead to small landslides or slumps. Implementation of PM&E GEOL-3 would minimize the potential for poorly designed cut and fill earthwork (e.g., cut slopes, improper fill compaction) that could cause landslides. Groundshaking caused by earthquake, pile driving, or similar activities usually results in liquefaction, and sandy soils are most prone to liquefaction. However, pile driving or related construction practices are not expected to be utilized during the decommissioning process. Thus, liquefaction is not expected to occur. Although the Kilarc Development is located in a seismically active region, because it is not located in an A-P zone, decommissioning activities are unlikely to result in a rupture of a known fault. PM&E measures GEOL-1 and GEOM-2 would also reduce the potential for impacts related to potential landslides from erosion. Therefore, with implementation of PM&E GEOL-1, -2, and -3 impacts related to exposure of people and structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, strong seismic ground shaking, ground failure, or landslides, would be considered less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site, Leaving the forebay in place would eliminate the potential for construction-related exposure of people or structures to adverse effects. There would be no additional impacts from this alternative related to IMPACT 4.9-1 (Kilarc).

IMPACT 4.9-2 (Kilarc): Would the action result in substantial soil erosion or the loss of topsoil?

Proposed Project

Without protective measures, activity related to removal of the dams and other structures could promote conditions favorable to local slope instability, with subsequent downstream sedimentation and erosion. Specifically, without implementation of adequate PM&E measures, erosion could occur (1) during removal of structures in the stream, along the banks and during

creek restoration activities; (2) off-stream along the canals along natural drainage paths that previously drained into the canals that would be restored to their natural condition and flow following decommissioning; and (3) with the increased use of access roads or the construction/expansion of new access roads.

The erosion potential in the Kilarc Development is lowest at lower elevations with relatively low hydraulic conductivity and highest at higher elevations with higher conductivity. Soils along the Kilarc Development generally consist of stony or gravelly loams with varying degrees of sand and clay. Most of the main canal is located over Cohasset and Windy and McCarthy loams; minor portions overlie Toomes and Aiken loams. As mentioned above, Cohasset very stony loam, which underlies the Kilarc Penstock and Kilarc Forebay Spillway, has a high potential for erosion.

Erosion and sedimentation may also result from the use of staging areas, which could erode during precipitation events. PG&E proposes to employ effective, site-specific, erosion control measures based on BMPs (PM&E measure GEOL-1) under FERC jurisdiction for 2 years following decommissioning. If monitoring indicates that further action is necessary, PG&E will work under the authority of permitting and resource agencies such as USACE (per CWA 404 permit conditions) and the State Water Board (per the CWA 401 permit conditions). PM&E measures GEOL-1 GEOL-2, and GEOM-2 would also help to reduce this impact to a less than significant level.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site, Leaving the forebay in place would eliminate the potential for construction-related soil erosion. There would be no additional impacts from this alternative related to IMPACT 4.9-2 (Kilarc)

IMPACT 4.9-3 (Kilarc): Would the action result in potential hazards due to construction on expansive or otherwise unstable soils?

Proposed Project

Construction activities could cause soil to become unstable resulting in on- or off-site landslides. In general, the stream channels below the Kilarc Main Canal are stable channel types. Following the removal of the Kilarc Main Canal Diversion Dam, localized bank erosion could occur around the infrastructure removal sites. Once the stored sediment is evacuated from behind the Kilarc Main Canal diversion dams (see Section 4.12 Hydrology and Geomorphology), newly exposed banks in the area defined by the former sediment deposition zone could be subject to bank instability and erosion. Also, construction activities related to access roads could cause soil to become unstable resulting in on- or off-site landslides. Implementation of PM&E GEOL-1 to restore natural drainage paths and re-contour slopes to reduce erosion and sedimentation would improve soil conditions and stability. PM&E measures GEOL-3 GEOM-1, and GEOM-2 would also help to reduce this impact to a less than significant level.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site, Leaving the forebay in place would eliminate the potential for construction-related hazards due to construction on expansive or unstable soils. There would be no additional impacts from this alternative related to IMPACT 4.9-3 (Kilarc).

4.9.4.2 Cow Creek

Potential impacts from decommissioning the Cow Creek Development are discussed below. The primary source of potential impacts consists of construction related activities. With the implementation of the below listed PM&E measures impacts are anticipated to be less than significant.

IMPACT 4.9-4 (Cow Creek): Would the action expose people and structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, strong seismic ground shaking, ground failure, or landslides?

Proposed Project

Construction activities related to the increased use of access roads or the construction of new access roads could cause unstable soil conditions and small landslides. Cut and fill earthwork that is not designed properly (e.g., cut slopes or improper fill compaction) can lead to landslides. Liquefaction is usually observed as a result of ground shaking caused by earthquake, pile driving, or similar activity. Sandy soils are most prone to liquefaction. It is not anticipated that pile driving or other related construction practices would be utilized during the decommissioning process. Thus, liquefaction would not be expected to occur. Although the Cow Creek Development is located in a seismically active region, because it is not located in an A-P zone, decommissioning activities are unlikely to result in a rupture of a known fault. Implementation of PM&E measures GEOL-1, GEOL-3, and GEOM-2 would reduce impacts related to potential landslides from erosion to levels less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and therefore construction activities could result in increased exposure of people or structures to adverse effects. With implementation of PM&E measures, impacts from these alternatives would be less than significant. There would be no additional impacts from these alternatives related to IMPACT 4.9-4 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place because no construction activities would occur; increased exposure of people or structures to adverse effects would not occur. There would be no additional impacts from this alternative related to IMPACT 4.9-4 (Cow Creek).

IMPACT 4.9-5 (Cow Creek): Would the action result in substantial soil erosion or the loss of topsoil?

Proposed Project

Without protective measures incorporated into project design, activity related to removal of the dams and other structures could promote conditions favorable to local slope instability, with subsequent downstream sedimentation and erosion. Specifically, without adequate PM&E measures, erosion could occur (1) during removal of structures in the stream banks and creek restoration activities; (2) off-stream along the canals along natural drainage paths that previously drained into the canals, but which, upon Project decommissioning would be restored to their natural condition and flow to the creek, and (3) with the increased use of access roads or the construction of new access roads.

In addition, erosion and sedimentation may result from increased use and/or expansion of access roads and construction and/or use of staging areas, which could erode during precipitation events for the Cow Creek Development, higher erosion potential is found at higher elevations such as the Sehorn silty clay found along a portion of the penstock and in the vicinity of the Cow Creek Powerhouse.

PG&E will employ effective, site-specific, erosion control measures based on BMPs under FERC jurisdiction for 2 years following decommissioning. If monitoring indicates that further action is necessary, PG&E will work under the authority of permitting and resource agencies such as USACE (per the conditions of the CWA 404 permit) and the State Water Board (per the conditions of the CWA 401 permit). PM&E measures GEOL-1 GEOL-2, and GEOM-2 would also help to reduce this impact to a less-than-significant level.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and therefore could result in short-term, minor impacts to geologic and soil resources during construction. As with the Proposed Project, implementation of PM&E measures would minimize soil erosion. Impacts from these alternatives would be less than significant. There would be no additional impacts from these alternatives related to IMPACT 4.9-5 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place because no construction activities would occur; no increased soil erosion would occur. There would be no additional impacts from this alternative related to IMPACT 4.9-5 (Cow Creek).

IMPACT 4.9-6 (Cow Creek): Would the action result in potential hazards due to construction on expansive or otherwise unstable soils?

Proposed Project

Construction activities could cause soil to become unstable resulting in on- or off-site landslides. In general, the stream channels below the South Cow Creek diversion dams are stable channel types. Following the removal of the South Cow Creek Diversion Dam, there is the potential for localized bank erosion to occur around the infrastructure removal sites. Once the stored sediment is evacuated from behind the South Cow Creek Diversion Dam, newly exposed banks in the area defined by the former sediment deposition zone could be subject to bank instability and erosion. Also, construction activities related to access roads could cause soil to become unstable resulting in on- or off-site landslides. However, the implementation of PM&E GEOL-1 to restore natural drainage paths and re-contour slopes to reduce erosion and sedimentation would improve soil conditions and stability. PM&E measures GEOL-3, GEOM-1, and GEOM-2 would also help to reduce this impact to a less-than-significant level.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and therefore could result in short-term, minor impacts to geologic and soil resources during construction. As with the Proposed Project, implementation of PM&E measures would minimize the potential for hazards due to construction on expansive or unstable soils. Impacts from these alternatives would be less than significant. There would be no additional impacts from these alternatives related to IMPACT 4.9-6 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place because no construction activities would occur; no construction-related hazards due to construction on expansive or unstable soils would occur. There would be no additional impacts from this alternative related to IMPACT 4.9-6 (Cow Creek).

This Page Intentionally Left Blank

4.10 Greenhouse Gas Emissions

Greenhouse gas (GHG) emissions are one component of an assessment generally referred to as climate change analysis. Climate change analysis is focused on: (1) the effect of future climate changes on a facility that occurs over time, such as the effects of increasing temperatures, weather changes, water availability, or rising sea levels, and (2) the generation of GHGs from a project, that contribute to global warming.

With regard to the first type of analysis, because the Proposed Project would decommission (remove) a facility, and construction would take place over a relatively short time period (3 years), long term-climate change effects on the facility, such as a change in water supplies or increased temperatures, are not relevant. The focus of this section, therefore, is on the second type of climate change analysis, the potential for GHG emissions.

Section 4.10.1.1 summarizes key information used in the analysis. Section 4.10.1.2 defines and explains greenhouse gases (GHGs) and presents inventories of GHG emissions in California and Shasta County. Existing GHG emissions from the existing Project are also estimated. Regulations pertinent to GHGs are presented in Section 4.10.1.3. The approach to the analysis and significance criteria used is described in Section 4.10.2. The GHG impacts associated with decommissioning, both short and long-term, and mitigation, are presented in Section 4.10.3.

4.10.1 Environmental Setting

4.10.1.1 Sources of Information

Key sources of information used in the analysis include:

- Existing GHG emissions in California and Shasta County were compiled from the California Air Resources Board and Shasta County Climate Action Plan GHG inventories
- Annual historic electrical generation was compiled from data contained in PG&E's "Statement of Gross Generation" filed with FERC annually
- Information used to estimate construction GHGs was based on Project descriptions and construction schedules provide by PG&E (see Appendix D-1)
- Construction emissions estimates were quantified using the California Emissions Estimator Model (CalEEMod), Version 2016.3.1 for the types and sizes of equipment to be used, and their duration of use
- Estimation factors for carbon content of trees and vegetation were taken from United States Forest Service data bases
- Equivalent GHG emissions for electricity production were based on CalEEMod default data tables

4.10.1.2 Regional Setting

Global Warming

Global warming is the name given to the increase in the average temperature of the atmosphere and oceans, and its projected continuation. Global surface temperatures have increased approximately 1.33°F over the last 100 years, and continued warming is projected to increase global average temperatures between 2°F and 11°F over the next 100 years (DWR 2010). The

causes of global warming include both natural processes and human actions. According to the Intergovernmental Panel on Climate Change (IPCC), after 1950 increasing GHG concentrations resulting from human activity, such as fossil fuel combustion and deforestation without adequate revegetation, have been responsible for most of the observed temperature increases. While there is some debate about the magnitude and rate of global warming, the vast majority of scientific experts agree that global warming, caused by human activity, is a significant problem.

Gases that trap heat in the atmosphere are referred to as greenhouse gases because they capture heat from the sun as it is reflected back into the atmosphere, similar to the action of a greenhouse. GHGs are substances that impede the release of solar radiation that has hit the earth and is being reflected back into space. Therefore, GHGs trap heat and cause the atmosphere to heat up. Some GHGs occur naturally. However, increases in the concentrations of GHGs in the atmosphere during the last 100 years as a result of human activities have decreased the amount of solar radiation that is being reflected back into space, intensifying the natural "greenhouse effect" and resulting in the increase of global average temperatures.

Global warming effects in California have been summarized as follows (CAPCOA 2009):

> *"In California and throughout western North America, signs of a changing climate are evident. During the last 50 years, winter and spring temperatures have been warmer, spring snow levels in lower- and mid-elevation mountains have dropped, snowpack has been melting one to four weeks earlier, and flowers are blooming one to two weeks earlier. These regional changes are consistent with global trends. If left unchecked, by the end of the century CO_2 concentrations could reach levels at which climate change impacts would severely impact our public health, economy, and environment."*

Principal Greenhouse Gases

As generally defined in the scientific community and under California law (Health and Safety Code, § 38505(g)), the six primary GHGs are:

- Carbon dioxide (CO_2) is a common gas that is emitted to the atmosphere through the combustion of fossil fuels such as gasoline or diesel, the burning of solid waste, wood, and other organic products, and as a result of other chemical reactions, for example in the manufacture of cement. CO_2 is removed from the atmosphere (or "sequestered") when it is taken up during photosynthesis, and incorporated into wood and plant material. CO_2 is the major component of GHG emissions from gasoline or diesel powered vehicles and construction equipment.
- Methane (CH_4) is a gas that is produced as a result of livestock and other agricultural practices and from the decay of organic waste in municipal solid waste landfills. CH_4 is also emitted during the production and transport of coal, natural gas, and oil, and as a result of anaerobic decomposition in lakes, reservoirs, and wetlands.
- Nitrous oxide (N_2O) is a gas that is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.
- Sulfur hexafluoride (SF_6) is a synthetic gas that is emitted from a variety of industrial processes. It is sometimes referred to as a high global warming potential gas because of its strong greenhouse effect.

- Hydrofluorocarbons (HFCs) are refrigerants and aerosols that replaced other gases that were causing ozone depletion. HFCs have been found to have potent GHG effects.
- Perfluorocarbons are gasses used in medical applications that have strong GHG effects.

The GHG of most concern is CO_2 because it is released during the combustion of fossil fuels (coal, oil, and gas) and transportation fuels. It can last in the atmosphere for centuries and contributes more to climate change than any other GHG (IPCC 2007). CO_2 is the reference gas to which other GHGs are compared because CO_2 is the most common GHG resulting from human activity.

Global Warming Potential

The potential heat trapping ability of each of the GHGs varies significantly from one another. To account for these differences in warming effect, GHGs are defined by their global warming potential (GWP). The GWP value for a GHG depends on the time span over which it is calculated and on how the gas concentration decays in the atmosphere over time. For that reason, slightly different GWP values appear in the scientific literature. This impact assessment is based on the use of the USEPA (2013) values for a 100-year period. Under this methodology, the GWP of CO_2 is set to 1, the GWP of CH_4 is 21, and the GWP of N_2O is 310.

Carbon Dioxide Equivalent

GHGs are reported as carbon dioxide equivalents (CO_2-e) to measure their relative potency. CO_2-e takes into account the relative potency of the non-CO_2 GHGs and converts quantities to an equivalent amount of CO_2, using the GWPs described previously, so that all emissions can be reported as a single quantity. In addition, a change in carbon storage, for example by timber harvesting or revegetation, can also be converted to CO_2-e. An *increase* of CO_2-e has an adverse effect on global warming, while a *decrease* has a beneficial effect.

Units of Measurement

A common unit of measurement for GHGs is the tonne, which is also referred to as a metric ton, and is an international unit of mass. One metric ton is equal to a Megagram (Mg), 1000 kilograms, 2204.6 pounds, or 1.1023 short tons. Because it is the standard unit of GHG measurement, the metric ton (MT), or ton, is used to discuss and evaluate GHGs throughout this section.

Man-Made Greenhouse Gases

The primary anthropogenic processes that release GHGs, principally in the form of CO_2, include burning of fossil fuels for transportation and construction equipment, heating and electricity generation, agricultural practices such as livestock grazing, decomposition of crop residue, trees, and other vegetation, and industrial processes.

Forests and Greenhouse Gasses

As described in the Forest Project Protocol (CAR 2010) forests play an important part in the net CO_2 balance because trees and other vegetation have the capacity to both emit and store (sequester) CO_2. Through the process of photosynthesis, trees take up CO_2 from the atmosphere and emit oxygen. The CO_2 that is removed from the atmosphere is converted to

carbon and stored as biomass such as leaves, wood, bark, and roots. Additional carbon is stored in forest soils as well as other forest vegetation such as understory plants. When trees are converted to lumber and wood products, such products continue to provide carbon storage over their lifetime.

As trees naturally decay, or are disturbed as a result of fire, disease, or pests, some or all of the carbon in storage may be oxidized and released back into the atmosphere in the form of CO_2. Thus, a forest naturally functions as a reservoir, converting CO_2 to carbon which is stored. Depending on how forests are managed, or affected by natural events, they can be a net source, or reservoir for CO_2 emissions into the atmosphere.

If soil is disturbed through grading a portion of the stored carbon may be oxidized and converted to CO_2 and be released into the atmosphere. Such soil disturbance reduces the ability of the land to sequester carbon from the atmosphere until a vegetative cover is reestablished.

Carbon in Storage

Carbon that is stored in plants is not generating CO_2 (GHGs) for the most part, because the carbon remains bound up in organic plant materials, and is not converted back to CO_2. In addition, as long as a plant continues to produce net growth, it has the capacity to take up CO_2 from the atmosphere (reducing GHGs) and to sequester more carbon in the future. Thus, in terms of climate change, removing trees or vegetation results in a reduction of carbon in storage and has an adverse impact upon global warming. An increase of stored carbon, as a result of revegetation or improved forest management, has a net beneficial effect.

Time Value of GHGs and Carbon

The majority of scientific experts worldwide now agree that global warming is a very immediate threat. The effects of global warming may also be accelerating. For example, recent scientific investigations (Science 2012) concluded that polar ice caps are melting at even faster rates than previously thought. As recently reported in Nature (2012), “the ice sheets in Greenland and Antarctica are melting at an ever-quickening pace.” Since 1992, they have contributed 11 millimeters — or one-fifth — of the total global sea-level rise. The two polar regions are now losing mass three times faster than they were 20 years ago, with Greenland alone now shedding ice at about five times the rate observed in the early 1990s.”

There is also the possibility that the rise of global temperatures could reach a “tipping point” at which the effects of global warming, for example the melting of glacial ice or thawing of northern permafrost deposits, would be irreversible, and “greenhouse gases reach a level where major climate changes can proceed mostly under their own momentum” (Hansen 2007). For these reasons, there is a time value to GHG emissions and changes in carbon storage. Short-term GHG emissions are more significant than the same amount at some future time. Sequestering a ton of carbon immediately will likely have greater value in terms of climate change than sequestering the same ton at a later time.

Study Area

For the purposes of assessing the potential emissions of GHGs, a project is typically described in terms of its "boundaries." According to the Forest Project Protocol (CAR 2010), a GHG boundary includes all of the GHG sources, sinks, and reservoirs associated with a project's GHG reductions and removals. These include a project's primary effects, such as changes in carbon stocks, GHG emissions or removals, or secondary effects, that may include increases in combustion CO_2 emissions associated with site construction.

The study area for the GHG assessment includes all of the direct or indirect activities necessary for, or associated with, the Proposed Project, that have the potential to either generate GHGs by way of direct emissions or change the net amount of carbon in storage.

Direct GHG emissions could include:

- Project-related construction and operation activities that have the potential for direct emissions of GHGs,
- Transport of goods and materials, and workers, required for the Proposed Project, traveling to and from the site from common places of origin that have the potential for direct emissions of GHGs,
- Revegetation, or vegetation removal, that could result in an increase or decrease of carbon in storage.

Indirect GHG emissions are potential changes in existing GHG inventories associated with temporary replacement of existing hydroelectric generation with sources fueled by fossil fuels.

"Life cycle" GHGs typically refer to the GHG emissions generated during the original manufacture or decommissioning of equipment, vehicles, or construction materials. Such life cycle emissions are not considered part of the direct or indirect project-related GHGs and are not included in this analysis.

California GHG Inventory

The California Air Resources Board (ARB) compiles a California GHG inventory that tabulates statewide GHG emissions and sinks. It includes estimates for the equivalent GHG emissions from carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), nitrogen trifluoride (NF_3), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs). According to the 2012 GHG inventory data compiled by ARB for the California Greenhouse Gas Inventory for 2000–2012 California emitted 458.67 MMT CO_2E of GHGs, including emissions resulting from out-of-state electrical generation (ARB 2014). These primary contributors to California's GHG emissions and their relative contributions in 2012 are presented in Table 4.10-1. As shown, the largest source of GHGs statewide is transportation (36.5%) following by electric power generation (20.7 percent).

Table 4.10-1 California Greenhouse Gas Inventory for 2012

Sector	Annual GHG Emissions (Million metric tons CO_2-e)	Percentage Contribution
Transportation	167.38	36.5
Electric Power	95.09[a]	20.7
Commercial and Residential	42.28	9.2
Industrial	89.16	19.4
Recycling & Waste (Landfilling & composting)	8.49	1.9
High Global Warming Potential Emissions (Ozone depleting substances, etc.)	18.41	4.0
Agriculture	37.86	8.3
TOTALS	458.67	100%

Source: ARB 2014

Notes:

[a] Includes emissions associated with imported electricity, which account for 44.07 MMT CO_2E annually.

GHG Trends in California

As pointed out in their most recent inventory there are many factors affecting year-to-year changes in GHG emissions, including the level of economic activity, demography, improved efficiency, and changes in environmental conditions such as drought (ARB 2017e). Over the period of 2000-2012, GHG emissions in California have decreased by 1.6 percent from 466.3 million MT of CO_2e in 2000 to 458.7 MT in 2012, with a maximum of 492.7 million in 2004. During that same period GHG emissions per person decreased from 13.7 to 12.1 MT of CO_2e per person (ARB 2017e).

Electricity Generation GHG Trends

The GHG intensity of electricity generation in California, as measured by million tonnes of CO_2-e, has been decreasing during the last 15 years, as shown in Figure 4.10-1. Overall the decrease in this sector is attributed to higher energy efficiency standards, the Renewable Portfolio Standard, which requires a greater percentage of power to be generated from renewable resources, and carbon pricing in the Cap-and-Trade program. (ARB 2017e).

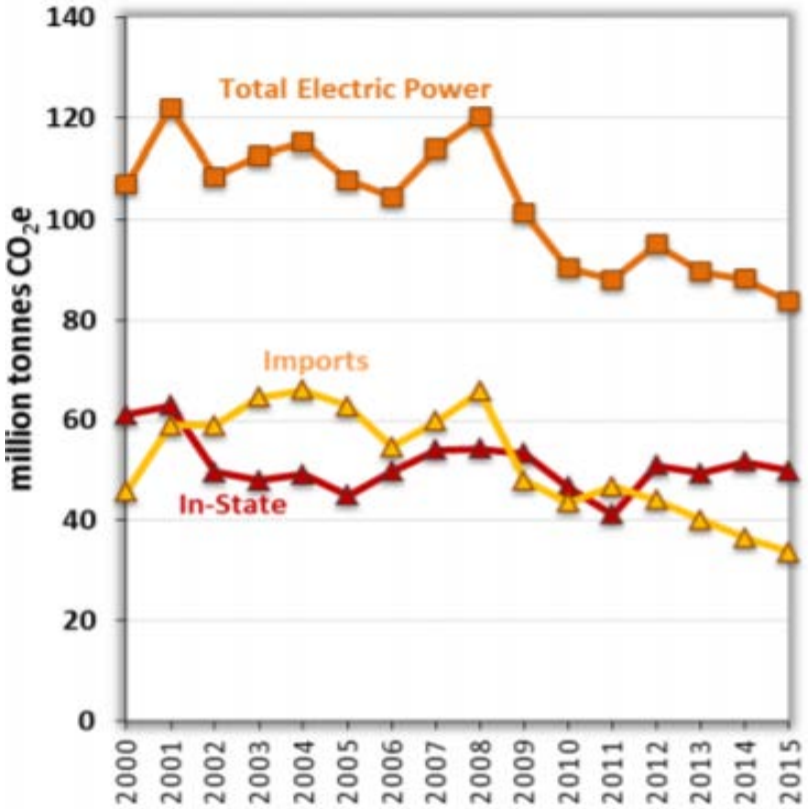


Figure 4.10-1 Electricity Generation Trends

This Page Intentionally Left Blank

Shasta County GHG Inventory

Table 4.10-2 presents a breakdown of the total GHG emissions in Shasta County for 2008 by source. Total GHG emissions were about 4.48 MMT CO_2-e. As shown, the greatest contribution (54% of total) is from stationary (industrial) sources, with transportation the second highest source, at 19% of the total.

Table 4.10-2 Shasta County 2008 Total GHG Inventory

Emissions Sector	MT CO_2-e	Contribution
Energy Consumption	647,618	14%
Transportation	843,649	19%
Solid Waste	102,083	2%
Water Consumption	17,817	0.4%
Wastewater Treatment	22,898	1%
Off-Road Vehicles & Equipment	75,330	2%
Recreation	53,005	1%
Agriculture	132,234	3%
Forestry	156,538	3%
Stationary Sources	2,425,415	54%
TOTAL	4,476,587	

Source: Shasta County 2012

Existing Project GHGs

As summarized in Table 4.10-3, the existing Project (Kilarc and Cow Creek) generates GHGs from two principal sources:

- Vehicle emissions associated with workers commuting to and from the Project Area, and
- CO_2 and methane production from the Kilarc and Cow Creek Forebays (reservoirs)

Table 4.10-3 Existing GHG Sources for the Project

Sector	Kilarc (MT CO_2-e/yr)	Cow Creek (MT CO_2-e/yr)
Worker Commute	78	33
Reservoirs	5.4	1.2
TOTAL	**83.4**	**34.2**

Operation and Maintenance. Currently, workers commute to and from the Kilarc and Cow Creek powerhouses, and locations within the waterways, from the Manton area or other locations. Based on estimated maximum commuting mileage, operation and maintenance commuting generates about 78 and 33 MT/yr of GHG emissions for Kilarc and Cow Creek respectively, as shown in Table 4.10-3.

Reservoirs. Newly created reservoirs produce carbon dioxide and methane (a potent GHG) due to the decomposition of biomass that has been flooded (inundated). During operation, organic materials that flow into the reservoir also have the potential to decompose and produce these GHGs. Large reservoirs that draw down water levels can also expose materials that more rapidly decompose to produce GHGs. The rate and amount of decomposition, and GHG production within a reservoir is highly variable, and depends on a number of factors, including:

- Temperature
- Water residence time
- Reservoir shape, volume, and depth
- Amount and type of vegetation flooded
- Reservoir age

In boreal zones where the Project is located (e.g. northern temperate forests dominated by coniferous trees such as spruce, fir, and pine), GHG emissions from reservoirs are relatively small in comparison to tropical or sub-tropical zones (Teodoru 2010). Reservoir age (time since initial inundation) also plays a major role in decomposition rates (Steinhurst et al. 2012) GHG emissions increase significantly immediately after reservoir construction but decrease exponentially over time (Teodoru et al. 2010).

Because the Project is in a northern temperate zone, and was constructed over 100 years ago, GHG emissions from the reservoirs are expected to be relatively low compared to newer reservoirs. Based on data for five older reservoirs (greater than 60 years old) measured fluxes of CO_2 averaged about 804 milligrams per square meter, per day (St Louis et al. 2000), or about 2,620 lbs per acre, per year. Estimated existing GHG production for the two reservoirs is:

- Kilarc Forebay: 5.4 MT CO_2-e/yr
- Cow Creek Forebay: 1.2 MT CO_2-e/yr

4.10.2 Regulatory Setting

4.10.2.1 Federal

Reporting

The USEPA, under 40 CFR Part 98, requires the reporting of GHG emissions from large sources and suppliers in the United States; this program is intended to collect accurate and timely emissions data to inform future policy decisions (EPA 2013b). Under Part 98, suppliers of fossil fuels, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions are required to submit annual reports to USEPA. This program covers approximately 85 percent of the nation's GHG emissions and applies to roughly 10,000 facilities;

the reporting threshold of 25,000 metric tons per year is equivalent to about the annual GHG emissions from 4,600 passenger vehicles (EPA 2009).

Emissions Limits

In April 2007, the Supreme Court concluded that GHGs meet the definition of an air pollutant under the Clean Air Act (CAA); therefore, USEPA has authority under the CAA to regulate GHGs subject to an endangerment test. On September 30, 2009, USEPA announced a proposed rule that will pertain to large facilities emitting over 25,000 tons a year of greenhouse gases. These facilities would be required to obtain permits that would demonstrate they are using the best practices and technologies to minimize GHG emissions. The rule proposed new thresholds for GHG emissions that define when CAA permits under the New Source Review and Title V operating permits programs would be required for new or existing industrial facilities. On May 13, 2010, USEPA set greenhouse gas emissions thresholds in order to define when permits under the New Source Review Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs are required for new and existing industrial facilities. This final rule "tailors" the requirements of these Clean Air Act permitting programs to limit covered facilities to the nation's largest greenhouse gas emitters: power plants, refineries, and cement production facilities (EPA 2011a).

On March 27, 2012, USEPA proposed a carbon pollution standard for new power plants that would, for the first time, set national limits on the amount of carbon pollution that electric generating units (EGUs) can emit. Based on extensive comments (over 2.5 million comments received) and concerns raised by the power industry regarding the inability of existing technology to achieve this standard, the USEPA revised the proposed standards. The final rule entitled Standards of Performance for Greenhouse Gas Emissions from New Stationary Sources: Electric Generating Units went into effect on October 23, 2015.

4.10.2.2 State

AB 32 and SB 32 – California Global Warming Solutions Act

In 2006 the California legislature passed the California Global Warming Solutions Act of 2006 (AB 32). AB 32 establishes upper limits on greenhouse gas emissions in California and outlines a regulatory framework to achieve the necessary reduction in emissions levels. Under AB 32, the ARB is directed to implement the act.

The purpose of this act is to reduce GHG emissions to 1990 levels by 2020 and further reduce GHG emissions by 80 percent of 1990 levels by 2050. To achieve these goals, a number of key regulations are being implemented by the ARB, including:

- Establish a statewide GHG emissions cap for 2020, based on 1990 emissions.
- Adopt mandatory reporting rules for significant sources of GHG emissions.
- Prepare and approve a “scoping plan” for achieving the maximum technologically feasible and cost-effective reductions in greenhouse gas emissions from sources or categories of sources of greenhouse gases.
- Adopt a plan indicating how emission reductions will be achieved from significant GHG sources via regulations, market mechanisms, and other actions.

Executive Order S-3-05

On June 1, 2005, Governor Schwarzenegger signed Executive Order S-3-05. This order established the following targets for the reduction of GHG emissions in California:

- By 2010, reduce GHG emissions to 2000 levels.
- By 2020, reduce GHG emissions to 1990 levels.
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

To meet these targets, the Governor directed the California Environmental Protection Agency to coordinate with several other agencies to develop a Climate Action Plan, and also directs a Climate Action Team (CAT) to report to the Governor annually on the progress and strategies to achieve the targets.

California GHG Reporting Requirements

Under California law (Subchapter 10, Article 2, sections 95100 to 95133, Title 17, California Code of Regulations) mandatory reporting and verification of GHG emissions is required for certain large stationary sources. These requirements apply to cement plants, petroleum refineries, and hydrogen plants, which have to report GHG emissions greater than 25,000 MT/yr CO_2e. Electric generating and cogeneration facilities must report emissions greater than 2,500 MT/yr CO_2-e. Emissions from mobile equipment, including construction equipment and vehicles, are voluntary under this statute.

California Scoping Plan

AB 32 required that ARB, in coordination with the Climate Action Team, develop a scoping plan that identifies key actions that can be taken to achieve the required emissions levels. A scoping plan, developed by ARB, was approved on December 12, 2008 (ARB 2008). This plan specifies the target level of GHG emissions that must be achieved by 2020, and estimates the levels that would occur in the absence of measures to reduce emissions – the "business-as-usual" scenario; the difference represents the quantity of emissions that must be reduced by the scoping plan measures (CAPCOA 2009). The plan also presents key GHG reduction strategies, and presents a range of GHG reduction actions, including direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms. The plan identified the following key approaches for reducing greenhouse gas emissions to 1990 levels by 2020 (CalEPA 2010):

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards.
- Achieving a statewide renewable electricity standard of 33 percent.
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system.
- Establishing targets for transportation-related greenhouse gas emissions for regions throughout California, and pursuing policies and incentives to achieve those targets.

- Adopting and implementing measures to reduce transportation sector emissions, including California's Clean Car Standards, goods movement measures, and the Low Carbon Fuel Standard.

The ARB is required to update the Scoping Plan every five years. The first update to the Climate Change Scoping Plan (Scoping Plan Update) was approved by the ARB Board on May 22, 2014. A second update to the Scoping Plan is currently underway to reflect the 2030 GHG emissions reduction target of 40 percent below 1990 levels set by Executive Order B-30-15 and codified by SB 32 (Stats. 2016, ch. 249).

Cap and Trade

As discussed above, one of the recommendations of the scoping plan to achieve reductions in GHGs was the development of a cap-and-trade system. Consistent with the scoping plan recommendation, ARB has developed and implemented cap and trade regulations for California. These regulations set a statewide limit on emissions from certain large GHG sources (exceeding 25,000 MT CO_2e/yr), and establish a marketplace for emission credits or allowances. The program establishes an overall cap on GHG emissions that will decline over the period of the program, designed to produce overall reductions by 2020. The cap and trade regulations apply to 600 facilities and several industry types, including large electricity generators and distributors of fuels.

California Renewables Portfolio Standard

SB 1078 (Stats. 2002, ch. 516), enacted in 2002, established California's Renewables Portfolio Standard (RPS) program. This program requires that a retail seller of electricity, including electrical corporations, community choice aggregators, and electric service providers, purchase a specified minimum percentage of electricity generated by "eligible renewable energy resources," in any given year as a specified percentage of total kilowatt hours sold to retail end-use customers.

Eligible renewable sources include one or more of the following (CEC 2011):

- Biodiesel
- Biogas (including pipeline biomethane)
- Biomass
- Conduit hydroelectric
- Digester gas
- Fuel cells using renewable fuels
- Geothermal
- Hydroelectric incremental generation from efficiency improvements
- Landfill gas
- Municipal solid waste
- Ocean wave, ocean thermal, and tidal current

- Photovoltaic
- Small hydroelectric (30 megawatts or less)
- Solar thermal electric
- Wind

SB 1078 required that the amount of electricity generated per year from eligible renewable energy resources be 20 percent of the total electricity generated per year by December 31, 2017. SB 107 (Stats. 2006, ch. 464), accelerated this timeline and instead required that the amount of electricity generated per year from eligible renewable energy resources be at least 20 percent of the total electricity sold by December 31, 2010. In 2011 SB 2 (Stats. 2011, 1st Ex. Sess. 2011, ch. 1) amended the statutes governing the RPS program and now requires that each retail seller of electricity procure 33 percent of retail sales from eligible renewable energy resources by December 31, 2020, and procure not less than 33 percent of retail sales in all subsequent years. In October 2015, SB 350 (Stats. 2015, ch. 547) was signed into law and required retail sellers and publicly owned utilities to procure 50 percent of their electricity from eligible renewable resources by December 31, 2030. SB 100 (Stats. 2018, ch. 312) has increased the RPS requirement to 60 percent by December 31, 2030, and established the state policy that 100 percent of all electricity retail sales and state electricity procurement be from renewable energy or zero-carbon resources by December 31, 2045. As of 2016, PG&E procured 33 percent of its electricity from eligible renewable energy resources and is forecasted to meet both the 33% and 50% RPS requirements by 2020 (CPUC 2017a.).

4.10.2.3 Local

Shasta County Climate Action Plan

In order to contribute to California's climate protection efforts, and to provide CEQA review streamlining benefits, the Shasta County Air Quality Management District has initiated a regional climate action planning process. Climate Action plans (CAPs) have been prepared for individual cities, and unincorporated areas within the county (Shasta County 2012b). The Proposed Project is within an unincorporated area of Shasta County.

The CAP for unincorporated areas in Shasta County establishes baseline GHG inventories. These include a total inventory, which includes emissions from all sectors, and a jurisdictional inventory. The jurisdictional inventory does not include sectors that are not under the county's control, which are agriculture, forestry, and stationary sources. The CAP provides GHG emission forecasts for a "business as usual" case, as well as an "adjusted business-as-usual" case, which incorporates applicable emission reductions anticipated to occur in the county through implementation of state and federal policies and regulations, such as fuel efficiency improvements, energy efficiency requirements for new construction, and the requirement that utilities obtain 33 percent of their electricity from renewable sources by 2020, as described above. These state and federal actions will reduce emissions in unincorporated Shasta County and help the county achieve 2020 and 2035 emission reduction goals.

As detailed in Table 4.10-4, in 2008 Shasta County generated a total of 4,476,587 MT CO2e. Under a "business as usual" scenario, Shasta County GHG emissions are estimated to increase to 4,723,107 MT CO2-e/yr by 2020 (6 percent increase), 5,125,534 MT CO2-e/yr by 2035 (14 percent increase), and 5,557,287 MT CO2-e/yr by 2020 (24 percent increase). For the

unincorporated areas, GHG emissions are projected to increase to 3,191,931 MT CO2-e/yr by 2020 (2 percent increase), 3,313,989 MT CO2-e/yr by 2035 (6 percent increase), and to 3,442,556 MT CO2-e/yr by 2050 (10 percent increase).

Table 4.10-4 Shasta County 2008 GHG Baseline Inventory and Business as Usual Forecast

Total Annual GHG Emissions (MT CO_2-e /yr)	2008	2020	2035	2050
All of Shasta County	4,476,587	4,723,107	5,125,534	5,557,287
Unincorporated Areas - Shasta County	3,131,054	3,191,931	3,313,989	3,442,556

Source: Shasta County 2012

The CAP for unincorporated areas sets GHG emission reduction targets for 3 years (2020, 2035, and 2050) that align with State legislative goals. GHG emissions that achieve these targets (i.e. are below target levels) would not be considered cumulatively significant.

The goals for the unincorporated areas of Shasta County are:

- Reduce community GHG emission to 15% below 2008 levels by 2020.
- Reduce community GHG emission to 49% below 2008 levels by 2035.
- Reduce community GHG emission to 83% below 2008 levels by 2050.

To meet these emission reduction targets, the county intends to adopt a variety of GHG reduction measures, addressing:

- Building construction, insulation, lighting, heating, and energy efficiency
- Residential water fixtures
- Lumber waste diversion for recycling or reuse
- Methane recovery from landfills
- Transportation measures including bicycle lanes and commute trip reduction
- Urban forest carbon sequestration

The lumber waste diversion measure is designed to reduce organic materials, such as wood waste, from going to landfills where it could produce methane emissions. Under this measure, the county would adopt a construction and demolition lumber waste diversion ordinance that would apply to new construction and renovation for residential and commercial projects. This ordinance would require 75% of lumber waste to be diverted from the waste stream. Based on these criteria, such an ordinance would probably not directly apply to the Proposed Project, which is neither a residential or commercial project. Other reduction measures summarized above would also not be directly applicable.

4.10.3 Analysis Methodology

4.10.3.1 Analytical Approach

Summary of Approach

The following methods were used to evaluate the greenhouse gas emissions associated with the Proposed Project.

- Relevant USEPA, California, and Shasta County plans, policies, climate action plans, and other regulatory programs and policies were assembled and reviewed.
- To establish a baseline, GHG emissions associated with existing facility operations were estimated, including worker commuting and reservoir emissions.
- The average net historic hydroelectric generation from the Project was tabulated.
- The savings in GHG emissions associated with hydroelectric generation of the Project, compared to generation of an equivalent amount of electricity from other sources on the grid, was estimated.
- The equivalent GHG emissions, including carbon dioxide, nitrous oxide, and methane, associated with decommissioning activities, was estimated.
- The equivalent GHG emissions associated with brush or tree removals for clearing of new access roads, as well revegetation of former reservoirs, canals, and other areas, was estimated.
- The replacement of the current hydroelectric power production with other renewable energy sources was evaluated.
- The net GHG emissions associated with the short-term loss of hydroelectric generation with an equivalent amount from other sources was estimated.
- Short and long-term GHG emissions for all sources was tabulated, including direct and indirect net GHG emissions.
- Potential mitigation measures were developed.

Construction Emissions

As presented in Section 4.5 Air Quality, a construction schedule was developed for each major activity, including the type of construction equipment needed, estimated hours per day, and number of days employed. Based on this information, a detailed equipment list for all Project phases was developed including, for every piece of equipment, the estimated number of days and hours per day required. Using this information, the Project-specific emissions were calculated using CalEEMod Version 2016.3.1. GHG emissions associated with construction were quantified in metric tons of CO_2e, which includes emissions of CO_2 plus CH_4 and N_2O as adjusted by their corresponding GWP.

Criteria for Determining Significance

In the case of GHG emissions, a single project would not, in itself, be sufficient to increase global warming, or cause adverse climate changes effects. It is the sum total of all GHG sources worldwide that is recognized as contributing to global warming. No single project generates significant greenhouse gas emissions to affect climate changes (CAPCOA 2009). Therefore, the GHG emissions resulting from the Proposed Project are evaluated in terms of their contribution to the cumulative impact of global climate change. The following sections provide some background regarding significance thresholds for GHGs, along with the criteria used in the impact assessment.

CEQA Background

As described in section 15064.4 of the CEQA Guidelines, a lead agency should consider the following factors, among others, when assessing the significance of impacts from GHG emissions on the environment:

- the extent to which a project may increase or reduce GHG emissions as compared to the existing environmental setting;
- whether a project's emissions exceed a threshold of significance that the lead agency determines applies to that project;
- the extent to which a project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate a project's incremental contribution of GHG emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for that project.

One of these factors relates to GHG plans (climate action plans). One of the CEQA environmental checklist questions (VIIb) asks whether the project conflicts with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases. Section 15125, subdivision (d) of the CEQA Guidelines requires that an EIR discuss any inconsistencies between the project and regional greenhouse gas reduction plans.

Numerical GHG Thresholds

There are no established numerical thresholds of significance for GHG emissions for a project of this type. However, a numerical threshold has been established for reporting and regulating large GHG sources that does put GHG emissions into perspective. This threshold is 25,000 metric tons (MT) CO_2-e per year, and it is used in several GHG reporting and regulatory programs:

- The USEPA, under 40 CFR Part 98, requires that facilities that emit 25,000 metric tons or more per year of GHG emissions must submit annual reports to USEPA;

- California law (California Code of Regulations, Title 17, Division 3, Chapter 1, Subchapter 10, Article 2) requires mandatory reporting and verification of GHG emissions for certain large stationary sources, at 25,000 MT CO_2-e/yr; and,
- California Air Resources Board's new cap and trade regulations set a statewide limit on emissions from certain large GHG sources exceeding 25,000 MT CO_2-e/yr.

While this threshold hasn't been directly proposed as a significance criterion, it does provide a general measure of comparison regarding the general magnitude of GHG emissions. For example, 25,000 MT would correspond to the equivalent GHG emissions of approximately 1,400 residential units or one million square feet of office space (CAPCOA 2009).

GHG Significance Criteria

The Proposed Project would result in a significant impact, either directly or indirectly, if it would:

- result in a significant increases in GHG emissions compared to the existing environmental setting; or,
- conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing GHG emissions, including: (1) the state goals as set forth by the timetable established in AB 32, California Global Warming Solutions Act of 2006, (2) the Climate Change Scoping Plan (ARB 2008), or (3) the Shasta County Climate Action Plan of 2012.

4.10.4 Environmental Impacts and Mitigation

The evaluation of GHG impacts considers a variety of relevant factors, and evaluates both direct and indirect GHG emissions. Because the Proposed Project is a decommissioning action, existing GHG sources, such as automobile GHG emission from workers commuting to and from the Project sites, would be eliminated. Similarly, existing methane and carbon dioxide emissions from the reservoirs would cease after they have been filled and revegetated. These actions would result in an overall decrease in GHG emissions (i.e., a decrease in CO_2-e) compared to existing conditions and are favorable impacts with regards to global warming. On the other hand, the removal of trees and vegetation in order to construct temporary access roads, which would reduce carbon in storage, and the direct construction equipment emissions, would result in increases in GHG emissions (increase in CO_2-e), which would be adverse impacts in terms of global warming.

As indicated in the LSA Exhibit E, PG&E will implement erosion control and revegetation practices consistent with the USDA Forest Service best management practices (USDA-FS 2000) which recommend the use of native species for revegetation of surface disturbed areas to the greatest extent possible. As specified in PM&E BOTA-1, PG&E shall reseed disturbed areas with native plants on PG&E's property, and also on private property unless the owner specifies the use of other materials. It is assumed therefore that disturbed areas will be reseeded with native species, and these areas will eventually revert to a natural species composition of grasses, shrubs, and trees similar to surrounding areas. Over time, the Proposed Project would result in a net increase in vegetation, and correspondingly an increase in sequestered carbon, from these revegetation actions.

The cessation of hydroelectric generation would result in the need to replace this renewable energy source with another renewable energy source in order to have no net change in GHG emissions. With the regulatory mandates and PG&E's forward planning and procurement, this amount of renewable energy generation has been replaced.

The analysis considers the total net GHG emissions from all of these sources, including both short and long-term impacts. As described previously, there is a time value to GHG emissions, and an increase of CO_2-e in the short-term may be more significant than an increase at some future time. The decommissioning activities would take place over a three-year period (FERC 2011) which is considered the short term. Long term is considered to be approximately 25 years, a period over which revegetation would become established and mature. Table 4.10-5 presents a summary of GHG emissions for each of the Project facilities. Appendix D-3 contains the CalEEMod estimated annual emissions summary report for construction-related GHG emissions.. The following sections discuss these impacts in greater detail for the Kilarc and Cow Creek facilities.

Table 4.10-5 Summary of GHG Emissions, Carbon Dioxide Equivalents (MT CO_2-e)

Project Phase	Kilarc Existing	Kilarc Short Term	Kilarc Long Term	Cow Creek Existing	Cow Creek Short Term	Cow Creek Long Term
Direct Emission						
Operation & Maintenance	78	-78	-78	33	-33	-33
Reservoir Methane	5.4	-5.4	-5.4	1.2	-1.2	-1.2
Decommissioning Construction	0	120.5	0	0	120.5	0
Vegetation Change	0	100.9	-645	0	0	-329
Totals	*83.1*	*138*	*-728*	*34.5*	*86*	*-364*
Change from Existing		*55*	*-811*		*52*	*-398*
Indirect Emissions						
Electric Generation	0	4,901	0	0	2,185	0
Change from Existing		4,901	0		2,185	0

4.10.4.1 Kilarc Development

IMPACT 4.10-1 (Kilarc): Would the action result in short-term direct GHG Emissions?

Proposed Project

Compared with existing conditions, the Proposed Project would result in both short-term increases and decreases in GHG emissions as follows.

Construction

Project construction would generate GHG emissions from diesel-powered construction equipment and diesel and gasoline-powered vehicles, including trucks and worker personal vehicles. GHGs emitted during the combustion of fuel from off-road construction equipment and on-road vehicles would consist mainly of CO_2, with small amounts of CH_4 and N_2O. The construction activities needed to develop access roads, remove the dam, canals, and appurtenant structures, fill and grade the Kilarc Forebay, and complete revegetation of disturbed areas, would generate an estimated maximum of 120.5 MT CO_2-e.

Vegetation

In the short term, the Proposed Project would result in the immediate removal of sequestered carbon (carbon stored in plants) as a result of the clearing of trees and brush needed to prepare temporary access roads. The estimated carbon dioxide equivalent (CO_2-e) for this lost carbon is estimated to be 101 MT as shown in Table 4.10-5.

The removal of sequestered carbon is a short-term impact. The temporary access road areas would be revegetated as specified in PM&E BOTA-1 and would revert to a natural species composition of grasses, shrubs, and trees similar to the surrounding areas. Therefore, over time, these areas would result in increased uptake of carbon (see Table 4.10-5) and result in an overall net benefit in carbon sequestration.

Operation and Maintenance

Because the current operation and maintenance activities would be discontinued, the estimated GHG emissions associated with workers commuting to and from the Kilarc powerhouse and associated waterways would be eliminated, resulting in a decrease of about 78 MT CO_2-e/yr, a beneficial direct impact.

Reservoir

Draining and filling the Kilarc Forebay would eliminate methane and carbon dioxide emissions from the reservoir, resulting in a decrease of about 5.4 MT CO_2-e/yr, a beneficial direct impact.

Summary of Short-Term Direct GHG Emissions

As shown in Table 4.10-5, in the short term there would be a *decrease* in CO_2-e associated with the cessation of workers commuting to and from the Project area for operation and maintenance, along with a decrease due to filling of the Kilarc Forebay. There would be an *increase* in GHGs associated with vegetation loss and construction activities. As a result, there would be a total net increase in GHG emissions, compared with existing conditions, of about 55 MT CO_2-e/yr. This would be an increase of about 0.001% compared to existing GHG emissions in Shasta County and would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. As a result of leaving the forebay in place, the beneficial impacts of reduced methane and carbon dioxide emissions would not result. Construction-related emissions would be eliminated, and impacts from these alternatives would be less than significant.

IMPACT 4.10-2 (Kilarc): Would the action result in a short-term reduction of renewable energy production?

Proposed Project

As a result of the Proposed Project, the existing hydroelectric generating capacity (4.67 MW) would be eliminated. The Kilarc powerhouse, with an installed capacity of 3.23 MW, represents about 69 percent of the Project total of 4.67 MW. Based on the historical generation records, the Project produced from 17,639,000 to 30,653,000 kilowatt hours (KWH) per year, gross electrical production, with an average of 24,200,000 KWH/yr, or 24.2 gigawatt hours/yr (GWH/yr). Kilarc would represent about 16.7 GWH/yr. This electric generation production would be eliminated.

Because it is an existing small hydroelectric generation facility of 30 MW or less, under California Public Utilities Code section 399.12(e), the Project meets the definition of a "renewable electrical generation facility" and is therefore an eligible renewable energy resource. The existing hydroelectric production contributes to PG&E's overall percentage of renewable energy sources under the RPS mandate, which, as described in Section 4.10.2.2 above, was at 33 percent in 2016.

As a result, PG&E has met the 33 percent RPS procurement requirement and is forecasted to meet the 50 percent RPS procurement target by the year 2020. Furthermore, PG&E along with other independently-owned utilities have significant excess RPS procurement (CPUC 2017a).

Considering that PG&E has met and exceeded the RPS procurement target, any short-term losses of renewable energy production from the Kilarc portion of the Project has already been replaced. The Project would not result in a short-term reduction of renewable energy that would impact PG&E's ability to comply with the RPS program.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site., Leaving the forebay in place would not include the continuation of power generation, and there would be no additional impacts from this alternative related to IMPACT 4.10-2 (Kilarc).

IMPACT 4.10-3 (Kilarc): Would the action conflict with Shasta County goals for reducing GHG emissions?

Proposed Project

As described above in Section 4.10.1.3, Shasta County has developed specific goals to reduce community GHG emissions for three target dates: 2020, 2035, and 2050. While the

implementation of the Project would result in the loss of hydroelectric production, PG&E has already replaced this with other eligible renewable energy in order to meet their RPS procurement requirements. Therefore, the Proposed Project would not impair, or adversely affect, the ability of the county to achieve its GHG goals for 2020. Overall, the Proposed Project would result in a net reduction in GHG emissions, which would help the county achieve its 2020 GHG target.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would not include the continuation of power generation, and there would be no additional impacts from these alternatives related to IMPACT 4.10-3 (Kilarc).

IMPACT 4.10-4 (Kilarc): Would the action result in changes to long-term direct GHG Emissions?

Proposed Project

Table 4.10-5 summarizes the long-term GHG emissions for the Proposed Project. As shown, there would be a net beneficial reduction in GHG emissions as a result of the elimination of operations and maintenance commuting (-78 MT CO_2-e/yr) and filling of the Kilarc Forebay (-5.4 MT CO_2-e/yr). As a result of revegetation, over time, former access roads, canals, and reservoirs would revert to natural conditions for the area, in turn providing net additional carbon sequestration compared to existing conditions. As shown in Table 4.10-6, revegetation would add an estimated 645 MT CO_2-e of new carbon, and so net GHG emissions would be correspondingly 645 MT less than existing conditions.

PG&E has replaced the electric generating production of the Project with other eligible renewable energy generation and is in order to meet its 33 percent RPS mandate by 2020. In the long term, therefore, there would be no net change in the equivalent GHG emissions from the lost generation potential of the Project. As shown in Table 4.10-5, the net change in the long term GHG emissions would overall be beneficial in reducing equivalent GHG emissions compared to existing conditions by an estimated 811 MT CO_2-e/yr.

- **Level of Significance:** No Impact (Beneficial)
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. As a result of leaving the forebay in place, there would be a reduction in operations and maintenance commuting, and construction-related commuting would be eliminated. Leaving the forebay in place would not include continuation of power generation. However, as with the Proposed Project, PG&E will need to replace the electric generating production of the Project with other eligible renewable energy generation. There would be no additional impacts from these alternatives related to IMPACT 4.10-4 (Kilarc).

4.10.4.2 Cow Creek Development

IMPACT 4.10-5 (Cow Creek): Would the action result in changes in short-term direct GHG Emissions?

Proposed Project

Compared with existing conditions, the Proposed Project would result in short-term increases and decreases in GHG emissions as follows.

Construction

Project construction would generate GHG emissions from diesel-powered construction equipment, and diesel and gasoline-powered vehicles, including trucks and worker personal vehicles. GHGs emitted during the combustion of fuel from off-road construction equipment and on-road vehicles would consist mainly of CO_2, with small amounts of CH_4 and N_2O. The maximum amount of construction activities needed to remove the dam, canals, and appurtenant structures, fill and grade the Cow Creek Forebay, and complete revegetation of disturbed areas, would generate an estimated maximum of 120.5 MT CO_2-e.

Operation and Maintenance

Because the current operation and maintenance activities would be discontinued, the estimated GHG emissions associated with workers commuting to the Cow Creek powerhouse and associated waterways would be eliminated, resulting in a decrease of about 33 MT CO_2-e/yr, a beneficial direct impact.

Reservoir

Draining and filling the Cow Creek Forebay would eliminate methane and carbon dioxide emissions from the reservoir, resulting in a decrease of about 1.2 MT CO_2-e/yr, a beneficial direct impact.

Summary of Short-Term Direct GHG Emissions

As shown in Table 4.10-5, in the short term there would be a *decrease* in CO_2-e associated with the cessation of workers commuting to and from the Project area for operation and maintenance, along with a decrease due to filling of the Cow Creek Forebay. There would be an *increase* in GHGs associated with construction activities. As a result, there would be a total net increase in GHG emissions, compared with existing conditions, of about 52 MT CO_2-e/yr. This would be an increase of about 0.001% compared to existing GHG emissions in Shasta County and would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and therefore construction activities would result in short-term and temporary GHG emissions. New equipment operation and maintenance would also require a limited

amount of new commuting. As with the Proposed Project, the increased emissions are anticipated to be incremental when compared to existing GHG emissions in Shasta County, and impacts would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, no short-term and temporary GHG emissions would result. There would be no additional impacts from this alternative related to IMPACT 4.10-5 (Cow Creek).

IMPACT 4.10-6 (Cow Creek): Would the action result in a short-term reduction of renewable energy production?

Proposed Project

As a result of the Proposed Project, the existing hydroelectric generating capacity (4.67 MW) would be eliminated. The Cow Creek powerhouse, with an installed capacity of 1.44 MW, represents about 31 percent of the Project total of 4.67 MW. Based on the historical generation records, the Project produced from 17,639,000 to 30,653,000 kilowatt hours (KWH) per year, gross electrical production, with an average of 24,200,000 KWH/yr, or about 24.2 gigawatt hours/yr (GHW/yr). Cow Creek would represent about 7.5 GWH/yr. This electric generation production would be eliminated.

Because it is an existing small hydroelectric generation facility of 30 MW or less, under California Public Utilities Code section 399.12(e), the Project meets the definition of a "renewable electrical generation facility" and is therefore an eligible renewable energy resource. The existing hydroelectric production contributes to PG&E's overall percentage of renewable energy sources under the RPS mandate, which, as described in Section 4.10.2.2 above, was at 33 percent in 2016.

As a result, PG&E has met the 33 percent RPS procurement requirement and is forecasted to meet the 50% RPS procurement target by the year 2020. Furthermore, PG&E along with other independently-owned utilities have significant excess RPS procurement (CPUC 2017a).

Considering that PG&E has met and exceeded the RPS procurement target, any short-term losses of renewable energy production from the Cow Creek portion of the Project has already been replaced. The Project would not result in a short-term reduction of renewable energy that would impact PG&E's ability to comply with the RPS program.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, however, the continuation of power generation is not proposed. There would be no additional impacts from these alternatives related to IMPACT 4.10-6 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place, No construction activities would occur, and power generation would not continue. There would be no additional impacts from this alternative related to IMPACT 4.10-6 (Cow Creek).

IMPACT 4.10-7 (Cow Creek): Would the action conflict with Shasta County goals for reducing GHG emissions?

Proposed Project

As described above in Section 4.10.1.3, Shasta County has developed specific goals to reduce community GHG emissions for three target dates: 2020, 2035, and 2050. While there would be a short-term increase in GHGs as a result of the loss of hydroelectric production, PG&E will need to replace the Project generating capacity with another eligible renewable energy source in order to meet its RPS requirement of 33 percent by 2020. Therefore, by 2020 there should be no net change in GHG emissions from energy production, and the Project would not impair, or adversely affect, the ability of the county to achieve its GHG goals for 2020. Assuming replacement of the Project by 2020, the Proposed Project would result in a net reduction in GHG emissions, which would help the county achieve its 2020 GHG target.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, however, the continuation of power generation is not proposed. There would be no additional impacts from these alternatives related to IMPACT 4.10-7 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place, No construction activities would occur, and power generation would not continue. There would be no additional impacts from this alternative related to IMPACT 4.10-7 (Cow Creek).

IMPACT 4.10-8 (Cow Creek): Would the action result in changes to long-term direct GHG Emissions?

Proposed Project

Table 4.10-5 summarizes the long-term GHG emissions for the Proposed Project. As shown, there would be a net beneficial reduction in GHG emissions as a result of the elimination of operations and maintenance commuting (-33 MT CO_2-e/yr) and filling of the Cow Creek (-1.2 MT CO_2-e/yr). As a result of revegetation, over time, former access roads, canals, and reservoirs would revert to natural conditions for the area, in turn providing net additional carbon sequestration compared to existing conditions. As shown in Table 4.10-5, revegetation would

add an estimated 329 MT CO_2-e of new carbon, and so net GHG emissions would be correspondingly 329 MT less than existing conditions.

Over time, PG&E will replace the electric generating production of the Project with other eligible renewable energy generation in order to meet its 33 percent RPS mandate by 2020. In the long term, therefore, there would be no net change in the equivalent GHG emissions from the lost generation potential of the Project. As shown in Table 4.10-5, the net change in the long term GHG emissions would overall be beneficial in reducing equivalent GHG emissions compared to existing conditions by an estimated 398 MT CO_2-e/yr.

- **Level of Significance:** No Impact (Beneficial)
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and therefore would include temporary construction commuting, but would include a reduction in operations and maintenance commuting over the Proposed Project. Implementation of these alternatives would not include continuation of power generation. However, as with the Proposed Project, PG&E will need to replace the electric generating production of the Project with other eligible renewable energy generation. There would be no additional impacts from this alternative related to IMPACT 4.10-8 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place, No construction activities would occur, and power generation would not continue. There would be no additional impacts from this alternative related to IMPACT 4.10-8 (Cow Creek).

4.11 Hazards and Hazardous Materials

This section presents an overview of hazards in the Project Area, including: (1) the potential types of hazardous materials contamination in Shasta County, with specific attention to areas subject to Project maintenance; (2) emergency response and transportation routes, and related considerations for routing of Project vehicles; and (3) other types of hazards that could affect or be affected by the Project, such as wildland fires.

4.11.1 Environmental Setting

Hazardous materials are used in many forms and activities throughout Shasta County. The most heavily used substances are motor vehicle fuels, lubricants, and propane. Regulations regarding the use of herbicides, pesticides, and fertilizers that contain hazardous materials are administered by the State Department of Food and Agriculture in conjunction with the County Agricultural Commissioner. Any operation which discharges wastes onto land or into bodies of water must also meet discharge requirements established by the Central Valley Water Board.

4.11.1.1 Sources of Information

The Public Safety Group Fire Safety and Sheriff Protection subsection of the Shasta County General Plan contains policies regarding fire protection and development practices within an identified high risk fire hazard area that are applicable to the Proposed Project.

The Shasta County Hazardous Materials Area Plan (Area Plan) establishes the policies, responsibilities, and procedures required to protect the health and safety of Shasta County's citizens, the environment, and public and private property from the effects of hazardous materials emergency incidents.

4.11.1.2 Regional Setting

Land Uses in the Project Area

The Project area for both the Kilarc and Cow Creek Developments in undeveloped and forested areas of the lower Cascade Range, There are scattered residences throughout the area surrounding both developments. The nearest town to the Kilarc Development is Whitmore, which is located approximately 3.6 miles from the reservoir. The town of Redwoods is located directly to the east of the Cow Creek Development. Both development areas are used for recreation and fishing.

Hazardous Waste and Contaminated Sites

Shasta County includes hundreds of facilities handling many forms of hazardous materials in the rural and urban areas. Hazardous materials are found at both permanent and temporary facility locations. All major roadways are used for routine transportation of these materials with Interstate 5, SR 44, SR 89, and SR 299 being the most heavily used. Union Pacific Railroad passes through the major population centers of the County, including the cities of Anderson, Redding, and Shasta Lake. Natural gas pipelines run to major population centers and bisect the eastern portion of the County.

Any of these routes and any facilities have the potential for major releases of hazardous materials. The rail line and Interstate 5 run through the most heavily populated areas of Shasta County, and should be expected to represent a higher degree of risk for populations in a release. However, even a small spill of a common material (gasoline) at a service station can pose significant hazard risk.

The California Department of Toxic Substances Control (DTSC) EnviroStor Database lists includes one Federal Superfund site, five State Response, and numerous other hazardous waste and substances sites located in Shasta County, however, none of these sites are in the vicinity of the Project Area (DTSC 2018). Additionally, a search of the State Water Board's Geotracker database did not return any results for cleanup sites within the vicinity of the Project Area (State Water Board 2018).

Wildland Fire Hazards

CAL FIRE has designated portions of Shasta County, including the Project Area, as a State Responsibility Area. Therefore, CAL FIRE is fiscally responsible for fire response in this area. As required by California Public Resources Code 4201-4204, CAL FIRE has identified and mapped Fire Hazard Severity Zones. The hazard level for the Project Area is "Very High" (CAL FIRE 2007). During wildfire emergencies in the area, Kilarc Forebay is used by CAL FIRE as a water supply for fire suppression when wildland fires are in the vicinity of the reservoir. The Kilarc Forebay is also used by the Whitmore Volunteer Community Fire Company (WVCFC) as a water resource for fire suppression in the immediate area. Cow Creek Forebay is not a water source for fire suppression. There are several other water bodies within 15 miles of the Kilarc Forebay, including Buckhorn Lake, Silver Lake, Blue Lake, Woodridge Lake, and Lake Shasta, which can also be used as a water resource for fire suppression. Additionally, wide points along creeks in the area have been successfully used in the past for water collection via helicopter. .

Volcanism

Mount Shasta and Mount Lassen are active volcanoes located approximately 50 miles and 24 miles, respectively, from the Kilarc and Cow Creek Developments. Mount Shasta has erupted, on the average, at least once per 800 years during the last 10,000 years, and about once per 600 years during the last 4,500 years. An eruption from Mount Shasta would most likely produce deposits of lithic ash, lava flows, domes, and pyroclastic flows. Lava flows and pyroclastic flows may affect low- and flat-lying ground almost anywhere within about 20 kilometer (km) of the volcano summit, and mudflows could cover valley floors and other low areas (Miller 1980).

The Lassen region forms the southernmost segment of the Cascade arc of volcanoes. The probability of an eruption in this region in any given year is approximately 1 chance in 7,150 (Clynne et al. 2012). Lassen Peak, the southernmost active Cascade volcano last erupted in 1914–17. The most likely volcanic event in the Lassen region is a short-lived mafic eruption, possibly lasting as long as a year, and producing a cinder cone, local tephra fall, and lava flows. Monitoring changes in seismic activity, ground deformation, gas emissions, and changes in hydrothermal systems provides the opportunity to forecast probable eruptions. A network of eight seismic stations is installed in the Lassen region, and data from station instruments are transmitted to USGS offices in Menlo Park, California (Clynne et al. 2012).

4.11.2 Regulatory Setting

4.11.2.1 Federal Regulations

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also called the Superfund Act) (42 U.S. Government Code [USC] Sec. 9601 et seq.) is intended to protect the public and the environment from the effects of prior hazardous waste disposal and new hazardous material spills. Under CERCLA, the U.S. USEPA has the authority to seek the parties responsible for hazardous materials releases and to assure their cooperation in site remediation. CERCLA also provides federal funding (the "Superfund") for the remediation of hazardous materials contamination. The Superfund Amendments and Reauthorization Act of 1986 (Public Law [PL]-99-499) amends some provisions of CERCLA and provides for a Community Right-to-Know program.

Resource Conservation and Act

The Resource Conservation and Recovery Act (RCRA) (42 USC Sec. 6901 et seq.) was enacted in 1976 as an amendment to the Solid Waste Disposal Act to address the nationwide generation of municipal and industrial solid waste. RCRA gives USEPA the authority to control the generation, transportation, treatment, storage and disposal of hazardous waste, including underground storage tanks storing hazardous substances. RCRA also establishes a framework for the management of nonhazardous wastes. RCRA addresses only active and future facilities; it does not address abandoned or historical sites, which are covered by CERCLA (see preceding section).

4.11.2.2 State Regulations

California state regulations, which are equal to or more stringent than federal regulations, require planning and management to ensure that hazardous wastes are handled, stored, and disposed of properly to reduce risks to human health and the environment. Several key state laws and programs are discussed below.

Hazardous Waste Control Act

The Hazardous Waste Control Act (Health & Saf. Code, § 25100) created the state Hazardous Waste Management Program, which is similar to, but more stringent than, the federal program under RCRA. The Hazardous Waste Control Act is implemented by regulations contained in Title 26 of the CCR. Regulations in Title 26 of the CCR list more than 800 materials that may be hazardous and establish criteria for their identification, packaging, and disposal. Under the Hazardous Waste Control Act and Title 26 of the CCR, hazardous waste generators must complete a manifest that accompanies the waste from the generator to the transporter to the ultimate disposal location. Copies of the manifest must be filed with California Department of Toxic Substances Control.

Emergency Services Act

Under the Emergency Services Act (Gov. Code, § 8550), the State of California developed an emergency response plan to coordinate emergency services provided by federal, state, and

local agencies. Rapid response to incidents involving hazardous materials or hazardous waste is an important part of the plan, which is administered by the California Office of Emergency Services. This office coordinates the responses of other agencies, including the USEPA, California Highway Patrol, the nine Regional Water Quality Control Boards, the various air quality management districts, and county disaster response offices.

California Occupational Safety and Health Administration Standards

Worker exposure to contaminated soils, vapors that could be inhaled, or possibly groundwater containing hazardous levels of constituents would be subject to monitoring and personal safety equipment requirements that are established in California Occupational Safety and Health Administration (Cal/OSHA) regulations (CCR, Title 8) and specifically address airborne contaminants. The primary intent of the Title 8 requirements is to protect workers, but compliance with some of these regulations would also reduce potential hazards to non-construction workers and project area occupants because required site monitoring, reporting, and other controls would be in place.

CAL FIRE Fire and Resource Assessment Program

Public Resources Code 4789 mandates periodic assessments of California's forest and rangeland resources. These assessments identify key issues and define the status and trends across all forest lands in each state. To the extent possible, spatial areas (called priority landscapes) are to be delineated that help focus investments and other programs to deal with associated issues (CAL FIRE 2010). CAL FIRE prepared California's the Fire and Resource Assessment Program (FRAP). Relating to wildfire, the FRAP states that wildfire trends point to increasing acres of forests and rangelands burned statewide, particularly in conifer forests. As stated in the FRAP, this is supported in part by the fact that the three largest fire years since 1950 have all occurred this decade. Wildfire related impacts are likely to increase in the future based on trends in increased investment in fire protection, increased fire severity, fire costs, and losses, and research indicating the influence of climate change on wildfire activity (CAL FIRE 2010). The Project Area is located within the Modoc Bioregion and is designated as a "High" and "Medium" Priority Landscape, indicating the Project is in an area "with important economic assets that face significant threat from wildfire." The FRAP identifies the need for priority landscapes to maintain a Community Wildfire Protection Plan (CWPP). Shasta County is currently covered by a 2016 CWPP, as described below.

4.11.2.3 Local Regulations

Shasta County General Plan

The Public Safety Group Fire Safety and Sheriff Protection element of the Shasta County General Plan contains the following policies, regarding fire protection and development practices within an identified high risk fire hazard area, that are applicable to the Proposed Project:

General Plan Policies

FS-a All new land use projects shall conform to the County Fire Safety Standards.

The Hazardous Materials subsection of the General Plan includes the following applicable policies regarding contact and release of hazardous materials.

HM-b Shasta County shall maintain an emergency preparedness plan for hazardous materials.

HM-c Shasta County shall adopt policies for hazardous materials use, transportation, storage, and disposal as required by State laws.

HM-d Shasta County shall adopt policies for the protection of life and property from contact with hazardous materials through site design and land use regulations.

Shasta County Hazardous Materials Area Plan

The Area Plan fulfills the Certified Unified Program Agency (CUPA) regulatory program requirements, and establishes the policies, responsibilities, and procedures required to protect the health and safety of Shasta County's citizens, the environment, and public and private property from the effects of hazardous materials emergency incidents.

The Area Plan establishes the emergency response organization for hazardous materials incidents occurring within Shasta County including the cities of Redding, Anderson, and Shasta Lake. This Plan documents the operational and general response procedures for the Shasta-Cascade Hazardous Materials Response Team, the primary hazardous materials response group for Shasta County (Shasta County Environmental Health Division 2018).

The Area Plan is the principle guide for agencies of Shasta County, some of its incorporated cities, and other local entities in mitigating hazardous materials emergencies. This Area Plan is consistent with the National Incident Management System (NIMS); a unified framework for incident management within which government and private entities at all levels can work together effectively. Specific plan objectives include the following (Shasta County Environmental Health Division 2018):

- Describe pre-emergency preparations, emergency operations, organizations, and supporting systems required to implement the Area Plan.
- Provide for a coordinated and integrated response to hazardous materials accidents, releases, or threatened releases.
- Define roles, responsibilities, and authority of participating agencies including local, state and federal agencies during a hazardous materials incident in Shasta County.
- Establish lines of authority, communication, and coordination when this plan is in effect.
- Provide to responding agencies, separately from this plan, specific information about facilities within Shasta County, which handle large quantities of hazardous materials, and may pose the greatest risk to the community.
- Provide the news media and the general public accurate and timely information and instructions concerning the release or threatened release of a hazardous material.

- Establish provisions for training of emergency response personnel (Shasta Cascade Hazardous Materials Response Team members and agency first responders).
- Provide evacuation-planning guidance.
- Provide a list and description of available emergency response supplies and equipment.
- Provide a mechanism for incident critiques and follow-up.

Shasta County Emergency Operations Plan

Shasta County's 2014 Emergency Operations Plan (EOP) (Shasta County 2014), prepared by the Shasta County Office of Emergency Services (OES), is an all-hazard plan that describes how Shasta County will organize and respond to emergencies and disasters in the community. It is based on, and is compatible with, federal, State of California, and other applicable laws, regulations, plans, and policies. Focused on response and short-term recovery activities, the EOP provides a framework for how the County will conduct emergency operations. The Plan identifies key roles and responsibilities, defines the primary and support roles of County agencies and departments, outlines the steps for coordination with response partners, and establishes a system for incident management. The EOP formally adopts the principles of the NIMS.

Western Shasta Resource Conservation District CWWP

To address the risk of wildfire in Shasta County, and in response to the 2002 Healthy Forests Initiative and 2003 Healthy Forests Restoration Act, a CWPP was developed in 2016. The Western Shasta Resource Conservation District (WSRCD) updated the existing strategic fuel management plans or CWPPs in Shasta County and consolidated them into a single county-wide plan. The purpose of the update was to meet with Fire Safe Councils, the watershed group, landowners, and agencies to review the existing project list and priorities, move completed projects to a category of maintenance projects, add new projects, identify wildland urban interface areas, conduct risk assessments, and establish a revised list of priority projects.

The 2016 CWPP identifies hazardous fuel reduction treatment priorities, recommends measures to reduce structural ignitability, and addresses issues such as wildfire response, hazard mitigation, and community preparedness and structure protection. The Project Area is within the Cow Creek Planning Area of the CWPP which is identified as having a wildland urban interface. The Cow Creek Planning Area includes the communities of Palo Cedro, Bella Vista, Whitmore, Oak Run, Round Mountain, Montgomery Creek, and Backbone Ridge. Several fuelbreak projects are identified within the Cow Creek Planning Area, including Fern Road and Whitmore Road, which are used to access the Kilarc Development (WSRCD 2016).

4.11.3 Analysis Methodology

The methodology section describes the resource-specific assessment methods, approach, and analytical models used to identify and evaluate the environmental impacts for the resource. It also describes any specific significance criteria used in the assessments to determine the level of significance of an impact. The thresholds section describes thresholds of significance used for the resource to determine the significance of impacts as required. The thresholds for determining the significance of impacts for this analysis are based on the State Water Board's Environmental Checklist in Appendix A of the Board's CEQA regulations and the Environmental Checklist in

Appendix G of the State CEQA Guidelines. [Note to Reader: The thresholds derived from the checklist may be modified as appropriate to meet the circumstances of the Project.

4.11.3.1 Analytical Approach

As required by California Public Resources Code 4201-4204, CAL FIRE has identified and mapped Fire Hazard Severity Zones (CAL FIRE 2007). The hazard level for the project area is categorized as "Very High" (FERC 2011). PG&E's proposed surrender activities related to clearing and piling of vegetative materials on site, and the use of equipment with internal combustion engines, gasoline powered tools, and equipment or tools that produce a spark, fire, or flame in an area designated as being "Very High" fire hazard could pose a wildland fire risk in the project area. In addition, the Proposed Project would result in the removal of the Kilarc Forebay which is used as a source of water for fire suppression.

The following methods were used to identify hazards and hazardous materials in the Project Area and to describe potential effects resulting from project implementation:

- Interpretation of aerial and general site photographs;
- Review of baseline data and the analysis of the effects of decommissioning contained within the FERC application and NEPA document;
- Identification of other potential water sources for fire-fighting in the area; and
- Review of compliance with state and local ordinances and regulations pertaining to hazardous resources.

Criteria for Determining Significance

Based on the State Water Board's Environmental Checklist in Appendix A of the Board's CEQA regulations, Appendix G of the CEQA Guidelines, and professional standards and practices, a Proposed Project would have a significant impact if it 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 section 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 2 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
- For a project within the vicinity of a private airstrip, 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 to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands

4.11.4 Environmental Impacts and Mitigation

To address impacts related to Hazards and Hazardous Materials, PG&E has proposed the following PM&E measures:

- **PM&E Measure GEOL-1: Implement Soil Erosion and Sedimentation Control Best Management Practices.** The Licensee shall identify and implement Soil Erosion and Sedimentation Control BMPs that address soil erosion impacts that may occur both during and after decommissioning construction work. The Licensee shall adhere to standard erosion control procedures, including applicable measures developed by the U.S. Forest Service (USDA-FS) and published in the Water Quality Management for Forest System Lands in California Best Management Practices (USDA-FS 2000).[34]

  Prior to construction, the Licensee shall identify all natural drainage paths along the canals and tunnel during pre-construction surveys. Slopes prone to instability shall be identified, and site specific BMPs shall be implemented to avoid potential slope erosion and increased sedimentation in streams during and after construction activities.

  During the construction period, the Licensee shall install BMPs in all areas where soil is disturbed and could result in an increase in sedimentation and/or erosion. The Licensee shall perform inspections after storm events and perform any necessary repairs, replacements, and/or addition of BMPs.

  At the end of construction, the Licensee shall identify potential future erosion sites and install long-term BMPs.[35] Specific areas to be addressed are listed below:

  - After removal of the canals, diversions, and impoundment structures, the Licensee shall implement BMPs such as restoration of natural drainage paths, and recontouring of slopes to match pre-existing slope morphology, as feasible. Revegetation shall be implemented to increase bank stability (see PM&E Measure BOTA-1).
  - The Licensee shall implement BMPs to address potential erosion of access roads and staging areas throughout the Kilarc and Cow Creek Developments. Artificial swales, culverts, and/or other structures shall be designed to direct runoff away from disturbed areas based on the natural drainage features of the area. For any temporary access roads that are removed, the Licensee shall implement measures in accordance with BMP 2-26 Obliteration or Decommissioning of Roads, as defined in the USDA-FS

[34] Water Quality Management for Forest System Lands in California (USDA-FS 2000) provides a set of standardized BMPs to protect water quality during the planning and construction of projects. The BMPs are organized into eight land use activity categories including Road and Building Site Construction and Watershed Management.

[35] If, for example, stabilization measures are warranted, the Licensee shall design BMPs to protect the banks at dam abutments and diversion canal intakes during high flow events.

Water Quality Management for Forest System Lands in California Best Management Practices (USDA-FS 2000).

To ensure the effectiveness of the long term BMPs, post-construction monitoring will be conducted for 2 years within the stream channel (see PM&E Measure GEOM-2) and for 1 year in all other construction areas.[36] The post-construction inspections will be to ensure that BMPs installed at the end of construction are effective and/or to identify areas where installation of additional BMPs is necessary.

- **PM&E Measure GEOL-2: Implement Soil Erosion and Sedimentation Control Best Management Practices.** The Licensee shall identify all potential pollutant sources, including sources of sediment (e.g., areas of soil exposed by grading activities, soil/sediment stockpiles) and hazardous pollutants (e.g., from petroleum products leaked by heavy equipment or stored in maintenance areas). Also, the Licensee shall identify any non-storm water discharges and implement BMPs[37] to protect streams from potential pollutants and minimize erosion of topsoil. The Licensee shall include a monitoring and maintenance schedule to ensure BMP effectiveness for sediment control, spill containment, and post-construction measures.

  The Licensee shall include a monitoring and reporting program, including pre- and post-storm inspections, to determine if BMPs are sufficient to protect streams and to identify any areas where storm water can be exposed to pollutants. The monitoring program will include provisions for sampling and analysis to evaluate whether pollutants that cannot be visually observed are contributing to degradation of water quality.

- **PM&E Measure GEOL-3: Professional Engineering Design Plans and Specifications.** The Licensee shall develop detailed design plans and specifications after FERC orders the Project to be decommissioned. These plans shall consider the potential for landslides and shall include provisions to minimize this potential. The Licensee shall prepare engineering plans for new access roads or staging areas to minimize grades and cut and fill volumes, as well as to minimize any potential for landslides as a result of the grading work.

- **PM&E Measure FIRE-1: Spark Arrestors.** The Licensee shall equip earthmoving and portable equipment with internal combustion engines with a spark arrestor to reduce the potential for igniting a wildland fire.

- **PM&E Measure FIRE-2: Fire Suppression Equipment.** The Licensee shall maintain appropriate fire suppression equipment during the highest fire danger period – from April 1 to December 1.

[36] The erosion control measures will be designed to develop and maintain geomorphically-stable stream channels above, below, and at the diversions, and the erosion control measures will also be designed to prevent contributions of sediment to drainages and streams.

[37] These measures may include: (1) requiring that fueling or maintenance of equipment (including washing) only be performed in specified areas outside an approved protective strip of predominately undisturbed and vegetated soil; (2) not allowing refueling of construction equipment within 100 feet from riparian or aquatic habitats; (3) reporting any release of oil or hazardous materials immediately upon detection in accordance with all applicable laws and regulations; and (4) requiring all contractors to have materials on hand to control and contain a spill of oil or hazardous materials.

- **PM&E Measure FIRE-3: Flammable Materials.** On days when a burning permit is required, the Licensee shall remove flammable materials to a distance of 10 feet from any equipment that could produce a spark, fire, or flame, and the Licensee shall maintain the appropriate fire suppression equipment.
- **PM&E Measure FIRE-4: Portable Gas-Powered Tools.** On days when a burning permit is required, the Licensee shall not use portable tools powered by gasoline fueled internal combustion engines within 25 feet of any flammable materials.

4.11.4.1 Kilarc Development

IMPACT 4.11-1 (Kilarc): Would the action 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?

Proposed Project

Decommissioning activities would require limited and temporary use of hazardous materials which may consist of solvents, batteries, diesel or gasoline (used for equipment fuel), and oil. Decommissioning activities may also generate hazardous wastes consisting of flushing and cleaning fluids, spent batteries, used oil, welding materials, and dried paint among others.

Standard construction procedures and BMPs would be implemented to reduce the emissions of dust and pollutants during construction. With the implementation of PM&E Measure GEOL-2, the potential impacts to water quality from accidental releases of hazardous materials would be minimized by providing spill containment.

The transport of non-visible pollutants by surface runoff from the Proposed Project would be regulated by storm water pollution prevention BMPs (PM&E Measure GEOL-1). PG&E would identify all potential pollutant sources, including sources of sediment (e.g., areas of soil exposed by grading activities, soil/sediment stockpiles) and hazardous pollutants (e.g., from petroleum products leaked by heavy equipment or stored in maintenance areas). Also, PG&E would identify any non-storm-water discharges and implement BMPs to protect streams from potential pollutants and minimize erosion of topsoil. Therefore, impacts related to a release of hazardous materials to the environment would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site, As a result of leaving the forebay in place, the use of construction-related hazardous materials would be reduced, thereby reducing the potential for upset and accident conditions. There would be no additional impacts from these alternatives related to IMPACT 4.11-1 (Kilarc).

IMPACT 4.11-2 (Kilarc): Would the action create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Proposed Project

The Proposed Project would require limited and temporary use of hazardous materials such as fuel, batteries, diesel or gasoline (used for equipment fuel), and oil and during decommissioning related construction activities. Decommissioning activities may also generate hazardous wastes such as flushing and cleaning fluids, spent batteries, used oil, welding materials, and dried paint among others. As required by PM&E Measures GEOL-1 and GEOL-2, during and after decommissioning hazardous materials would be stored and disposed of appropriately and in a timely manner to reduce the potential for an impacts. The impact would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. As a result of leaving the forebay in place, the use of construction-related hazardous materials would be reduced, thereby reducing the potential for hazards to the public or the environment. There would be no additional impacts from these alternatives related to IMPACT 4.11-2 (Kilarc).

IMPACT 4.11-3 (Kilarc): Would the action impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Proposed Project

CAL FIRE has designated portions of Shasta County, including the Project Area, as having a "Very High" fire hazard and as a State Responsibility Area, which designates CAL FIRE as fiscally responsible for fire response. During wildfire emergencies in the Project Area, the Kilarc Forebay has provided a source of water to aid in the suppression of active wildfires. The Kilarc Forebay has a surface area of approximately 4.5 acres and gross useable storage capacity of 30.4 ac ft. The Kilarc Forebay can be accessed by both helicopter and ground by CAL FIRE for such needs. The Kilarc Forebay is also used by the WVCFC as a water resource for fire suppression in the immediate area. Comments on FERC's Draft EIS from CAL FIRE, WVCFC, SPI, and Shasta County were received expressing concern about the loss of Kilarc Forebay. However, there were no records indicating how often the forebay has been used for fire suppression activities (FERC 2011; CAL FIRE 2018).

There are several other water bodies of similar size or larger within approximately 15 miles of the Kilarc Forebay that are accessible via helicopter for fire suppression. The distance between the Kilarc Forebay and other nearby water resources, while not far in distance, may not be as easily accessible by Cal FIRE and WVCFC as the forebay for areas closest to the forebay. However, other water bodies include Buckhorn Lake, Silver Lake, Blue Lake, Woodbridge Lake, and Lake Shasta. Additionally, wide points along creeks in the area have been successfully used in the past for water collection via helicopter. Additionally, wide points along creeks in the area have been successfully used in the past for water collection via helicopter. The availability of alternative water

sources for fire suppression provides mitigation for adverse long-term impacts associated with forebay removal.

In addition, PM&E measures FIRE-1, FIRE-2, FIRE-3, and FIRE-4 would minimize the potential for igniting flammable materials during the decommissioning process. These measures are consistent with pre-fire management techniques of ignition management and fire-safe engineering activities, as identified within the FRAP and the CWPP. The Project would not interfere with planned fuelbreak projects identified within the Cow Creek Planning Area of the CWPP, along Fern Road and Whitmore Road. Minor road improvements are proposed to provide improved access to Project facilities to enable decommissioning.

Access roads at the Kilarc Development transverse lands inside and outside of the Project boundary and are held in a combination of PG&E, public, and private ownerships. Equipment needed for activities associated with decommissioning may require improvement of existing access roads. However, improvements would be limited to the existing road bed, and consist primarily of surface smoothing and pothole filling with a motor grader. When the decommissioning of existing Project features is completed, any new temporary access roads would be left in place per landowner requests. Equipment would be relatively small as appropriate for the small size of the Project features, and would have limited impacts on existing roads. Construction equipment would be transported to locations along major Project roads and travel under their own power to work sites in order to minimize overall impacts to the associated area, including blockage of roadways.

For these reasons, impacts related to interfering with an emergency response plan, including fire suppression, or evacuation plan would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site, As a result of leaving the forebay in place, a source of water for fire suppression would be retained, which would be a beneficial impact when compared to the Proposed Project.

IMPACT 4.11-4 (Kilarc): Would the action expose people or structures to a significant risk of loss, injury or death involving wildland fires?

Proposed Project

Potential sources of ignition include equipment with internal combustion engines, gasoline powered tools, and equipment or tools that produce a spark, fire, or flame. Such sources include sparks from blades or other metal parts scraping against rock, overheated brakes on wheeled equipment, friction from worn or unaligned belts and drive chains, and burned out bearings or bushings. Sparking as a result of scraping against rock is difficult to prevent. The other hazards result primarily from poor maintenance of the equipment. Smoking by onsite personnel is also a potential source of ignition during construction. Shasta County is designated as a high or very high fire hazard area by the CAL FIRE, including the Project Area. Implementation of PM&E measures FIRE-1, FIRE-2, FIRE-3, and FIRE-4 would minimize the potential for ignition of flammable materials during Project activities. These measures are consistent with pre-fire

management techniques of ignition management and fire-safe engineering activities, as identified within the FRAP and the Shasta County CWPP. Therefore, impacts related to exposing people or structures to significant risk involving wildland fires would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

PG&E's Land Conservation Commitment (LCC) identified the Cow-Battle Creek Watershed, the watershed that includes the Project, as containing two planning units. These units consist of approximately 11,085 acres and are identified as the Kilarc Reservoir Planning Unit and the Cow Creek Planning Unit. One of the objectives for these planning units includes development and implementation of forestry practices in order to ensure appropriate fuel load management. Creating the appropriate fuel load within the Project area would help minimize the potential for wildfire.

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. As a result of leaving the forebay in place, construction-related activities in the area of the forebay would not occur, thereby reducing the potential for exposure involving wildland fires. Further, a source of water for fire suppression would be retained, which would be a beneficial impact when compared to the Proposed Project.

4.11.4.2 Cow Creek Development

IMPACT 4.11-5 (Cow Creek): Would the action 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?

Proposed Project

The Proposed Project would require limited and temporary use of hazardous materials which may consist of paints, solvents, batteries, diesel or gasoline (used for equipment fuel), and oil. Construction activities may also generate hazardous wastes consisting of flushing and cleaning fluids, spent batteries, used oil, welding materials, and dried paint among others.

Standard construction procedures and BMPs will be implemented to reduce the emissions of dust and pollutants during construction. With the implementation of PM&E Measures GEOL-1 and GEOL-2, the potential impacts to water quality as a result of soil erosion, sedimentation, and/or hazardous materials release would be minimized.

The transport of non-visible pollutants by surface runoff from the construction site would be regulated by storm water pollution prevention BMPs (see PM&E measure GEOL-2). PG&E would identify all potential pollutant sources, including sources of sediment (e.g., areas of soil exposed by grading activities, soil/sediment stockpiles) and hazardous pollutants (e.g., from petroleum products leaked by heavy equipment or stored in maintenance areas). Also, PG&E would identify any non-storm-water discharges and implement BMPs to protect streams from potential pollutants and minimize erosion of topsoil. Therefore, impacts related to a release of hazardous materials to the environment would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and construction activities would use hazardous materials and could result in upset and accident conditions. As with the Proposed Project, standard construction procedures, BMPs, and PM&E measures would be implemented to reduce the potential for hazardous materials release. There would be no additional impacts from this alternative related to IMPACT 4.11-5 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, no use of hazardous materials that could result in upset and accident conditions would result. There would be no additional impacts from this alternative related to IMPACT 4.11-5 (Cow Creek).

IMPACT 4.11-6 (Cow Creek): Would the action create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Proposed Project

The Proposed Project would require limited and temporary use of hazardous materials such as fuel, batteries, diesel or gasoline (used for equipment fuel), and oil during decommissioning related construction activities. Decommissioning activities may also generate hazardous wastes such as flushing and cleaning fluids, spent batteries, used oil, welding materials, and dried paint among others. As required by PM&E Measures GEOL-1 and GEOL-2, during and after decommissioning hazardous materials would be stored and disposed of appropriately and in a timely manner to reduce the potential for an impacts. The impact would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and construction activities would use hazardous materials that could create a hazard to the public or the environment. As with the Proposed Project, standard construction procedures, BMPs, and PM&E measures would be implemented to reduce the potential for hazardous materials release. There would be no additional impacts from this alternative related to IMPACT 4.11-6 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, no use of hazardous materials

that could create a hazard to the public or the environment would result. There would be no additional impacts from this alternative related to IMPACT 4.11-6 (Cow Creek).

IMPACT 4.11-7 (Cow Creek): Would the action impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Proposed Project

CAL FIRE has designated portions of Shasta County, including the project area, a State Responsibility Area, which designates CAL FIRE as fiscally responsible for fire response. The project proposes the removal of the Kilarc and Cow Creek Forebays. While Kilarc Forebay is currently valued as a water source for fire suppression, Cow Creek Forebay is not (FERC 2011).

PM&E measures FIRE-1, FIRE-2, FIRE-3, and FIRE-4 would minimize the potential for igniting flammable materials during the decommissioning process. These measures are consistent with pre-fire management techniques of ignition management and fire-safe engineering activities, as identified within the FRAP and the CWPP. In addition, the Project would not interfere with planned fuelbreak projects identified within the Cow Creek Planning Area of the CWPP, along Fern Road and Whitmore Road. Minor road improvements are proposed to provide improved access to Project facilities to enable decommissioning. Construction equipment would be transported to locations along major Project roads and travel under their own power to work sites in order to minimize overall impacts to the associated area, including blockage of roadways.

Impacts related to interfering with an emergency response plan or evacuation plan would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. These alternatives involve the installation of new equipment on private property. Implementation of any of these alternatives is not anticipated to interfere with emergency response plans, and does not include a reduction in sources of water for fire suppression. There would be no additional impacts from these alternatives related to IMPACT 4.11-7 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, no interference with emergency response plans would result. There would be no additional impacts from these alternatives related to IMPACT 4.11-7 (Cow Creek).

IMPACT 4.11-8 (Cow Creek): Would the action expose people or structures to a significant risk of loss, injury, or death involving wildland fires?

Proposed Project

Potential sources of ignition include equipment with internal combustion engines, gasoline powered tools, and equipment or tools that produce a spark, fire, or flame. Such sources include sparks from blades or other metal parts scraping against rock, overheated brakes on wheeled equipment, friction from worn or unaligned belts and drive chains, and burned out bearings or bushings. Sparking as a result of scraping against rock is difficult to prevent. The other hazards result primarily from poor maintenance of the equipment. Smoking by onsite personnel is also a potential source of ignition during construction.

Shasta County is designated as a high or very high fire hazard area by the CAL FIRE, including the Project Area. Implementation of PM&E measures FIRE-1, FIRE-2, FIRE-3, and FIRE-4 would minimize the potential for ignition of flammable materials during Project activities. These measures are consistent with pre-fire management techniques of ignition management and fire-safe engineering activities, as identified within the FRAP and the Shasta County CWPP. Therefore, impacts related to exposing people or structures to significant risk involving wildland fires would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

PG&E's LCC identified the Cow-Battle Creek Watershed, the watershed that includes the Project, as containing two planning units. These units consist of approximately 11,085 acres and are identified as the Kilarc Reservoir Planning Unit and the Cow Creek Planning Unit. One of the objectives for these planning units includes development and implementation of forestry practices in order to ensure appropriate fuel load management. Creating the appropriate fuel load within the Project area would help minimize the potential for wildfire.

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, for which construction activities would include equipment that could be a source of ignition and would increase the potential for wildland fire. As with the Proposed Project, PM&E measures would be implemented to reduce the potential for wildland fire and impacts would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, no increase in potential for wildland fire would result. There would be no additional impacts from these alternatives related to IMPACT 4.11-8 (Cow Creek).

4.12 Hydrology and Geomorphology

This section discusses the regional and local hydrologic environment, identifies the potential impacts of the Proposed Project and alternatives on hydrology and geomorphology in the Project vicinity, and prescribes mitigation measures to avoid or minimize those impacts. Water quality effects are addressed in Section 4.13.

4.12.1 Environmental Setting

4.12.1.1 Sources of Information

The principal sources of information for this section include the License Surrender Application (PG&E 2009), the EIS (FERC 2011), and the wetland delineation (NSR 2011).

4.12.1.2 Regional Setting

Topography

The Project is located within the western foothills at the junction between the Cascade Range and Sierra Nevada mountain ranges. The elevation ranges in the Project vicinity span 2,600 to 4,000 ft msl for the Kilarc facilities, 800 to 1,750 ft msl for the Cow Creek facilities, and both upstream contributing watershed areas have maximum elevations just over 6,000 ft msl. The topography of region is diverse with low rolling hills in the lower watershed to steep, narrow canyons in the upper portions of the watershed. In the Project vicinity, relatively narrow valleys and steep side slopes dominate, with fairly broad, convex ridge lines, forming the topographic divides between sub-basin watersheds.

Climate and Precipitation

The climate within the Project area can be characterized as Mediterranean, with warm dry summers, and cool wet winters. Based on the climate station at the Volta 1 Powerhouse (12 miles away at 2,200 feet msl), the annual mean air temperature is approximately 59°F with average annual precipitation of about 34 inches. The highest temperatures occur on average in July while the highest monthly precipitation occurs in January. Precipitation amounts and the proportion of precipitation received as rain versus snow is influenced by the topography, which slows and cools air masses as they move over the foothills. Snowfall is very light at lower elevations in the watershed, the transitional rain and snow zone is from 2,500 to 4,500 ft msl and the seasonal snowpack zone is generally above 4,500 ft msl (SHN 2001).

Surface Hydrology Watersheds

The Proposed Project is located in the 431 square mile Cow Creek watershed, which drains southwesterly off Lassen Peak from headwaters over 7,300 ft msl to meet the Sacramento River on the valley floor around 340 ft msl.

Old Cow Creek

The Kilarc Development encompasses about 80 square miles, 25 square miles of which is upstream of the Kilarc diversion dam. Old Cow Creek flows westerly about 33 miles from its headwaters to its confluence with South Cow Creek 3 miles east of Millville near SR 44. These two streams converge to become the main stem of Cow Creek and join the Sacramento River about 7.25 miles further south (SHN 2001). The average annual runoff at

the Kilarc diversion dam is 48,900 af and about 55 percent is diverted through the powerhouse.

South Cow Creek

The Cow Creek Development drains an area of 78 square miles, including 53 square miles upstream of the south Cow Creek diversion dam. South Cow Creek flows about 29 miles from the headwaters around 5,800 feet elevation to its confluence with Old Cow Creek about 3 miles east of Millville near SR 44. These two streams converge to become the main stem of Cow Creek and meet the Sacramento River about 7.25 miles downstream. Average annual runoff at the South Cow Creek diversion dam is about 79,500 af and about 37 percent is diverted through the powerhouse.

Surface Water Bodies and Developed Features

Old Cow Creek

The Kilarc Development diverts a subset of flow from North Canyon Creek, South Canyon Creek, and Old Cow Creek, which are perennial streams. North Canyon Creek has an average width of 6 feet and depth of one foot. South Canyon Creek has an average width of 10 feet and depth of one foot. Old Cow Creek has an average width of 50 feet and depth of 2 feet.

The bypassed reach of Old Cow Creek is approximately 4 miles long downstream of the Kilarc Diversion Dam.

South Cow Creek

The Cow Creek Development diverts a subset of flow from Mill Creek and South Cow Creek, which are perennial streams. Mill Creek has an average width of 25 feet, with an average depth of 4 inches (0.333 ft) below the dam and one foot above the dam. South Cow Creek has an average width of 30 feet and depth of 2 feet.

The bypassed reach of South Cow Creek is approximately 4 miles long, extending from the diversion to the confluence with Hooten Gulch.

Hooten Gulch

Hooten Gulch is an intermittent stream that receives diverted Mill Creek and South Cow Creek flows that have passed through the South Cow Creek Powerhouse. Natural seeps/springs contribute to Hooten Gulch.

Hooten Gulch is about 20 ft wide upstream of the powerhouse and about 30 feet wide just above the confluence with South Cow Creek. The channel depth of Hooten Gulch varies between 0.5 and 2.0 feet. The augmented reach of Hooten Gulch extends for about 0.6 mile between the powerhouse and its confluence with South Cow Creek.

The Abbott Ditch irrigation diversion dam on Hooten Gulch just upstream of the confluence with South Cow Creek on the east channel of South Cow Creek is the facility where the ADU consumptive water right is exercised.

The 110 kilowatt-capacity Tetrick Hydroelectric Project reportedly has or had operated on Hooten Gulch downstream of the powerhouse beginning in 1984, but it was not constructed

to store or consume water. Tetrick Ranch reportedly also uses or used water from Hooten Gulch for consumptive purposes similar to or in conjunction with the ADU.

Canals and Spillways

The diversion canals include portions of varied type: unlined canal, concrete lined canal, concrete flume, wood flume, and steel flume. Water is conveyed by the 3.65 mile long Kilarc Main Diversion Canal to the Kilarc Forebay. There are spillways along the South Canyon Creek and Kilarc Main Diversion Canal that convey water to Old Cow Creek via gullies that are ephemeral and range from 3 to 10 feet wide and 0.5 to 2.0 feet deep.

Water diverted from both Mill and South Cow Creeks is conveyed to the Cow Creek Forebay via the 0.17 mile long Mill Creek diversion canal and the 2.06 mile long Cow Creek Diversion Canal. There are spillways along the Mill Creek and Cow Creek diversion canals that convey water to South Cow Creek or Mill Creek via ephemeral gullies.

Forebays

The Kilarc Forebay has a gross and useable storage capacity of 30.4 af and surface area of 4.5 acres. It is located at 3,779 ft msl, on a broad topographic ridge about 1,000 ft above and 0.75 mile southeast of the closest portion of the Old Cow Creek valley bottom.

The Cow Creek Forebay has a gross and useable storage capacity of 5.4 af and surface area of one acre. It is located at 1,555 ft msl, on a broad topographic ridge about 200 ft above and 0.2 mile east of the closest portion of the South Cow Creek valley bottom.

Unnamed Drainages

Several intermittent streams ranging from 3 to 5 feet wide and averaging 4 inches deep occur in the Kilarc portion of the study area. Two intermittent streams are intercepted by the North Canyon Creek Diversion Canal, which conveys water to South Canyon Creek just upstream of the South Canyon Creek diversion dam. Ephemeral drainages crossing the Kilarc Main Diversion Canal are diverted under or over the canal and are not intercepted or captured.

One unnamed intermittent stream crosses over the Cow Creek Diversion Canal via flume and continues on to flow into South Cow Creek about 140 feet downslope. One unnamed intermittent stream is intercepted by the Cow Creek Diversion Canal and the water is conveyed to the Cow Creek Forebay.

Streamflow

Streamflow in Old Cow Creek and South Cow Creek originates from runoff during precipitation events, snow melt in the winter and spring, and contributions from groundwater (base flow) during the dry season.

Streamflow within these watersheds has been modified by diversions and consumptive uses (i.e., the hydroelectric generation project and agricultural uses), but there is no recorded gaging of all diversions and the cumulative influence on streamflow is not documented.

There is little impaired and unimpaired stream flow information available within the Project Area. Annual peak flow and average monthly flows from the nearest USGS gages on the streams for Old Cow Creek (downstream of the Kilarc Development) and South Cow Creek

(downstream of the Cow Creek Development) was used as a check on estimated impaired flow data. While some flow data exist with respect to Old Cow Creek and South Cow Creek, there are no gaging stations and no recorded flow data associated with measurement of unimpaired flows, impaired bypass flows, or diversion rates at Project facilities on North and South Canyon creeks or Mill Creek.

The best available estimates of unimpaired streamflow used herein are based on the USGS gaged data, the bypass reach flow estimates made for the EIS by FERC staff using the PG&E canal flow data minus the estimates of unimpaired flow at the diversions. No measured or estimated unimpaired flow estimates for Hooten Gulch were prepared for the LSA or EIS.

Monthly Flow Regime

The seasonal flow regime is typical for the region, with winter maxima during January/February and low flows from mid-summer through fall (July-October).

The monthly streamflow statistics for the unimpaired flows on Old Cow Creek and the bypassed flows (Figure 4.12-1) indicate the overall seasonal regime, flow magnitudes, and relative difference between unimpaired and bypassed conditions. The diversions are a fairly consistent reduction by month on the maxima and average flows. However, the diversions were a larger relative reduction from unimpaired conditions for the minimum flows, particularly from April through August. The estimated average monthly flows on Old Cow Creek during the low flow season (July-October) under existing bypassed conditions range from 8 to 31 cfs.

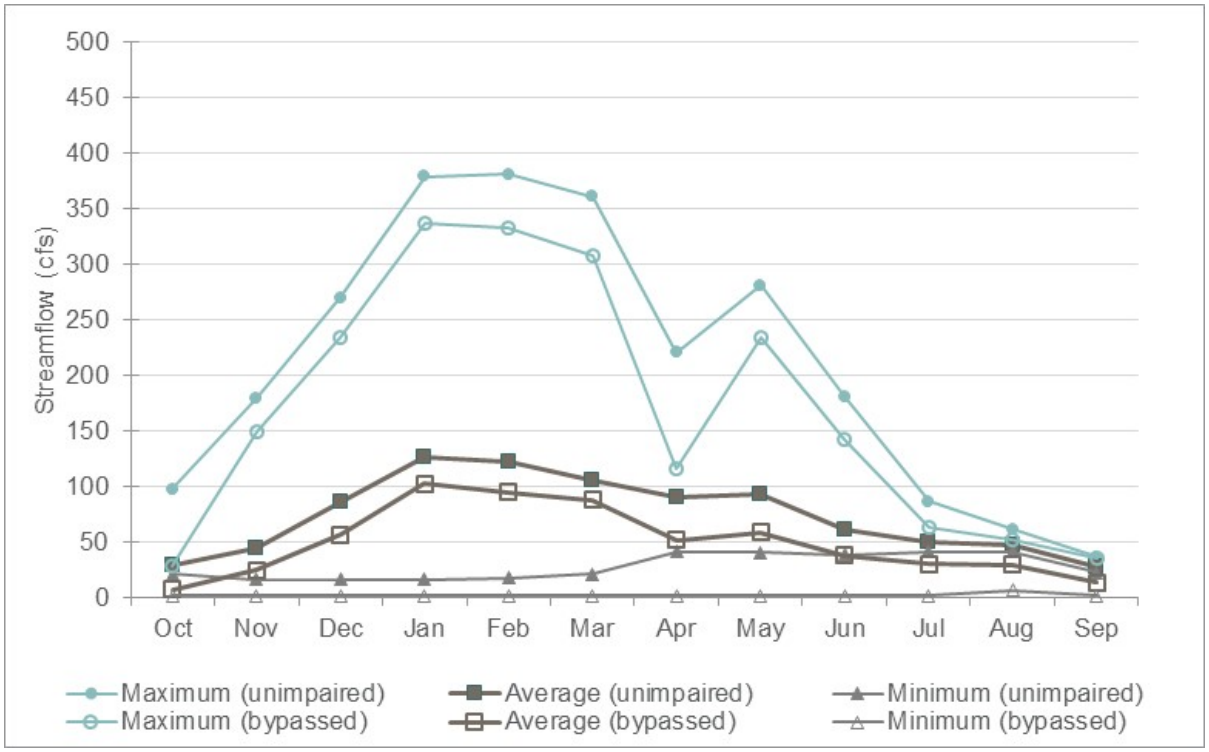


Figure 4.12-1 Old Cow Creek Monthly Streamflow: Unimpaired and Bypassed

The monthly streamflow statistics for the unimpaired flows on South Cow Creek and the bypassed flows (Figure 4.12-2) indicate the overall seasonal regime, flow magnitudes, and relative difference between unimpaired and bypassed conditions. The diversions create a fairly consistent small reduction by month for all statistics from September through January. There is a varied change in maxima and averages from February through August, with a large decrease in both maximum and average from June through August. The reduction in minimum flows is large and consistent from April through August. The estimated average monthly flows on South Cow Creek during the low flow season (July-October) under existing bypassed conditions range from 6 to 10 cfs.

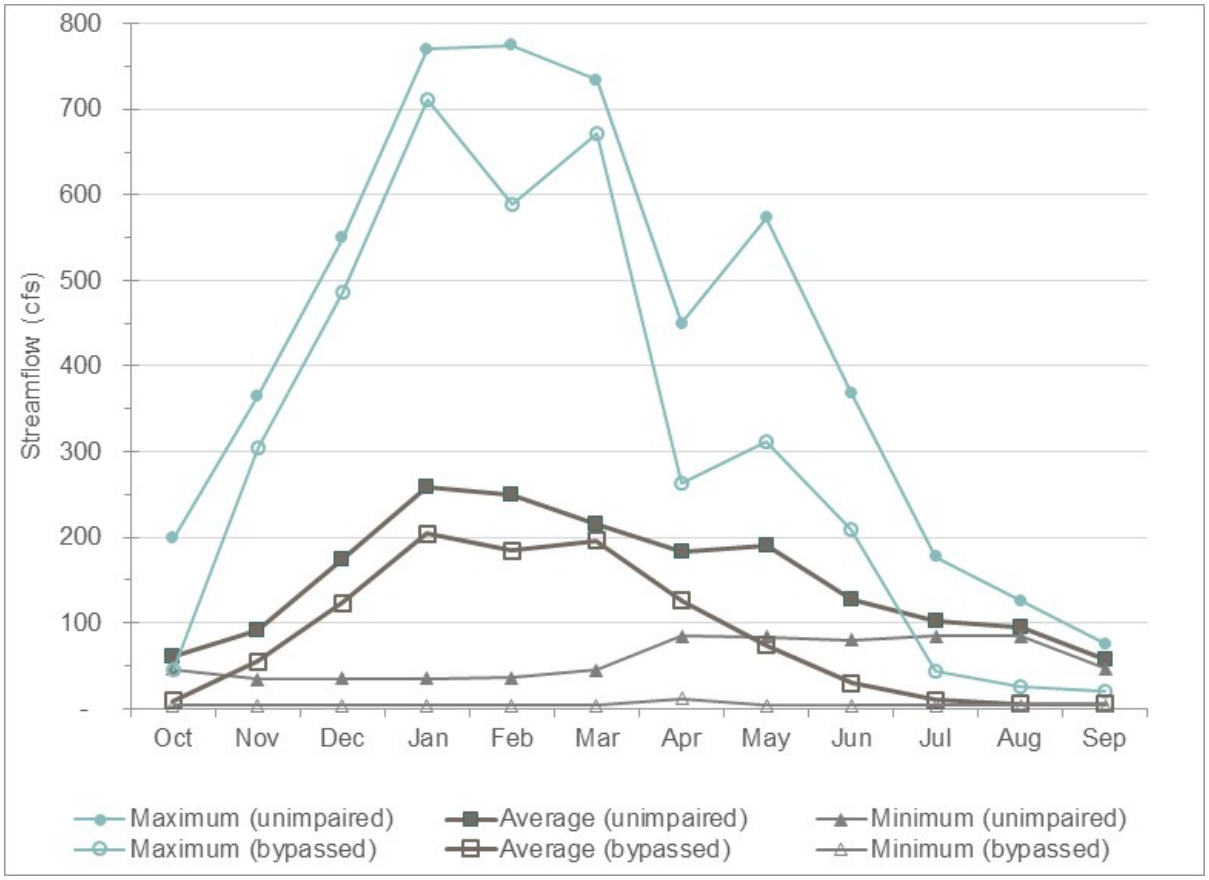


Figure 4.12-2 South Cow Creek Monthly Streamflow: Unimpaired and Bypassed

Comparison of the unimpaired and bypassed streamflow estimates indicate that flow reductions during the peak runoff season may affect the maximum average daily flows, with a reduction from unimpaired condition on the order of 50 to 100 cfs for Old Cow Creek (see Figure 4.12-1) and 50 to 200 cfs for South Cow Creek (see Figure 4.12-2). These data are generally informative about the limited effect of the existing diversion dams on flood hydrology, but do not directly indicate peak flow reductions.

Peak Flows

Many of the major floods in the basin are from rain-on-snow events, and peak flow statistics for Cow Creek near Millville range from 18,700 cfs for the 1.5-year event to 45,000 cfs for the 25-year event (Figure 4.12-3) based on measured data. Estimated peak flows for the Old Cow Creek and South Cow Creek tributaries in the Project reaches are a small portion of the downstream total, reflecting their small portion of the contributing drainage areas. The unimpaired peak flows on Old Cow Creek below the Kilarc diversion dam range from 1,047 cfs for the 1.5-year event to about 2,520 cfs for the 25-year event. The unimpaired peak flows on South Cow Creek below the Cow Creek diversion dam range from 2,057 cfs for the1.5-year event to 4,950 cfs for the 25-year event.

While the peak flows at the Project diversion points are relatively small, the run-of-river diversion facilities lack adequate storage capacity to substantially attenuate even these modest peak flows. The maximum capacities of the diversion facilities and/or the canals to detain flows and decrease instantaneous peak flows are extremely small relative to peak flows on either stream (Figure 4.12-3). The Kilarc Main Canal has a capacity of 52 cfs and the South Cow Creek Main Canal has a capacity of 50 cfs. Even when completely full, the canals could convey less than 5 percent of the peak flows estimated at the points of diversion on each stream. During major flood events, flows over the 50 cfs capacity may enter the Cow Creek canal, but excess flows (over the 50 cfs limit) are returned to South Cow Creek via a spillway.

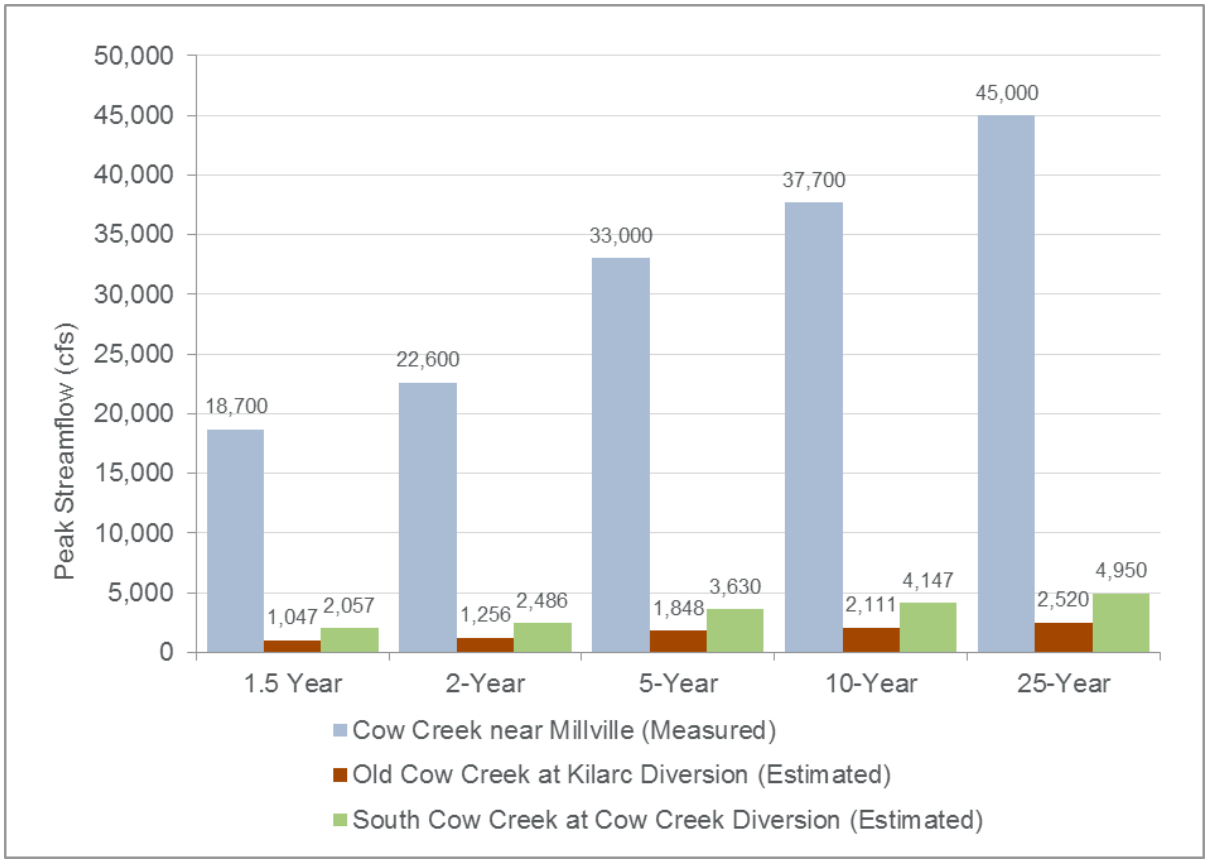


Figure 4.12-3 Peak Flow Estimates for Cow Creek and its Old Cow Creek and South Cow Creek Tributaries at the Diversions

Groundwater Hydrology

The Project areas are in the foothills upslope of the alluvial groundwater basins along the Sacramento River. Groundwater within the volcanic and marine sedimentary rocks of the area typically occurs either as seeps or springs. Groundwater typically accumulates within shallow alluvial deposits below rivers and creeks, but can also occur as hot springs that originate from deep faults and fractures in this volcanic environment.

The closest major groundwater basin down gradient of the Project is the Redding Basin Millville Subbasin (DWR 2004) (Figure 4.12-4). The Kilarc study area is about 13 miles from the eastern edge of the basin and the Cow Creek study area is about 6 miles from the eastern edge of the basin. The water-bearing materials of the Millville Subbasin include Quaternary river deposits from the Sacramento River, but the primary water-bearing unit is the older Tuscan Formation comprised of various volcanic rocks and sedimentary rocks of volcanic origin. Recharge to the Millville principal aquifer is mostly by infiltration of streamflows (along with infiltration of applied water and direct infiltration of precipitation). Over the long-term, there was a slight decline in groundwater levels of about 5 feet during the 1976-77 and 1987-94 droughts, with a gradual recovery; but there does not appear to be any recent trend in groundwater levels (DWR 2004; website checked for updates in April 2018). The State of California groundwater monitoring well network does not include any wells within a mile radius of either development area (DWR 2018).

Figure 4.12-4 Groundwater Basins in the Project Region

Groundwater conditions in the Kilarc and Cow Creek Development areas are associated with either fractured bedrock and/or minor, shallow, or discontinuous alluvial deposits that are not directly connected to the Millville Subbasin.

There are a few private wells within 2 miles radius of the Kilarc Development area, located near springs and stream channels (see FERC 2011 page 70, Figure 5). The existing diversion of surface flows reduces the opportunity for natural recharge into the shallow alluvium of the Old Cow Creek valley bottom in the bypassed reach. However, return flows downstream of the bypassed reach allow for natural recharge in along Old Cow Creek for several miles upstream of the Millville groundwater basin. The existing conveyance of diverted water through the canals and the storage of diverted water in the forebay creates an opportunity for local groundwater support to isolated shallow colluvial soil and sediment deposits and may reach fractured bedrock. However, there is no evidence of substantial connectivity to areas supporting wells (FERC 2011). In particular, there is no evidence of large magnitude water loss from forebay storage in excess of evapotranspiration and penstock deliveries.

Geomorphology

The existing geomorphology is described based on 2003 field studies of stream type, sediment transport, channel stability on Old Cow Creek, South Cow Creek, and Hooten Gulch, the 2008 studies of sediment behind diversion dams, and stream substrate characterized for the wetlands delineation (NSR 2011).

Most of Old Cow Creek, South Cow Creek, and Hooten Gulch are alluvial channels, but have short segments dominated by bedrock control. The channel banks are largely comprised of the hillslopes of the valley walls, as would be typical for their stream types and topography.

Old Cow Creek upstream of the Kilarc diversion has cascade bedform and the bypassed reach of Old Cow Creek downstream of the diversion has a cascade /step-pool morphology. Upstream of the diversion, hillslope failures deliver sediment and large woody debris (LWD) to Old Cow Creek. The first 0.75 mile downstream of the diversion has boulder dominated stable banks interspersed with eroding cut banks. The remainder of the 3.02 miles surveyed below the diversion has unstable hillslopes and channel banks that lack vegetation.

South Cow Creek Upstream of the Cow Creek diversion is primarily pool-riffle. Downstream, the channel bed form changes from step-pool/plane-bed (about 1.5 miles) to cascade/step-pool (about 2.3 miles) and pool-riffle/plane-bed for the last 0.25 mile above Hooten Gulch. Upstream of the diversion, the channel banks on South Cow Creek are stable and formed of boulder and bedrock. For most of nearly 3 miles surveyed downstream, the channel banks are protected by large boulders, but some isolated hillslope failures are present.

Hooten Gulch has a pool-riffle/plane-bed channel form both above and below the powerhouse. Upstream of the powerhouse, the channel banks are moderately stable, but there is bank erosion that appears to be associated with livestock access. Further upstream, the hillslopes are comprised of eroding fine sedimentary rock (mudstone). Between the powerhouse and South Cow Creek, the Hooten Gulch channel banks are moderately stable, aside from one short section with active erosion.

Stream Channels and Sediment Storage

Upstream of the Kilarc Diversion Old Cow Creek is a Rosgen A2/A2a+ with steep gradients and boulder bed. This stream type typically occurs in areas of high relief, zones of deep deposition, or landforms that are structurally controlled, with channels characterized by moderate to steep gradients. No fine sediment bars occur above the diversion. The median percentage of pool bed covered with fine sediment upstream of the Kilarc diversion is 15 percent. Downstream of the Kilarc Diversion Old Cow Creek is a Rosgen B2 with moderately high gradient and boulder bed. The B stream type primarily exists on moderately steep to gently sloped terrain in areas where structural contact zones, faults, joints, colluvial-alluvial deposits, and structurally controlled valley side slopes limit the development of a wide floodplain. Only four sediment bars are present below the diversion, having a D50 of gravel to coarse gravel. The D stream type is configured as a multiple channel exhibiting a braided pattern with a very high channel width/depth ratio, and a channel slope generally the same as the associated valley slope. Two of the bars have well-established alder vegetation. The median percentage of pool bed covered with fine sediment downstream of the Kilarc diversion is 5 percent (PG&E 2009).

Upstream of the Cow Creek diversion, South Cow Creek is a Rosgen B4c/B3c with a moderate gradient and gravel bed. Two sediment bars occur above the diversion, with a D50 of coarse gravel, and grass vegetation. The median percentage of pool bed covered with fine sediment upstream of the Cow Creek diversion is 10 percent. Downstream of the Cow Creek diversion, South Cow Creek is a Rosgen B3 or B4/B3 (with moderately high gradient and either gravel or cobble and gravel bed. Seven bars occur within the first 1.5 miles downstream of the diversion, and only one more in the steeper reach between 1.5 and 4.05 miles downstream. The D50 ranged from coarse gravel to small cobble, with most having a D50 in very coarse gravel. Some of the bars have well-established alder vegetation. The median percentage of pool bed covered with fine sediment downstream of the Cow Creek diversion is 5 percent.

Hooten Gulch is a B3 or B4/B3 channel type upstream and downstream of the powerhouse. The dominant bed material in Hooten Gulch upstream of the powerhouse consists of cobble, with boulder, sand and gravel, and the dominant bed material downstream is gravel and cobble. No sediment bars are present in Hooten Gulch. However, the median percentage of pool bed covered with fine sediment on Hooten Gulch is 63 percent, much higher than either Old Cow Creek or South Cow Creek. The most downstream pool on South Cow Creek, near its confluence with Hooten Gulch, had the highest percentage of fine sediment on South Cow Creek.

The physical channel types and sediment characteristics indicate that the Old Cow Creek and South Cow Creek bypass reaches have low in-channel sediment storage and are transport-dominated reaches, as would be expected for higher-gradient mountain stream channels.

Hooten Gulch has smaller, more easily mobilized bed material in temporary storage within the channel and its capacity to transport sediments is not as great relative to the available sediment supply.

Accumulated Sediment

The run-of-river diversions at Old Cow and South Cow creeks have virtually no water storage capacity and relatively little sediment storage capacity. Sediments have in-filled behind both the Kilarc Main Canal and South Cow Creek diversion dams, probably decades ago when the diversions were first constructed, so that bedload transported along the streambed continued to pass downstream.

The total volume of sediment retained upstream of the Old Cow Creek Kilarc Diversion Dam is small, and 40 to 50 percent of the total sediment is very coarse (boulder sized) (Table 4.12-1). Of the sediment smaller than boulders, gravel dominates, silt is absent, and sand is a very small component.

Table 4-12.1 Old Cow Creek Kilarc Diversion Sediments

Stored Sediment Volume Total Volume (CY)	Stored Sediment Volume Occupied by Boulders (CY)	Stored Sediment Particle Size Characteristics* Dominant Class	Stored Sediment Particle Size Characteristics* Median Class (D50)
580	232 to 290	Gravel	Gravel and Cobble

* Bulk samples of materials smaller than boulder size category where analyzed for particle size distribution.

The total volume of sediment retained upstream of the South Cow Creek Diversion Dam is small, but larger than at the Kilarc Diversion. Bedrock and concrete pieces provide scour pools. Of the sediment smaller than boulders, gravel dominates, silt is absent, and sand is a very small component (Table 4.12-2).

Table 4.12-2 South Cow Creek Diversion Sediments

Stored Sediment Volume Total Volume (CY)	Stored Sediment Volume Occupied by Boulders (CY)	Stored Sediment Particle Size Characteristics* Dominant Class	Stored Sediment Particle Size Characteristics* Median Class (D50)
1,400	N/A	Gravel	Gravel and Cobble

* Bulk samples of materials smaller than boulder size category where analyzed for particle size distribution.

The diversion dams on North Canyon Creek, South Canyon Creek, and on Mill Creek have very small impoundments with little or no accumulated sediment.

4.12.2 Regulatory Setting

The following section discusses the policies and regulations that are relevant to the specific analysis of hydrology and geomorphology impacts of the Proposed Project.

4.12.2.1 Federal

Clean Water Act (CWA)

The CWA (33 U.S.C. § 1251 et seq.) regulates water quality and the discharge of pollutants into waters of the United States. (See 40 C.F.R. 230.3.) National Pollutant Discharge Elimination System (NPDES) permits are required for discharges of pollutants from a point source to waters of the United States. (See 33 U.S.C. §§ 1342 & 1362.) See additional discussion of CWA at Sections 4.6.2, 4.7.2, & 4.13.2.

4.12.2.2 State and Regional

Porter-Cologne Water Quality Control Act

California's primary statute governing water quality and water pollution issues with respect to both surface waters and groundwater is the Porter-Cologne Water Quality Control Act of 1970 (Wat. Code, Division 7 [§ 13000 et seq.]) (Porter-Cologne Act). The Porter-Cologne Act grants the State Water Board and each of the nine Regional Water Quality Control Boards authority and duty to protect water quality, and is also the primary vehicle for implementation of California's responsibilities under the CWA. The Porter-Cologne Act confers upon the State Water Board and the Regional Water Boards authority and responsibility to adopt plans and policies, to regulate discharges to surface and groundwater, to regulate waste disposal sites, and to require cleanup of discharges of hazardous materials and other waste. The Porter-Cologne Act also establishes reporting requirements for unintended discharges of any hazardous substance, sewage, or oil or petroleum product. The State Water Board and the Regional Water Boards jointly administer federal and state laws related to water quality in coordination with the U.S. Environmental Protection Agency (USEPA) and USACE.

Regional Water Quality Control Plan (Basin Plan)

The Basin Plan includes the designation of beneficial water uses, water quality objectives needed to protect the identified beneficial uses, and implementation measures. The Basin Plan establishes water quality standards for all the ground and surface waters of the region. The term "water quality standards," as used in the CWA, includes both the beneficial uses of specific water bodies and the levels of quality that must be met and maintained to protect those uses.

The Basin Plan reflects, incorporates, and implements applicable portions of a number of national and statewide water quality plans and policies, including the CWA and the Porter-Cologne Act. The Central Valley Water Board regulates waste discharges in several ways, including developing total maximum daily loads (TMDL's) for impaired waters and issuing permits under a number of programs and authorities. The terms and conditions of permits are enforced through a variety of technical, administrative, and legal means.

The Central Valley Water Board has adopted several general NPDES permits and waste discharge requirements, each of which regulates discharges of similar types of wastes. The State Water Board has issued general permits for storm water runoff from construction sites.

Storm water discharges from industrial and construction activities in the Central Valley Region may be covered under these general permits, which are administered jointly by the State Water Board and the Central Valley Water Board.

See also additional discussion in Section 4.13.2.

4.12.2.3 Local

Shasta County General Plan

The Water Resources and Water Quality element of the Shasta County General Plan includes the following objectives and policies relevant to water resources, hydrology and geomorphology issues.

General Plan Objectives

W-9 Institute effective measures to protect groundwater quality from potential adverse effects of increased pumping or potential sources of contamination.

General Plan Policies

W-a Sedimentation and erosion from proposed developments shall be minimized through grading and hillside development ordinances and other similar safeguards as adopted and implemented by the County.

W-f The County shall encourage and participate in interagency planning efforts, such as the Redding Area Water Council, to protect and enhance the quality of all groundwater and surface water resources.

Shasta County Grading Ordinance

The Shasta County Grading Ordinance, included in the Shasta County Code (Chapter 12.12), sets forth regulations concerning grading, excavating, and filling. The Shasta County Grading Ordinance, amongst other thresholds, prohibits movement of earth materials in excess of 250 cubic yards or which disturbs 10,000 square feet of surface area without a grading permit from the County. The grading permit must include an approved grading plan provided by the project applicant, and it must set forth terms and conditions of grading operations that conform to the County's grading standards. The permit also requires the project applicant to provide a permanent erosion control plan that must be implemented upon completion of the project. Ongoing maintenance of erosion control measures is required for the duration of the project and for 3 years after completion of the project, unless the project is released earlier by the enforcing officer designated by the County Board of Supervisors (Shasta County 2003b, website checked for updates in April 2018).

Shasta County Groundwater Management Ordinance

The Shasta County Groundwater Management Ordinance (SCC 98-1), is included in the Shasta County Code (Chapter 18.08) for the purpose of protecting groundwater resources from extraction for use on lands outside of the County (Shasta County 2003b, website checked for updates in April 2018). The ordinance requires permit approval for extraction of groundwater for export out of the County, including extraction of groundwater to replace a surface water supply which would be exported. The ordinance acknowledges that other groundwater management

measures may be part of comprehensive and cooperative planning efforts that the County may jointly undertake with other agencies.

4.12.3 Analysis Methodology

4.12.3.1 Analytical Approach

Each potential impact was evaluated by qualitatively and, in some cases, quantitatively by estimating the changes in water flow and storage related to the project and comparing those changes to existing conditions using the significance criteria identified below.

Criteria for Determining Significance

Based on the State Water Board's Environmental Checklist in Appendix A of the Board's CEQA regulations, Appendix G of the CEQA Guidelines, and professional standards and practices, a Proposed Project would have a significant impact if it would:

- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site

The following additional guidelines are included in Appendix G of the CEQA Guidelines but are not relevant to the Proposed Project:

- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam
- Inundation by seiche, tsunami, or mudflow

The Proposed Project does not include new or relocated houses or structures and will not have any mechanism to modify 100-year flood peak flows, the 100-year flood boundaries, or change the exposure or risks of flooding, dam failure inundation, seiche, tsunami, or mudflow.

4.12.4 Environmental Impacts and Mitigation

PG&E has included the following measure to address impacts due to decommissioning activities.

- **PM&E Measure GEOM-1: Sediment Release Measures.** Following removal of the South Cow Creek and Kilarc Main Diversion dams, the Licensee shall reshape the downstream face of the sediment wedge left in place at each diversion structure to an appropriate angle of repose. The Licensee shall also form a pilot thalweg to ensure temporary fish passage until the stored sediment has been transported by flow from the former impoundment sites and to help advance the processes of natural channel formation at the nick point created by the dam removal, by performing the following measures:
  - Excavate a pilot thalweg through the sediment wedge that connects with the existing thalweg at a nearby upstream point to the thalweg immediately downstream of the dam.
  - Shape the pilot thalweg on-site during the dam removal process.
  - Dimension the pilot thalweg so that it has at minimum a 6-foot bottom width, which is approximately 20 percent of the 30 foot bankfull channel width downstream from the dam.
  - Lay back the side slopes of the pilot thalweg to a natural, stable angle of repose.
  - Construct the thalweg channel so that the starting depth at the downstream end of the channel is approximately equivalent to the water surface elevation of the plunge pools immediately downstream from each of the respective dams.
  - Incorporate into the pilot thalweg channel, coarse bed-elements, or other techniques, to ensure appropriate depth and velocities for fish passage, as needed.

  The final design will be based on the best available information at the time prior to implementation, in consultation with NMFS and CDFW. The Licensee shall make adjustments to the thalweg dimensions and elevation if site-specific conditions make it infeasible to construct the pilot channel to the recommended dimensions at either of the dam sites.

  The Licensee shall allow the sediments remaining behind the diversions after excavation of the pilot channel to redistribute downstream during natural high flow events.

  The Licensee shall place sediments excavated from the South Cow Creek and Kilarc Main Canal diversion impoundments along channel margins for future recruitment during high flow events to downstream areas. The Licensee shall place these native sediments so they do not interfere with riparian vegetation. The Licensee shall not place non-native angular rock material (which may be found between the bin walls of South Cow Creek Dam) in the stream, but shall dispose of it locally at a suitable site (e.g. as canal fill).

  The Licensee shall monitor fish passage conditions along the pilot thalweg channels and for 10 channel widths downstream of the dams for 2 years following removal. The monitoring program is discussed under PM&E Measure AQUA-5.

- **PM&E Measure GEOM-2: Bank Erosion Measures.** To minimize potential impacts associated with bank erosion, the Licensee shall conduct the following monitoring and mitigation:
  - The Licensee shall conduct a monitoring assessment after removal of the Kilarc Main Canal and South Cow Creek diversion dams. The monitoring shall consist of a visual assessment with photographic documentation of the impounded sediment wedge and streambanks adjoining the perimeter of the former sediment impoundment area. The monitoring shall be conducted after spring runoff, as soon as weather permits access to the sites and flows are low enough that the streambanks can be easily observed. The Licensee shall utilize the visual assessment to identify any areas of active erosion or undercutting, or areas that appear to be susceptible to erosion. The Licensee shall conduct the monitoring assessment for 2 years.
  - If during the monitoring assessment, the Licensee observes significant erosion or bank undercutting, then the Licensee shall implement and install erosion control measures, as feasible, in the channel. The Licensee shall adhere to standard erosion control procedures, including applicable measures developed by the USDA-FS and published in the Water Quality Management for Forest System Lands in California Best Management Practices (USDA-FS 2000).

  During the permitting process, the Licensee will design bank erosion control measures in consultation with CDFW, and the RWQCB-CVR. These erosion control measures may include planting vegetation on the exposed banks to help in stabilization, use of geotextile fabric, dormant pole plantings, or other techniques that may be suitable, potentially in combination with rip-rap for stabilization. Any re-vegetation will be consistent with the MMP (see PM&E Measure BOTA-1).

- **PM&E Measure GEOL-1: Implement Soil Erosion and Sedimentation Control Best Management Practices.** The Licensee shall identify and implement Soil Erosion and Sedimentation Control BMPs that address soil erosion impacts that may occur both during and after decommissioning construction work. The Licensee shall adhere to standard erosion control procedures, including applicable measures developed by the U.S. Forest Service (USDA-FS) and published in the Water Quality Management for Forest System Lands in California Best Management Practices (USDA-FS, 2000).

  Prior to construction, the Licensee shall identify all natural drainage paths along the canals and tunnel during pre-construction surveys. Slopes prone to instability shall be identified, and site specific BMPs shall be implemented to avoid potential slope erosion and increased sedimentation in streams during and after construction activities.

  During the construction period, the Licensee shall install BMPs in all areas where soil is disturbed and could result in an increase in sedimentation and/or erosion. The Licensee shall perform inspections after storm events and perform any necessary repairs, replacements, and/or addition of BMPs.

  At the end of construction, the Licensee shall identify potential future erosion sites and install long-term BMPs. Specific areas to be addressed are listed below:

  - After removal of the canals, diversions, and impoundment structures, the Licensee shall implement BMPs such as restoration of natural drainage paths, and recontouring

of slopes to match pre-existing slope morphology, as feasible. Revegetation shall be implemented to increase bank stability (See PM&E Measure BOTA-1).

- The Licensee shall implement BMPs to address potential erosion of access roads and staging areas throughout the Kilarc and Cow Creek Developments. Artificial swales, culverts, and/or other structures shall be designed to direct runoff away from disturbed areas based on the natural drainage features of the area. For any temporary access roads that are removed, the Licensee shall implement measures in accordance with BMP 2-26 Obliteration or Decommissioning of Roads, as defined in the USDA-FS Water Quality Management for Forest System Lands in California Best Management Practices (USDA-FS 2000).

To ensure the effectiveness of the long term BMPs, post-construction monitoring will be conducted for 2 years within the stream channel (See PM&E Measure GEOM-2) and for one year in all other construction areas. The post-construction inspections will be to ensure that BMPs installed at the end of construction are effective and/or to identify areas where installation of additional BMPs is necessary.

- **PM&E Measure AQUA-1: Isolate Construction Area.** To minimize the deconstruction impacts at the five diversion dams and the Kilarc Tailrace (where instream construction would be required), the Licensee shall isolate the construction area from the active stream using coffer dams or other such barriers. The Licensee shall route water around the construction area in pipes or by removing the dam in two or more phases, allowing the flow to move down the other portion of the stream, while the isolated portion of the dam is removed.

4.12.4.1 Kilarc Development

IMPACT 4.12-1 (Kilarc): Would the action re-establish a natural streamflow regime in the bypassed reach of Old Cow Creek?

Proposed Project

PG&E would abandon their water rights and the flows previously diverted under those water rights into the Kilarc Creek Main Canal would, instead, flow down the bypass reach of Old Cow Creek.

Streamflow in the bypassed reach of Old Cow Creek would be increased to the unimpaired levels described in the setting section (Figure 4.12-5). The ratio of proposed versus existing streamflow in the bypassed reach would vary by month (Figure 4.12-5). Mean daily flows in the bypassed reach of Old Cow Creek would increase slightly from December through August, but by 2.0 to 4.0 times during September, October, and November.

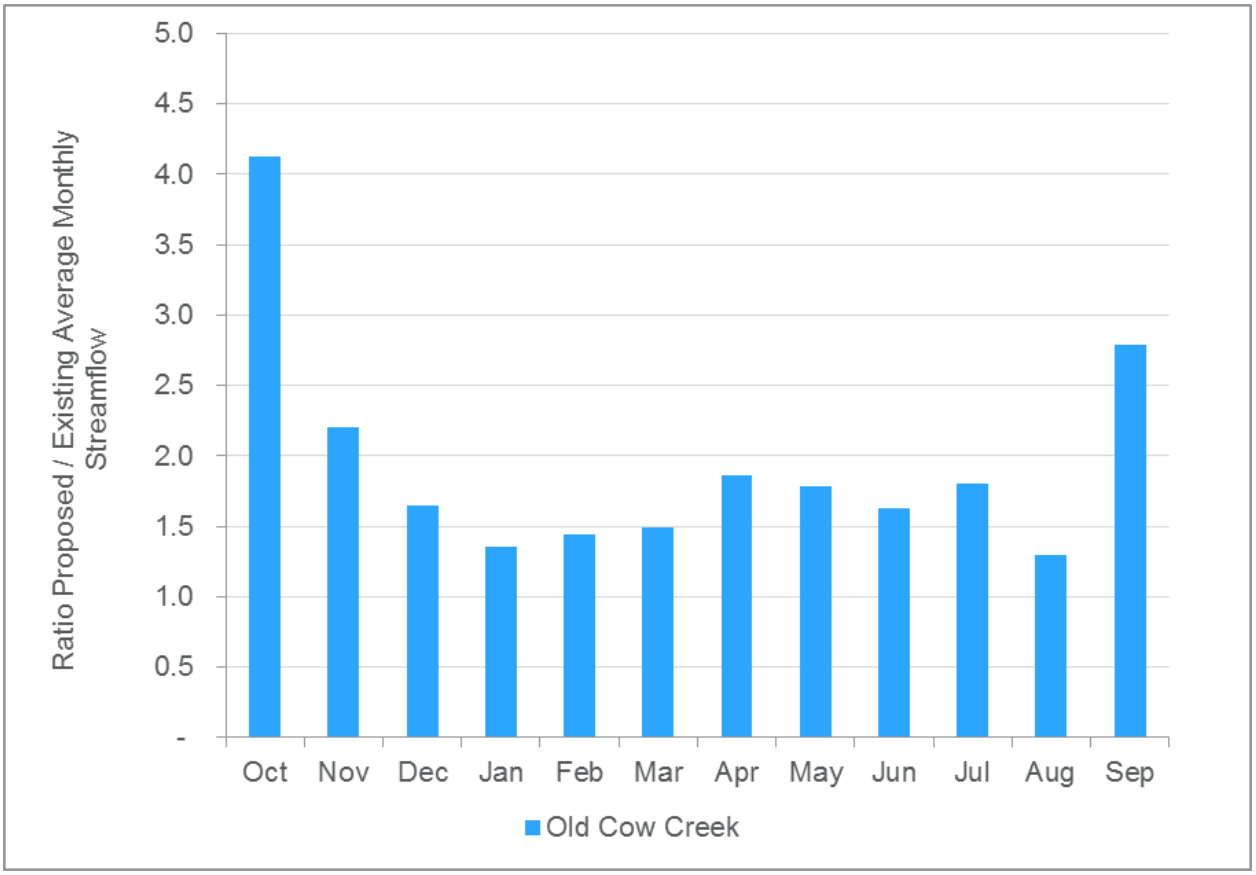


Figure 4.12-5 Ratio of Average Monthly Old Cow Creek Streamflow under Proposed Project versus Existing Conditions

Average streamflow in the bypassed reach of Old Cow Creek during the low flow season (July-October) would range between 28 and 51 cfs.

The peak streamflow conditions on Old Cow Creek in the bypass reach would be modified only slightly. Since the diversion and canal capacities are very small relative to the peak flows, the possible increase would be less than 5% of the 1.5-year peak, and proportionally less of larger flood flows.

The changes to Old Cow Creek streamflow would restore natural average monthly flows throughout the year which would increase average and minimum flows during the low flow season while not adversely increasing peak flows. This would be a beneficial impact.

- **Level of Significance:** No Impact (Beneficial)
- **Mitigation Measures:** None required

Alternative 1

Under Alternative 1, those facilities of the Kilarc Development required to maintain the flow of water to the forebay would be improved to prevent fish entrainment and to increase flows to the reach of Old Cow Creek below the Kilarc Canal Diversion Dam. As with the Proposed Project, peak streamflow conditions would be modified only slightly, and natural average monthly flows

would be increased. There would be no additional impacts from this Alternative related to IMPACT 4.12-1 (Kilarc).

No Project Alternative

The No Project Alternative would result in no change at the Kilarc Forebay site. All flows would pass through the natural channels of Old Cow Creek, increasing flows through the bypassed reaches. As with the Proposed Project, peak streamflow conditions would be modified only slightly, and natural average monthly flows would be restored. There would be no additional impacts from this Alternative related to IMPACT 4.12-1 (Kilarc).

IMPACT 4.12-2 (Kilarc): Would the action result in channel adjustments to removal of diversion dams and changes in streamflow?

Proposed Project

Channel adjustments to the removal of the diversion dams and changes in streamflow would be spatially concentrated near the dam sites and in the impoundment zone where direct removal of artificial materials and substantial hydraulic changes would occur. The bypassed reach could experience some changes in sediment transport and deposition patterns as the small volume of accumulated sediment is delivered through the reach, but the hydrologic effect on geomorphically important peak flows would be minimal (see IMPACT 4.12-1). Stored sediment behind the diversion dam would be delivered to the bypassed reach through natural streamflow hydraulics. The volume of sediment is not large, and depending on natural climate and runoff patterns following dam removal, delivery of the sediment into the bypassed reach could occur over a period of months to years. Some local variations from existing channel characteristics would be expected within the bypassed reach, including some temporary changes. No measurable change in overall channel form, pattern, or stability would result.

Removal of the Kilarc Diversion Dam would eliminate the concrete portion of the structure on top of the natural bedrock and dispose of other constructed above-grade materials and debris. Removal of the North Canyon Creek diversion dam would retain the small wooden structure to minimize disturbance. Removal of the South Canyon Creek diversion would restore natural ground and streambed elevations. Access by heavy equipment to perform the facility removals would require disturbance of streambank vegetation and soils, but implementation of PM&E measures would provide temporary BMPs, revegetation to increase long-term bank stability, and effectiveness monitoring and adaptive management actions for 2 years.

The accumulated sediment behind the Kilarc Diversion Dam would not be removed, but reshaping of the sediment, placement of suitable excavated sediments along channel margins, and excavation of a pilot channel as part of the PM&E measures would facilitate entrainment of the accumulated sediment during future high streamflow events for natural redistribution in the bypassed reach.

The channel within the bypassed reach of Old Cow Creek may demonstrate some changes in the location and amount of fine sediment stored during the low flow season, since the absolute and relative increase in low flow season discharge would be substantial. The existing streambed is dominated by boulder material, there are few sediment bars, and pool fines are not excessive. Therefore, increases in medium and/or fine sediment deposition would primarily benefit physical

habitat characteristics, rather than adversely impact the geomorphic condition of the channel bed and banks.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 1

Under Alternative 1, those facilities of the Kilarc Development required to maintain the flow of water to the forebay would be improved to prevent fish entrainment and to increase flows to the reach of Old Cow Creek below the Kilarc Canal Diversion Dam. As with the Proposed Project, the bypassed reach could experience some changes in sediment transport and deposition patterns as the small volume of accumulated sediment is delivered through the reach, but the hydrologic effect on geomorphically important peak flows would be minimal. The return to a more natural flow regime would not adversely change peak flows or cause geomorphic instability, and these changes are not anticipated to increase the likelihood of or risks from erosion and sedimentation.

No Project Alternative

The No Project Alternative would result in no change at the Kilarc Forebay site. All flows would pass through the natural channels of Old Cow Creek, increasing flows through the bypassed reaches. As with the Proposed Project, the bypassed reach could experience some changes in sediment transport and deposition patterns as the small volume of accumulated sediment is delivered through the reach, but the hydrologic effect on geomorphically important peak flows would be minimal. The return to a more natural flow regime would not adversely change peak flows or cause geomorphic instability, and these changes are not anticipated to increase the likelihood of or risks from erosion and sedimentation.

IMPACT 4.12-3 (Kilarc): Would the action modify surface hydrology and drainage patterns along decommissioned canal routes and retired road segments?

Proposed Project

Decommissioning of canals and retirement of some access roads would return much of the disturbed topography and drainage patterns to a natural state and incorporate temporary and long-term BMPs to limit risks of adverse flow routing and/or erosion due to construction disturbance.

Decommissioning of the North and South Canyon Creeks' canals and the earthen sections of the Kilarc Main Canal would be achieved by abandoning in place combined with strategic breaching in limited access sections, and berm collapse/filling in accessible sections. Decommissioning of the concrete and shotcrete lined sections of canal would be achieved by varied options, depending on accessibility for heavy equipment. The overflow spillway would be demolished and natural topography would be re-contoured. A range of hand removal options would be determined on a case-by-case basis for locations inaccessible to heavy equipment. The proposed PM&E measures would be applied throughout the length of the decommissioned canals, regardless of method of decommissioning.

The partial removal/breaching and the berm removal/filling of the canals would modify the surface drainage patterns along the decommissioned canal route. In areas where complete removal/fill is possible, the resulting drainage pattern would be returned to the natural condition, controlled primarily by the upslope topography. In other sections, the resulting drainage pattern would remain modified, but more closely reflect the natural topography than under existing conditions. The removal of spillways and the elimination of potential canal overflows would prevent concentrated flow routing to downslope locations that experienced rill and gully erosion risks under existing conditions. Erosion control measures as part of the PM&Es would minimize the potential for conditions in the near term after decommissioning to create any preferential flow paths that could produce adverse long-term drainage patterns.

Retirement of access road segments that would no longer be necessary would primarily be accomplished by abandonment in place and installation of barriers/obstacles to limit access. Scarification and seeding to revegetate the retired road surfaces would be carried out to reduce potential erosion and sedimentation. PM&E Measure GEOL-1 requires that PG&E identify potential future erosion sites and install long-term BMPs, for Project areas including access roads and staging areas. As required by PM&E Measure GEOL-1, temporary access roads would be removed in compliance with BMP 2-26 Obliteration or Decommissioning of Roads, which has been retitled to 12.21 Road Management BMPs, BMP 2.7 – Road Decommissioning, as defined in the USDA-FS Water Quality Management Handbook for the Southwest Region (Region 5)(USDA-FS 2011). As stated in the Handbook, the purpose of road decommissioning BMPs, for both temporary and permanent roads, is to 1) reduce erosion from road surfaces and slopes and related sedimentation of streams; 2) reduce risk of mass failures and subsequent impact on water quality; 3) restore natural surface and subsurface drainage patterns; and 4) restore stream channels at road crossings and where roads run adjacent to channels. BMP 2.7 specifically requires:

1. Restore stream courses and floodplains where feasible, to natural grade and configuration.
2. Remove drainage structures determined as necessary to protect water quality:
3. Re-contour disturbed fill material, and compact minimally to allow filtration.
4. Re-contour the road surface cut and fill slopes to restore natural hillslope topography where specified.
5. De-compact areas with stable fill but reduced infiltration and productivity.
6. Haul excess fill to stable disposal areas outside of the SMZ.
7. Provide effective soil cover (such as mulch, woody debris, rock, vegetation, blankets) to exposed soil surfaces for both short- and long-term recovery.
8. Revegetate disturbed areas, particularly at or near stream crossings.
9. Block vehicle access to prevent motorized traffic, in conjunction with signing, publication, and enforcement of the forest's motor vehicle use map.

As stated in FERC's EIS, NMFS recommended land-use conditions for surrender of the Project consistent with PG&E's proposed PM&E measures, and concurred with PG&E's proposed plan for decommissioning, including disposition of existing and any surrender-related new access

roads. A mitigation monitoring plan (MMP), required as part of PM&E BOTA-1, includes restoration of abandoned or temporary roadbeds, addressing compaction issues, and requiring seeding, mulching and planting. The MMP would be developed in consultation with private landowners. Mitigation measures included in the MMP would enhance and work in conjunction with those proposed as part of the erosion and sedimentation control BMPs in the PM&E measures described above. PG&E further proposes two years of erosion monitoring. Post-construction BMPs would be monitored for effectiveness and additional BMPs would be installed as necessary. PG&E would consult with the resource agencies on the need for possible additional monitoring.

With implementation of PM&Es, impacts related to surface hydrology and drainage patterns along decommissioned canal routes and retired road segments would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures**: No additional mitigation required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Under Alternative 1, those facilities of the Kilarc Development required to maintain the flow of water to the forebay would be improved to prevent fish entrainment and to increase flows to the reach of Old Cow Creek below the Kilarc Canal Diversion Dam. Changes to current topography and drainage patterns are not anticipated to result from implementation of these alternatives, and impacts would be less than significant.

IMPACT 4.12-4 (Kilarc): Would the action result in the dewatering of the Kilarc Forebay?

Proposed Project

Discontinuation of water delivery to the Kilarc penstock would dewater the existing artificial water body of the Kilarc Forebay, although some minor topographic irregularities may remain. These features would support net detention or retention/infiltration of precipitation and/or runoff from the small natural contributing watershed along the ridge line. Filling, grading, and seeding of the existing reservoir area would support conversion of the former reservoir to the soil and vegetation conditions suited to the proposed hydrology and natural drainage area.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Under Alternative 1 and the No Project Alternative, the Kilarc Forebay would not be dewatered and would be left in place. Conversion of the former reservoir to the soil and vegetation conditions suited to the proposed hydrology and natural drainage area would not occur.

IMPACT 4.12-5 (Kilarc): Would the action result in beneficial changes in groundwater recharge?

Proposed Project

Modifications to routing and detention of surface water due to the removal of the diversion dams, decommissioning of the canal conveyance system, discontinuation of water storage in the forebay, and restoration of natural streamflow regimes to the bypassed reaches would return the timing and location of opportunities for groundwater recharge to natural watershed conditions.

Groundwater recharge opportunities along the bypassed reach would be improved and would increase support for stream base flow and valley bottom springs and seeps within the bypassed reach. Additionally, return of surface flows to the bypassed reach and elimination of potential upland water losses along the canals and forebay would improve the down valley delivery of surface and subsurface flows along Old Cow Creek to the regional groundwater basin. This would be a beneficial impact.

- **Level of Significance:** No Impact (Beneficial)
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative:

Under Alternative 1 and the No Project Alternative, restoration of natural streamflow regimes to the bypassed reaches would return the timing and location of opportunities for groundwater recharge to natural watershed conditions. There would be no additional impacts from these alternatives related to IMPACT 4.12-5 (Kilarc).

IMPACT 4.12-6 (Kilarc): Would the action result in temporary dewatering and bypassing of surface flows during decommissioning activities?

Proposed Project

Decommissioning of the North Canyon, South Canyon, and Kilarc diversion dams would require localized dewatering and/or bypassing of flows to allow heavy equipment access and protect aquatic resources and water quality (PM&E measure AQUA-1). Decommissioning of the North Canyon Creek, South Canyon Creek, and Kilarc Main Diversion canals would be conducted during the dry season and after discontinuation of diversions into the canals, but could require localized dewatering and/or bypassing of intermittent stream crossings. These activities would result in a temporary cessation of surface water in the isolated work areas and extending downstream to the return points. The temporary local dewatering would not result in any direct adverse impact to long-term surface or groundwater conditions. This would be a less than significant impact.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Under Alternative 1 and the No Project Alternative, no construction would occur, and temporary local dewatering would not be required. There would be no additional impacts from this alternative related to IMPACT 4.12-6 (Kilarc).

4.12.4.2 Cow Creek

IMPACT 4.12-7 (Cow Creek): Would the action re-establish a natural streamflow regime in bypassed reach of South Cow Creek?

Proposed Project

PG&E would abandon their water rights and the flows previously diverted under those water rights into the South Cow Creek Canal would, instead, flow down the bypass reach of South Cow Creek.

Streamflow in the bypassed reach of South Cow Creek would be increased to the unimpaired levels, described in the setting section (Figure 4.12-6). The ratio of proposed versus existing streamflow in the bypassed reach would vary by month (Figure 4.12-6). Mean daily flows in the bypassed reach of South Cow Creek would increase slightly during late fall and through spring months, and by 3.5 to 4.5 times the existing levels from July through October.

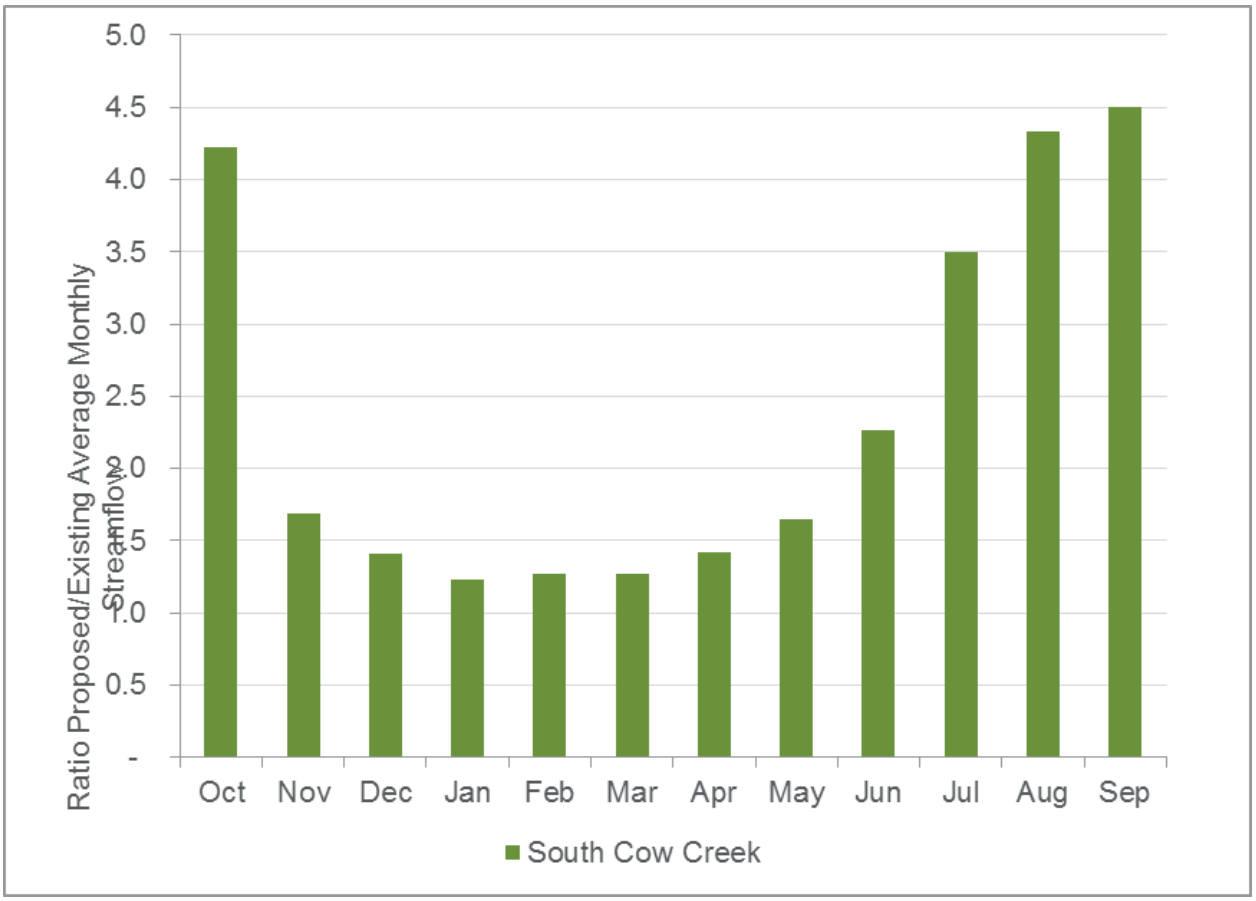


Figure 4.12-6 Ratio of Average Monthly South Cow Creek Streamflow under Proposed Project versus Existing Conditions

Average streamflow in the bypassed reach of South Cow Creek during the low flow season (July-October) would range between 57 and 103 cfs.

The peak streamflow conditions on South Cow Creek in the bypass reach would be modified only slightly. Since the diversion and canal capacities are very small relative to the peak flows, the possible increase would be less than 3 percent of the 1.5-year peak, and proportionally less of larger flood flows.

The changes to South Cow Creek streamflow would restore natural average monthly flows throughout the year which would increase average and minimum flows during the low flow season while not adversely increasing peak flows. This would be a less than significant impact.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. For Alternative 2A, facilities of the Cow Creek Development required to maintain flow to Hooten Gulch would be improved to provide fish passage, fish screens, and to increase flow to the bypass reach. Alternative 2B would retain flow to ADU via a restored east channel in South Cow Creek. Alternative 2C would retain flow to ADU via a new pump in South Cow Creek near the current ADU diversion location. Alternative 2D would retain flow to ADU via a new conveyance from South Cow Creek to the Hooten Gulch. As with the Proposed Project, the changes to South Cow Creek streamflow would restore natural average monthly flows throughout the year which would increase average and minimum flows during the low flow season while not adversely increasing peak flows.

No Project Alternative

Under the No Project Alternative, all flows would pass through the natural channels of South Cow Creek, increasing flows through the bypassed reaches. The changes to South Cow Creek streamflow would restore natural average monthly flows throughout the year which would increase average and minimum flows during the low flow season while not adversely increasing peak flows. Because no discharges would occur from the Cow Creek powerhouse, Hooten Gulch would return to its natural, ephemeral condition as observed upstream of the powerhouse.

IMPACT 4.12-8 (Cow Creek): Would the action re-establish a natural streamflow regime in the augmented segment of Hooten Gulch?

Proposed Project

Streamflow in the segment of Hooten Gulch between the powerhouse discharge and the Abbott Ditch diversion dam would no longer be augmented above natural watershed contributions, and would fall to zero between rainstorm or snowmelt events.

While these changes would decrease surface flows relative to existing (and historic) conditions, they would restore a more natural seasonal flow regime to this intermittent stream. The channel-forming flows would continue to be dominated by peak flows resulting from major precipitation events.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. Flows to Hooten Gulch would be retained and the natural streamflow regime would not be reestablished at this location, similar to existing conditions prior to decommissioning.

No Project Alternative

Under the No Project Alternative, all flows would pass through the natural channels of South Cow Creek, increasing flows through the bypassed reaches. Because no discharges would occur from the Cow Creek powerhouse, Hooten Gulch would return to its natural, ephemeral condition as observed upstream of the powerhouse. Impacts would be similar to the Proposed Project.

IMPACT 4.12-9 (Cow Creek): Would the action result in channel adjustments to removal of diversion dams and changes in streamflow?

Proposed Project

Channel adjustments to the removal of the diversion dams and changes in streamflow would be spatially concentrated near the dam site and in the impoundment zone where direct removal of artificial materials and substantial hydraulic changes would occur. The bypassed reach could experience some changes in sediment transport and deposition patterns as the small volume of accumulated sediment is delivered through the reach, but the hydrologic effect on geomorphically important peak flows would be minimal (see IMPACT 4.12-1). Stored sediment behind the diversion dam would be delivered to the bypassed reach through natural streamflow hydraulics. The volume of sediment is not large, and depending on natural climate and runoff patterns following dam removal, delivery of the sediment into the bypassed reach could occur over a period of months to years. Some local variations from existing channel characteristics would be expected within the bypassed reach, including some temporary changes. No measureable change in overall channel form, pattern, or stability would result.

Removal of the Mill Creek diversion dam would remove the gate and structure and bury the concrete in the canal. Removal of the South Cow Creek diversion dam would remove above grade materials. Access by heavy equipment to perform the facility removals would require disturbance of streambank vegetation and soils, but implementation of PM&E measures would provide temporary BMPs, revegetation to increase long-term bank stability, and effectiveness monitoring and adaptive management actions for 2 years.

The accumulated sediment behind the South Cow Creek diversion dam would not be removed, but reshaping of the sediment, placement of suitable excavated sediments along channel margins, and excavation of a pilot channel as part of the PM&E measures would facilitate

entrainment of the accumulated sediment during future high streamflow events for natural redistribution in the bypassed reach.

The channel within the bypassed reach of South Cow Creek may demonstrate some changes in the location and amount of fine sediment stored during the low flow season, since the absolute and relative increase in low flow season discharge would be substantial. The existing streambed is dominated by cobble and gravel material; sediment bars are not extensive, and pool fines are not excessive. Therefore, increases in medium and/or fine sediment deposition would primarily benefit physical habitat characteristics, rather than adversely impact the geomorphic condition of the channel bed and banks.

Changes to the channel of lower Hooten Gulch could result from reduction of artificial discharge between runoff events from the natural watershed. Similarly to the main stem of South Cow Creek, the return to a more natural flow regime would not adversely change peak flows or could cause geomorphic instability. Unlike the bypass reach, Hooten Gulch would experience net decrease in low flow season streamflow and this could allow vegetation encroachment on lower streambanks and/or net channel narrowing over time. These changes would not increase the likelihood of or risks from erosion and sedimentation. Therefore, impacts related to removal of diversion dams and changes in streamflow would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation is required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. For Alternative 2A, facilities of the Cow Creek Development required to maintain flow to Hooten Gulch would be improved to provide fish passage, fish screens, and to increase flow to the bypass reach. Alternative 2B would retain flow to ADU via a restored east channel in South Cow Creek. Alternative 2C would retain flow to ADU via a new pump in South Cow Creek near the current ADU diversion location. Alternative 2D would retain flow to ADU via a new conveyance from South Cow Creek to the Hooten Gulch. As with the Proposed Project, the bypassed reach could experience some changes in sediment transport and deposition patterns as the small volume of accumulated sediment is delivered through the reach, but the hydrologic effect on geomorphically important peak flows would be minimal. The return to a more natural flow regime would not adversely change peak flows or cause geomorphic instability, and these changes are not anticipated to increase the likelihood of or risks from erosion and sedimentation.

No Project Alternative

Under the No Project Alternative, all flows would pass through the natural channels of South Cow Creek, increasing flows through the bypassed reaches, and the return to a more natural flow regime would not adversely change peak flows or could cause geomorphic instability. Because no discharges would occur from the Cow Creek powerhouse, Hooten Gulch would return to its natural, ephemeral condition as observed upstream of the powerhouse and would experience net decrease in low flow season streamflow and this could allow vegetation

encroachment on lower streambanks and/or net channel narrowing over time. These changes are not anticipated to increase the likelihood of or risks from erosion and sedimentation.

IMPACT 4.12-10 (Cow Creek): Would the action result in modified surface hydrology and drainage patterns along decommissioned canal routes and retired road segments?

Proposed Project

Decommissioning of canals and retirement of some access roads would return much of the disturbed topography and drainage patterns to a natural state and incorporate temporary and long-term BMPs to limit risks of adverse flow routing and/or erosion due to construction disturbance.

Private landownership would influence the preferred methods of decommissioning along the Mill Creek-South Cow Creek and the South Cow Creek Canal. The primary treatment for the Mill Creek-South Cow Creek canal would be abandonment and backfilling with excavated dam material. Abandonment in place, combined with strategic breaching to avoid excessive storm water retention or runoff would be the principal method. The proposed PM&E measures would be applied throughout the length of the decommissioned canals, regardless of method of decommissioning.

The partial removal/breaching and the berm removal/filling of the canals would modify the surface drainage patterns along the decommissioned canal route. In areas where complete removal/fill is possible, the resulting drainage pattern would be returned to the natural condition, controlled primarily by the upslope topography. In other sections, the resulting drainage pattern would remain modified, but more closely reflect the natural topography than under existing conditions. The removal of spillways and the elimination of potential canal overflows would prevent concentrated flow routing to downslope locations that experienced rill and gully erosion risks under existing conditions. Erosion control measures as part of the PM&Es would minimize the potential for conditions in the near term after decommissioning to create any preferential flow paths that could produce adverse long-term drainage patterns.

While the decommissioning of the canals would re-shape the topography close to the natural shapes, local topographic irregularities will remain within sections of the canal footprint. These areas may detain surface water temporarily and/or have some net retention and infiltration. Therefore, local surface and groundwater hydrology along the canal routes would not be returned to a completely undisturbed condition.

Retirement of access road segments that would no longer be necessary would primarily be accomplished by abandonment in place and installation of barriers/obstacles to limit access. Scarification and seeding to revegetate the retired road surfaces would be carried out to reduce potential erosion and sedimentation. PM&E Measure GEOL-1 requires that PG&E identify potential future erosion sites and install long-term BMPs, for Project areas including access roads and staging areas. As required by PM&E Measure GEOL-1, temporary access roads would be removed in compliance with BMP 2-26 Obliteration or Decommissioning of Roads, which has been retitled to 12.21 Road Management BMPs, BMP 2.7 – Road Decommissioning, as defined in the USDA-FS Water Quality Management Handbook for the Southwest Region (Region 5)(USDA-FS 2011). As stated in the Handbook, the purpose of road decommissioning BMPs, for both temporary and permanent roads, is to 1) reduce erosion from road surfaces and

slopes and related sedimentation of streams; 2) reduce risk of mass failures and subsequent impact on water quality; 3) restore natural surface and subsurface drainage patterns; and 4) restore stream channels at road crossings and where roads run adjacent to channels. BMP 2.7 specifically requires:

1. Restore stream courses and floodplains where feasible, to natural grade and configuration.
2. Remove drainage structures determined as necessary to protect water quality:
3. Re-contour disturbed fill material, and compact minimally to allow filtration.
4. Re-contour the road surface cut and fill slopes to restore natural hillslope topography where specified.
5. De-compact areas with stable fill but reduced infiltration and productivity.
6. Haul excess fill to stable disposal areas outside of the SMZ.
7. Provide effective soil cover (such as mulch, woody debris, rock, vegetation, blankets) to exposed soil surfaces for both short- and long-term recovery.
8. Revegetate disturbed areas, particularly at or near stream crossings.
9. Block vehicle access to prevent motorized traffic, in conjunction with signing, publication, and enforcement of the forest's motor vehicle use map.

As stated in FERC's EIS, NMFS recommended land-use conditions for surrender of the Project consistent with PG&E's proposed PM&E measures, and concurred with PG&E's proposed plan for decommissioning, including disposition of existing and any surrender-related new access roads. An MMP, required as part of PM&E BOTA-1, includes restoration of abandoned or temporary roadbeds, addressing compaction issues, and requiring seeding, mulching and planting. The MMP would be developed in consultation with private landowners. Mitigation measures included in the MMP would enhance and work in conjunction with those proposed as part of the erosion and sedimentation control BMPs in the PM&E measures described above. PG&E further proposes two years of erosion monitoring. Post-construction BMPs would be monitored for effectiveness and additional BMPs would be installed as necessary. PG&E would consult with the resource agencies on the need for possible additional monitoring.

With implementation of PM&Es, impacts related to surface hydrology and drainage patterns along decommissioned canal routes and retired road segments would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. For Alternative 2A, facilities of the Cow Creek Development required to maintain flow to Hooten Gulch would be improved to provide fish passage, fish screens, and to increase flow to the bypass reach. Alternative 2B would retain flow to ADU via a restored east channel in South Cow Creek. Alternative 2C would retain flow to ADU via a new pump in South

Cow Creek near the current ADU diversion location. Alternative 2D would retain flow to ADU via a new conveyance from South Cow Creek to the Hooten Gulch. While some changes to current topography and drainage patterns would result from implementation of these alternatives, temporary and long-term BMPs would be incorporated to limit risks of adverse flow routing and/or erosion due to construction disturbance, and impacts would be less than significant.

No Project Alternative

Under the No Project Alternative, all flows would pass through the natural channels of South Cow Creek, increasing flows through the bypassed reaches. Because no discharges would occur from the Cow Creek powerhouse, Hooten Gulch would return to its natural, ephemeral condition as observed upstream of the powerhouse. Because no construction would occur, there would be no risks of adverse flow routing and/or erosion due to construction disturbance.

IMPACT 4.12-11 (Cow Creek): Would the action result in dewatering of the Cow Forebay?

Proposed Project

Discontinuation of water delivery to the Cow Creek penstock would dewater the existing artificial water body of the Cow Forebay, although some minor topographic irregularities may remain. These features would support net detention or retention/infiltration of precipitation and/or runoff from the small natural contributing watershed along the ridge line. Filling, grading, and seeding of the existing reservoir area would support conversion of the former reservoir to the soil and vegetation conditions suited to the proposed hydrology and natural drainage area.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

As with the Proposed Project, under Alternative 2A, 2B, 2C, or 2D, filling, grading, and seeding of the existing reservoir area will support conversion of the former reservoir to the soil and vegetation conditions suited to the proposed hydrology and natural drainage area. There would be no additional impacts from these alternatives related to IMPACT 4.12-11 (Cow Creek).

No Project Alternative

Under the No Project Alternative, the Cow Creek Forebay would not be dewatered and would be left in place. Conversion of the former reservoir to the soil and vegetation conditions suited to the proposed hydrology and natural drainage area would not occur.

IMPACT 4.12-12 (Cow Creek): Would the action result in beneficial changes in groundwater recharge?

Proposed Project

Modifications to routing and detention of surface water due to the removal of the diversion dams, decommissioning of the canal conveyance system, discontinuation of water storage in the forebay, and restoration of natural streamflow regimes to the bypassed reaches would

return the timing and location of opportunities for groundwater recharge to natural watershed conditions.

Groundwater recharge opportunities along the bypassed reach would be improved and would increase support for stream base flow and valley bottom springs and seeps within the bypassed reach. Additionally, return of surface flows to the bypassed reach and elimination of potential upland water losses along the canals and forebay would improve the down valley delivery of surface and subsurface flows along South Cow Creek to the regional groundwater basin. This would be a beneficial impact.

- **Level of Significance:** No Impact (Beneficial)
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D and No Project Alternative

As with the Proposed Project, under Alternative 2B, 2C, or 2D, restoration of natural streamflow regimes to the bypassed reaches would return the timing and location of opportunities for groundwater recharge to natural watershed conditions. There would be no additional impacts from these alternatives on IMPACT 4.12-12 (Cow Creek).

IMPACT 4.12-13 (Cow Creek): Would the action result in temporary dewatering and bypassing of surface flows during decommissioning activities?

Proposed Project

Decommissioning of the Mill Creek and South Cow Creek diversion dams would require localized dewatering and/or bypassing of flows to allow heavy equipment access and protect aquatic resources and water quality (PM&E measure AQUA-1). Decommissioning of the Mill Creek and Mill-Creek-South Cow Creek canals would be conducted during the dry season and after discontinuation of diversions into the canals, but could require localized dewatering and/or bypassing of intermittent stream crossings. These activities would result in a temporary cessation of surface water in the isolated work areas and extending downstream to the return points. The temporary local dewatering would not result in any direct adverse impact to long-term surface or groundwater conditions. This would be a less than significant impact.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. Construction activities for these alternatives could result in temporary dewatering to modify or install equipment. As with the Proposed Project, temporary local dewatering is not anticipated to result in any direct adverse impact to long-term surface or groundwater conditions, and impacts would be less than significant.

No Project Alternative

Under the No Project Alternative, no construction would occur, and temporary local dewatering would not be required. There would be no additional impacts from this alternative related to IMPACT 4.12-13 (Cow Creek).

This Page Intentionally Left Blank

4.13 Water Quality

This section describes the potential to affect water quality in the Project area that would result from implementation of the Proposed Project. The Environmental Setting section presents existing water quality conditions in the Project area. Significance criteria are also identified with potential impacts that may occur as a result of project actions.

4.13.1 Environmental Setting

4.13.1.1 Sources of Information

PG&E conducted a water quality study of the Kilarc and Cow Creek Developments in 2003 with samples collected from eight sites in the Old Cow Creek watershed and four sites in the South Cow Creek watershed. The parameters analyzed for this study included minerals, trace metals, nutrients, PCBs, and coliform bacteria. In addition, information on dissolved oxygen, temperature, specific conductance, pH, and turbidity were measured at nine locations in the Old Cow Creek watershed and nine sites in the South Cow Creek watershed. PG&E also conducted an analysis of the sediment stored behind the Kilarc Main Canal diversion dam and the South Cow Creek diversion dam, assessing concentrations of mercury, copper, arsenic, and silver.

4.13.1.2 Regional Setting

The Cow Creek Development occurs within the South Cow Creek watershed, which has an area of 78 square miles, including 53 square miles upstream of the south Cow Creek diversion dam. The Cow Creek Development diverts flow from Mill Creek at the Mill Creek diversion dam into the Mill Creek-South Cow Creek canal. Water is then diverted from the South Cow Creek and the Mill Creek-South Cow Creek canal into the South Cow Creek main canal, which eventually flows in the Cow Creek Forebay. Average annual runoff at the south Cow Creek diversion dam is about 79,500 af. Flow released from the Cow Creek Powerhouse flows into Hooten Gulch, a natural ephemeral stream channel which connects downstream to the South Cow Creek about 4 miles downstream of the South Cow Creek diversion dam.

For the Kilarc Development, the boundaries of the study area extend from the Project diversion dams at the North Canyon Creek, South Canyon Creek, and Old Cow Creek downstream to Old Cow Creek just downstream of the Kilarc tailrace. The geographic scope for the Cow Creek Development extends upstream to the diversion dam pools on Mill Creek and South Cow Creek downstream to the confluence of Hooten Gulch with South Cow Creek.

Topographic Setting

The Project area consists of areas within the Old Cow Creek and South Cow Creek subwatersheds, which are located near the community of Whitmore, about 30 miles east of the city of Redding. These two subwatersheds are both part of the Cow Creek watershed, which encompasses about 430 square miles and drains the foothills of Cascade range into the Sacramento River. The Project is located within the foothills of the Cascade Range, with an elevation from approximately 856 feet above mean sea level (ft msl) to 3,940 feet. The topography of the Project site is diverse with low rolling hills in the lower watershed to steep, narrow canyons in the upper portions of the watershed. The upper watershed of the Project area is characterized by densely vegetated river banks with conifer forests while the lower watershed of the Project area is typified by grasslands and sparsely occurring oak and pine trees.

Climate and Precipitation

The western margin of the Cascade Range rises gradually from the eastern flank of the Sacramento valley. The presence of this mountain range causes moist air arriving from the Pacific Ocean to cool and condense, facilitating increased amounts of precipitation. The climate within the Project area can be characterized as Mediterranean, with warm dry summers, and cool wet winters. The annual mean air temperature is approximately 59°F with average annual precipitation of about 34 inches. The highest temperatures occur on average in July while the highest monthly precipitation occurs in January.

Surface Hydrology

Details about the surface hydrology of the area within the Project area are provided above in the Hydrology and Geomorphology Section (refer to Section 4.12.1.2 Surface Hydrology).

Water and Sediment Quality at the Kilarc Development

Water quality conditions at the Kilarc Development vary throughout the year. The water temperatures are coolest generally during the winter season and warms throughout the spring into the summer period. Continuous water temperature monitoring was conducted between May 14 and September 30, 2003, at nine different locations with data collected every 20 minutes. These sites were also sampled in March, May, June, July, August, and September of 2003 for temperature, dissolved oxygen, specific conductance, pH, and turbidity. Additionally, at eight stations water was tested for minerals, trace metals, nutrients, PCBs, and coliform bacteria in March and October 2003.

In general, concentrations of dissolved oxygen consistently met water quality objectives for the watershed. Turbidity fluctuated greatly seasonally, ranging from 0.1 to 5.8 Nephelometric Turbidity Units (NTUs), but reflected the natural variability of different flow conditions between spring and summer. Water temperatures were lower at the upstream end of bypassed reaches and increased progressively downstream, as expected since water in the creeks gradually warms to reach equilibrium with generally warmer air temperatures. The change in water temperature between the Kilarc main diversion dam and the Kilarc tailrace increased between 5°-9°F during the summer months, in exceedance of a state water quality objective for a maximum increase of 5°F. There was one exceedance of water quality objectives for pH, however in general; measurements for other water quality constituents were generally within water quality objectives.

Four sediment samples collected upstream of the Kilarc Main Canal diversion dam were screened for mercury, methylmercury, copper, silver, and arsenic. Levels of mercury, methylmercury, silver, and arsenic were considered to be below screening levels or considered to be consistent with natural background levels. All four samples were also analyzed for both total and leachable copper concentrations; leachable copper reflects the copper that could be released to the water column. Three of the samples were below the probable effects level (PEL), but above the threshold effects level (TEL) (ENTRIX 2008). The four samples had leachable copper concentrations exceeding the probably effects level (PEL) (ENTRIX 2008).

Water Quality at the Cow Creek Development

A water quality study of the Cow Creek Development was conducted simultaneously to the study at the Kilarc Development and measured the same water quality constituents. Water samples were collected at four sites to analyze minerals, trace metals, nutrients, PBCs, and coliform bacteria in March and October 2003. Eight stations were sampled to measure temperature, dissolved oxygen, specific conductance, pH, and turbidity, with temperature data collected continuously (20-minute intervals) at these sites.

Turbidity varied between 0.1 to 8.5 NTUs but were within the range of the expected natural variability for the watershed during the time frame the samples were collected. Concentrations of dissolved oxygen consistently met water quality objectives for the watershed. Water temperatures within the bypassed reach of the South Cow Creek diversion to upstream of the tailrace were on average within the water quality objective of no more than a 5°F increase. Although there were two pH samples that were outside the range set by the state, generally measurements of the water quality constituents analyzed for the study showed they were within targets set for water quality objectives.

Two samples were taken to evaluate the chemical concentrations of sediment impounded behind the South Cow Creek diversion dam. Laboratory studies analyzed concentrations of mercury, copper, silver, and arsenic and each of these metals were either below screening levels or were within the range of background levels (North State Resources 2008c).

Under existing conditions, South Cow Creek is listed by the State Water Board and Central Valley Water Board as impaired for indicator bacteria (fecal coliform).

4.13.2 Regulatory Setting

The following federal, State, and local regulations associated with water quality are applicable to the Proposed Project.

4.13.2.1 Federal

Clean Water Act (CWA) and Associated Environmental Compliance

There are several sections of the CWA that pertain to regulating impacts on waters of the United States.

CWA Section 303

The State Water Board and Regional Water Quality Control Boards adopt water quality standards and water quality control plans (including Basin Plans) to protect beneficial uses of waters, as required by Section 303 of the CWA (33 U.S.C. § 1313). Section 303(d) of the CWA requires the State Water Board and Regional Water Quality Control Boards to periodically identify and to develop total maximum daily loads (TMDL) for waters that do not meet, or are not expected to meet, established water quality standards.

CWA Section 401

Section 401 of the CWA requires that an applicant that is seeking to conduct an activity that may result of a discharge of fill material in to waters of the United States must obtain a water quality certification, or waiver. See additional discussion in Sections 1.1, 4.6.2, and 4.7.2.

CWA Section 404

Dredging and placement of fill materials into the waters of the United States is regulated by Section 404 of the CWA, which is administered by the USACE. See additional discussion in Sections 4.6.2 and 4.7.2.

4.13.2.2 State

Porter-Cologne Water Quality Control Act (Porter-Cologne Act)

The Porter-Cologne Act established the State Water Board and the nine different Regional Water Boards. The State Water Board is primarily state agency responsible for protecting the state's surface and groundwater resources, but much of the implementation authority is delegated to the nine Regional Water Boards, which implement the Porter-Cologne Act in addition to Sections 402 and 303(d) of the CWA. The Proposed Project occurs within the jurisdiction of the Central Valley Water Board. See additional discussion in Section 4.12.2.

Storm Water Discharges

The State Water Board has adopted a General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, which requires landowners to file a Notice of Intent to discharge storm water runoff to waters of the United States from certain construction, demolition, or other land disturbance activity. The permit generally requires dischargers to develop and implement a Storm Water Pollution Prevention Plan (SWPPP) and to perform inspections of storm water pollution prevention measures. (See State Water Board Order 2009-0009-DWQ and NPDES No. CAS000002, as amended by Order 2010-0014-DWQ, Order 2012-0006-DWQ, and any subsequent amendments thereto.)

Sacramento River Basin Plan

Under provisions of both the CWA, including Section 303, and the Porter-Cologne Act, the Central Valley Regional Water Quality Board maintains a Basin Plan for the Sacramento and San Joaquin River basins, including the entire extent of the Project area. The Basin Plan explicitly delineates the specific beneficial uses associated with the Cow Creek watershed, which are summarized in Table 4.13-1. The beneficial uses of the Cow Creek watershed include irrigation, stock watering, power generation, contact recreation, canoeing and rafting, other noncontact recreation, cold freshwater habitat, coldwater fish migration habitat, warmwater spawning habitat, coldwater spawning habitat, and wildlife habitat.

Table 4.13-1 Beneficial Uses Associated with the Cow Creek Watershed

Category of Use	Type of Beneficial Uses	Beneficial Use Designation in Cow Creek Watershed
Municipal	Municipal and Domestic Supply	Potential Beneficial Use
Agriculture	Irrigation	Existing Beneficial Use
Agriculture	Stock Watering	Existing Beneficial Use
Industry	Processes	
Industry	Service Supply	

Category of Use	Type of Beneficial Uses	Beneficial Use Designation in Cow Creek Watershed
Industry	Power	Existing Beneficial Use
Recreation	Contact	Existing Beneficial Use
Recreation	Canoeing and Rafting	Potential Beneficial Use
Recreation	Other Noncontact	Existing Beneficial Use
Freshwater Habitat	Warm	
Freshwater Habitat	Cold	Existing Beneficial Use
Migration	Warm	
Migration	Cold	Existing Beneficial Use
Spawning	Warm	Existing Beneficial Use
Spawning	Cold	Existing Beneficial Use
Wildlife	Wildlife Habitat	Existing Beneficial Use
Navigation	Navigation	

Source: Central Valley Regional Water Quality Control Board, Water Quality Control Plan (Basin Plan), May 2018 (Fifth Edition).

As discussed above, the Regional Board has adopted and periodically amended a Basin Plan for the Sacramento River watershed that contains objectives for a comprehensive list of different water quality constituents. The maximum concentration for constituents and the applicable water bodies are shown in Table 4.13-2.

Table 4.13-2 Objectives for Water Quality Constituents

Constituent	Maximum Concentration (mg/L)	Applicable Water Bodies
Arsenic	0.01	Sacramento River from Keswick Dam to the I Street Bridge at City of Sacramento, American River Folsom Dam to the Sacramento River, Folsom Lake, and Sacramento-San Joaquin Delta.
Barium	0.1	As noted above for Arsenic
Cadmium	0.00022	Sacramento River and its tributaries above State Hwy 32 bridge at Hamilton City
Copper	0.0056	As noted above for Cadmium
Cyanide	0.01	As noted above for Arsenic
Iron	0.3	As noted above for Arsenic

Constituent	Maximum Concentration (mg/L)	Applicable Water Bodies
Manganese	0.05	As noted above for Arsenic
Silver	0.01	As noted above for Arsenic
Zinc	0.016	As noted above for Cadmium
Color	Free from discoloration	
Dissolved oxygen	▪ Water designated WARM: 5.0mg/L ▪ Waters designated COLD: 7.0mg/L ▪ Waters designated SPWN: 7.0mg/L ▪ 9.0mg/L	9.0mg/L standard in place from June 1 to August 31 for the Sacramento River from Keswick Dam to Hamilton City.
Floating Material	Not contain floating materials that causes nuisance or adversely affect beneficial uses	Entire basin
Oil and Grease	Free of oils, greases, waxes; absent of visible film or coating on surface of water.	Entire basin
pH	Between 6.5 and 8.5	Entire basin, unless otherwise noted
sediment	Not contain sediment load that causes nuisance or adversely affect beneficial uses	Entire basin
Settleable Material	Not contain substances in concentrations that causes nuisance or adversely affect beneficial uses	Entire basin
Suspended Material	Not contain suspended substances in concentrations that causes nuisance or adversely affect beneficial uses	Entire basin
Tastes and Odors	Free of taste or odor-producing substances that impart undesirable tastes and odors to water supplies or to edible products of aquatic origin	Entire basin
Temperature	Water temperature not to be increased more than 5°F above natural receiving water temperature. Temperature changes due to controllable factors not exceed 56°F.	Sacramento River from Shasta Dam to I Street Bridge
Turbidity	If natural turbidity is less than 1 NTU, controllable factors shall not cause downstream turbidity to exceed 2NTU. If natural turbidity is between 1-5NTUs, increases shall not exceed 1NTU.	Entire basin

Source: Central Valley Regional Water Quality Control Board, Water Quality Control Plan (Basin Plan), May 2018 (Fifth Edition).

For waters within the basin that are designated for contact recreation, “the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 ml.”

Bodies of water that consistently fail to reach the Basin Plan objectives for one or more water quality measures are placed on the Section 303(d) list of impaired water bodies. Under existing conditions, South Cow Creek is listed as impaired for indicator bacteria (fecal coliform). A TMDL has not been developed, but the Project is not believed to be a source of the pollutant.

4.13.2.3 Local

Shasta County General Plan

The Shasta County General Plan (2004) addresses issues regarding water quality. These policies include:

- Sedimentation and erosion from proposed developments shall be minimized through grading and hillside development ordinances and other similar safeguards as adopted and implemented by the County.
- Septic systems, waste disposal sites, and other sources of hazardous or polluting materials shall be designed to prevent contamination to streams, creeks, rivers, reservoirs, or groundwater basins in accordance with standards and water resource management plans adopted by the County.
- The potential for cumulative water quality impacts resulting from widespread use of septic systems in poorly suited soil areas shall be periodically evaluated by the County for the need to provide greater monitoring and possible changes to applicable sewage disposal standards.

4.13.3 Analysis Methodology

The qualitative programmatic analysis of the water quality impacts is based on review of the Proposed Project design and identifies potential environmental effects, based on the standards of significance presented later wherein.

Impacts on surface and groundwater quality were analyzed by reviewing existing groundwater and surface water quality literature on the specific plan, evaluating short-term water quality reports on the Project area, and determining potential sources of water quality pollutants based on the operational activities to occur under the Proposed Project. Furthermore, the applicability of federal and state regulations, and local ordinances were assessed. Potential impacts from implementation of the Proposed Project were determined by evaluating whether the Proposed Project would exceed thresholds of significance outlined later within this report.

The impacts on water quality are assessed as a function of potential pollutant types, concentrations, and load. These are evaluated qualitatively because specific design characteristics and land uses could affect the amount, type, and susceptibility of the Project area to runoff.

For significant impacts, mitigation measures are presented that would reduce the impacts to less-than-significant if possible. Where mitigation measures are unable to reduce the level of impacts

to less-than-significant, mitigation measures would be implemented to offset the impact to the extent possible.

4.13.3.1 Analytical Approach

Each potential impact was evaluated by qualitatively estimating the effects of the Project on water quality and comparing those effects to the significance criteria identified below. Additionally, water quality effects as they affect beneficial uses are also discussed in Section 4.6, Aquatic and Fisheries Resources and Section 4.16, Recreation.

The following methods were used to evaluate the potential effects on water quality resulting from implementation of the Proposed Project and include:

- Comparison of expected water quality to Basin Plan objectives
- Evaluation of findings conducted by PG&E in 2003 regarding sediment and water quality in the Kilarc and Cow Creek Development

Criteria for Determining Significance

Based on the State Water Board's Environmental Checklist in Appendix A of the Board's CEQA regulations, Appendix G of the CEQA Guidelines, and professional standards and practices, a Proposed Project would have a significant impact if it would:

- Violate any water quality standards or waste discharge requirements
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site
- Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff
- Otherwise substantially degrade water quality

4.13.4 Environmental Impacts and Mitigation

PG&E has included the following measure to address impacts due to decommissioning activities.

- **PM&E Measure GEOL-1: Implement Soil Erosion and Sedimentation Control Best Management Practices.** The Licensee shall identify and implement Soil Erosion and Sedimentation Control BMPs that address soil erosion impacts that may occur both during and after decommissioning construction work. The Licensee shall adhere to standard erosion control procedures, including applicable measures developed by the U.S. Forest Service (USDA-FS) and published in the Water Quality Management for Forest System Lands in California Best Management Practices (USDA-FS, 2000).

  Prior to construction, the Licensee shall identify all natural drainage paths along the canals and tunnel during pre-construction surveys. Slopes prone to instability shall be identified, and site specific BMPs shall be implemented to avoid potential slope erosion and increased sedimentation in streams during and after construction activities.

During the construction period, the Licensee shall install BMPs in all areas where soil is disturbed and could result in an increase in sedimentation and/or erosion. The Licensee shall perform inspections after storm events and perform any necessary repairs, replacements, and/or addition of BMPs.

At the end of construction, the Licensee shall identify potential future erosion sites and install long-term BMPs. Specific areas to be addressed are listed below:

- After removal of the canals, diversions, and impoundment structures, the Licensee shall implement BMPs such as restoration of natural drainage paths, and recontouring of slopes to match pre-existing slope morphology, as feasible. Revegetation shall be implemented to increase bank stability (See PM&E Measure BOTA-1).
- The Licensee shall implement BMPs to address potential erosion of access roads and staging areas throughout the Kilarc and Cow Creek Developments. Artificial swales, culverts, and/or other structures shall be designed to direct runoff away from disturbed areas based on the natural drainage features of the area. For any temporary access roads that are removed, the Licensee shall implement measures in accordance with BMP 2-26 Obliteration or Decommissioning of Roads, as defined in the USDA-FS Water Quality Management for Forest System Lands in California Best Management Practices (USDA-FS, 2000).

To ensure the effectiveness of the long term BMPs, post-construction monitoring will be conducted for 2 years within the stream channel (See PM&E Measure GEOM-2) and for 1 year in all other construction areas. The post-construction inspections will be to ensure that BMPs installed at the end of construction are effective and/or to identify areas where installation of additional BMPs is necessary.

- **PM&E Measure GEOL-2: Implement Storm Water Pollution Prevention Best Management Practices.** The Licensee shall identify all potential pollutant sources, including sources of sediment (e.g., areas of soil exposed by grading activities, soil/sediment stockpiles) and hazardous pollutants (e.g., from petroleum products leaked by heavy equipment or stored in maintenance areas). Also, the Licensee shall identify any non-storm water discharges and implement BMPs to protect streams from potential pollutants and minimize erosion of topsoil. The Licensee shall include a monitoring and maintenance schedule to ensure BMP effectiveness for sediment control, spill containment, and post-construction measures.

  The Licensee shall include a monitoring and reporting program, including pre- and post-storm inspections, to determine if BMPs are sufficient to protect streams and to identify any areas where storm water can be exposed to pollutants. The monitoring program will include provisions for sampling and analysis to evaluate whether pollutants that cannot be visually observed are contributing to degradation of water quality.

4.13.4.1 Kilarc Development

IMPACT 4.13-1 (Kilarc): Would excavation and decommissioning of the Kilarc Development canals and tailraces degrade the quality of receiving water bodies?

Proposed Project

Construction activities associated with the Proposed Project would result in land-disturbing activities such as excavation, grading, and in-fill of canals. These decommissioning activities would occur at the North Canyon Creek Diversion Canal, South Canyon Creek Diversion Canal, and the Kilarc Main Canal. These actions could affect the stability of soils and result in increased erosion potential. One of two options for decommissioning each of the canals would be implemented based on best professional judgment: 1) abandoning in place where the canal would be strategically breached to minimize storm water runoff potential, and 2) in-fill of the canal which would entail excavating half the height of the canal berms and using the material as fill. For canal sections lined with concrete and shotcrete, the concrete lining would be broken up completely by using heavy equipment or strategically breached to minimize storm water runoff potential.

In addition, approximately 0.5 mile of new temporary access would be built for the Kilarc Development. Upgrades to existing roadways would consist only of smoothing and repaving over the existing road bed. Construction work associated with clearing out areas for construction for the new access road will involve ground disturbance and may include limited excavation.

Exposure of bare soils would lead to increased erosion hazards. If not controlled with appropriate measures, increased erosion would lead to increased risk of sedimentation to water bodies, including the North Canyon Creek, South Canyon Creek, and Old Cow Creek. PM&E Measure GEOL-1 requires that PG&E implement Soil Erosion and Sedimentation Control BMPs to address potential water quality impacts both during and after decommissioning. PM&E GEOL-2 requires implementation of a SWPPP, as well as a monitoring and reporting program, including pre- and post-storm inspections, to determine if BMPs are sufficient to protect streams and to identify any areas where storm water can be exposed to pollutants. The monitoring program will include provisions for sampling and analysis to evaluate whether pollutants that cannot be visually observed are contributing to degradation of water quality. With implementation of these PM&Es, impacts related to degradation of water quality from decommissioning canals and tailraces would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would eliminate construction activities that could affect soil stability and result in soil erosion. There would be no additional impacts from these alternatives related to IMPACT 4.13-1 (Kilarc).

IMPACT 4.13-2 (Kilarc): Would the action substantially degrade water quality during decommissioning related to dam diversion structures?

Proposed Project

Excavation and removal of the North Canyon Creek, South Canyon Creek, and Old Cow Creek dam diversion structures would increase potential for erosion and sediment transport. The sediment wedge impounded behind these diversion structures would have the potential to be washed downstream, leading to increased levels of turbidity. If not controlled appropriately, increased erosion and transport of sediment downstream could lead to violations of Basin Plan objectives for turbidity, water color, sediment, settleable material, and suspended materials.

The Kilarc Forebay would be decommissioned by infilling with excavated bank material and subsequently graded and seeded with appropriate seed mixes. These activities would ensure that the sediment impounded within the Kilarc Forebay is safely sequestered there during and following decommissioning work.

Based on water quality monitoring conducted in 2003, water temperatures in the bypassed reach increased on average 5° to 9°F during the summer months, which is outside of the objectives set by the Regional Board Basin Plan. Removal of the dam diversion structures will also increase flows within the bypassed (refer to IMPACT 4.12-1 (Kilarc) for further details). With more water within the bypassed channel, it would take longer for flows to reach thermal equilibrium with the warmer air during the summer. Therefore, it is expected removal of the diversion dams would result in a minor cooling effect on water temperatures in the bypassed reaches compared to existing conditions, and reduce the incidences when these water bodies are out of compliances with water quality objectives.

The sediments impounded behind the diversion dams in the Kilarc Development have the potential to contain hazardous materials. An evaluation of the sediment stored behind the Kilarc Main Canal diversion dam contained concentrations of mercury, methylmercury, silver, and arsenic at concentrations near background levels and below published TEL and PEL guidelines for these metals (North State Resources 2008b). The concentration of copper in the sediment stored behind the Kilarc Main Canal diversion dam though was found to be elevated. Laboratory results indicate that the concentration of copper adsorbed to sand/silt/clay size material was elevated. A leachable copper test suggested that less than 30% of the total copper was available to the water column, although one sediment sample resulted in a finding of 100 percent leachability of copper (North State Resources 2008b). Modeling was conducted to determine streamflow copper concentrations across a range of reasonable hydrologic conditions. This modeling indicated that copper concentrations in Old Cow Creek downstream of the Kilarc Diversions dam would be substantially below the Basin Plan objective for copper concentrations, even assuming extreme conditions that would increase the mobilization of copper and its concentration in the streamflow (ENTRIX 2008). It is assumed that sediment stored behind the other diversion structures in the Kilarc Development contain similar levels of leachable copper as found behind the Kilarc Diversion Dam. Project PM&Es include measures such as isolating the construction areas around the diversion dams with cofferdams and implementing soil erosion BMPs in order to minimize these risks. Overall, there is a potential for the release of sediment stored behind the Kilarc Development diversion structures to result in a temporary increase in copper concentrations, however it is not expected that the effect would result in exceedence of the Sacramento River Basin Plan objectives (5.6 µg/L). Therefore, with

implementation of PM&Es, impacts related to degradation of water quality from decommissioning dam diversion structures would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would eliminate construction activities that could increase the potential for soil erosion and sediment transport. There would be no additional impacts from these alternatives related to IMPACT 4.13-2 (Kilarc).

IMPACT 4.13-3 (Kilarc): Would the action substantially degrade water quality during decommissioning activities from fuel releases?

Proposed Project

A potential source of water quality degradation is leakage or spills of hazardous materials, including petroleum products from heavy equipment during construction activities. Improper use of fuels, oils, and other construction-related hazardous materials may also pose a threat to surface or groundwater quality. Through storm water runoff, these contaminants may be transported to waterways within the Kilarc Development, including the North Canyon Creek, South Canyon Creek, Old Cow Creek and downstream channels and water bodies.

Although the construction activities associated with the Proposed Project would be temporary, accidental released of construction-related hazardous materials would degrade downstream surface waters. The following regulatory mechanism will regulate construction activities and minimize the degradation of water quality.

Implementation of a Spill Prevention and Control Program

A Spill Prevention and Control Program (SPCP) would be implemented as part of the SWPPP prepared for the Proposed Project. The SPCP will include BMPs to minimize the potential for, and impacts from, accidental releases of hazardous, toxic, and petroleum substances during construction activities. The federal reportable spill quantity for petroleum products, as defined in 40 CFR 110, is any oil spill that either violates applicable water quality standards; causes a film or sheen on, or discoloration of, the water surface or adjoining shoreline; or causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

In the event of a spill, appropriate safety and clean-up crews would be contacted to ensure the SPCP is properly followed. A written description of the nature of the accidental releases would be submitted to the Regional Board and the DTSC. The submittal will include a description of the type(s) of materials released and estimate of the amount of material spilled; the date of the release; an explanation for why the spill occurred; and a description of measures to be taken to prevent future accidental release. In the case of an appreciable release of hazardous materials, a detailed analysis will be performed to the specifications of the DTSC. The results of this analysis would be used to select further actions to control contamination and ensure

that surface and/or groundwater quality is returned to baseline water quality conditions. These measured would be subject to approval by the Regional Board.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required.

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would eliminate construction activities that could result in leakage or spills of hazardous materials. There would be no additional impacts from these alternatives on IMPACT 4.13-3 (Kilarc).

IMPACT 4.13-4 (Kilarc): Would the action alter the existing drainage pattern of the site or area in a manner which would result in substantial erosion or siltation on- or off-site?

Proposed Project

The Project would decommission the Kilarc Development which would alter the hydrology of the Project area from existing conditions. The result will increase flows that enter the bypassed reaches of the North Canyon Creek, South Canyon Creek, and the Old Cow Creek. The hydrology will be restored to normal flow patterns that existed on the site that occurred prior to the original construction of the Kilarc Development. This change is not expected to substantially increase the amount of flow through the bypassed reach.

Immediately following the removal of the diversion dams, there is a potential to erode the impounded sediment wedge (refer to IMPACT 4.13-2). However the increase in flow would be relatively minor, and negligible at high flow events. Since high flows are most important in transporting of sediment, the increase in flows from decommissioning of the Kilarc Development canals and tailraces are not expected to increase the rate of erosion of the sediment wedge. The impact is considered less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site, Those facilities of the Kilarc Development required to maintain the flow of water to the forebay would be improved to prevent fish entrainment and to increase flows to the reach of Old Cow Creek below the Kilarc Canal Diversion Dam. As with the Proposed Project, the changes in flow are not anticipated to substantially increase the amount of flow through the bypassed reach or result in substantial erosion or siltation. There would be no additional impacts from these alternatives related to IMPACT 4.13-4 (Kilarc).

IMPACT 4.13-5 (Kilarc): Would the action create or contribute runoff water would exceed the capacity of existing or planned storm water drainage systems?

Proposed Project

The Kilarc Development is not served by an existing public storm water management system. Therefore, the Proposed Project would not have the potential to exceed the capacity of any existing or planned storm water drainage systems and no impact would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Because the Kilarc Development is not served by an existing public storm water management system, Alternative 1 and the No Project Alternative would have no impact on capacity of storm water drainage systems. There would be no additional impacts from these alternatives related to IMPACT 4.13-5 (Kilarc).

4.13.4.2 Cow Creek

IMPACT 4.13-6 (Cow Creek): Would excavation and decommissioning of the Cow Creek Development canals and tailraces degrade the quality of receiving water bodies?

Proposed Project

Construction activities associated with the Proposed Project would result in land-disturbing activities such as excavation, grading, and in-fill of canals. These decommissioning activities would occur at the Mill Creek Canal and the South Cow Creek Main Canal. These actions could affect the stability of soils and result in increased erosion. One of two options for decommissioning each of the canals will be implemented based on best professional judgment: 1) abandoning in place where the canal will be strategically breached to minimize storm water runoff potential, and 2) in-fill of the canal which will entail excavating half the height of the canal berms and using the material as fill. For canal sections lined with concrete and shotcrete, the concrete lining will be broken up completely by using heavy equipment or strategically breached to minimize storm water runoff potential.

Exposure of bare soils will lead to increased erosion hazards. If not controlled with appropriate measures, increased erosion would lead to increased risk of sedimentation to water bodies, including Mill Creek and South Cow Creek.

PM&E Measure GEOL-1 requires that PG&E implement Soil Erosion and Sedimentation Control BMPs to address potential water quality impacts both during and after decommissioning. PM&E GEOL-2 requires implementation of a SWPPP, as well as a monitoring and reporting program, including pre- and post-storm inspections, to determine if BMPs are sufficient to protect streams and to identify any areas where storm water can be exposed to pollutants. The monitoring program will include provisions for sampling and analysis to evaluate whether pollutants that cannot be visually observed are contributing to degradation of water quality. With implementation of these PM&Es, impacts related to degradation of water quality from decommissioning canals and tailraces would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and construction activities could affect soil stability and result in soil erosion and increased risk of sedimentation to water bodies. As with the Proposed Project, protective measures would be implemented to reduce impacts to less than significant. There would be no additional impacts from these alternatives related to IMPACT 4.13-6 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, no impact on soil stability and resulting soil erosion would result. There would be no additional impacts from this alternative related to IMPACT 4.13-6 (Cow Creek).

IMPACT 4.13-7 (Cow Creek): Would the action substantially degrade water quality during decommissioning related to dam diversion structures?

Proposed Project

Excavation and removal of the Mill Creek and South Cow Creek dam diversion would increase potential for erosion and sediment transport. The sediment wedge impounded behind these diversion structures would have the potential to be washed downstream, leading to increased levels of turbidity. If not controlled appropriate, increased erosion and transport of sediment downstream could lead to violations of Basin Plan objectives for turbidity, water color, sediment, settleable material, and suspended material.

Based on water quality monitoring conducted in 2003, water temperatures in the bypassed reach of South Cow Creek increased on average by no more 5°F, which is within the appropriate temperature range set by the Regional Board. Removal of the dam diversion structures would also increase flows within the bypassed (refer to IMPACT 4.12-6 (Cow Creek) for further details). With more water within the bypassed channel, it would take longer for flows to reach thermal equilibrium with the warmer air during the summer. Therefore, it is expected removal of the diversion dams would result in a minor cooling effect on water temperatures in the bypassed reaches compared to existing conditions.

The sediments impounded behind the diversion dams in the Kilarc Development have the potential to contain hazardous materials. An evaluation of the sediment stored behind the South Cow Creek Diversion Dam contained concentrations of mercury, methylmercury, silver, copper, and arsenic at concentrations near background levels and below published TEL and PEL guidelines for these metals (North State Resources 2008c). It is assumed that sediment stored behind the other diversion structures in the South Cow Creek Development contain similar levels of leachable copper as found behind the South Cow Creek Diversion Dam. Therefore, release of sediments impounded behind the Cow Creek Development diversion dams would not result in hazardous materials exceeding water quality objectives outlined in the Basin Plan. Furthermore,

PG&E's PME&Es include measures such as isolating the construction areas around the diversion dams with cofferdams and implementing soil erosion BMPs in order to minimize these risks. Overall, the effect of decommissioning activities may result in temporary increases in sediment releases to downstream reaches; however the effect would be minor and temporary in nature. Therefore, with implementation of PM&Es, impacts related to degradation of water quality from decommissioning dam diversion structures would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and construction activities could increase the potential for soil erosion and sediment transport. As with the Proposed Project, implementation of soil erosion BMPs and other measures would reduce temporary impacts to less than significant. There would be no additional impacts from these alternatives related to IMPACT 4.13-7 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, no soil erosion and associated sediment transport would result. There would be no additional impacts from this alternative related to IMPACT 4.13-7 (Cow Creek).

IMPACT 4.13-8 (Cow Creek): Would the action substantially degrade water quality during decommissioning activities from fuel releases?

Proposed Project

A potential source of water quality degradation is leakage or spills of hazardous materials, including petroleum products from heavy equipment during construction activities. Improper use of fuels, oils, and other construction-related hazardous materials may also pose a threat to surface or groundwater quality. Through storm water runoff, these contaminants may be transported to waterways within the Cow Creek Development, including Mill Creek and South Cow Creek and downstream channels and water bodies.

Although the construction activities associated with the Proposed Project would be temporary, accidental released of construction-related hazardous materials would degrade downstream surface waters. The following regulatory mechanism will regulate construction activities and minimize the degradation of water quality.

Implementation of a SPCP

A SPCP would be implemented as part of the SWPPP prepared for the Proposed Project. The SPCP will include BMPs to minimize the potential for, and impacts from, accidental releases of hazardous, toxic, and petroleum substances during construction activities. The federal reportable spill quantity for petroleum products, as defined in 40 CFR 110, is any oil spill that either violates applicable water quality standards; causes a film or sheen on, or

discoloration of, the water surface or adjoining shoreline; or causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

In the event of a spill, appropriate safety and clean-up crews would be contacted to ensure the SPCP is properly followed. A written description of the nature of the accidental releases would be submitted to the Regional Board and the Department of Toxic Substances Control. The submittal will include a description of the type(s) of materials released and estimate of the amount of material spilled; the date of the release; an explanation for why the spill occurred; and a description of measures to be taken to prevent future accidental release. In the case of an appreciable release of hazardous materials, a detailed analysis will be performed to the specifications of the DTSC. The results of this analysis would be used to select further actions to control contamination and ensure that surface and/or groundwater quality is returned to baseline water quality conditions. These measured would be subject to approval by the Regional Board.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** No additional mitigation required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion, and construction activities could result in leakage or spills of hazardous materials. As with the Proposed Project, an SPCP would be implemented and would include BMPs to minimize the potential for, and impacts from, accidental releases of hazardous, toxic, and petroleum substances during construction activities. Impacts related to leakage or spills of hazardous materials would be less than significant. There would be no additional impacts from these alternatives on IMPACT 4.13-8 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, no impact on from leakage or spills of hazardous materials would result. There would be no additional impacts from this alternative on IMPACT 4.13-8 (Cow Creek).

IMPACT 4.13-9 (Cow Creek): Would the action alter the existing drainage pattern of the site or area in a manner which would result in substantial erosion or siltation on- or off-site?

Proposed Project

The Project would decommission the Cow Creek Development which would alter the hydrology of the Project area from existing conditions. The result would increase in flows that enter the bypassed reaches of Mill Creek and South Cow Creek. The hydrology would be restored to normal flow patterns that existed on the site that occurred prior to the original construction of the Cow Creek Development. The change in flow is expected not to substantially increase the amount of flow through the bypassed reach.

Immediately following the removal of the diversion dams, there is a potential to erode the impounded sediment wedge (refer to IMPACT 4.13-2). However the increase in flow would be

relatively minor, and negligible at high flow events. Since high flows are most important in transporting of sediment, the increase in flows from decommissioning of the Cow Creek Development canals and tailraces are not expected to increase the rate of erosion of the sediment wedge. Therefore impacts would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed to continue flows to the Abbott Diversion. The remainder of the Cow Creek Development would be decommissioned as described for the Proposed Project and would result in similar impacts. As with the Proposed Project, the change in flow is not anticipated to substantially increase the amount of flow through the bypassed reach, or result in substantial erosion or siltation. There would be no additional impacts from these alternatives related to IMPACT 4.13-9 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place, All flows would pass through the natural channels of Old Cow and South Cow Creeks, increasing flows through the bypassed reaches. As with the Proposed Project, the change in flow is not anticipated to substantially increase the amount of flow through the bypassed reach, or result in substantial erosion or siltation. Because no discharges would occur from the Cow Creek powerhouse, Hooten Gulch would return to its natural, ephemeral condition as observed upstream of the powerhouse. There would be no additional impacts from these alternatives related to IMPACT 4.13-9 (Cow Creek).

IMPACT 4.13-10 (Cow Creek): Would the action create or contribute runoff water would exceed the capacity of existing or planned storm water drainage systems or provided substantial addition sources of polluted runoff?

Proposed Project

Construction activities associated with the Proposed Project would result in increases of runoff into existing drainage systems. However, the Cow Creek Development is not served by an existing public storm water management system. Therefore, the Proposed Project would not have the potential to exceed the capacity of any existing or planned storm water drainage systems and no impact would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D and No Project Alternative

Because the Cow Creek Development is not served by an existing public storm water management system, Alternative 2A, 2B, 2C, 2D and the No Project Alternative would have no additional impact on capacity of storm water drainage systems.

4.14 Land Use and Planning

4.14.1 Cow Creek Development

This section addresses the potential land use conflicts associated with the Proposed Project and the alternatives. Impacts to agricultural and forestry resources resulting from implementation of the Proposed Project are addressed in Section 4.4.

4.14.2 Environmental Setting

Land uses in the Project area are classified as Timber Production, Exclusive Agriculture, and Unclassified. These lands support economic activity and employment related to timber production, agriculture, cattle ranching and grazing, recreation, conservation, transportation, and hydroelectric power generation. There are also residential uses in proximity to both the Kilarc and Cow Creek Developments. These land uses are described in detail below.

4.14.2.1 Sources of Information

The Agricultural Lands Element (Shasta County 2004e), the Timberlands Element (Shasta County 2004f), and the Community Development Group (Shasta County 2004k) of the Shasta County General Plan contain objectives and policies that help guide land use decisions in the County.

The Shasta County Zoning Plan contains regulations and maps which help to implement the county general plan, and to facilitate and guide growth in accordance with the general plan (Shasta County 2016).

4.14.2.2 Regional Setting

The Proposed Project is located in Shasta County, California, at the southern end of the Cascade Mountain Range. The Project area is about 30 miles east of the city of Redding, near the community of Whitmore. The Project occupies property owned by PG&E, or property for which PG&E holds easements on private lands. A total of 184.32 acres of land are included within the Project boundary.

Per the Shasta County Zoning Plan, the Kilarc Development is zoned as Timber Production District (TP) and Unclassified (U), and the Cow Creek Development is zoned as Exclusive Agricultural District (EA), Agricultural Preserve District (AP), TP, and U (Shasta County 2016). The zoning designations for the Kilarc Development are shown on Figure 4.14-1, and the zoning designations for the Cow Creek Development are shown on Figure 4.14-2. The purpose of each of these zoning district types is described below, as outlined in the Zoning Plan (Shasta County 2016).

- The purpose of the timber production (TP) district is to preserve lands devoted to and used for the growing and harvesting of the California Timberland Productivity Act of 1982, and to provide for uses compatible with the growing and harvesting of timber.
- The purpose of the exclusive agricultural (EA) district is to preserve lands with agricultural value that have the combination of size and quality, sometimes in conjunction with other lands, to make their use for agriculture economically feasible, and within which agricultural preserves may be created for the purpose of utilizing provisions of the law relating to agricultural preserves

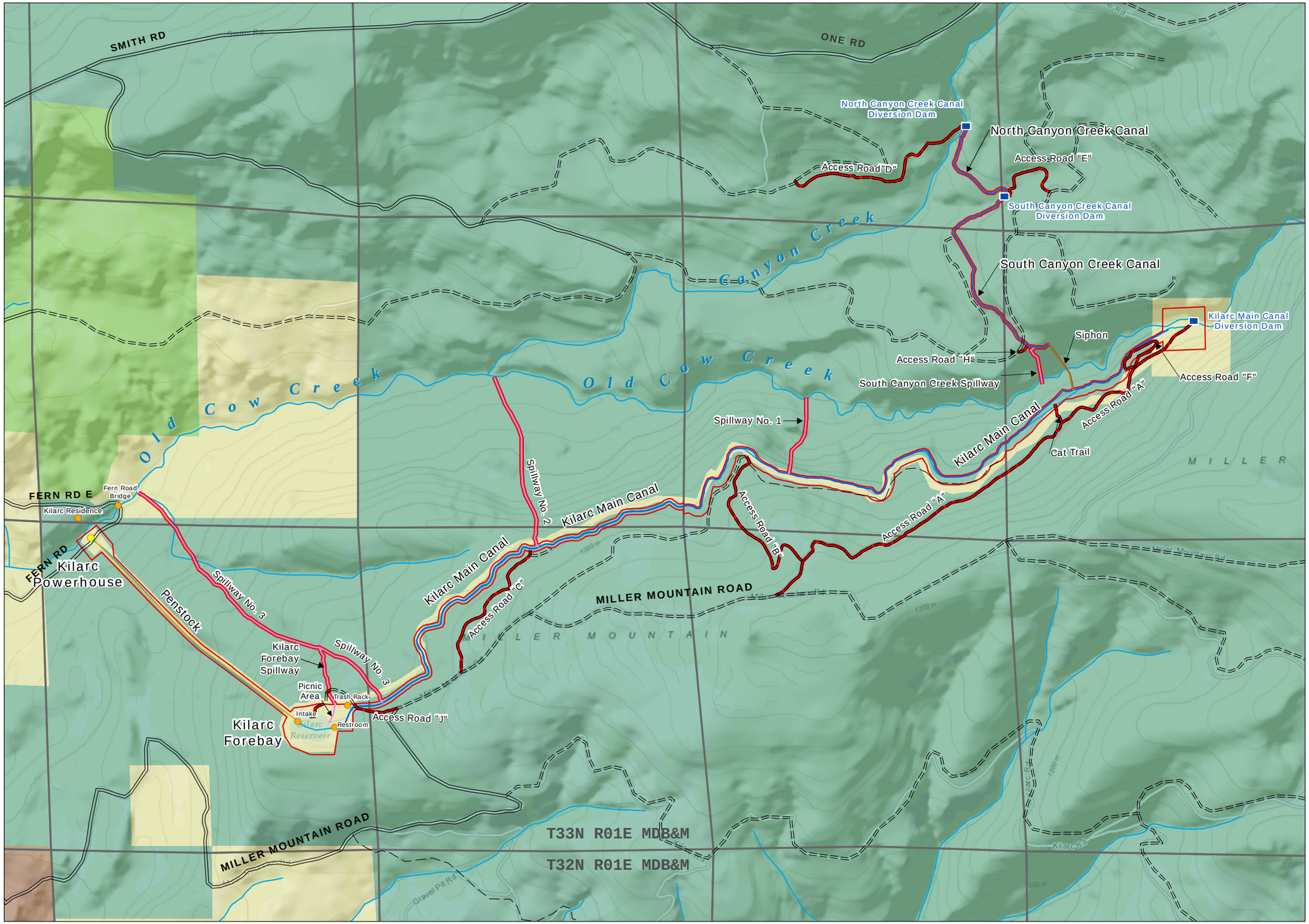
- The agricultural preserve (AP) district is intended to be combined with the EA district to identify the precise boundaries of agricultural preserves, and to provide such additional regulations regarding the use of land as are necessary to comply with provisions of law applicable to agricultural preserves.
- The unclassified (U) district is intended to be applied as a holding district until a precise principal zone district has been adopted for the property.

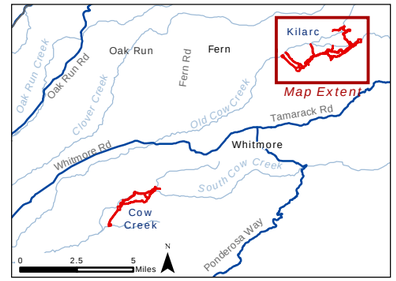
Land uses in the Project area support economic activity and employment related to timber production, agriculture, cattle ranching and grazing, recreation, conservation, transportation, and hydroelectric power generation. There are also residential uses in proximity to both the Kilarc and Cow Creek Developments, as shown on Figures 4.14-3 and 4.14-4. Lands in the Project area are primarily under PG&E or other private ownership, also as shown on Figures 4.14-3 and 4.14-4.

The Kilarc Development encompasses about 125.02 acres of Project lands, of which PG&E owns 95.50 acres (Kilarc powerhouse, canal diversion dam, penstock, forebay, and main canal). The remaining 29.52 acres are privately-owned lands (spillways, North Canyon Creek and South Canyon Creek canals and diversion dams, and access roads). Lands in the immediate vicinity of the Kilarc powerhouse include commercial timber harvesting on private and state lands, and cattle grazing on private lands (PG&E 2009). Sierra Pacific Industries (SPI) owns approximately 45,000 acres of adjoining timber lands.

The Cow Creek Development encompasses about 59.31 acres of Project lands, of which PG&E owns 14.20 acres (Cow Creek powerhouse and forebay, uppermost end of Mill Creek/South Cow Creek canal, Mill Creek diversion dam, and access roads). The remaining 45.11 acres lands include: 43.24 acres of privately owned lands (Cow Creek penstock and forebay, South Cow Creek main canal and diversion dam, spillways, and access roads), and 1.87 acres of U.S. Department of the Interior (DOI) owned lands at the Cow Creek Penstock, under the jurisdiction of BIA (PG&E 2009). Lands in the immediate vicinity of the Cow Creek Development are primarily used for cattle grazing, private timber production, rural residential development, and an agricultural water diversion. Surrounding land uses include cattle grazing, rural residential, private commercial-timber harvesting, and state-owned forest for commercial-timber harvesting.

Below the Cow Creek powerhouse tailrace, waters are diverted from Hooten Gulch for private landowner use, including for domestic, livestock, and irrigation purposes. The Abbott Ditch diversion is operated by the ADU, an informal association of seven property owners. The Abbott Ditch diversion redirects flows pursuant to an adjudication of the watershed entitling the ADU to divert 13.13 cfs from the natural flow of South Cow Creek. Flows in the Abbott Ditch are used by area farming and ranching operations for flood irrigation on approximately 320 acres of crop and pasture lands. The boundary of the Abbott Ditch is shown on Figures 4.14-2 and 4.14-4.





- Diversion
- Miscellaneous Feature
- PG&E Facility
- Trail
- Light Duty Road
- Unimproved Road
- Road within FERC Boundary
- Canal
- Penstock
- Siphon
- Spillway
- FERC Boundary
- Section Boundary
- Stream/River

Zoning *Defined per Shasta County Resource Management Dept.*

- Exclusive Agricultural/Agricultural Preserve
- Planned Development
- Timber Production
- Unclassified

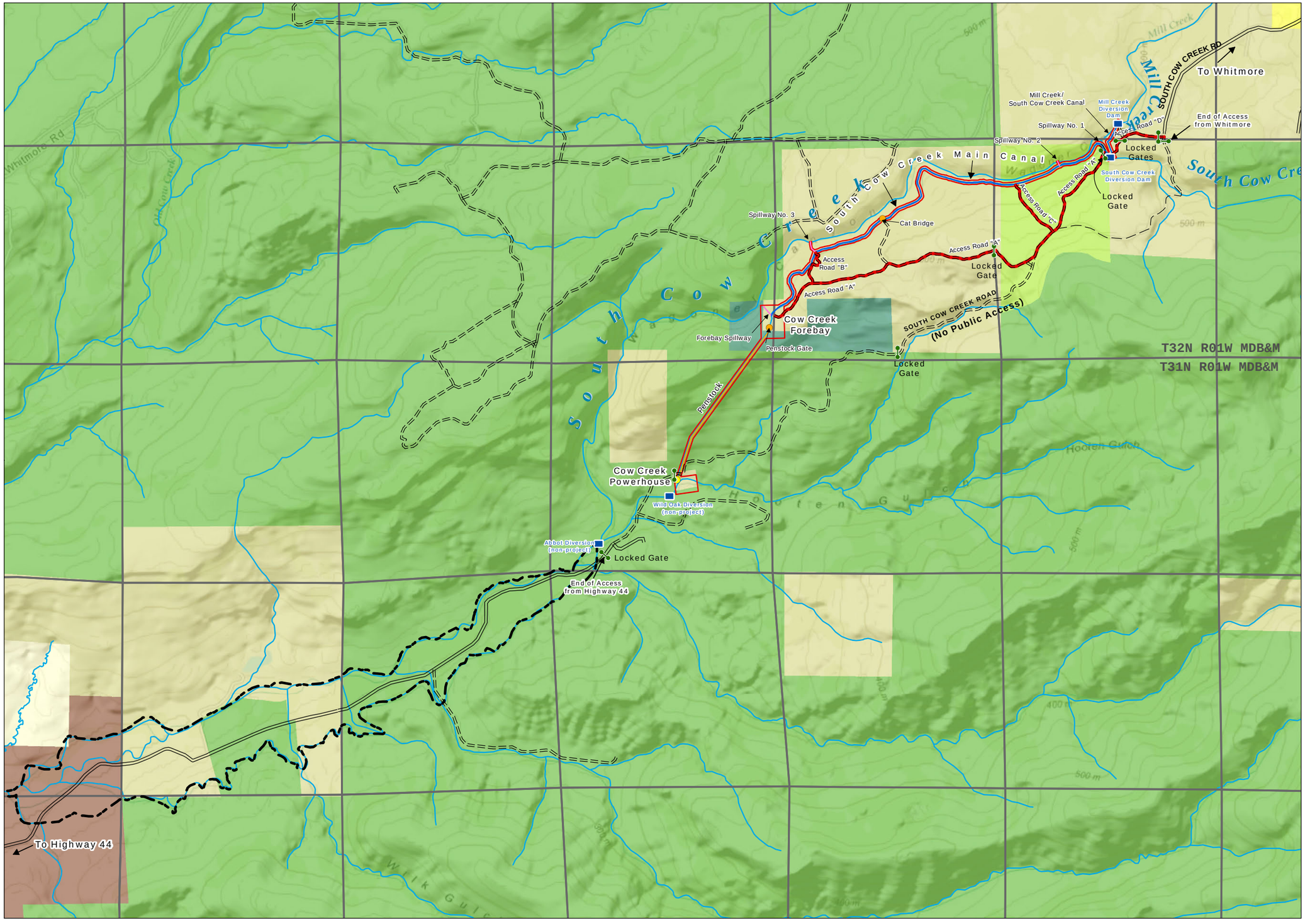
0 0.125 0.25 0.375 0.5 Mi
0 0.1 0.2 0.4 0.6 0.8 Km

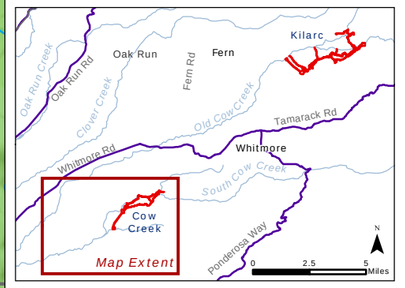
Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.14-1**
Kilarc Development Zoning

Date: 11/11/2013 Document Path: C:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\Fig 3-14-1 Kilarc Zoning.mxd

This Page Intentionally Left Blank





- Gate
- Diversion
- Miscellaneous Feature
- PG&E Facility
- Trail
- Light Duty Road
- Unimproved Road
- Road within FERC Boundary
- Stream/River
- Canal
- Penstock
- Spillway
- FERC Boundary
- Abbott Ditch Boundary (ADB)
- Section Boundary

Zoning *Defined per Shasta County Resource Management Dept.*

- Exclusive Agricultural/Agricultural Preserve
- Exclusive Agricultural
- Timber Production
- Planned Development/Agricultural Preserve
- Unclassified

N

0 0.25 0.5 0.75 Mi

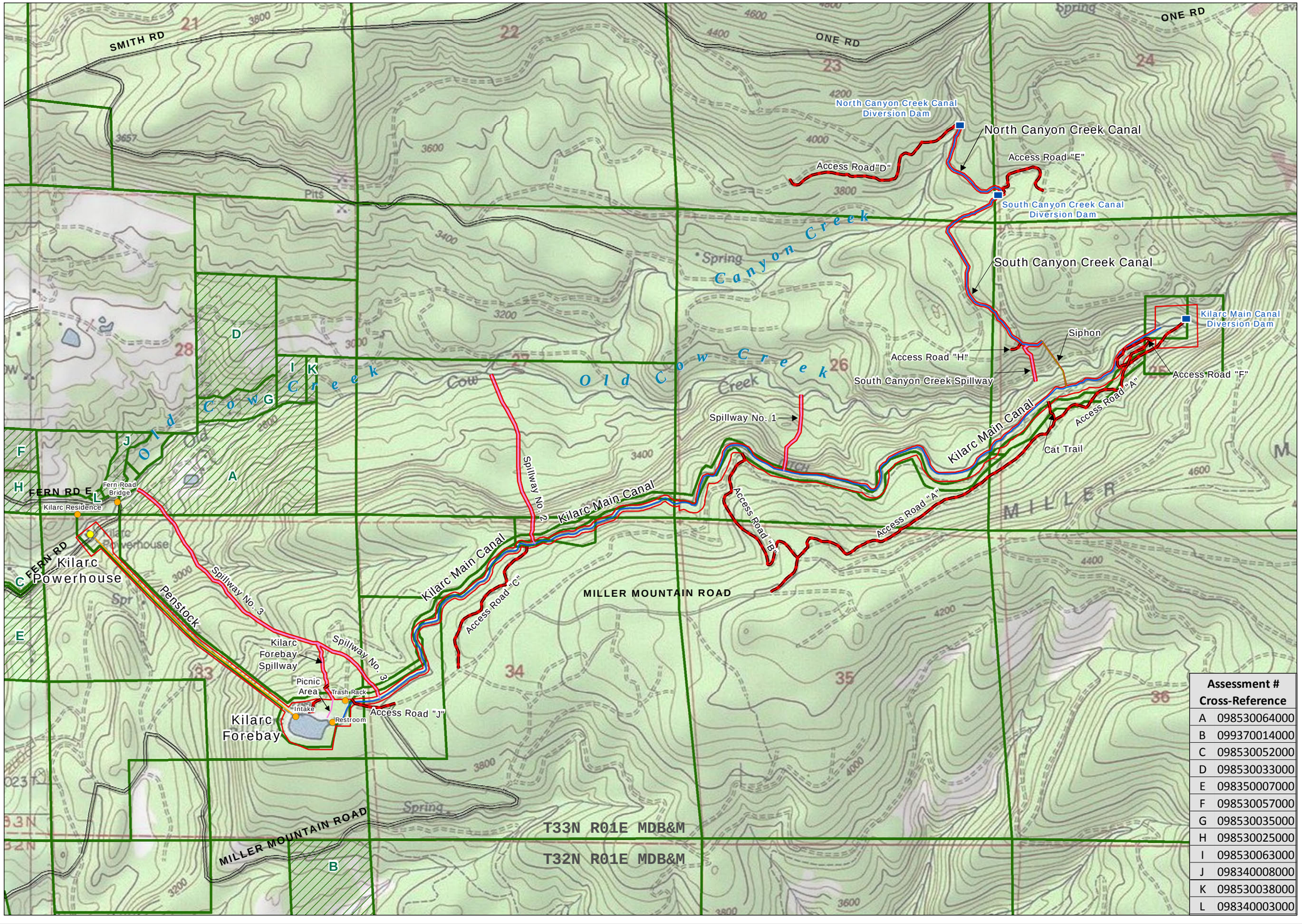
0 0.25 0.5 0.75 1 Km

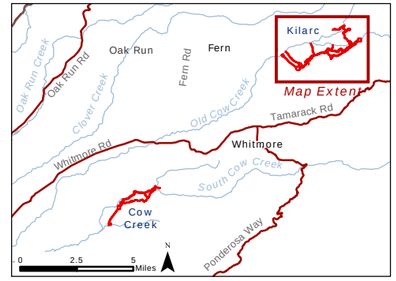
Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.14-2**
Cow Creek Development
Zoning

Date: 11/11/2013 Document Path: C:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\Fig 3-14-2 Cow Creek Zoning.mxd

This Page Intentionally Left Blank





- Diversion
- Miscellaneous Feature
- PG&E Facility
- Canal
- Penstock
- Spillway
- FERC Boundary
- Parcel Boundary
  all parcels within map extent are privately held
- Parcel with Residential Structure
- Section Boundary

Roads *Defined per USGS topographic base map*

- Trail
- Light Duty Road
- Unimproved Road
- Unimproved Road (in FERC boundary)

Assessment # Cross-Reference	
A	098530064000
B	099370014000
C	098530052000
D	098530033000
E	098350007000
F	098530057000
G	098530035000
H	098530025000
I	098530063000
J	098340008000
K	098530038000
L	098340003000

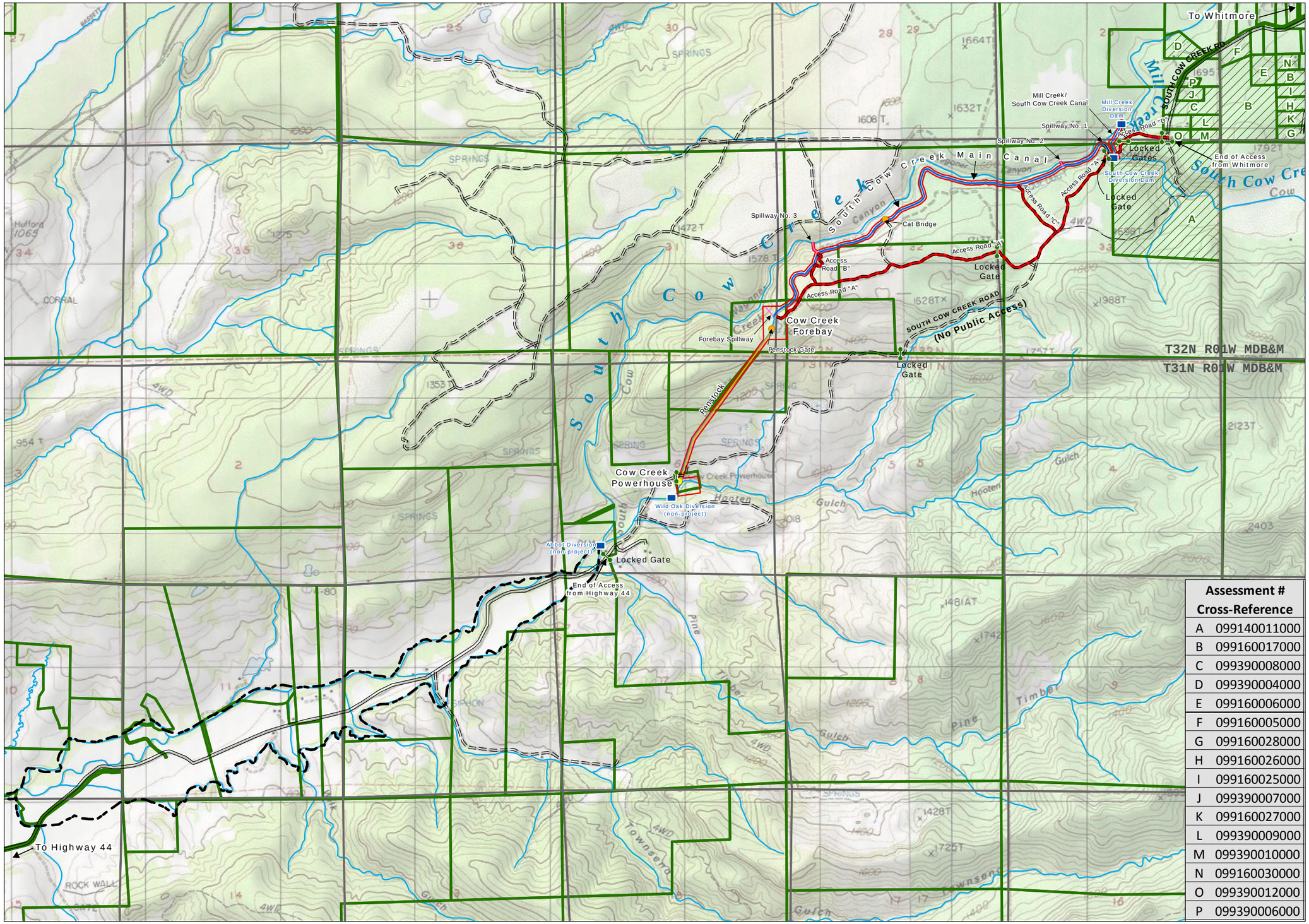
0 0.1 0.2 0.3 0.4 0.5 Mi
0 0.2 0.4 0.6 0.8 Km

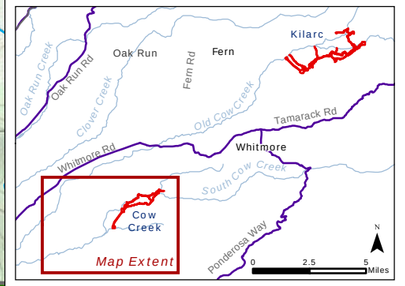
Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.14-3**
Kilarc Development Parcels

Date: 11/13/2013 Document Path: C:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\KC_Kilarc Parcels.mxd

This Page Intentionally Left Blank





- Gate
- Diversion
- Miscellaneous Feature
- PG&E Facility
- Trail
- Light Duty Road
- Unimproved Road
- Road within FERC Boundary
- Stream/River
- Canal
- Penstock
- Spillway
- FERC Boundary
- Abbott Ditch Boundary (ADB)
- Section Boundary
- Parcel Boundary
  all parcels within map extent are privately held
- Parcel with Residential Structure

Assessment # Cross-Reference	
A	099140011000
B	099160017000
C	099390008000
D	099390004000
E	099160006000
F	099160005000
G	099160028000
H	099160026000
I	099160025000
J	099390007000
K	099160027000
L	099390009000
M	099390010000
N	099160030000
O	099390012000
P	099390006000

N
0 0.25 0.5 0.75 Mi
0 0.25 0.5 0.75 1 Km

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.14-4**
Cow Creek Development Parcels

Date: 11/13/2013 Document Path: C:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\Fig 3-14-4 Cow Creek Parcels.mxd

This Page Intentionally Left Blank

4.14.3 Regulatory Setting

As described above, applicable local land use plans for the project area include the Shasta County General Plan and the Shasta County Zoning Plan (Shasta County 2016). Land use and zoning designations for the Project area, as outlined in these plans, are described in detail above.

4.14.3.1 Land Conservation Commitment

As stated in FERC's EIS, in 2003 the California Public Utilities Commission (CPUC) issued its bankruptcy decision in a final order as a Settlement Agreement that required PG&E commit to preserving or enhancing 140,000 acres of lands in California and associated with its hydroelectric system in a Land Conservation Commitment (LCC). The properties are located in 22 counties and 11 watersheds, primarily in the Sierra Nevada and Cascade Mountain Range watersheds. Approximately half of the lands are associated with PG&E hydroelectric facilities.

As part of its LCC, PG&E has stated that it is working with the Pacific Forest and Watershed Lands Stewardship Council (Stewardship Council), a private non-profit foundation, to permanently protect the watershed lands (PG&E 2009). The Stewardship Council Board adopted a Land Conservation Plan (LCP) in 2007 to provide a framework for how the protected lands are to be beneficially managed for the community and the environment, consistent with the following six values: protection of natural habitat for wildlife, fish, and plants; preservation of open space; sustainable forestry; agricultural uses; outdoor recreation by the public; and historical values.

The LCP requires the Stewardship Council, along with PG&E and other stakeholders, to develop land conservation and conveyance plans (LCCPs) and use recommendations for PG&E watershed lands associated with the Project. The LCP is intended to contribute to the management of certain lands in the Project area (FERC 2011). The LCC identified the Cow-Battle Creek Watershed, the watershed that includes the Project, as containing two planning units. These units consist of approximately 11,085 acres and are identified as the Kilarc Reservoir Planning Unit (111 acres in Shasta County; 16 acres outside FERC boundary; and 95 acres within FERC boundary) and the Cow Creek Planning Unit (2,310 acres in Shasta County; 2,292 acres outside the FERC boundary; and 18 acres within the FERC boundary). PG&E has stated that it intends to donate conservation easements or fee title for the 11,085 acres to public agencies or qualified non-profit conservation organizations for permanent preservation and enhancement (Stewardship Council 2007).

For each planning unit, the Stewardship Council has identified an overall management objective, as well as objectives to preserve and/or enhance specific Beneficial Public Values (BVPs) relevant to the planning unit. These objectives guide future land conservation plans and will be referenced in future real estate transactions for specific parcels (Volume III of the LCP). Volume II of the LCP identifies a number of preservation and/or enhancement measures that may contribute to the conservation management program for each planning unit. These measures are intended to be illustrative in nature, not prescriptive, and will be amended, deleted, or augmented over time in coordination with future land owners and managers to best meet the objective for each planning unit. Extensive community input and coordination with future land stewards (donee organizations) preceded implementation of the Stewardship Council's recommendations, and the disposition packages created for Volume III fully describe

the actual preservation and/or enhancement measures to be undertaken or overseen by future land stewards.

The objectives for the Kilarc Reservoir Planning Unit and Cow Creek Planning Unit include:

- Preserve and enhance habitat in order to protect special biological resources;
- Preserve open space in order to protect natural and cultural resources and the recreation setting;
- Assess recreation potential in order to provide additional education and recreation opportunities;
- Develop and implement forestry practices in order to ensure appropriate fuel load management; and
- Document and manage cultural resources in order to ensure their protection if discovered in the future.

The Proposed Project would require PG&E's LCC, as it relates to the Stewardship Council's recommendations for the Kilarc Reservoir Planning Unit and the Cow Creek Planning Unit, to be revisited and reassessed and make recommendations for the LCCP that reflect the status and outcome of the Proposed Project, and the terms of any FERC order, in coordination with stakeholders and all interested parties (Stewardship Council 2007).

4.14.4 Analysis Methodology

In order to determine impacts of the Proposed Project on land use, project activities were evaluated in context of existing general plan and zoning designations, as well as in context of surrounding land use with a focus on land use compatibility.

4.14.4.1 Analytical Approach

Proposed decommissioning activities could result in short-term conflicts with land uses in surrounding properties. Impacts related to land use were assessed using published information, aerial photos, scoping comments and prior correspondence, FERC NEPA analysis, recent field reconnaissance, state and federal regulations, and conversations with knowledgeable individuals.

Criteria for Determining Significance

Based on the State Water Board's Environmental Checklist in Appendix A of the Board's CEQA regulations, Appendix G of the CEQA Guidelines, and professional standards and practices, a Proposed Project would have a significant impact if it would:

- Physically divide an established community
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect, including conflicts resulting from changes in land ownership and/or existing land uses

- Conflict with any applicable habitat conservation plan or natural community conservation plan

4.14.5 Environmental Impacts and Mitigation

PG&E has not included any PM&E measures to address land use impacts due to decommissioning activities. Impacts to agricultural and forestry resources resulting from project implementation are addressed in Section 4.4. Impacts of the Proposed Project on land use in the Project area would be limited to the disposition of existing Project features, such as equipment operation and access road construction, and impacts would be temporary and short-term. Impacts related to the loss of recreational use of the Kilarc Forebay are discussed in Section 4.16, Recreation. Impacts related to the use of existing access roads, construction and use of new temporary access roads, and use of the local and regional transportation network during project implementation are discussed in further detail in Section 4.17, Transportation/Traffic.

4.14.5.1 Kilarc Development

IMPACT 4.14-1 (Kilarc): Would the action physically divide an established community?

Proposed Project

Much of the Project area lands are undeveloped and currently used for timber, agricultural and recreational purposes. The Proposed Project would not create a new barrier between various portions of the Project area, and would not result in any permanent structures that would physically divide an established community. Therefore, no impact would occur related to physically dividing an established community.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. There would be no changes that could result in the physical division of an established community, and therefore, no additional impacts from these alternatives related to IMPACT 4.14-1 (Kilarc).

IMPACT 4.14-2 (Kilarc): Would the action conflict with any applicable land use plan, policy, or regulation, including conflicts resulting from changes in land ownership and/or existing land uses?

Proposed Project

The Proposed Project would cause short term land use impacts as a result of removal or disposition of Project facilities at the Kilarc Development. Temporary disturbance by equipment operation and the construction of new access roads would occur. However, the Proposed Decommissioning Plan (PDP) prepared for the Proposed Project incorporates consultation with interested parties, including affected landowners; and specific decommissioning actions will be developed in consultation with the affected landowners (PG&E 2009). Where feasible, PG&E's

proposals for disposition of existing Project features (i.e., canals, abutments and foundation structures, existing and proposed access roads, etc.) are the methods preferred by the private landowners. PG&E would also work with affected landowners to resolve issues regarding proposed access across private property.

For lands within the Kilarc Development, PG&E would retain ownership of the 95.5 acres of Project lands it owns until the license surrender process is completed. For the remaining 29.52 acres where PG&E holds either deeded easements or prescriptive rights over private lands, PG&E would provide a quitclaim deed to the private landowner or extinguish prescriptive rights after abandoning use of the property (PG&E 2009). No additional changes to land ownership at the Kilarc Development are anticipated with implementation of the Proposed Project, and the Proposed Project would be consistent with the Shasta County General Plan and the Shasta County Zoning Plan.

Proposed decommissioning activities at the Kilarc Development would require PG&E's LCP be revisited and reassessed to reflect any changes associated with impacts to the Kilarc Reservoir Planning Unit. The re-evaluation would provide sufficient mitigation of any negligible impacts to public values for the Kilarc Forebay, which are also discussed in further detail in Section 4.16, Recreation.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Implementation of Alternative 1 would result in a change in land ownership at the Kilarc Forebay; however, this change is not anticipated to result in a conflict with applicable land use plans, as land use at the forebay would continue as with current conditions. Under Alternative 1 and the No Project Alternative, there would be no changes that could result in the physical division of an established community, and therefore, no additional impacts from these alternatives related to IMPACT 4.14-1 (Kilarc).

IMPACT 4.14-3 (Kilarc): Would the action conflict with any applicable habitat conservation plan or natural community conservation plan?

Proposed Project

No habitat conservation plans are applicable in the Project area. Portions of the Project are within the Kilarc Reservoir Planning unit of PG&E's LCP, intended to preserve and enhance BPVs in the community. However, decommissioning of the Project is a main consideration in the LCP, with many of the LCP objectives and measures aimed at addressing land use and conservation issues once decommissioning is completed. Proposed decommissioning activities at the Kilarc Development would require PG&E's LCP be revisited and reassessed to reflect any changes associated with impacts to the Kilarc Reservoir Planning Unit. Therefore, no conflict would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Because there are no applicable habitat conservation plans in the project area, there would be no additional impact from these alternatives related to IMPACT 4.14-3 (Kilarc).

4.14.5.2 Cow Creek

IMPACT 4.14-4 (Cow Creek): Would the action physically divide an established community?

Proposed Project

Much of the project area lands are undeveloped and currently used for timber, agricultural and recreational purposes. The Proposed Project would not create a new barrier between various portions of the Project area, and would not result in any permanent structures that would physically divide an established community.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed on private lands to continue flows to the Abbott Diversion; however, there would be no changes that could result in the physical division of an established community, and therefore, no additional impacts from these alternatives related to IMPACT 4.14-4 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, there would be no changes that could result in the physical division of an established community, and therefore, no additional impacts from these alternatives related to IMPACT 4.14-4 (Cow Creek).

IMPACT 4.14-5 (Cow Creek): Would the action conflict with any applicable land use plan, policy, or regulation, including conflicts resulting from changes in land ownership and/or existing land uses?

Proposed Project

The Proposed Project would cause short term land use impacts as a result of removal or disposition of project facilities at the Cow Creek Development. Temporary disturbance by equipment operation would also occur. However, the PDP prepared for the Proposed Project incorporates consultation with interested parties, including affected landowners; and specific decommissioning actions were developed in consultation with the affected landowners (PG&E 2009). Where feasible, PG&E's proposals for disposition of existing Project features (i.e., canals, abutments and foundation structures, existing and proposed access roads, etc.) are the methods preferred by the private landowners. PG&E would also work with affected landowners to resolve issues regarding proposed access across private property.

For lands within the Cow Creek Development, PG&E would retain ownership of the 14.2 acres of project land it owns until license surrender activities are completed. For the remaining 43.24 acres where PG&E holds deeded easements or prescriptive rights over private lands, PG&E would provide a quitclaim deed to the private landowner or extinguish prescriptive rights after abandoning use of the property (PG&E 2009). For the 1.87 acres held in trust by DOI, under jurisdiction of the BIA, PG&E is exploring the option of acquiring the land rights. No additional changes to land ownership at the Cow Creek Development are anticipated with implementation of the Proposed Project, and the Proposed Project would be consistent with the Shasta County General Plan and the Shasta County Zoning Plan.

Implementation of the Proposed Project would remove augmented water flow to Hooten Gulch, and thus would result in loss of flows to the Abbott Diversion. This would result in a significant long-term impact on the ADU's ability to use these flows for domestic, agricultural, and hydropower uses, and the ADU would be reduced to use of natural flows from Hooten Gulch when available. These impacts are addressed above in Section 4.4, Agricultural and Forestry Resources. While the proposed changes would decrease surface flows relative to existing (and historic) conditions, they would restore a more natural seasonal flow, as discussed in Section 4.7, Terrestrial Biological Resources, and Section 4.12, Hydrology and Geomorphology. Further, implementation of the Proposed Project does not affect the ADU's water rights or ability to divert water from another location. Nor does the Proposed Project prevent the continued use of these private lands for agricultural purposes, such as for dryland pasture. Therefore, the impact would be less than significant.

As discussed above for the Kilarc Development, proposed decommissioning activities at the Cow Creek Development would require PG&E's LCP be revisited and reassessed to reflect any changes associated with impacts to the Cow Creek Planning Unit. It is anticipated that this re-evaluation would result in recommendations for impacts resulting from removal of flows at the Abbott Diversion, which are discussed in further detail in Section 4.4, Agricultural and Forestry Resources, and Section 4.12, Hydrology and Geomorphology.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed on private lands to continue flows to the Abbott Diversion. However, these alternatives are not anticipated to result in changes in ownership or to conflict with any applicable land use plans. There would be no additional impacts from these alternatives related to IMPACT 4.14-5 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place, Because no construction activities would occur, there would be no changes that could result in the a conflict with applicable land use plans. There would be no additional impacts from this alternative related to IMPACT 4.14-5 (Cow Creek).

IMPACT 4.14-6 (Cow Creek): Would the action conflict with any applicable habitat conservation plan or natural community conservation plan?

Proposed Project

No habitat conservation plans are applicable in the Project area. Portions of the Project are within the Cow Creek Planning unit of PG&E's LCP, intended to preserve and enhance BPVs in the community. However, decommissioning of the Project is a main consideration in the LCP, with many of the LCP objectives and measures aimed at addressing land use and conservation issues once decommissioning is completed. Proposed decommissioning activities at the Cow Creek Development would require PG&E's LCP be revisited and reassessed to reflect any changes associated with impacts to the Kilarc Reservoir Planning Unit. Therefore, no conflict would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D and No Project Alternative

Because there are no applicable habitat conservation plans in the project area, there would be no additional impact from these alternatives related to IMPACT 4.14-6 (Cow Creek).

This Page Intentionally Left Blank

4.15 Noise

During site preparation, road work, demolition, removal, and restoration activities (hereafter referred to as "construction" for the purposes of this analysis), the Proposed Project would generate noise due to operation of offroad equipment, portable equipment, and vehicles in the vicinity of the Kilarc Development and Cow Creek powerhouses, forebays, flumes, canals, and diversion dams as applicable. Project-generated noise is evaluated in relation to established thresholds of significance. No strong sources of vibrations would be used during construction activities.

The following sections discuss the existing noise environment in Shasta County and the Project vicinity, describe applicable regulations, and estimate potential impacts associated with the Proposed Project. Local noise ordinances are summarized and their relevance to the Proposed Project assessed, potential short- and long-term noise impacts from Project sources on nearby receptors are evaluated, and applicable mitigation measures for suppressing and managing noise impacts from Project activities are identified.

4.15.1 Environmental Setting

4.15.1.1 Noise Descriptors

Noise is typically described as any unwanted or objectionable sound. Sound is technically described in terms of the loudness (amplitude) and frequency (pitch) of the sound. The standard unit of measurement of the loudness of sound is the decibel (dB). Because the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity, the A-weighted decibel scale (dBA). Table 4.15-1 lists common sources of sound and their intensities in dBA.

In most situations, a 3-dBA change in sound pressure is considered a "just-detectable" difference. A 5-dBA change (either louder or quieter) is readily noticeable, and 10-dBA change is a doubling (if louder) or halving (if quieter) of the subjective loudness. Sound from a small localized source (a "point" source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates (drops off) at a rate of 6 dBA for each doubling of the distance.

The duration of noise and the time period at which it occurs are important factors in determining the impact of noise on sensitive receptors. A single number called the equivalent continuous noise level (L_{eq}) may be used to describe sound that is changing in level. It is also used to describe the acoustic range of the noise source being measured, which is accomplished through the maximum L_{eq} (L_{max}) and minimum L_{eq} (L_{min}) indicators.

In determining the daily measure of community noise, it is important to account for the difference in human response to daytime and nighttime noise. Noise is more disturbing at night than during the day, and noise indices have been developed to account for the varying duration of noise events over time as well as community response to them. The Community Noise Level Equivalent (CNEL) adds a 5 dB penalty to the "nighttime" hourly noise levels (HNLs) (i.e., 7:00 p.m. to 10:00 p.m.) and the Day-Night Average Level (L_{dn}) adds a 10 dB penalty to the evening HNLs (Caltrans 2004, FTA 2006).

Table 4.15-1 Typical Sound Level Characteristics

Pressure N/m^2	Level dB	Sound Level Characteristic
2000	160	Rocket Launch
600	150	Military Jet Plane Takeoff
200	140	Threshold of Pain
60	130	Commercial Jet Plane Takeoff
20	120	Industrial Chipper or Punch Press
6	110	Loud Automobile Horn
2	100	Passing Diesel Truck
0.6	90	Factory - Heavy Manufacturing
0.2	80	Factory - Light Manufacturing
0.06	70	Open Floor Office - Cubicles
0.02	60	Conversational Speech
0.006	50	Private Office - Walled
0.002	40	Residence in Daytime
0.0006	30	Bedroom at Night
0.0002	20	Recording or Broadcasting Studio
0.00006	10	Threshold of Good Hearing - Adult
0.00002	0	Threshold of Excellent Hearing - Child

Sources: Broch 1971, Plog 1988

Notes:

Reference Level P_O = 0.00002 N/m^2 = 0.0002 µbar

N/m^2 = Newtons per square meter (the Newton is the unit of force derived in the metric system); it is equal to the amount of net force required to accelerate a mass of one kilogram at a rate of one meter per second per second (1 kg • 1 m/s^2).

4.15.1.2 Vibration Descriptors

Vibration is a unique form of noise because its energy is carried through structures and the earth, whereas noise is carried through the air. Thus, vibration is generally felt rather than heard. Typically, groundborne vibration generated by man-made activities attenuates rapidly as distance from the source of the vibration increases. Actual human and structural response to different vibration levels is influenced by a combination of factors, including soil type, distance between the source and receptor, duration, and the number of perceived events.

While not a direct health hazard, the energy transmitted through the ground as vibration can result in structural damage; which can be costly to repair and dangerous in the event of structural failure.

To assess the potential for structural damage associated with vibration, the vibratory ground motion in the vicinity of the affected structure is measured in terms of point peak velocity/peak particle velocity (PPV) in the vertical and horizontal directions (vector sum). A freight train passing at 100 feet can cause PPVs of 0.1 inch per second, while a strong earthquake can produce PPVs in the range of 10 inches per second. Minor cosmetic damage to buildings can begin in the range of 0.5 inch per second. (Caltrans 2004, FTA 2006).

4.15.1.3 Sources of Information

Preliminary lists of construction equipment and estimated usage for three project phases at each site comprising: 1) site preparation and road work; 2) demolition of canals and appurtenant features; and 3) demolition of dams and appurtenant structures were established by the Applicant as shown in Appendix D-5 (same lists as air quality). Chapter 7, References, lists official information sources used in this assessment.

4.15.1.4 Regional Setting

Existing Noise Environment

The Kilarc and Cow Creek Developments are located in rural Shasta County, in characteristically remote and scarcely populated unincorporated areas which are generally quiet except for occasional traffic noise on public roads, aircraft flyovers, and small power equipment (e.g., mowers, tillers, etc.). Due to the rural locations away from population centers, the County has not assessed ambient noise levels in these areas (Shasta County 2004m).

Sensitive Receptors

Some land uses are generally regarded as being more sensitive to noise than others due to the types of population groups or activities involved. Sensitive population groups include children and the elderly. The Shasta County General Plan (2004) also includes residential areas as noise-sensitive land uses. Other sensitive land uses generally include hospitals, schools, child care facilities, senior facilities, libraries, churches, and parks.

The nearest sensitive receptors to the Kilarc Development are residences approximately 500 feet (150 meters) north and approximately 1,000 feet (300 meters) northeast of the powerhouse. The nearest sensitive receptor to Cow Creek is a residence approximately 1,800 feet (550 meters) southwest of the powerhouse. Other activity areas such as forebays, flumes, canals, and diversion dams are secluded from receptors by distance and topography and any noise generated at these locations would attenuate to insignificance. Since all construction activities would be short-term (40 weeks) and hydroelectric generating equipment would be removed or immobilized, no new permanent sources of noise would result from the Proposed Project at either location. All construction work would be conducted during daylight hours; no nighttime work would be performed.

4.15.2 Regulatory Setting

4.15.2.1 State

The State of California does not promulgate statewide standards for environmental noise but requires each city and county to include a noise element in its general plan (Gov. Code, § 65302, subd. (f)). In addition, Title 4 of the CCR has guidelines for evaluating the compatibility of various land uses as a function of community noise exposure.

Construction vibration is regulated at the state level in accordance with standards established by the *Transportation and Construction-Induced Vibration Guidance Manual* issued by Caltrans in 2004. Continuous sources include the use of vibratory compaction equipment and other construction equipment that creates vibration other than in single events. Transient sources create a single isolated vibration event, such as blasting. Thresholds for continuous sources are 0.5 and 0.1 inch per second PPV for structural damage and annoyance, respectively. Thresholds for transient sources are 1.0 and 0.9 PPV for structural damage and annoyance, respectively (Caltrans 2004).

4.15.2.2 Local

The noise element of the Shasta County General Plan (2004) lists three objectives:

- To protect County residents from the harmful and annoying effects of exposure to excessive noise.
- To protect the economic base of the County by preventing incompatible land uses from encroaching upon existing or programmed land uses likely to create significant noise impacts.
- To encourage the application of state-of-the-art land use planning methodologies in the area of managing and minimizing potential noise conflicts.

Noise level performance standards for new projects in Shasta County affected by or including non-transportation sources must meet the following requirements (Shasta County 2004m):

- Daytime (7 am to 10 pm) hourly L_{EQ} not to exceed 55 dB
- Nighttime (10 pm to 7 am) hourly L_{EQ} not to exceed 50 dB

The noise levels specified above shall be lowered by 5 dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings). In addition, the County can impose noise level standards which are more restrictive than those specified above based upon determination of existing low ambient noise levels. In rural areas where large lots exist, the exterior noise level standard shall be applied at a point 100 feet away from the residence (Shasta County 2004m).

4.15.3 Analysis Methodology

Use of off-road equipment, on-road vehicles, and portable equipment would generate noise due to engine mechanicals, engine exhaust, driveline mechanicals, shaft-driven devices and accessories, hydraulics operation, ground friction and displacement, and gravity drops (dumping, unloading). Since no intense percussive actions (strikes, impacts) would occur during the course of the site work, no strong vibrations would be generated which could affect nearby

structures. Types of equipment to be used during the Proposed Project and noise-emitting characteristics (i.e., usage factors, reference dBA, and percussive source) are shown in Table 4.15-2 consistent with Appendix D-5 (FHWA 2006). The Proposed Project is expected to require about 40 weeks of planned work activities over the course of a year. Deviations from this schedule would not affect the noise analysis because noise does not persist or accumulate in the environment.

Table 4.15-2 FHWA Noise Reference Levels and Usage Factors

Equipment Description	Usage Factor percent	Reference Level dBA	Percussive Source yes/no
Backhoe (with loader)	40%	80	No
Crane	16%	85	No
Dozer (crawler tractor)	40%	85	No
Dump Truck or Tractor Trailer	40%	84	No
Flat Bed Truck or Water Truck	40%	84	No
Front End Loader	40%	80	No
Grader	40%	85	No

Source: FHWA 2006

4.15.3.1 Analytical Approach

As shown in Table 4.15-3, attenuated noise impacts for activity at sites and receptors are compared against quantitative thresholds of significance shown in Section 4.15.1.3 as established by the Shasta County Planning Division. If a quantitative threshold is not exceeded, then the impact is deemed less than significant. (Shasta County 2004m, FHWA 2006)

Table 4.15-3 Estimated Noise Impacts at Nearest Receptors

Project Location	Receptor Distance meters	Daytime Impact L_{EQ} dBA	Daytime Threshold L_{EQ} dBA	Level of Significance
Kilarc Powerhouse	150	53	55	LTS
Cow Creek Powerhouse	550	38	55	LTS

Sources: SCPD 2004, FHWA 2006

4.15.3.2 Criteria for Determining Significance

Per CEQA Guidelines Appendix G – Noise, where available, the significance criteria established by the applicable city or county may be relied upon to make the following determinations. The Proposed Project would result in noise effects if it would:

- Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies
- Expose persons to or generate excessive ground borne vibration or ground borne noise level
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project

Determinations with respect to the four CEQA noise questions are given below for the Kilarc and Cow Creek Developments.

4.15.4 Environmental Impacts and Mitigation

4.15.4.1 Kilarc Development

IMPACT 4.15-1 (Kilarc): Would the action expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

During construction activities, the Proposed Project would generate noise due to operation of offroad equipment, portable equipment, and vehicles in the vicinity of the Kilarc Development powerhouse, forebay, flumes, canals, and diversion dams as applicable. The work sites are characteristically remote and in scarcely populated unincorporated areas. Most activity areas are secluded from receptors by distance and topography and any noise generated at these locations would attenuate to insignificance. All construction work would be conducted during daylight hours and no nighttime work would be performed.

The nearest sensitive receptors to the Kilarc Development are residences approximately 500 feet (150 meters) north and approximately 1,000 feet (300 meters) northeast of the powerhouse. As shown in Table 4.15-3, estimated daytime nose impacts are not expected to exceed 53 dB L_{EQ}, which is under the SCPD significance threshold of 55 dB L_{EQ}. Therefore, impacts related to exposure of people to or generation of noise in excess of established standards would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures**: None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site, Leaving the forebay in place would eliminate the potential for construction-related noise at the forebay, and there would be no additional impacts from these alternatives related to IMPACT 4.15-1 (Kilarc).

IMPACT 4.15-2 (Kilarc): Would the action expose persons to or generate excessive ground borne vibration or ground borne noise levels?

Proposed Project

No intense percussive actions (strikes, impacts) would occur during the course of the site work and no strong vibrations would be generated which could affect nearby structures. Therefore, no impacts would occur related to excessive ground borne vibration.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would eliminate the potential for construction-related ground borne vibration or noise levels at the forebay. There would be no additional impacts from these alternatives related to IMPACT 4.15-2 (Kilarc).

IMPACT 4.15-3 (Kilarc): Would the action result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

Proposed Project

All construction activities would be short-term (40 weeks) and hydroelectric generating equipment would be removed or immobilized. Therefore, no new permanent sources of noise would result from the Proposed Project.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site, Leaving the forebay in place would eliminate the potential for construction-related noise at the forebay, and no new permanent sources of noise are proposed. There would be no additional impacts from these alternatives related to IMPACT 4.15-3 (Kilarc).

IMPACT 4.15-4 (Kilarc): Would the action result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Proposed Project

All construction activities would be short-term (40 weeks), conducted during daylight hours, and no nighttime work would be performed. The Proposed Project would generate noise due to operation of offroad equipment, portable equipment, and vehicles in the vicinity of the Kilarc Development powerhouse, forebay, flumes, canals, and diversion dams as applicable. The work sites are characteristically remote and in scarcely populated unincorporated areas. Most activity

areas are secluded from receptors by distance and topography and any noise generated at these locations would attenuate to insignificance.

The nearest sensitive receptors to the Kilarc Development are residences approximately 500 feet (150 meters) north and approximately 1,000 feet (300 meters) northeast of the powerhouse. As shown in Table 4.15-3, estimated daytime nose impacts are not expected to exceed 53 dB L_{EQ}, which is under the SCPD significance threshold of 55 dB L_{EQ}. Therefore, impacts related to a temporary increase in noise levels would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would eliminate the potential for construction-related noise at the forebay, and, therefore, would not increase ambient noise levels in the project vicinity. There would be no additional impacts from these alternatives related to IMPACT 4.15-4 (Kilarc).

4.15.4.2 Cow Creek

IMPACT 4.15-5 (Cow Creek): Would the action expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Proposed Project

During construction activities, the Proposed Project would generate noise due to operation of offroad equipment, portable equipment, and vehicles in the vicinity of the Cow Creek powerhouse, forebay, flumes, canals, and diversion dams as applicable. The work sites are characteristically remote and in scarcely populated unincorporated areas. Most activity areas are secluded from receptors by distance and topography and any noise generated at these locations would attenuate to insignificance. All construction work would be conducted during daylight hours and no nighttime work would be performed.

The nearest sensitive receptor to Cow Creek is a residence approximately 1,800 feet (550 meters) southwest of the powerhouse. As shown in Table 4.15-3, estimated daytime nose impacts are not expected to exceed 38 dB L_{EQ}, which is under the SCPD significance threshold of 55 dB L_{EQ}. Therefore, impacts related to exposure of people to or generation of noise in excess of established standards would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed on private lands to continue flows to the Abbott Diversion, and therefore would result in generation of construction-related noise. As with the Proposed Project, the work sites are characteristically remote and in scarcely

populated unincorporated areas. Most activity areas are secluded from receptors by distance and topography and any noise generated at these locations would attenuate to insignificance. All construction work would be conducted during daylight hours and no nighttime work would be performed. Further, increase in noise levels would be temporary and short-term, and would not exceed established standards. There would be no additional impacts from these alternatives related to IMPACT 4.15-5 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, there would be no generation of construction-related noise, and therefore, no additional impacts from these alternatives related to IMPACT 4.15-5 (Cow Creek).

IMPACT 4.15-6 (Cow Creek): Would the action expose persons to or generate excessive ground borne vibration or ground borne noise levels?

Proposed Project

No intense percussive actions (strikes, impacts) would occur during the course of the site work and no strong vibrations would be generated which could affect nearby structures. Therefore, no impacts would occur related to excessive ground borne vibration.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed on private lands to continue flows to the Abbott Diversion, and therefore would result in generation of construction-related noise. As with the Proposed Project, the work is not anticipated to result in generation of strong vibrations. There would be no additional impacts from these alternatives related to IMPACT 4.15-6 (Cow Creek).

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, there would be no generation of construction-related noise, and therefore, no additional impacts from these alternatives related to IMPACT 4.15-6 (Cow Creek).

IMPACT 4.15-7 (Cow Creek): Would the action result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

Proposed Project

All construction activities would be short-term (40 weeks) and hydroelectric generating equipment would be removed or immobilized, therefore, no new permanent sources of noise would result from the Proposed Project.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed on private lands to continue flows to the Abbott Diversion, and therefore would result in generation of construction-related noise. However, this increase in noise levels would be temporary and short-term, and impacts would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, there would be no generation of construction-related noise, and therefore, no additional impacts from these alternatives related to IMPACT 4.15-7 (Cow Creek).

IMPACT 4.15-8 (Cow Creek): Would the action result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Proposed Project

All construction activities would be short-term (40 weeks), conducted during daylight hours, and no nighttime work would be performed. The Proposed Project would generate noise due to operation of offroad equipment, portable equipment, and vehicles in the vicinity of the Cow Creek powerhouse, forebay, flumes, canals, and diversion dams as applicable. The work sites are characteristically remote and in scarcely populated unincorporated areas. Most activity areas are secluded from receptors by distance and topography and any noise generated at these locations would attenuate to insignificance.

The nearest sensitive receptor to Cow Creek is a residence approximately 1,800 feet (550 meters) southwest of the powerhouse. As shown in Table 4.15-3, estimated daytime nose impacts are not expected to exceed 38 dB L_{EQ}, which is under the SCPD significance threshold of 55 dB L_{EQ}. Therefore, impacts related to a temporary increase in noise levels would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed on private lands to continue flows to the Abbott Diversion, and therefore would result in generation of construction-related noise. As with the Proposed Project, the work sites are characteristically remote and in scarcely populated unincorporated areas. Most activity areas are secluded from receptors by distance and topography and any noise generated at these locations would attenuate to insignificance. All construction work would be conducted during daylight hours and no nighttime work would be performed. Increase in noise levels would be temporary and short-term, and impacts would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, there would be no generation of construction-related noise, and therefore, no additional impacts from these alternatives related to IMPACT 4.15-8 (Cow Creek).

This Page Intentionally Left Blank

4.16 Recreation

This section provides a description of recreation opportunities and recreational use in the affected environment and evaluates potential impacts to recreational resources associated with the Proposed Project. The purpose of this section is to provide:

- an overview of regional recreation resources;
- a description of recreational uses that occur in the Project area; and,
- an analysis of the environmental impacts on local and regional recreation opportunities due to Proposed Project.

The key issue relates to the proposed decommissioning of the Project and resulting elimination of the Kilarc Forebay and its associated recreational facilities. This section addresses how the Proposed Project and alternatives may affect recreational resources and uses in and around Shasta County (the study area). Closure of the forebay may lead to the potential displacement of visitors who currently recreate at the site. As such, a review of regional recreational resources is provided in this section followed by a brief discussion of regional demand.

This analysis takes into consideration comments that were received during project scoping (see Appendix A). In general, comments related to recreation focused on concerns about the impacts to recreational resources as a result of the potential removal of the Kilarc Forebay. These include the potential loss of fishing, the loss of aesthetic qualities associated with the area (this is addressed in detail in Section 4.3 Aesthetics and Visual Quality), and the impacts associated with the potential loss of accessible recreational features.

4.16.1 Environmental Setting

4.16.1.1 Sources of Information

The primary source of information used to complete this section is from existing documentation and reports. The following types of documents were reviewed and relied upon for preparation of this section:

- Government documents reporting on trends in fish licensing sales, location of fish stocking, population trends, and recreational use estimations and projections.
- Guidebooks and websites describing the availability and facilities present at recreation areas in Shasta County
- Reports produced by PG&E and the Stewardship Council describing recreational resources within PG&E operated facilities.

4.16.1.2 Regional Setting

Regional Recreational Resources

The Proposed Project is located in Shasta County, which has, in general, a relatively large amount of water-based recreational opportunities. This section describes water based recreational opportunities and their providers in Shasta County. Opportunities provided by federal agencies are discussed first, then those provided by state and local agencies, followed by those managed by private providers. Table 4.16-1 lists lakes and reservoirs in the County along with the distance from the communities of Whitmore (the closest community to Kilarc

Forebay) and Redding (the largest community in the county) to the various water bodies. Figure 4.16-1 shows the location of these lakes and reservoirs.

Table 4.16-1 Potential Substitute Lakes and Reservoirs in Shasta County 1

Lake or Reservoir	Managing Entity	Selected Activities Available	Distance from Whitmore (miles)	Distance from Redding (miles)[2]	Notes
Baum Lake	PG&E	▪ Fishing ▪ Camping ▪ Boating ▪ Picnicking	56	64	Powerboats are prohibited
Big Lake	California State Parks /PG&E	▪ Fishing ▪ Camping ▪ Boating ▪ Picnicking	75	84	Wakeless speed required
Bluff Lake	USDA-FS /Private	▪ Fishing	110	117	Small lake owned by timber products company in Mt. Shasta City. Camping is not allowed.
Echo Lake	USDA-FS	▪ Fishing	88	63	Small lake with quality brook trout fishing
Fall River Lake	PG&E	▪ Fishing ▪ Boating ▪ Picnicking	62	70	Also called Pit No. 1 Forebay
Grace Lake	PG&E	▪ Fishing ▪ Picnicking	20	63	Swimming and boating not allowed
Iron Canyon Reservoir	USDA-FS	▪ Fishing ▪ Camping ▪ Boating ▪ Picnicking	53	62	
Keswick Reservoir	USDA-FS	▪ Fishing ▪ Boating ▪ Picnicking	34	5	Located just below Shasta Dam.
Lake Britton	PG&E	▪ Fishing ▪ Camping ▪ Boating ▪ Picnicking	57	66	Close to McArthur-Burney Falls Memorial State Park
Lake McCloud (McCloud Reservoir)	USDA-FS /PG&E	▪ Fishing ▪ Boating ▪ Camping	106	78	
Manzanita Lake	NPS	▪ Fishing ▪ Camping ▪ Boating ▪ Picnicking	37	48	Powerboats are prohibited

Lake or Reservoir	Managing Entity	Selected Activities Available	Distance from Whitmore (miles)	Distance from Redding (miles)[2]	Notes
McCumber Reservoir	PG&E	▪ Fishing ▪ Camping ▪ Boating ▪ Picnicking	28	39	Primitive Boat Ramp Available for launch
Nora Lake	PG&E	▪ Fishing ▪ Picnicking	22	33	Located near Grace Lake. Swimming and boating not allowed
North Battle Creek Reservoir	PG&E	▪ Fishing ▪ Camping ▪ Boating ▪ Picnicking	38	49	
Shasta Lake	USDA-FS	▪ Fishing ▪ Camping ▪ Boating ▪ Picnicking	40	15	Very large Reservoir (over 29,000 acres) with expansive recreational opportunities
Whiskeytown Lake	USDA-FS /NPS	▪ Fishing ▪ Camping ▪ Boating ▪ Picnicking	43	13	Partially within Whiskeytown National Recreation Area

Notes:

[1] Source: Dirksen & Dirksen (2004, as cited in Cardno ENTRIX 2013); PG&E (2007a); Stienstra (2008); Stewardship Council (2007); USDA-FS (2013)

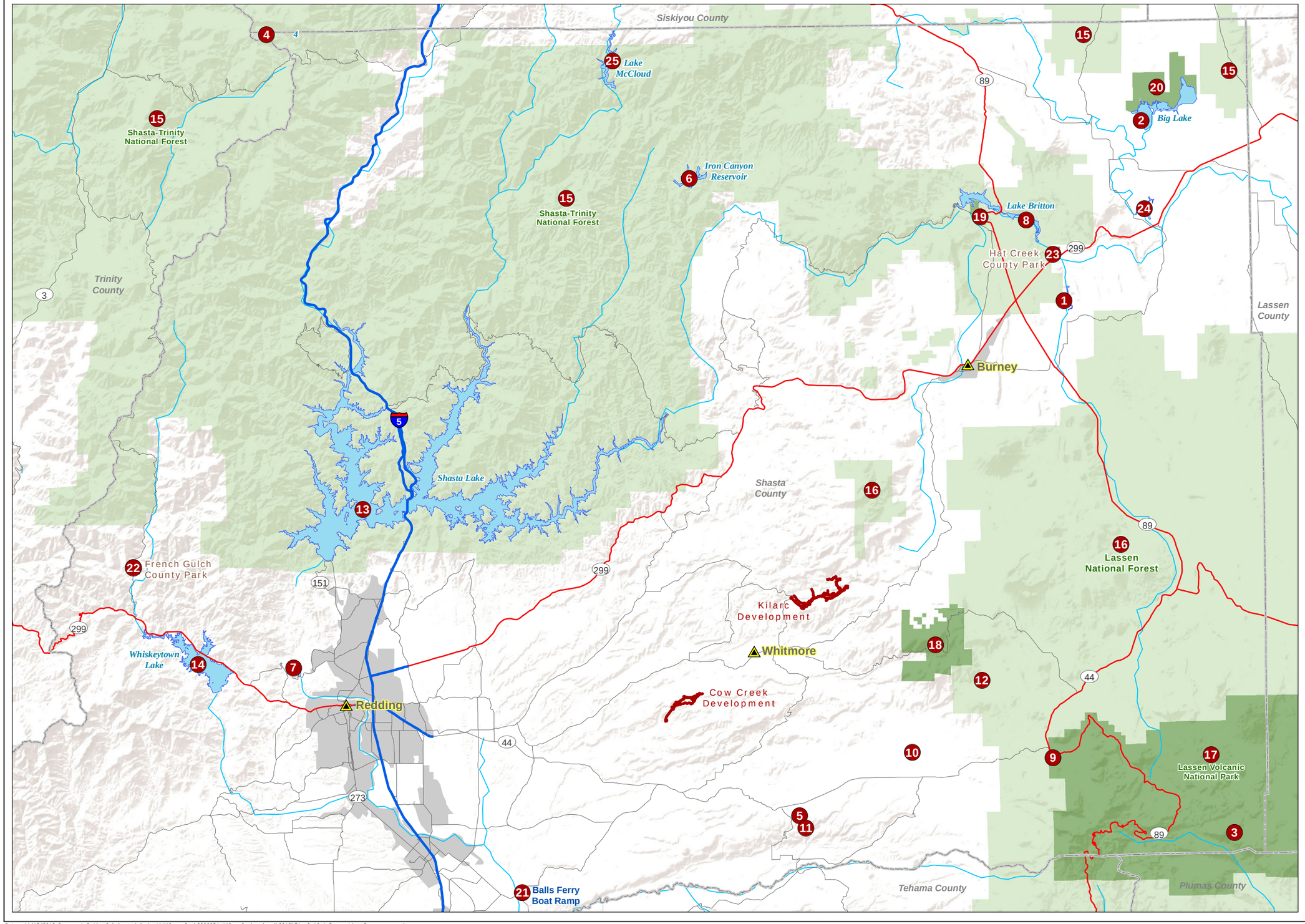
[2] Calculated from downtown Redding

The following provides a summary of the major providers of recreational opportunities in Shasta County. Federal provides are first listed followed by state and county and then private providers (PG&E).

- **Shasta-Trinity National Forest -** Shasta Trinity National Forest lies partially within Shasta County and provides a large proportion of the regional recreational opportunities given its size and prevalence of rivers, creeks, as well as lakes and reservoirs. The Forest covers 2.1 million acres and includes over 6,000 miles of streams and rivers. The USDA-FS National Visitor Use Monitoring (NVUM) program estimates use within as 1.9 million visits annually, based on fiscal year 2008 data (USDA-FS 2012a). Whiskeytown Lake is partially within the Forest, but a portion of the Lake is managed by the National Park Service (NPS); visitation was reported as about 750,000 in 2011 (Cui et al. 2013).
- **Lassen National Forest –** Lassen National Forest is also partially within Shasta County. The USDA-FS reported a visitation use estimate at the Forest of 734,000 for fiscal year 2005 (USDA-FS 2012b).
- **Lassen National Park -** Lassen Volcanic National Park (106,000 acres), located to the east of the Project area is partially within Shasta County, reported visitation of

approximately 350,000 in 2011 (Cui et al. 2013). Along with several streams and creeks as well as several small lakes, Manzanita Lake is located within the park and provides opportunities for fishing. Most of the water-based recreational resources within the forest are outside of Shasta County.

- **Bureau of Land Management (Redding Field Office) –** The Redding Field Office is responsible for managing about 250,000 acres spread throughout in Butte, Shasta, Siskiyou, Tehama, and Trinity counties (BLM 2017).
- **California State Recreational Facilities –** The following recreational facilities in Shasta County are managed by stage agencies:
  - *LaTour Demonstration State Forest*, located near Lassen National Forest, is about 9000 acres and provides hiking, biking, primitive camping, and picnicking. The California Department of Forestry and Fire Protection manages the forest.
  - *McArthur-Burney Falls Memorial State Park*, located near Lake Britton, provides hiking trails and camping with the primary attraction of 129 foot Burney Falls.
  - *Ahjumawi Lava Springs State Park*, adjacent to Big Lake, the park is accessible by boat and provides boat-in camping and picnicking.
  - *Shasta County Parks* – Three parks, managed by Shasta County, provide water-based recreational opportunities in the County (Shasta County 2013).
  - *Balls Ferry Boat Ramp* provides facilities, including picnic tables, parking and a restroom, along with access to the Sacramento River.
  - *French Gulch Park* is located on Clear Creek, west of Redding, and provides fishing access along with picnicking.
  - *Hat Creek Park* provides fishing access, along with day use facilities, to Hat Creek. The access is popular for fly-fishing.
- **Other Recreational Facilities -** In addition, several PG&E facilities (Baum Lake, Lake Britton, Lake Grace, Lake Nora, McCumber Reservoir, North Battle Creek) associated with other Hydroelectric Projects also provide fishing and other opportunities in the general vicinity of the project. The lakes and reservoirs, managed in conjunction with these hydroelectric Projects are shown in both Table 4.16-1 and Figure 4.16-1.



City/Town
Interstate
State Highway
Local Highway
Stream/River
Lake/Reservoir
Urban Area
State Park/Forest
National Forest
County Boundary

ID	Location/Decription
1	Baum Lake
2	Big Lake
3	Bluff Lake
4	Echo Lake
5	Grace Lake*
6	Iron Canyon Reservoir
7	Keswick Reservoir
8	Lake Britton
9	Manzanita Lake
10	McCumber Reservoir*
11	Nora Lake*
12	North Battle Creek Reservoir
13	Shasta Lake
14	Whiskeytown Lake
15	Shasta Trinity National Forest
16	Lassen National Forest
17	Lassen Volcanic National Park
18	LaTour Demonstration State Forest
19	McArthur-Burney Falls Memorial State Park
20	Ahjumawi Lava Springs State Park
21	Balls Ferry Boat Ramp
22	French Gulch Park
23	Hat Creek Park
24	Fall River Lake
25	Lake McCloud

** Included in Accessibility Assessment*

0 2 4 6 8 Mi
0 2 4 6 8 10 12 Km

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.16-1**
Regional Recreational Resources

Date: 11/15/2013 Document Path: C:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\Fig 3-16-1 Recreation Resources.mxd

Service Layer Credits: Sources: USGS, ESRI, TANA, AND

This Page Intentionally Left Blank

Fishing

Fishing is the most popular activity at Kilarc Forebay, and individuals potentially displaced may seek other areas to catch fish, trout in particular. CDFW operates several hatcheries throughout California, in part, to provide for recreational opportunities throughout the state. Currently, the following locations within Shasta County (CDFW 2018a) have also been approved for stocking catchable rainbow trout (Figure 4.16-2):

- Baum Lake
- Burney Creek (Lower, Middle and Upper)
- Clear Creek
- Cow Creek (Little)
- Grace Lake
- Hat Creek (Middle and Upper)
- Hatchet Creek
- Keswick Canal
- McCumber Reservoir
- Montgomery Creek
- Nora Lake
- Sacramento River
- Whiskeytown Lake

Accessibility

As noted in public comments, there is a concern that the potential closure of the Kilarc Forebay recreational features due to Project decommissioning would eliminate an important recreational opportunity for individuals with mobility issues. Although the facilities are not necessarily ADA-compliant, public comments have noted that the facilities are generally usable by individuals with mobility issues. As such, three water-based recreational areas (Lakes Nora and Grace, and McCumber Reservoir) chosen due to their relative proximity to Kilarc Forebay, but also, in the cases of Lakes Grace and Nora, the reservoirs are similar in size and the activities provided. In all cases, fishing is popular. Swimming as well as boating and other body contact activities are prohibited.

An assessment by an individual with mobility issues was completed to determine if these proximate facilities offer accessible recreational opportunities. The researcher visited the three potential substitute locations in late April 2013 and conducted an assessment of the various facilities and their accessibility. Kilarc Forebay was not visited during the assessment as it was determined the road was in such a condition that access to the site with a low-profile vehicle outfitted to be used by individuals with mobility issues would be difficult. In fact, the researcher suggested access to the forebay may be difficult for these types of vehicles form late fall through spring.

A site accessibility form was completed for each site and is available in Appendix F. The type of facilities and facility features were reviewed and a summary table is included as Table 4.16-2. McCumber Reservoir is the only location with a campground and boat ramp; however it does not have an accessible picnic area. McCumber Reservoir was also noted for not having accessible fishing, although the report notes that it could be possible, but difficult, near the boat ramp. Accessible facilities were found to be rather comparable between Kilarc Forebay and Lakes Nora and Grace, although based on photos of the restroom at Kilarc Forebay, it was determined that the restroom at this site was not accessible. In summary, these locations were found to provide access, although limited in some cases, for individuals with mobility issues. In general, the report concluded that, in terms of access, ease of use, and recreational opportunities, each area provided relatively similar facilities for individuals with mobility issues. Also, the memo notes that Kilarc Forebay may be unique among the four sites as being less crowded and offering more opportunities for solitude.

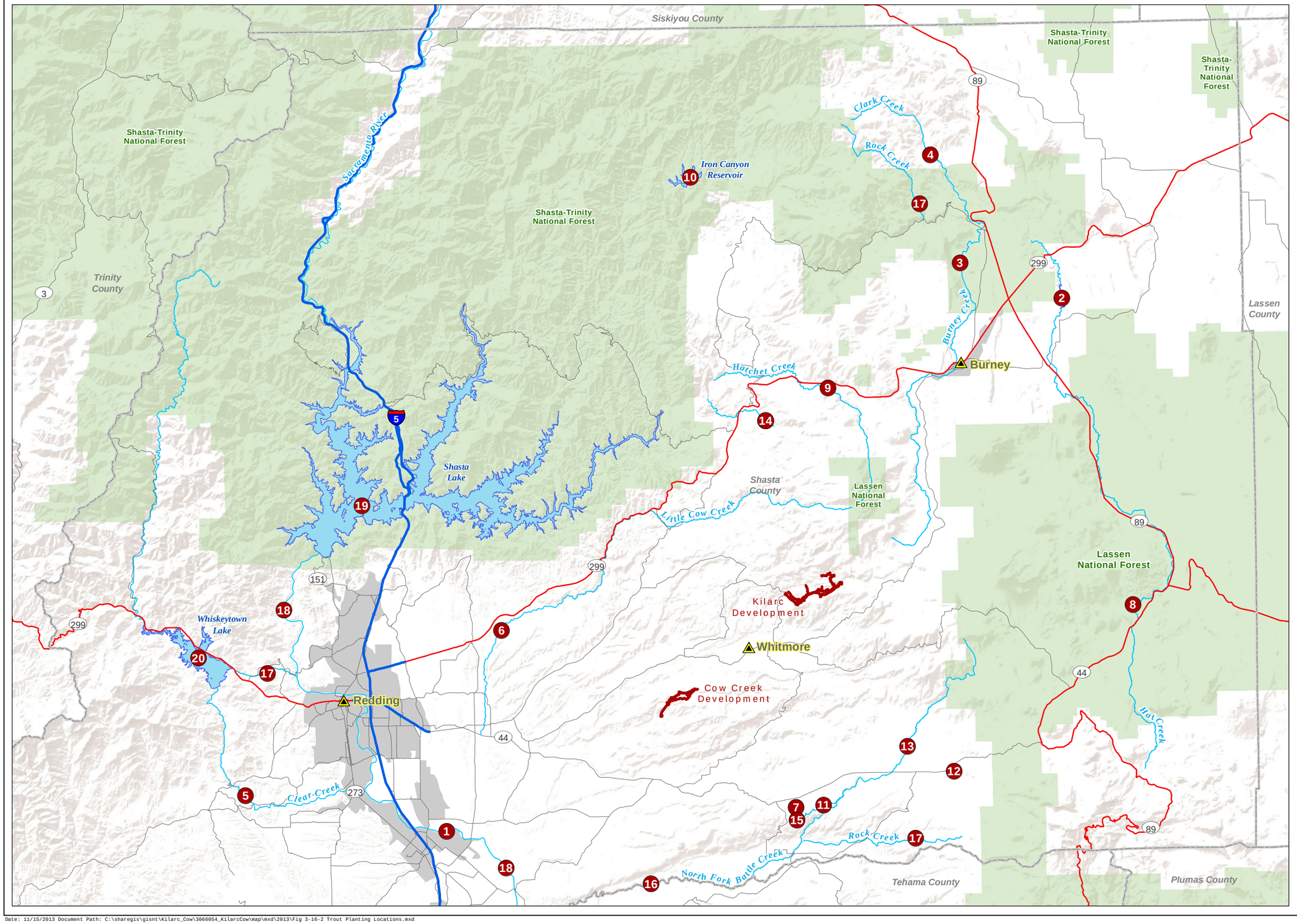
Table 4.16-2 Summary of Recreational Accessibility Assessment Findings[1]

Facility or Feature	Kilarc Forebay[2]	Nora Lake	Grace Lake	Lake McCumber	Notes
Developed Campground				X	Campground has slight slope
Picnic Area	X	X	X		
Pedestrian Paths	X	X	X		Berm is accessible at southern end of Lake Grace – but slope to berm is slightly greater than ADA guidelines
Parking	X	X	X	X	
Restrooms		X	X	X	
Water Supply				X	
Boat Ramp				X	
Fishing	X	X	X		No accessible fishing at Lake McCumber

Notes:

[1] See Appendix F for complete analysis. This table focuses on the primary facilities that are present at one or more of the locations.

[2] Kilarc Forebay was not visited as a part of the assessment as road conditions were poor when the assessment occurred (April 2013).



City/Town
Interstate
State Highway
Local Highway
Stream/River
Lake/Reservoir
Urban Area
National Forest
County Boundary

ID	Location/Decription
1	Anderson River Park Pond
2	Baum Lake
3	Burney Creek (Lower, Middle and Upper)
4	Clark Creek (Lower)
5	Clear Creek
6	Cow Creek (Little)
7	Grace Lake*
8	Hat Creek (Middle and Upper)
9	Hatchet Creek
10	Iron Canyon Reservoir
11	Keswick Canal
12	Lassen Pines Pond
13	McCumber Reservoir
14	Montgomery Creek
15	Nora Lake*
16	North Battle Creek
17	Rock Creek
18	Sacramento River
19	Shasta Lake
20	Whiskeytown Lake

** Included in Accessibility Assessment*

0 2 4 6 8 Mi
0 2 4 6 8 10 12 Km

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.16-2**
Locations within Shasta County Approved for Planting of Catchable Rainbow Trout

Date: 11/15/2013 Document Path: C:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\Fig 3-16-2 Trout Planting Locations.mxd

This Page Intentionally Left Blank

All three of the reservoirs considered in this assessment are a part of the Battle Creek Project (FERC Project No. 1121). Existing recreation use and capacity information for the facilities are provided to help address the capacity for these locations to tolerate additional recreational use without leading to physical environmental changes (FERC 2009a). In short, these facilities appear to be able to tolerate additional recreational use.

- McCumber Reservoir had an estimated annual visitation of 4,500 daytime Recreation Days (RDs) and 5,020 nighttime RDs. The access areas were estimated to be at 25 percent capacity.
- Lake Grace had an estimated annual visitation of 11,000 Recreation Days (RDs). The access areas were estimated to be at 45 percent capacity and the picnic areas were estimated to be at 25 percent capacity.
- Lake Nora had an estimated annual visitation of 4,200 Recreation Days (RDs). The access areas were estimated to be at 6 percent capacity and the picnic areas were estimated to be at 30 percent capacity.

Regional Recreational Demand

In 2013, Shasta County had an estimated population of 178,601 (California Department of Finance 2013). The population of the County is expected to increase to about 199,000 in 2020, 220,000 in 2030, and 242,000 in 2040. Over this period, population is expected to grow at 1.1% annual rate. At a statewide level, the number of fishing licenses purchased annually has steadily declined. There were over 2.2 million licenses sold in 1980. In 1990, fewer than 1.5 million licenses were purchased and in 2000, the number was under 1.3 million. By 2017, the number was just over 1 million (CDFW 2018b). This decrease of over 50 percent has occurred in spite of steady population growth over the past 30 years. The decline in popularity of fishing mirrors national trends (Bowker et al. 2012) and, in fact, is expected to continue. Therefore, it is not anticipated that demand for fishing is expected to increase regionally.

Recreational Resources Associated with Kilarc-Cow Project

Recreation use in connection with the Proposed Project is primarily associated with Kilarc Forebay and associated facilities. Public access is not available to the Cow Creek Development and Forebay due to locked gates and the necessity to cross private land to reach the Forebay. Further, the Cow Creek Development has not been designated or maintained by PG&E for public recreation.

Some informal fishing and picnicking occurs in close proximity to the Kilarc Powerhouse and this access is not anticipated to change. The only formal recreational facilities are associated with the Kilarc Forebay. In 2007, PG&E produced the Recreational Resources Report for the Kilarc Cow Creek Project (PG&E 2007c). This document reports on both the level of existing recreation use based on field observations completed in 2003, as well as visitor preferences and behavior based on an on-site questionnaire.

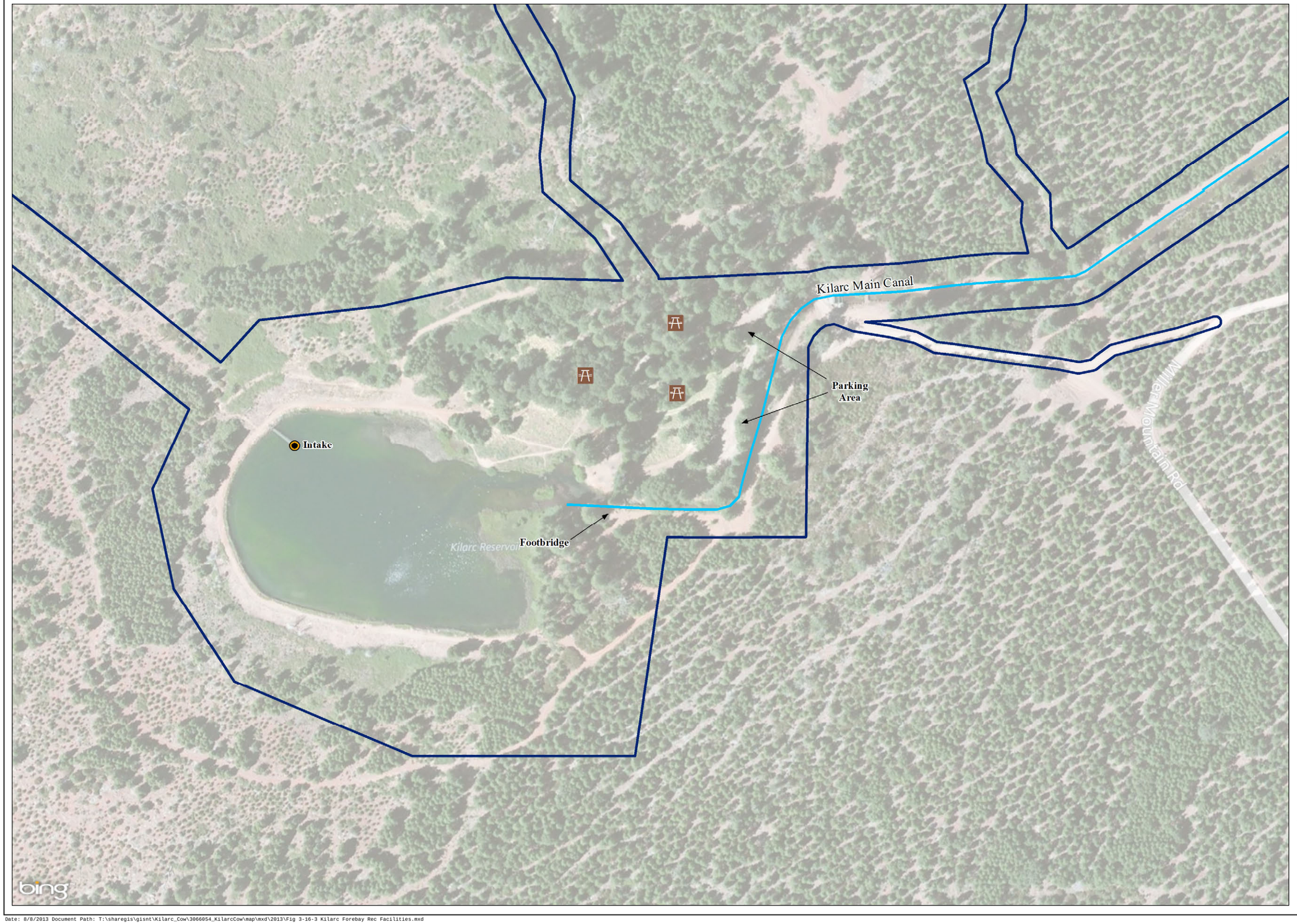
A 2-lane 3-mile gravel road provides access to the Forebay; the road crosses private lands requiring an easement maintained by PG&E for passage. Access to the forebay is difficult in the winter as weather conditions can make the roads impassable due to snow, mud, or ice. Access to the recreational facilities at the forebay is currently provided as required by the

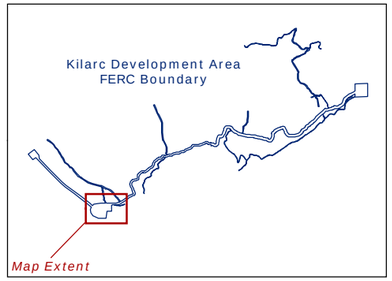
current FERC license. The Kilarc Forebay (Figure 4.16-3) is a 4.5-acre reservoir with a berm and trail, used by anglers, that wraps almost entirely around the water body. A footbridge across the Kilarc Main Canal provides access to the trail. There are two picnic areas in close proximity to the forebay, each with gravel parking areas (PG&E 2007d). The picnic areas are along the northeastern shore of the forebay. Both picnic areas, actually relatively close to each other, have eight picnic tables and four barbecue pedestals each. The picnic area further to the east also has two vault toilets. Safety and recreational informal signage is also present around the forebay and near the picnic areas. Due to a county ordinance, swimming and boating are not allowed at the forebay; camping is also not allowed at the Kilarc Forebay. Currently, CDFW stock the water body with catchable rainbow trout, although brown trout have also been caught at the Forebay (CDFW 2018b).

Existing Recreation Use

This section relies on recreation use estimates from a supporting document from FERC Form 80 (FERC 2009). As reported in the Recreational Resources Report (PG&E 2007c), previous research used on-site observations to estimate the amount of recreation use at Kilarc Forebay. Field technicians recorded the number of people observed, time of day, and recreation activity participation. The number of vehicles observed on-site throughout the day was also recorded. Of the five sites where recreation use was observed, four of these were in close proximity of the Kilarc Forebay (the two picnic areas, the shoreline, and the inlet canal); the fifth site was near the Kilarc Powerhouse. The data were reported as People at One Time (PAOT) and Vehicles at one time (VAOT). The following bullet points summarize the results of 22 field days between Memorial Day weekend and Labor Day weekend:

- The maximum number of PAOT observed was 25 people along the Kilarc Forebay Shoreline.
- The maximum number of VAOT was observed near the picnic area (further to the west) with 9 vehicles.
- When totaling the mean number of PAOT at the four sites near the forebay, a mean number of 11.3 people were observed.
- When totaling the mean number of VAOT at the four sites near the forebay, a mean number of 14.2 vehicles were observed.
- The vast majority of people (77.9%) were observed at the Kilarc Forebay Shoreline (includes Kilarc Powerhouse).





Picnic Area

Canal

FERC Boundary

0 50 100 150 200 Feet

0 10 20 30 40 50 60 Meters

Pacific Gas & Electric Company
KILARC-COW CREEK HYDROELECTRIC PROJECT

Figure **4.16-3**
Recreational Facilities
at Kilarc Forebay

Date: 8/8/2013 Document Path: T:\sharegis\gisnt\Kilarc_Cow\3066054_KilarcCow\map\mxd\2013\Fig 3-16-3 Kilarc Forebay Rec Facilities.mxd

This Page Intentionally Left Blank

FERC requires licensees to file a FERC Form 80 Licensed Hydropower Development Recreation Report every 6 years and requires the licensee to prove both peak weekend and annual visits measured in Recreation Days (RDs). A RD represents a visit to a development for recreational purposes during any portion of a 24-hour period. The most recent report (FERC 2009b) reflects estimated use for the previous year, 2008. The annual total was reported at 10,000 RDs while the peak weekend average was reported as 300 RDs. The report also requires the licensee to estimate facility capacity as a percentage for the recreation facilities in and around the development. For Kilarc Forebay, facility capacity was estimated as 62 percent for access areas (undeveloped areas), and 37 percent capacity at the picnic areas. In addition, the Recreational Resources Report for the Kilarc Cow Creek Project concluded that, based on field observations, picnic table capacity is adequate at the forebay.

Visitor Origin

As part of the Recreational Resources Report (PG&E 2007c) for the Kilarc Cow Creek Project, results from an on-site survey questionnaire were reported. The results suggest the visitors to the forebay are primarily from Shasta County. Forty-five questionnaires were completed as a part of the survey. In general, a very large proportion of the respondents were from the local area; 84 percent of the respondents were from Shasta County followed by Colusa County (4 percent). Four other counties (Fresno, Riverside, Lassen, and Alameda) were cited by one respondent each. One respondent was from outside of California (Florida).

Activity Participation

Activity participation was determined by two approaches in the Recreational Resources Report for the Kilarc Cow Creek Project (PG&E 2007c). Visitors were asked to self-report their activity participation on the questionnaire including both the primary activity as well as a list of all of their activities. Secondly, field technicians also documented activity participation based on their observations. In general, fishing is the most popular activity in the Project area:

- 93% of the respondents stated fishing as an activity they participated in (multiple reposes were accepted). Sightseeing (36 percent), followed by picnicking and wildlife viewing (both 31%) were the next most popular activities
- 86% cited fishing as their primary activity

On-site observations confirm fishing (62 percent) as the most popular activity; this was followed by general recreation (20 percent) and picnicking (12 percent). According to the Stewardship Councils' Land Conservation Plan (2007), a planning document developed to guide conservation efforts on 140,000 acres of watershed lands owned and managed by PG&E, fishing for trout is popular at the forebay, in particular, during the month of May.

In Summary, the Kilarc Forebay is a relatively small (4.5 acres) reservoir and receives an estimated 10,000 RDs of visitation annually. The opportunity to fish at the forebay is the primary reason people visit the site. Prior studies indicate visitors primarily come from the local area (Shasta County). It is possible that a large proportion is from Whitmore or Palo Cedro; however, the data from these studies were reported at a County level.

4.16.2 Regulatory Setting

Project recreation features are on PG&E owned and managed lands, however recreational access to Kilarc Forebay is required, consistent with FERC requirements.

4.16.3 Analysis Methodology

4.16.3.1 Analytical Approach

The focus of the assessment is on physical changes to the environment that may affect recreational resources. The following methods were used to evaluate the potential impacts to recreational resources in the study area:

- Apply results of existing surveys and studies about Kilarc Forebay to define the effect of the potential closure of the forebay
- Compare recreational resources, at Kilarc Forebay with regional recreational resources to evaluate potential effects of site closure at Kilarc Forebay and the potential for visitor displacement. The primary consideration is related to the potential for displaced visitors to visit alternative areas and subsequently impact them. The following items may be considered when comparing resources:
  - Visitation (FERC Form 80 and other government documents)
  - Activity Participation (regional and site level surveys as well as agency documents and informational resources)
  - Accessibility (weather/wheel chair access)
  - Facilities (picnic tables, campsites etc.)
  - Proximity (distance from Kilarc Forebay to other sites)
  - Setting (proximity to town/presence of water, trees etc.)

Criteria for Determining Significance

Based on the State Water Board's Environmental Checklist in Appendix A of the Board's CEQA regulations, Appendix G of the CEQA Guidelines and professional standards and practices, the Proposed Project and alternatives would be determined to have a significant impact of recreational resources if it were to:

- Physically degrade or diminish existing recreational resources?
- Increase use at existing regional recreational facilities such that substantial physical deterioration would occur or be accelerated?
- Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?

The analysis of the Proposed Project conducted for this section considers two primary factors: (1) the potential direct impacts of decommissioning the Project, such as losing the fishing area; and (2) the indirect impacts of decommissioning the Project such as displacing existing recreation use from Kilarc Forebay.

4.16.4 Environmental Impacts and Mitigation

PG&E has not included any PM&E measures to address recreation-related impacts due to decommissioning activities.

The potential for recreational impacts is limited to the Kilarc Development. There are no existing recreational uses at the Cow Creek Development and, therefore, no discussion of recreational impacts is provided for Cow Creek.

4.16.4.1 Kilarc Development

IMPACT 4.16-1 (Kilarc): Would the action physically degrade or diminish existing recreational resources?

Proposed Project

The decommissioning of the Project would lead to the loss of all of the recreational facilities associated with Kilarc Forebay although fishing would still be available near the Kilarc Powerhouse along Old Cow Creek. As a part of decommissioning, the forebay area would be restored and water would no longer be delivered by canal; additionally, the picnic tables would be removed and restrooms would be demolished. Annually, the Project provides 10,000 RDs of recreation use – much of the use is attributed to fishing. As such, the Proposed Project would result in the loss of the opportunity to fish at the forebay. Additionally, the facilities at Kilarc Forebay are usable for individuals with mobility issues and this location and resource would be lost as a result of the Proposed Project. The loss of recreational opportunities at the Kilarc Forebay is lessened somewhat due to the availability of numerous substitute recreational facilities in and around Shasta County, including similar accessible facilities at Lakes Nora and Grace. However, the impact would remain significant and unavoidable.

- **Level of Significance:** Significant and Unavoidable
- **Mitigation Measures:** None available. Given the unique characteristics of the Kilarc Forebay and associated recreational facilities, implementation of Proposed Project would result in a significant and unavoidable impact on recreational resources.

Alternative 1

Alternative 1 would result in no change at the Kilarc Forebay site. Leaving the forebay in place would prevent the loss of an existing recreational resource, as compared to the Proposed Project, and the significant impact would be lessened to less than significant impact under this alternative.

No Project Alternative

Under the No Project Alternative, all flows would remain in the natural channels of Old Cow Creek and water supply in Kilarc Forebay would be dependant on natural precipitation events. Although recreational fishing resources may not be impacted immediately, Kilarc Forebay would become an unmaintained waterbody without a consistent source of freshwater or Project operation and maintenance activities. The resident fish population would be isolated from Old Cow Creek and water quality would degrade given the transition from a run-of-river facility to a subwatershed basin. Recreational resources in Kilarc Forebay would be especially impacted during warmer months and low water years due to freshwater supply being even more limited. As compared with the Proposed Project, impacts related to implementation of this alternative would be less than significant.

IMPACT 4.16-2 (Kilarc): Would the action increase use at existing regional recreational facilities such that substantial physical deterioration would occur or be accelerated?

Proposed Project

The Proposed Project would lead to the displacement of many of the existing visitors at the Kilarc Forebay to other proximate or outlying recreational resources. It is likely that a majority of the annual 10,000 Recreation Days would be transferred to other recreational facilities in Shasta County. This is a very small proportion of the recreational visitation in the vicinity of the Proposed Project. Shasta National Forest currently reports almost 2 million visits annually and Lassen National Forest has over 1 million visits. Additionally, CDFW plants catchable trout at 16 locations in Shasta County and these locations would be available for anglers potentially displaced by the Proposed Project. Plus, demand for fishing in California (and nationwide) continues to decrease and the displacement of visitors from Kilarc Forebay to other locations in Shasta County (and others areas in close proximity) is, in relation, very small.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1

Alternative 1 would result in no change at the Kilarc Forebay site. Leaving the forebay in place would prevent the loss of an existing recreational resource and would eliminate the displacement of existing visitors to the forebay. As compared with the Proposed Project, this alternative would reduce the potential for increased use of other regional recreational facilities, and impacts would be less than significant. There would be no additional impact from this alternative related to IMPACT 4.16-2 (Kilarc).

No Project Alternative

The No Project Alternative would not impact regional recreational facilities immediately, but existing visitors to Kilarc Forebay would eventually be displaced to nearby recreation locations due to the degradation of recreational resources at Kilarc Forebay. The forebay would become an unmaintained waterbody without a consistent source of freshwater or Project operation and maintenance activites. Water quality and fish habitat would degrade given the transition from a run-of-river facility to a subwatershed basin. Displaced Kilarc Forebay visitors would cause more impacts to nearby recreational locations during warmer months and low water years since

fishing opportunities at the forebay would be less available. Despite this potential increase, regional recreational facilities would experience less than significant impacts related to the implementation of this alternative due to the relatively small number of existing visitors to Kilarc Forebay.

IMPACT 4.16-3 (Kilarc): Would the action require the construction or expansion of recreational facilities?

Proposed Project

The Proposed Project does not require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment. Therefore, no impact would occur.

- **Level of Significance:** No Impact
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change to construction or expansion of recreational facilities at the Kilarc Forebay site. There would be no additional impact from these alternatives related to IMPACT 4.16-3 (Kilarc).

4.17 Transportation/Traffic

This section presents an analysis of transportation conditions on roads and transit routes in the Project area that would be modified by the Proposed Project or used by construction traffic. Due to the relatively rural nature of the Project area, there are no designated bikeways, pedestrian pathways, or major public transit services in the area. The transportation analysis will focus on impacts to local roadways.

The analysis of traffic conditions is focused primarily on construction-related impacts, such as road closures, detours, deterioration of road conditions related to construction and hauling, and interruptions in transit service. Maintenance and operational related traffic impacts following completion of construction are also discussed and addressed.

4.17.1 Environmental Setting

4.17.1.1 Sources of Information

The Circulation Element of the Shasta County General Plan contains objectives and policies that help guide transportation land use decisions in the County (Shasta County 2004l).

4.17.1.2 Regional Setting

Shasta County is located in northeastern California. It is situated at the north end of the Sacramento Valley, 150 miles north of Sacramento, and 110 miles south of the Oregon border. The County's three incorporated cities (Redding, Anderson, and City of Shasta Lake), and the town centers of Cottonwood and Palo Cedro all lay in the south central, non-mountainous portion of Shasta County. There are two more town centers located in Burney/Johnson Park and Fall River Mills/McArthur, both of which are located in the mountains of northeastern Shasta County.

Project Area

The Project is located in eastern Shasta County, east and northeast of Redding and Palo Cedro. The Project area is in the foothills of Mount Lassen and Lassen National Park. The area is rural with scattered residences.

The Cow Creek watershed which contains both the Kilarc and Cow Creek Developments encompasses about 430 square miles and drains the base and foothills of Mount Lassen in a southwest direction into the Sacramento River. The basin area is roughly bordered by State Route (SR) 299 to the north, SR 44 to the south, and SR 89 to the east.

Kilarc Development Roadways

Major roadways and access roads for the Kilarc Development are shown in Figure 1-1 and Figure 2-3 and are described below.

- **SR 44** is a state highway that runs from Redding to Lassen Volcanic National Park. It is considered an Eligible State Scenic Highway as part of the Volcanic Legacy Scenic Byway.
- **Whitmore Road** is a paved 2-lane County road that provides access from SR 44 to Fern Road and the Project area. It runs through the towns of Whitmore and Millville.

- **Fern Road** is a paved rural 2-lane County road which provides access to the Kilarc powerhouse as well as several residences in the area.
- **Kilarc Road/ Miller Mountain Road-** Kilarc Road turns into Miller Mountain Road as it runs east. It is an unimproved partially graveled road that provides access to most of the Kilarc Development facilities.

The Kilarc Development is accessed from Fern Road East via Whitmore Road. A junction connecting to Whitmore Road lies approximately 30 miles east of Redding along SR 44. The paved Whitmore Road transitions into Miller Mountain Road as far as the Kilarc Forebay intake structure. Miller Mountain Road continues on, transitioning into a Project road for the length of the Kilarc Main Canal system. Access to the North and South Canyon portion of the Kilarc Development from Fern Road is via Oak Run Fern Road to Smith Road.

Cow Creek Development Roadways

Major Roadways and access roads for the Cow Creek Development are shown in Figure 1-1 and Figure 2-4 and are described below.

- **SR 44** is a state highway that runs from Redding to Lassen Volcanic National Park. It is considered an Eligible State Scenic Highway as part of the Volcanic Legacy Scenic Byway.
- **South Cow Creek Road** is a paved public County road which is accessed from and runs northeast of SR 44. South Cow Creek Road runs through agricultural lands and scattered residences and leads to the Cow Creek Powerhouse. The road turns into a private road shortly before leading to the Cow Creek Powerhouse.

The Cow Creek Development is accessed from the southwest on SR 44 via South Cow Creek Road. South Cow Creek Road, a paved County road, connects with SR 44 approximately 35 miles east of Redding. South Cow Creek Road has been defined by Shasta County to end at the pavement terminus where it is gated. The unpaved road continues over private property to the Cow Creek Powerhouse a short distance beyond. From there, over private lands, a single lane unpaved rough road with steep grades climbs to the Cow Creek Forebay and South Cow Creek Diversion Dam via unpaved spur roads. The South Cow Creek Diversion Dam and Cow Creek Forebay can also be reached from the northeast through gates at the County-defined end of South Cow Creek Road on the Whitmore side. These single lane roads are unpaved and run across private land. This road segment crosses South Cow Creek over a wet crossing. The County maintained portion of South Cow Creek Road intersects Whitmore Road approximately 2 miles east of Whitmore. Since the County maintained portion of South Cow Creek Road is gated on the southwest and northeast of the Project, the Cow Creek Development is inaccessible to the public.

4.17.2 Regulatory Setting

4.17.2.1 Federal

No federal traffic and transportation regulations are applicable to this section.

4.17.2.2 State

The California Department of Transportation (Caltrans) measures traffic capacities in terms of a Level of Service (LOS). The Caltrans published Guide for the Preparation of Traffic Impact Studies (December 2002) states the following:

> *Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on State highway facilities, however, Caltrans acknowledges that this may not be always feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS.*

4.17.2.3 Local

Shasta County General Plan

General Plan Goals

Shasta County shall strive to develop a balanced, integrated, and diversified transportation system that addresses the regional needs (both urban and rural) of its citizens for a convenient, affordable, safe, and efficient multimodal transportation system to move goods and people.

General Plan Policies

C-6b In order to adequately plan for the future circulation network regarding highways, roads, and streets, the General Plan shall use the functional hierarchy and related policies shown in Table RS-1 in its circulation planning. Arterial and collectors are further divided into urban and rural roads. Urban roads generally require more right-of-way per lane, more lanes, and full urban improvements such as curbs, gutters, and sidewalks. All projects shall be evaluated as to their conformance with this circulation network.

C-6d New commercial and industrial development accessing arterial and collectors shall provide access controls for public safety by means such as limiting the location and number of driveway access points and controlling ingress and egress turning movements.

C-6h Development adjacent to arterial and collectors should be designed to minimize the noise impact received from traffic. The circulation system shall also be designed with consideration given to minimizing noise impacts on adjacent development.

C-6l New development which may result in exceeding LOS E on existing facilities shall demonstrate that all feasible methods of reducing travel demand have been attempted to reach LOS C. New development shall not be approved unless traffic impacts are adequately mitigated.

Such mitigation may take the form of, but not limited to, the following: provision of capacity improvements to the specific road link to be impacted, the transit system, or any reasonable combination; provision of demand reduction measures included as part of the project design or project operation or any feasible combination.

C-9b Project proponents shall be required to implement effective measures included in the County's lists of Standard Mitigation Measures (SMM) and Best Available Mitigation Measures (BAMM) to reduce vehicle use and associated emissions related to existing and future land use development as part of the environmental review process.

N-d The feasibility of Proposed Projects with respect to existing and future transportation noise levels shall be evaluated by comparison to Figure N-1 and Table N–VI.

4.17.3 Analysis Methodology

The total road network is estimated to consist of 9.3 miles of existing roads that would be improved and 0.4 mile of newly constructed access roads.

4.17.3.1 Analytical Approach

The Proposed Project would not cause a permanent increase in traffic, as it does not include any traffic-generating land uses except during temporary decommissioning activities. Traffic related to Project decommissioning is estimated to be nominal. Therefore, this traffic analysis evaluates the potential impacts of temporary decommissioning related traffic on the local circulation network.

The Traffic and Circulation analysis included examination of information from the following sources:

- Shasta County General Plan
- PG&E License Surrender Application
- PG&E Decommissioning Plan

PG&E does not anticipate hauling of any fill material for decommissioning of either the Kilarc Development or the Cow Creek Development, and grading is anticipated to be balanced on site utilizing previously excavated and above grade materials as fill. Where practical, the concrete and shotcrete that forms portions of the canal system will be collapsed into the canal and buried with soils from the berm construction. Equipment, such as trash rakes and racks, gates and gate operators may be salvaged by the landowner. Disposal of other materials and equipment will be disposed of at approved offsite landfills or salvaged depending on value. For the proposed road improvements discussed above, approximately 750 cubic yards of Caltrans Standard Class 2 Aggregate Base would be required to be hauled in from local gravel pit sources. Table 4.17-1 illustrates the approximate type and quantities of construction equipment required on a daily basis. Decommissioning is anticipated to occur for approximately 3 years followed by another 2 years of maintenance and monitoring related to restoration of the sites.

Table 4.17-1 Kilarc Cow Creek Equipment and Vehicle Schedule for Proposed Project

Offroad Equipment and Onroad Vehicles Name or Type	Offroad Equipment and Onroad Vehicles Category*	Offroad Equipment and Onroad Vehicles Quantity	Planned Schedule Weeks	Planned Schedule Days/Week	Offroad Hours/Day	Onroad Miles/Day
Site Prep/Road Work						
Motor Grader (CAT120M)	Offroad	1	6	5	10	
Dump Truck	On HD	1	6	5		50
Water Truck	On HD	1	6	5		20
Pickup	On LD	1	6	5		100
Demolition - Canals and Appurtenant Features						
Dozer (CAT D3)	Offroad	1	23	5	10	
Multi Terrain Loader (CAT 219C)	Offroad	1	23	5	10	
Backhoe (CAT 450E)	Offroad	1	23	5	10	
Pickup	On LD	1	23	5		100
Dump Truck	On HD	1	23	5		50
Demolition - Dams and Appurtenant Structures						
Dozer (CAT D3)	Offroad	1	11	5	10	
Multi Terrain Loader (CAT 219C)	Offroad	1	11	5	10	
Backhoe (CAT 450E)	Offroad	1	11	5	10	
Pickup	On LD	1	11	5		100
Dump Truck	On HD	1	11	5		50
Tractor Trailer	On HD	1	2	5		100
Crane	On MD	1	2	5		10

Source: Cardno, Air Quality Section Kilarc Cow EIR (estimated based on similar projects). *Category - all offroad is "offroad"; onroad is either "light duty" (LD), "medium duty" (MD), or "heavy duty" (HD) by weight class: LD up to 3 tons, MD 3 to 8 tons, HD over 8 tons

4.17.3.2 Criteria for Determining Significance

Potential Project impacts to the transportation system are evaluated utilizing thresholds of significance. Guidelines for evaluating significance thresholds are based on the CEQA Environmental Checklist (CEQA Guidelines, Appendix G). According to these guidelines, the Proposed Project would have a significant traffic impact if it would result in any of the following:

- Would create a substantial increase in traffic along major roadways in the area during decommissioning activities
- Would impede traffic access to areas during decommissioning
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- Would result inadequate emergency access
- Would conflict with any applicable plans or policies related to transportation or alternative transportation facilities

There are no hazardous design features proposed as part of the Proposed Project, and the Proposed Project would not result in a change in air traffic patterns. Consequently, these significance criteria related to impacts on air traffic patterns and hazardous design features are not considered further in this analysis.

In addition, Caltrans has the following significance thresholds:

Roadways

- An existing segment that operates acceptable (LOS A through LOS C) without the project is degraded to an unacceptable LOS D or worse due to the addition of the project traffic.
- A roadway segment that operates at unacceptable LOS D or worse without the project experiences an increase in its daily volumes to capacity ratio (V/C) of 0.05 or greater due to the addition of the project traffic.

Intersections

- An existing intersection that operates acceptable (LOS A through LOS C) without the project is degraded to an unacceptable LOS D or worse due to the addition of the project traffic.
- A roadway segment that operates at unacceptable LOS D or worse without the project experiences an increase of 5.0 or more seconds of delay due to the addition of the project traffic.

4.17.4 Environmental Impacts and Mitigation

PG&E has not included any PM&E measures to address traffic-related impacts due to decommissioning activities.

4.17.4.1 Kilarc Development

IMPACT 4.17-1 (Kilarc): Would the action create a substantial increase in traffic along major roadways in the area during decommissioning activities?

Proposed Project

The Proposed Project would involve temporary construction activities related to decommissioning activities. Decommissioning of the Kilarc Development would involve dismantling of some facilities while others, such as the Kilarc Powerhouse, would be left in place. For most projects, typical construction related traffic on roadways results from hauling of materials to and from the site. For decommissioning of the Kilarc Development, PG&E anticipates that no fill material will be required and grading activities would be balanced on site. Therefore, the primary source of traffic would be worker traffic and the hauling of heavy equipment to and from the site, as listed in Table 4.17-1. Also as shown in Table 4.17-1, one of each type of construction equipment is anticipated to be onsite per work day. It is also anticipated that heavy equipment would be staged onsite and therefore equipment would generally make one roundtrip to and from the site. Worker traffic would increase in the area; however, the local roads are not frequently traveled and are primarily rural roads used to access the Kilarc Forebay or scattered residences and ranches in the area. Due to the lack of continuous hauling activities and the minor increase in traffic resulting from heavy equipment use and worker transportation, impacts related to substantial increases in traffic and the changes to existing roadway level of service would be less than significant.

Once decommissioning is complete, the Project site would be monitored for 2 years to ensure success of restoration efforts. Traffic to the site to conduct monitoring is expected to be nominal and infrequent. After monitoring is complete, no project related traffic is anticipated and overall, traffic may be reduced in the area since recreational facilities would no longer be available as a result of the Proposed Project. Therefore, the Proposed Project would not create a substantial increase in traffic in the Project area. Impacts would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would eliminate the potential for construction-related traffic to and from the forebay. However, under Alternative 1, recreation-related traffic to and from the forebay would continue as under current conditions. Under Alternative 1 or the No Project Alternative, there would be no substantial increase in traffic along major roadways. There would be no additional impacts from these alternatives related to IMPACT 4.17-1 (Kilarc).

IMPACT 4.17-2 (Kilarc): Would the action impede traffic access to the area and residences during decommissioning?

Proposed Project

There are a few scattered residences in the Project Area. Decommissioning activities would be temporary, and access to residences would be maintained throughout decommissioning. Once decommissioning is complete, there would be minimal to no Project-related traffic. Impacts related to access would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site, Leaving the forebay in place would eliminate the potential for construction-related traffic to and from the forebay. However, under Alternative 1, recreation-related traffic to and from the forebay would continue as under current conditions. Under Alternative 1 and the No Project Alternative, would not impede traffic access to the area and residences. There would be no additional impacts from these alternatives related to IMPACT 4.17-2 (Kilarc).

IMPACT 4.17-3 (Kilarc): Would the action result in inadequate emergency access?

Proposed Project

The Kilarc Development is relatively isolated and minor improvements are proposed to provide improved access to Project facilities to enable decommissioning. With the addition of improved access roads, emergency access during decommissioning would be enhanced within the Project Area. Improvements would be limited to the existing road bed and consist primarily of surface smoothing and pothole filling. Some of these proposed access roads would cross private property. PG&E would discuss proposed access with the private property owners. Since the Project is primarily isolated in nature and hauling and construction traffic would be minimal as shown in Table 4.17-1, it is not expected that implementation of the Proposed Project would result in inadequate emergency access. In addition, construction equipment would be transported to locations along major Project roads and travel under their own power to work sites in order to minimize overall impacts to the associated area, including blockage of roadways. Impacts related to emergency access would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would eliminate the potential for construction-related traffic to and from the forebay. However, under Alternative 1, recreation-related traffic to and from the forebay would continue as under current conditions. Under Alternative 1 and the No Project Alternative,

there would be no reduction in emergency access. There would be no additional impacts from these alternatives related to IMPACT 4.17-3 (Kilarc).

IMPACT 4.17-4 (Kilarc): Would the action conflict with any applicable plans or policies related to transportation and alternative transportation facilities?

Proposed Project

Since the area is relatively undeveloped and remote in nature, there are limited roads and trails. No public roads are proposed to be removed or altered as part of the Proposed Project with the exception of access to Kilarc Forebay which would be closed to public access. The Proposed Project would not conflict with adopted policies, plans, or programs regarding roadways, public transit, bikeways, or pedestrian facilities, or otherwise substantially decrease the performance or safety of such facilities. Impacts would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 1 and No Project Alternative

Alternative 1 and the No Project Alternative would result in no change at the Kilarc Forebay site. Leaving the forebay in place would eliminate the potential for construction-related traffic to and from the forebay. However, under Alternative 1, recreation-related traffic to and from the forebay would continue as under current conditions. Under Alternative 1 and the No Project Alternative, no conflict with transportation plans or policies would result. There would be no additional impacts from these alternatives related to IMPACT 4.17-4 (Kilarc).

4.17.4.2 Cow Creek

IMPACT 4.17-5 (Cow Creek): Would the action create a substantial increase in traffic along major roadways in the area during decommissioning activities?

Proposed Project

As with the Kilarc Development, due to the lack of continuous hauling activities and the minor increase in traffic resulting from heavy equipment use and worker transportation, impacts related to substantial increases in traffic and the changes to existing roadway level of service would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed on private lands to continue flows to the Abbott Diversion, and construction-related activities would generate an increase in traffic along local roadways. However, this increase would be temporary and short-term, and impacts would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, there would be no generation of construction-related traffic, and therefore, no additional impacts from this alternative related to IMPACT 4.17-5 (Cow Creek).

IMPACT 4.17-6 (Cow Creek): Would the action impede traffic access to the area and residences during decommissioning?

Proposed Project

There are a few scattered residences in the Project Area. Decommissioning activities would be temporary, and access to residences would be maintained throughout decommissioning. Once decommissioning is complete, there would be minimal to no Project related traffic. Impacts related to access would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed on private lands to continue flows to the Abbott Diversion, and construction-related activities would generate an increase in traffic along local roadways. However, this increase would be temporary and short-term. Access to the area or residences would be maintained during construction, and access and maintenance agreements would be developed with private landowners as necessary. Therefore, impacts would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, there would be no generation of construction-related traffic, and therefore, no additional impacts from this alternative related to IMPACT 4.17-6 (Cow Creek).

IMPACT 4.17-7 (Cow Creek): Would the action result inadequate emergency access?

Proposed Project

The Cow Creek Development is relatively isolated and minor improvements are proposed to provide improved access to Project facilities to enable decommissioning. With the addition of improved access roads, emergency access during decommissioning would be enhanced within the Project Area. Improvements would be limited to the existing road bed and consist primarily of surface smoothing and pothole filling. Some of these proposed access roads would cross private property. PG&E would discuss proposed access with the private property owners. Since the Project is primarily isolated in nature and hauling and construction traffic would be minimal as shown in Table 4.17-1, it is not expected that implementation of the Proposed Project would result in inadequate emergency access. In addition, construction equipment would be

transported to locations along major Project roads and travel under their own power to work sites in order to minimize overall impacts to the associated area, including blockage of roadways. Impacts related to emergency access would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed on private lands to continue flows to the Abbott Diversion, and construction-related activities would generate an increase in traffic along local roadways. However, this increase would be temporary and short-term. Access and maintenance agreements would be developed with private landowners as necessary. Therefore, impacts would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, there would be no generation of construction-related traffic, and therefore, no additional impacts from this alternative related to IMPACT 4.17-7 (Cow Creek).

IMPACT 4.17-8 (Cow Creek): Would the action conflict with any applicable plans or policies related to transportation and alternative transportation facilities?

Proposed Project

Since the area is relatively undeveloped and remote in nature, there are limited roads and trails. No public roads are proposed to be removed or altered as part of the Cow Creek portion of the Proposed Project. The Proposed Project would not conflict with adopted policies, plans, or programs regarding roadways, public transit, bikeways, or pedestrian facilities, or otherwise substantially decrease the performance or safety of such facilities. Impacts would be less than significant.

- **Level of Significance:** Less than Significant
- **Mitigation Measures:** None required

Alternative 2A, 2B, 2C, and 2D

Under Alternative 2A. ADU would continue to access water at the current point of diversion. Under Alternative 2B, 2C, and 2D, new features would be installed on private lands to continue flows to the Abbott Diversion, and construction-related activities would generate an increase in traffic along local roadways. However, this increase would be temporary and short-term. No conflict with applicable plans or policies is anticipated, and impacts would be less than significant.

No Project Alternative

Under the No Project Alternative, existing features of the Cow Creek Development would remain in place. Because no construction activities would occur, there would be no conflict with applicable plans or policies, and therefore, no additional impacts from this alternative related to IMPACT 4.17-8 (Cow Creek).

Chapter 5 Additional Discussion of Environmental Impacts

5.1 Introduction

This chapter presents discussions of irreversible impacts, significant and unavoidable impacts, growth-inducing impacts, and cumulative impacts as required by the CEQA Guidelines. This chapter also includes a comparison of impacts of the project alternatives to the Proposed Project.

5.2 Irreversible Impacts

CEQA Guidelines Section 15126.2(c) requires that an EIR discuss the significant irreversible environmental changes that would result from the implementation of a Proposed Project. These changes include use of nonrenewable resources during a project's initial and continued phases. A project's primary and secondary impacts that would commit future generations to similar uses (e.g., highway improvements that provide access to a previously inaccessible area) would be irreversible changes.

With the exception of new temporary access roads, the Proposed Project does not include the construction of any new facilities; therefore, it would not result in a large commitment of any non-renewable natural resources to such activities. Accordingly, the Proposed Project would not involve any significant irreversible impacts.

5.2.1 Energy Resources

As a result of the Proposed Project, the existing hydroelectric generating capacity (4.67 MW) would be eliminated, as described in detail in Section 4.10, Greenhouse Gas Emissions. Because it is an existing small hydroelectric generation facility of 30 MW or less, under California Public Utilities Code Section 399.12(e), the Project meets the definition of a "renewable electrical generation facility" and is therefore an eligible renewable energy resource. The existing hydroelectric production contributes to PG&E's overall percentage of renewable energy sources under the RPS mandate, which as described in Section 4.10.2.2 above was at 33% in 2016. As a result, PG&E has met the 33% RPS procurement requirement and is forecasted to meet 50% RPS procurement by the year 2020. Furthermore, PG&E along with other independently-owned utilities have significant excess RPS procurement (CPUC 2017a).

Considering that PG&E has met and exceeded the RPS procurement target, any short-term losses of renewable energy production from the Project has already been replaced. The Proposed Project would not result in a short-term reduction of renewable energy that would impact PG&E's ability to comply with the RPS program.

5.3 Significant Impacts

Unavoidable significant adverse impacts are those effects that would significantly affect either natural systems or other community resources, and cannot be mitigated to less than significant. Each of the significant impacts associated with decommissioning activities would be reduced to less-than-significant levels by mitigation measures or alternatives specified in this EIR.

5.4 Growth-Inducing Impacts

Section 15126.2(d) of the CEQA Guidelines requires an EIR to include a detailed statement of a Proposed Project's anticipated growth-inducing impacts. The analysis of growth-inducing impacts must discuss the ways in which a Proposed Project could foster economic or population growth or the construction of additional housing in the project area. The analysis must also address project-related actions that, either individually or cumulatively, would remove existing obstacles to population growth. A project would be considered growth inducing if it induces growth directly (such as through the construction of new housing or increasing population) or indirectly (such as increasing employment opportunities or eliminating existing constraints on development). Under CEQA, growth is not assumed to be either beneficial or detrimental.

The Proposed Project would not involve new development or infrastructure installation that could directly induce population growth in the Project Area. Additionally, the Project would not involve construction of new housing or create a demand for additional housing. Minimal staff would be required to carry out the proposed activities that are short-term in nature.

Furthermore, the Proposed Project would not displace any existing housing units or persons. The Project Area is located on primarily privately owned lands, and no housing exists within the limits of proposed activity. Therefore, the Proposed Project would have no impact on population growth or housing demand.

5.5 Cumulative Impacts

5.5.1 Introduction

The CEQA Guidelines, section 15355 defines cumulative impacts as two or more individual effects that, when considered together, are considerable or that compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects. The cumulative impact from several projects is the change in the environment that results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probably future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

CEQA requires a summary of the expected environmental effects to be produced by those projects, with specific reference to additional information stating where that information is available, and a reasonable analysis of the cumulative impacts of the relevant projects. An EIR must examine reasonable options for mitigating or avoiding any significant cumulative effects of a Proposed Project.

5.5.2 Approach

5.5.2.1 Projects included in the Cumulative Impact Analysis

The CEQA Guidelines, section 15130, subdivision (b), requires either (1) a list of past, present, and reasonably foreseeable future projects producing related or cumulative impacts, including those projects outside the control of the lead agency ("list approach"); or (2) a summary of projects contained in an adopted general plan or related planning document that is describes or evaluates conditions contributing to the cumulative effect ("plan approach"). Projects included in this cumulative impact analysis were identified using a list approach and are those that could

result in impacts on the same resources in the same geographic areas as the Project. The general area that was considered in the cumulative impact analysis is Shasta County. Shasta County projects were examined for their potential to result in a cumulative impact when combined with the Project.

5.5.2.2 Cumulative Impact Methodology

The cumulative impact analysis is based on CEQA requirements. When assessing whether there would be a significant cumulative impact from implementation of the Project in combination with other projects, the analysis considers whether the incremental effects of the Project would be cumulatively considerable (Pub. Resources Code, § 21094, subd. (e)(2)). As set forth in the CEQA Guidelines, section 15064, subdivision (h)(4), the mere existence of significant cumulative impacts caused by other projects alone does not constitute substantial evidence that the Proposed Project's incremental effects are "cumulatively considerable." "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (CEQA Guidelines, § 15064, subd. (h)(1)).

The Proposed Project's incremental contribution to a cumulative effect would not be cumulatively considerable if the project would comply with the requirements in a previously approved plan or mitigation program (including, but not limited to, water quality control plan, air quality attainment or maintenance plan, integrated waste management plan, habitat conservation plan, natural community conservation plan, plans or regulations for the reduction of greenhouse gas emissions) that provides specific requirements that will avoid or substantially lessen the cumulative problem within the geographic area in which the project is located (CEQA Guidelines, § 15064, subd. (h)(3)). Such plans or programs must be specified in law or adopted by the public agency with jurisdiction over the affected resources through a public review process to implement, interpret, or make specific the law enforced or administered by the public agency (CEQA Guidelines, § 15064, subd. (h)(3)).

5.5.3 Analysis of Cumulative Impacts by Project

This section describes the projects included in the cumulative impact analysis, the status of their environmental documentation, and the environmental impacts of those projects (identifying only those resources that would also be affected by the Proposed Project and alternatives).

5.5.3.1 Tierra Robles Planned Development Project

- **Project Description.** The Tierra Robles Planned Development Project is located approximately 5 miles east of the City of Redding, between the unincorporated communities of Bella Vista and Palo Cedro. The proposed project consists of a residential Planned Development requiring a Zone Amendment to change the current zoning from Rural Residential 5-acre minimum (RR-BA-5), Rural Residential 3-acre minimum (RR-BA-3), and Unclassified (U) to a Planned Development (PD) zone district establishing a conceptual development plan covering the entire site; and a Tract Map to divide the 715.4-acre property into 166 residential parcels ranging from 1.5 acres to 7.5 acres in size, and four open space parcels totaling 175.4 acres. As proposed, the project would include a non-contiguous annexation of the 715.4-acre property into County Service Area No. 8, for sewage treatment and disposal.

- **Project Environmental Analysis Status and Anticipated Environmental Impacts.** The project's Initial Study, dated October 26, 2012, concluded that the project could potentially result in significant environmental impacts on following resources: aesthetics, agriculture resources, air quality, biological resources, cultural resources, geology and soils, hazards and hazardous materials, hydrology and water quality, land use and planning, noise, population and housing, public services, transportation/traffic, and utilities and service systems. Shasta County is the Lead Agency under CEQA and is preparing an EIR for the project.

5.5.3.2 Moody Flats Quarry Project

- **Project Description.** The Moody Flats Quarry Project is located in the Mountain Gate area of Shasta County approximately one mile west of the Interstate 5 interchange with Old Oregon Trail, Wonderland Boulevard, and Holiday Road, and adjacent to the north boundary of the City of Shasta Lake. The Moody project includes the following components:
  - Proposed General Plan Amendment 09-002 to change the General Plan land use designation of three parcels totaling 233.55 acres from Suburban Residential (SR) to Mineral Resource (MR); the designation of two parcels totaling 0.06 acres from Rural Residential A (RA) to MR; and the designation of one 512.7-acre parcel from MR and Industrial (I) to MR.
  - Proposed Zone Amendment 09-013 to change the zoning of three parcels totaling 233.55 acres from the Interim Rural Residential Zone District (IR) to the Mineral Resource Zone District (MR); the zoning of two parcels totaling 0.06 acres from the Community Commercial Zone District combined with the Design Review Zone District (C-M-DR) to the Mineral Resource Zone District (MR); and the zoning of one 512.7-acre parcel from the Mineral Resource Zone District (MR) and the General Industrial Zone District (M) to the Mineral Resource Zone District (MR).
  - Use Permit 09-018 for a proposed 345-acre quarry (including a 60-acre overburden fill area) with a 75-acre processing area including an aggregate crushing, screening, and washing plant, a Portland cement concrete plant, an asphalt concrete plant, a recycled construction materials processing plant, truck and railroad loading facilities, and access roads. The quarry production would be about 2 million tons per year of which about 75% would be shipped by rail and 25% shipped by truck. The quarry would operate from 6 am to 10 pm, Monday through Friday, and 6 am to 3 pm on Saturdays. Processing, loading, and hauling would occur up to 24 hours per day, 7 days per week. The proposed term of the use permit would be 100 years.
  - Reclamation Plan 09-001 to reclaim the proposed 345-acre quarry (including a 60-acre overburden fill area), the 15-acre primary processing plant area, and the10-acre railroad cut area. The secondary and ancillary processing and loading area would remain for use as an industrial site. A total of about 430 acres would be disturbed, and about 370 acres would be reclaimed. The reclaimed areas would be used for open space and possibly water storage (Shasta County Department of Resource Management 2011).

- **Project Environmental Analysis Status and Anticipated Environmental Impacts.** The project's Initial Study, dated April 12, 2011, indicated that the project has the potential to significantly impact the following resources: aesthetics, agricultural resources, air quality, biological resources, cultural resources, geology/soils, greenhouse gas emissions, hazards and hazardous materials, hydrology/water quality, land use/planning, noise, transportation/traffic, and utilities/service systems. The County of Shasta, State of California, acting as the lead agency, is preparing an Environmental Impact Report (EIR) for the project. The period for receiving comments regarding potential environmental impacts of the project to be addressed in the EIR ended February 14, 2012 (Shasta County Department of Resource Management 2011).

5.5.3.3 Panorama Planned Development

- **Project Description.** The Panorama Planned Development Project occupies 307 acres located in the northeast portion of the Cottonwood Planning Area, approximately 1 mile south of the City of Anderson. The project area is bounded by Locust Road to the west with Trefoil Lane and Balls Ferry Road to the south. The project applicant is requesting approval of a planned residential development in the Cottonwood Planning Area, consisting of approximately 430 lots on a 307-acre site. Approximately 130 acres will be preserved as open space. Lot sizes will vary from 4,000-square-feet to over three acres, which necessitates a General Plan Amendment to "Suburban Residential" and a Zone Amendment to "Planned Development."

  In accordance with Shasta County's Planned Development zone district requirements, the applicant proposes to incorporate the following design features into the project: 1) inclusion of a passive solar design program to ensure all new homes within the development will reduce annual energy consumption by at least 15 percent; 2) provision of lot sizes between 4,000 and 5,000 square feet for construction of detached single-family housing involving 42 percent of all proposed dwelling units; 3) an eight-foot-wide Class 1 public bikeway that would connect Locust Road to Balls Ferry Road through the project site; and 4) sidewalks with a minimum 4-foot-wide landscaped area with trees located between the roadway and sidewalk.

  The Project would also include installation of a private RV storage facility; construction of internal street network; utility and storm-drain improvements necessary to serve all lots; expansion of current domestic water service, including the construction of an additional well on site and a water storage tank off site; improvements and expansion of the Cottonwood Sewer District CSA #17 facilities (consisting of 1.5 million gallon Emergency Retention Basin/Sludge Storage Basin, pump stations and force main); and dedication of right-of-way for future realignment of Balls Ferry Road at the railroad intersection.

- **Project Environmental Analysis Status and Anticipated Environmental Impacts.** According to the project's Draft EIR, dated April 19, 2010, all project impacts can be reduced to less-than-significant levels with incorporation of the mitigation measures, with the exception of impacts with regard to the conversion of farmland; project-generated traffic impacts at the Riverside Avenue/NB I-5 ramps intersection; cumulative traffic impacts at the Main Street/Fourth Street intersection, on mainline Interstate 5, and at the I-5 ramp intersections with Riverside Avenue and Balls Ferry Road; and increased

greenhouse gas emissions attributable to the proposed project and cumulative development.

5.5.3.4 Knighton & Churn Creek Commons Retail Center

- **Project Description.** The project applicant has proposed to develop and operate a commercial retail, dining, entertainment, and lodging center on approximately 92 acres in Shasta County, located at the northeast corner of the Knighton Road and the Interstate 5 interchange. When completed, the project would include approximately 740,000 square feet of mixed commercial development (which may include retail shops, restaurants, lodging, food supplies, recreation activities and equipment, traveler services including gasoline fueling facilities and entertainment-related facilities) to be phased in accordance with market conditions and required improvement thresholds. The proposed project site is bordered by I-5 to the west, Churn Creek Road to the east, and Knighton Road to the south (Quad Knopf 2011).
- **Project Environmental Analysis Status and Anticipated Environmental Impacts.** The Final EIR for the project, dated May 2011, found that the project may result in significant impacts to the following resources: aesthetics; air quality; biological resources; geology, soils, and mineral resources; hazards and hazardous materials; hydrology and water quality; land use, planning, population and housing; noise; public services and recreation; transportation and circulation; utilities and service systems; and global climate change (Quad Knopf 2011).

5.5.3.5 Sierra Pacific Industries Cogeneration Power Plant Project

- **Project Description.** The 154-acre Sierra Pacific Industries Cogeneration Power Plant Project is located at the end of Riverside Avenue, ½ mile west of the Interstate 5 interchange. The proposed project consists of the construction and operation of a new cogeneration power facility, including a new boiler, fuel shed, boiler building, turbine building, cooling tower, electrostatic precipitator, ash silo, and electric substation, on the SPI Anderson sawmill site. The boiler associated with the plant would burn biomass fuel (i.e., non-treated wood and agricultural crop surplus, as well as urban wood waste) generated by the lumber manufacturing facility on-site, regional lumber manufacturing facilities, and other biomass fuel sources to produce up to 250,000 pounds of steam per hour. The steam would be used to dry lumber in existing kilns and to power a steam turbine. The steam turbine would drive a generator that would produce up to 31 megawatts (MW) of electricity. Approximately 7 MW would be used to power on-site equipment; the remainder would be sold on the open market to a publicly regulated utility. The electricity that is sold would originate from the on-site electric substation and be transferred to the local power grid for distribution to the purchaser.
- **Project Environmental Analysis Status and Anticipated Environmental Impacts.** Shasta County supervisors approved a use permit for the project in July 2012. A Final EIR, dated May 2012, identified significant and unavoidable impacts for the following resources: aesthetics, air quality and climate change, and transportation and circulation (De Novo Planning Group 2012).

5.5.3.6 Hatchet Ridge Wind Project (HRW)

- **Project Description.** HRW, an affiliate of RES and Renewable Energy Systems LTD (RES), filed a Conditional Use Permit application with the Shasta County Department of Resource Management on June 6, 2006. RES proposes to construct and operate a wind energy project in eastern Shasta County. The proposed project site includes a portion of Hatchet Mountain, located approximately 7 miles west of the town of Burney and 34 miles northeast of Redding. The proposed project would be located on private land owned by Sierra Pacific Industries and the Fruit Growers Supply Company. HRW has a long-term lease agreement with Sierra Pacific Industries and is negotiating a long-term lease with Fruit Growers Supply Company for the parcels where the wind energy project would be developed (Shasta County Department of Resource Management 2008).

  HRW proposes to construct up to 68 three-bladed wind turbines along a 6.5-mile turbine string corridor on Hatchet Ridge. Each wind turbine would be installed on a tubular steel tower up to 262 feet (80 meters) tall. Each turbine/tower combination would have a maximum height of approximately 420 feet (128 meters), measured from the ground to the turbine blade tip at its highest point. The exact height and placement of the turbines and associated facilities within the development corridor would be determined by such factors as equipment manufacturer and environmental constraints. HRW has requested to make these final turbine and equipment siting determinations prior to construction but subsequent to this environmental analysis. The final permanent project footprint of the Hatchet Ridge Wind Energy project would be approximately 73 acres (Shasta County Department of Resource Management 2008).

- **Project Environmental Analysis Status and Anticipated Environmental Impacts.** A final environmental impact report (EIR) was prepared in 2008 to comply with the California Environmental Quality Act (CEQA) for the Hatchet Ridge Wind Project (proposed project). The EIR identified potentially significant environmental impacts as well as mitigation measures to reduce the significance of those impacts, where feasible. Potentially significant and unavoidable impacts were identified for the following resource areas: Aesthetics and Visual Resources; Biological Resources; and Cultural Resources.

5.5.3.7 Elk Trail Area Annexation and Water System Improvements

- **Project Description.** The Elk Trail Area Annexation and Water System Improvements Project involves annexation of the study area into County Service Area No. 6, and expansion of the existing Jones Valley Water System to serve the existing Elk Trail West (ETW) and Elk Trail East (ETE) Subdivisions. The subdivisions were developed in the 1970s. ETW consists of 56 parcels on approximately 337 acres. Seven (13%) of these parcels are undeveloped. ETE consists of 140 parcels on approximately 1520 acres, of which, 72 parcels (51%) are undeveloped. Eight parcels adjacent to the Elk Trail subdivisions, consisting of about 320 acres, are also proposed to be served by the expanded water system (Shasta County Department of Public Works 2008).

- **Project Environmental Analysis Status and Anticipated Environmental Impacts.** The project's initial study, dated December 26, 2008, stated that the project has the potential to cause significant effects involving biological resources and cultural resources. Mitigation measures have been identified and agreed to by Shasta County that will

reduce these potential impacts to below a level of significance (Shasta County Department of Public Works 2008).

5.5.3.8 Swede Creek Road Bridge Replacement at Little Cow Creek

- **Project Description.** The Swede Creek Road Bridge Replacement Project is located on Swede Creek Road, just north of its intersection with Bridlewood Lane, approximately 1.6 miles north of Old Forty-Four Drive, approximately 2.4 miles north of State Highway 44, and about 2 miles northeast of the community of Palo Cedro. The existing three-span, 105-foot long by 12-foot wide bridge over Swede Creek will be widened to 33.3 feet wide. The north approach roadway will require about 230 feet of approach work. The south approach roadway will require approximately 420 feet of roadway realignment. The existing bridge is a reinforced concrete slab bridge constructed in 1968. It was built utilizing existing abutments, which were built in 1939. The widening will utilize the same bridge type and thickness. The Proposed Project would require approximately 0.29 acre of additional right-of-way to be acquired from four parcels. There are utility poles on the south end of the bridge that will need to be relocated. The existing bridge will remain open while the majority of the widening takes place. Once the new portion is complete, traffic will be routed onto this new structure while a closure pour is completed tying the old and new structures together. A concrete overlay will be placed on the existing bridge to match the cross slopes of the new bridge. The widening will be founded on spread footings to match the existing bridge foundation, but will probably be a couple of feet deeper to account for degradation of the creek channel. Excavation for the structural section and roadside ditches will be up to three feet deep. The northern approach will require some fill material for the widening. The fills are up to 10 feet above original ground on the northern approach. This material will be generated from the cut material on the southern approach (Shasta County Department of Public Works 2008).
- **Project Environmental Analysis Status and Anticipated Environmental Impacts.** The CEQA determination for the project, based on its Initial Study stated, “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.” Impacts to biological resources may be potentially significant unless mitigation is incorporated. Best Management Practices will be utilized as necessary to prevent erosion. Conservation measures will be incorporated into the project to minimize potential effects on federally listed species, as well as other biological resources (Shasta County Department of Public Works 2008).

5.5.3.9 Shasta County Road and Bridge Improvements

- **Project Description.** The Shasta County Department of Public Works has several current road-widening projects scheduled or taking place, related to the construction and maintenance of the county's roads and bridges. These include the East Redding Bike Lane Project, the Old Oregon Trail Two-Way Left Turn Lane Project, Fern Road East, and the Whitmore Road Widening Project; also, projects at the Glendenning Creek Bridge and Swede Creek Road at Little Cow Creek Bridge (Shasta County Department of Public Works 2013).

- **Project Environmental Analysis Status and Anticipated Environmental Impacts.** These road and bridge improvement projects are not anticipated to result in significant environmental impacts. Some Shasta County transportation routes may overlap with those used for the Project.

5.5.4 Cumulative Effects of the Proposed Project

This section summarizes the cumulative impacts, organized by resource area that would result from the implementation of the Proposed Project and the related projects described above.

5.5.4.1 Aesthetics and Visual Resources

The aesthetic and visual resource impacts of individual projects can often be mitigated through site and landscape design, avoidance of significant visual features, and compliance with city and county development standards. With the exception of new access roads, the Proposed Project does not include any new construction or sources of light or glare. Because of the generally forested condition of the areas surrounding the various project elements, most of the scenic vista opportunities are substantially limited or are non-existent, and most project elements are located either on private property, away from public roadways, or are too remote to be seen by the viewing public. The Project's contribution to cumulative impacts with regard to aesthetics and visual resources would be less than significant.

5.5.4.2 Agricultural and Forestry Resources

Implementation of the Proposed Project at the Cow Creek Development would end the augmented flows to Hooten Gulch, resulting in insufficient flows to fulfill the ADU water right at the current point of diversion. Because flows from the Abbott Diversion are used by area farming and ranching operations for flood irrigation, the removal of flows from the diversion would have a significant long-term impact on existing agricultural uses for crop, pasture, and livestock production. While implementation of the Proposed Project would not directly convert any existing farmland to non-agricultural use, the loss of water for agricultural purposes represents changes in the existing environment which could indirectly result in the conversion of farmland to non-agricultural use by reducing the ability of the landowners and ADU to use their lands for such purposes. The Proposed Project and the cumulative projects contain lands designated as important farmland in Shasta County. Implementation of the Proposed Project plus the cumulative projects would affect a small percentage of available agricultural land within the County, and, the cumulative impact on agricultural lands would be less than significant.

It should be noted that all of the Abbott Ditch alternatives (Alternative 2A, 2B, 2C, or 2D) would prevent the loss of farmlands owned or operated by the ADU, and therefore would not indirectly convert farmland to non-agricultural use. As compared to the Proposed Project, the significant impact would be lessened to no impact under these alternatives.

5.5.4.3 Air Quality

The Proposed Project would be in conformance with the AQMP, and would not result in operational impacts that would significantly increase criteria pollutant emissions over the long-term. Furthermore, short-term Project construction activities are not considered to be a significant source of criteria pollutants on an individual basis. The CEQA Guidelines (Cal. Code Regs., tit. 14, § 15064, subd. (h)(3)) state that for an impact involving a resource that is addressed by an approved plan or mitigation program, the lead agency may determine that a

project's incremental contribution is not cumulatively considerable if the project complies with the adopted plan or program. The Project is in conformance with the AQMP and the Project has no long-term impacts, and is not significant on an individual basis during construction activities. Therefore, the Project's incremental contribution to criteria pollutant emissions is not cumulatively considerable.

5.5.4.4 Aquatic and Fisheries Resources

The Proposed Project would result in improved conditions for resident fish species in the Kilarc Development and improved conditions for both native anadromous and resident fish species in the Cow Creek Development. Although there may be a loss of some spawning habitat as a result of the Proposed Project, increased flows in the bypassed reaches would facilitate improved access to spawning habitat by both anadromous and resident fish species. Overall, the Project is expected to have minor to negligible benefit for juvenile rearing habitat of native, fish species within the Cow Creek Development. Implementation of the Proposed Project combined with the cumulative projects would be less than significant.

5.5.4.5 Terrestrial Biological Resources

Short-term, minor, adverse impacts would occur to existing upland vegetation communities as a result of the Proposed Project, and effects to riparian and wetland vegetation would be minor and short-term. Vegetation is expected to re-establish where conditions remain appropriate and riparian and wetland areas would return to more natural seasonal and cyclic hydrologic conditions. To the extent practical, special status plant species would be avoided. Restoration of disturbed or cleared areas by reseeding will hasten growth of noxious vegetation species and minimize soil erosion. In general, the effects on birds and mammals would be short-term and temporary and not severe enough to affect the survival of a species or population. Mitigation and restoration of riparian and wetland areas would minimize effects of habitat loss on birds and mammals. No direct impacts to terrestrial special status species are expected, though short-term adverse effects could occur to potential habitat. Impacts to terrestrial biological resources would be minimized through the implementation of PM&E measures. Implementation of the Proposed Project plus the cumulative projects would have a less than significant impact on terrestrial resources.

As discussed above, the Proposed Project does not include a means of maintaining water flows to Abbott Ditch, which currently relies almost completely on releases from the Cow Creek Development into Hooton Gulch. Therefore, under the Proposed Project, much of the land irrigated and otherwise watered by Abbott Ditch would cease to have a summer supply of water. Riparian and wetland habitats on these lands would be affected. It is likely that nearly all of the fresh emergent wetlands and much of the riparian habitat associated with these irrigated lands would revert to the surrounding blue oak-digger pine and dry non-native annual grassland habitat types. The proposed PM&E measures would address losses of wetlands and riparian habitat, but are not likely to provide adequate mitigation for this site. Implementation of mitigation measures identified for Impact 4.7-9 and 4.7-10 would reduce the Proposed Project's contribution to cumulative impacts.

Implementation of the Proposed Project plus the cumulative projects would affect a small percentage of riparian habitat in the region. The Project's contribution to cumulative impacts resulting from the conversion of riparian habitats, such as those associated with the Abbott

Ditch are considered less than significant with mitigation. It should be noted that all of the Abbott Ditch alternatives (Alternatives 2A, 2B, 2C, or 2D, would avoid the loss of wetlands and riparian habitat in the areas irrigated and thus under hydrological influence by Abbott Ditch, and the significant impact would be lessened to no impact under these alternatives.

5.5.4.6 Cultural Resources

A project's impacts with respect to cultural resources are generally site specific and would not affect or be affected by other development in the region. Given past investigations in the region, cultural resources are likely to be present at some of the cumulative project sites. Mitigation would be provided on an individual project basis by examining specific project circumstances, in accordance with Shasta County requirements. Environmental review would be required for the cumulative projects as with the Proposed Project. With PG&E's PM&Es and compliance with the 2015 Memorandum of Agreement, as discussed in Section 4.8, the Proposed Project would not result in significant impacts on cultural resources. Cumulative impacts on cultural resources would be less than significant.

5.5.4.7 Geology and Soils

A project's impacts with respect to geology are generally site specific and would not affect or be affected by other development in the region. As a result of the Proposed Project, erosion could occur (1) during removal of structures in the stream banks and creek restoration activities; (2) off-stream along the canals along natural drainage paths that previously drained into the canals, and (3) with the increased use of access roads or the construction of new access roads. Grading or other site preparation activities could cumulatively contribute to soil erosion and the resultant siltation of local creeks. However, the Proposed Project would implement erosion control measures (PM&Es and Best Management Practices [BMPs]), and cumulative projects would also be required to implement BMPs to avoid adverse impacts to geologic and soil resources. Therefore, cumulative geologic impacts would be less than significant.

5.5.4.8 Greenhouse Gas Emissions

In the short term there would be a *decrease* in CO_2-e associated with the cessation of workers commuting to and from the Project area for operation and maintenance, along with a decrease due to filling of the Kilarc Forebay. There would be an *increase* in GHGs associated with vegetation loss and construction activities. As a result, there would be a total net increase in GHG emissions, compared with existing conditions, of about 55 MT CO_2-e/yr. This would be an increase of about 0.001 percent compared to existing GHG emissions in Shasta County.

In the long term there would be an overall reduction in GHG emissions. Shasta County has developed specific goals to reduce community GHG emissions for three target dates: 2020, 2035, and 2050. While the implementation of the Project would result in the loss of hydroelectric production, PG&E has already replaced this with other eligible renewable energy in order to meet their RPS procurement requirements. Therefore, the Proposed Project would not impair, or adversely affect, the ability of the county to achieve its GHG goals for 2020. Overall, the Proposed Project would help the county achieve its 2020 GHG target. The Proposed Project would result in less than considerable contributions to cumulative effects.

5.5.4.9 Hazards and Hazardous Materials

The transport of by surface runoff from the Proposed Project would be regulated by storm water pollution prevention BMPs and PM&Es. Implementation of the Proposed Project and cumulative projects would also result in the handling of hazardous materials, and to a minor extent would result in a temporary increase in hazardous materials transport, use, and disposal. Although there is some potential for accidental release of hazardous materials, the risk would be minimized through compliance with federal, state, and local regulations. If an accidental release of hazardous materials were to occur, it would be a short-term event, and would not have a cumulative contribution. Adherence to regulations would preclude activities that could lead to long-term, cumulative impacts related to the handling and/or use of hazardous materials.

Implementation of the Proposed Project would occur in an area of "Very High" fire hazard. During wildfire emergencies in the project area, the Kilarc Forebay has provided a source of water to aid in the suppression of active wildfires. The Proposed Project would remove this source of water; however, there are several other water bodies within approximately 15 miles of the Kilarc Forebay accessible via helicopter for fire suppression. Additionally, wide points along creeks in the area have been successfully used in the past for water collection via helicopter. Implementation of PM&E measures would help to minimize the potential for ignition of flammable materials during project activities. The cumulative projects, depending on their location within the County and the area's potential for wildland fire, may increase demands on local fire protection districts. Mitigation would be provided on a project specific basis, and the Project's contribution to cumulative impacts with regard to wildland fire would be less than significant.

5.5.4.10 Hydrology and Geomorphology

Implementation of the Proposed Project would result in changes to the hydrologic features in the project area, such as streamflow regime, channel adjustments, surface hydrology and drainage patterns, groundwater recharge, surface flows. However, with implementation of PM&E measures, impacts to the hydrology and geomorphology of the project area were determined to be less than significant. The Proposed Project and cumulative projects may have a cumulative impact on surface water quality, groundwater quality, groundwater availability, and/or storm water drainage. However, most of the cumulative projects are located outside the affected watershed and would not contribute cumulatively to impacts within the watershed. Furthermore, cumulative projects would also be required to implement BMPs to avoid adverse impacts to hydrologic features. Therefore, cumulative hydrology and geomorphology impacts would be less than significant.

5.5.4.11 Water Quality

Implementation of the Proposed Project could affect water quality in the short-term as a result of increased turbidity as a function of decommissioning activities, accidental spills of hazardous materials from construction vehicles, and increase in turbidity associated with storm water runoff. However, the impacts to water quality would be temporary in nature, and in the long term there would be no change in turbidity compared to current conditions. Furthermore, the Proposed Project would implement erosion control measures (PM&Es and Best Management Practices (BMPs)), and cumulative projects would also be required to implement BMPs to avoid adverse impacts to water quality. Therefore, cumulative water quality impacts would be less than significant.

5.5.4.12 Land Use

The Proposed Project would cause short term land use impacts as a result of removal or disposition of project facilities, and temporary disturbance by equipment operation would also occur. However, the Proposed Decommissioning Plan (PDP) (see Appendix B-2) prepared for the Proposed Project was based in part on consultation with interested parties, including affected landowners; and specific decommissioning actions were developed in consultation with the affected landowners. The Proposed Project would not change any existing land uses, and the Proposed Project would be consistent with the Shasta County General Plan and the Shasta County Zoning Plan. Therefore, implementation of the Proposed Project would not result in cumulative land use impacts.

5.5.4.13 Noise

Implementation of the Proposed Project plus cumulative projects could result in construction-related noise temporarily exceeding noise thresholds identified in local plans, policies, and ordinances. All construction activities for the Proposed Project would be short-term and would be conducted during daylight hours. The work sites are characteristically remote and in scarcely populated unincorporated areas. Most activity areas are secluded from receptors by distance and topography and any noise generated at these locations would attenuate to insignificance. Mitigation would be implemented on a project specific basis, and cumulative construction-related noise impacts would be less than significant. The Proposed Project would not increase or create any new sources of operational noise; and therefore, cumulative operational noise impacts would also be less than significant.

5.5.4.14 Recreation

Existing Project facilities do not rely heavily on or involve public services such as parks, due to their nature as a hydroelectric power facility in a relatively remote area. Therefore, implementation of the Proposed Project plus cumulative projects would not increase demand for parks. However, the Proposed Project would lead to the loss of recreational facilities associated with Kilarc Forebay. The loss of recreational opportunities at the Kilarc Forebay is lessened somewhat due to the availability of numerous substitute recreational facilities in and around Shasta County. Implementation of the Proposed Project plus cumulative projects could lead to increased use of other recreational facilities in the County. However, this is not considered a significant impact. Implementation of Alternative 1 would avoid the loss of an established recreation facility.

5.5.4.15 Transportation and Traffic

The Proposed Project would involve temporary construction activities related to decommissioning activities. The primary source of traffic would be worker traffic as well as the hauling of heavy equipment to and from the site. It is also anticipated that heavy equipment would be staged onsite and therefore equipment would generally make one roundtrip to and from the site. Worker traffic would increase in the area; however, the local roads are not frequently traveled and are primarily rural roads used to access the Kilarc Forebay or scattered residences and ranches in the area. Therefore due to the lack of continuous hauling activities and the minor increase in traffic resulting from heavy equipment use and worker transportations, impacts to the local circulation network resulting from the Proposed Project plus cumulative projects would be less than significant.

5.5.5 Comparison of Impacts of the Proposed Project and Alternatives

Chapters 2 and 3 provide descriptions of the Proposed Project and Alternatives, respectively. Table 5-1 provides a comparison of the impacts that would result from implementation of the Proposed Project, Alternative 1, Alternative 2A, 2B, 2C, or 2D, or the No Project Alternative. The following is a brief description of the Proposed Project and alternatives as well as the associated environmental effects.

5.5.5.1 Proposed Project

Characteristics. PG&E proposes to surrender the license for operation of the Project and to decommission and remove or modify several Project features, including:

- remove diversion dams and allow for free passage of fish and sediment;
- leave in place some diversion dam abutments and foundations to protect stream banks and provide grade control;
- leave in place and secure powerhouse structures during decommissioning with an option for preservation of powerhouse structures for future reuse;
- remove electric generators, turbines, and other equipment;
- grade and fill forebays;
- in consultation with affected landowners, leave in place, breach, or fill canal segments and remove metal and wood flume structures; and,
- retire access roads to the project where possible.

Upon receipt of State Water Board certification and other required permits, including FERC's final approval; PG&E intends to commence decommissioning activities in phases beginning with either the Kilarc Development or the Cow Creek Development and then proceed to decommission the remaining development.

Environmental Effects. The Draft EIR analysis has determined that the Proposed Project:

- Would conflict with existing zoning for agricultural use, or a Williamson Act contract;
- Would involve other changes in the existing environment which could result in conversion of Farmland to non-agricultural use;
- Would result in impacts on wetlands and riparian habitats;
- Would physically degrade or diminish existing recreational resources.

Significant unavoidable impacts were identified for agricultural and recreational resources. For all remaining impacts determined to be significant, effective and feasible mitigation measures have been presented to reduce those impacts to levels that are less than significant.

Table 5-1 Comparison of Alternatives

Resource Area	Proposed Project	Alternative 1 Retaining Kilarc Forebay	Alternative 2, Option A Retaining Flow to ADU Via Existing Point of Diversion	Alternative 2, Option B Retaining Flow to ADU Via Restored East Channel	Alternative 2, Option C Retaining Flow to ADU Via New Pump in South Cow Creek	Alternative 2, Option D Retaining Flow to ADU Via New Conveyance to Hooten Gulch	No Project Alternative
Aesthetics/Visual Resources	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Agricultural and Forestry Resources	SU	LTS	N	N	N	N	S
Air Quality	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Aquatic and Fisheries Resources	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Terrestrial and Biological Resources	S	LTS	LTS	LTS	LTS	LTS	LTS
Cultural Resources	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Geology and Soils	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Greenhouse Gas Emissions	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Hazards and Hazardous Materials	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Hydrology and Geomorphology	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Water Quality	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Land Use	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Noise	LTS	LTS	LTS	LTS	LTS	LTS	LTS

Resource Area	Proposed Project	Alternative 1 Retaining Kilarc Forebay	Alternative 2, Option A Retaining Flow to ADU Via Existing Point of Diversion	Alternative 2, Option B Retaining Flow to ADU Via Restored East Channel	Alternative 2, Option C Retaining Flow to ADU Via New Pump in South Cow Creek	Alternative 2, Option D Retaining Flow to ADU Via New Conveyance to Hooten Gulch	No Project Alternative
Recreation	SU	N	NA	NA	NA	NA	S
Transportation and Traffic	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Greater Impact							
Lesser Impact		1	2	2	2	2	
Similar Impact		14	13	13	13	13	15

LTS – Less than Significant
N – No Impact (Beneficial)
NA – Not Applicable
S – Significant
SU – Significant and Unavoidable

5.5.5.2 Alternative 1 – Retaining Kilarc Forebay

Characteristics. Under Alternative 1, the Kilarc Forebay and related infrastructure would be maintained in order to provide continued recreational access. Alternative 1 is intended to provide continued recreation access at the Kilarc Forebay, reducing the significant impacts to recreation resources to less than significant (see Section 4.16 for more details). Those facilities of the Kilarc Development required to maintain the flow of water to the forebay would be improved to prevent fish entrainment and to increase flows to the reach of Old Cow Creek below the Kilarc Canal Diversion Dam. The remainder of the Kilarc Development and the entire Cow Creek Development would be decommissioned as described for the Proposed Project. Implementation of Alternative 1 would result in a change in land ownership at the Kilarc Forebay, as well as a change in the beneficial use of the water rights associated with the water supplying the forebay.

Environmental Effects. Features of the Kilarc Development that are not necessary for forebay maintenance would be decommissioned as described in Section Chapter 2, Proposed Project, including implementation of all of the relevant PM&E measures proposed for the Kilarc Development, and would result in similar impacts to those described for the Proposed Project under each resource area in Section Chapter 4., Environmental Analysis.

5.5.5.3 Alternative 2 – Retaining Flow to the Abbott Ditch Users

Characteristics. Implementation of the Proposed Project would remove the outflow of water from the South Cow Powerhouse to Hooten Gulch, and thus the existing Abbott Diversion would experience a loss of flows up to no flow in the late summer when Hooten Gulch has no natural flow. Under Alternative 2, flows to the Abbott Diversion, which is used by a collection of land owners downstream known as the Abbott Ditch Users (ADU) would be retained via one of the following four options: the existing point of diversion (Option A); a restored East Channel (Option B); a new pump in South Cow Creek (Option C); or new conveyance to Hooten Gulch (Option D).

Environmental Effects. Under Alternative 2, the Kilarc Development and the Cow Creek Development would be decommissioned as described in Section 2, Proposed Project, and would result in similar impacts to those described under each resource area in Section 4, Environmental Analysis. However, under Options B, C and D, construction activities may have the potential to result in impacts beyond those identified for the Proposed Project due to ground disturbance. These environmental effects would include potential changes in appearance of the landscape, increased temporary air emissions and noise, disturbance of, and impacts to aquatic and terrestrial species and habitat in South Cow Creek, disturbance of known or unidentified cultural resources, increased soil erosion and potential impacts to water quality, changes in flow regime of South Cow Creek, and temporary increase in local traffic. It is anticipated that these impacts would be less than significant with mitigation.

5.5.5.4 No Project Alternative

Characteristics. PG&E indicated in an email on July 25th, 2013, that if FERC neither approved the LSA nor renewed the annual license for the Project, PG&E would cease to operate the project. PG&E stated that, under this scenario, PG&E would presumably abandon the facilities in place and reduce potential liabilities by taking steps to secure the facilities to protect public safety and the environment, minimize or eliminate maintenance needs, and protect the facilities

from vandalism. FERC could then issue an order that declares the Project abandoned and the associated FERC license terminated.

Environmental Effects. Under the No Project Alternative, all Kilarc and Cow Creek facilities would be abandoned in place and all flows would remain in the natural channels of Old Cow and South Cow Creeks. As with the Proposed Project, increased flows would benefit aquatic and water quality resources in the bypassed reaches, Hooten Gulch would return to its naturally ephemeral condition, and significant and unavoidable agricultural impacts would affect downstream water users and landowners on Abbott Ditch. Because there would be no major construction activities, there would be no potential construction-related impacts to water quality. The No Project Alternative would not immediately impact resources associated with Kilarc Forebay, e.g., recreation, hydrology, and aquatic and fisheries since all water would remain in the forebay after being abandoned. However, there would be potential for degradation of the Kilarc Forebay area due to the lack of operation and maintenance of the diversion facilities providing continuous fresh water to the reservoir. Kilarc Forebay would be fed solely by natural precipitation events and would have the potential to become stagnant or dry up during low water years or summer months. The No Project Alternative would cause less than significant impacts to recreation, hydrology, and aquatic and fisheries resources.

5.5.6 Environmentally Superior Alternative

Based solely on the comparison of potential environmental effects among alternatives that would potentially satisfy the project objectives, Alternative 2, Options A, B, C or D, would be the environmentally superior alternatives since they would avoid potential significant effects to agriculture and farmland that would be unavoidable with implementation of the Proposed Project. However, the State Water Board is not obligated to adopt the environmentally superior alternative and may, after considering the final EIR, including final assessment of feasibility of alternatives, and considering and balancing economic, legal, social, technological, or other benefits, make overriding findings to approve another alternative that would have greater potential effects on the environment.

Chapter 6 List of Preparers

6.1 State Water Board

Jeffrey Parks ..... Water Resource Control Engineer
Jeff Wetzel ..... Senior Water Resource Control Engineer
Chase Hildeburn ..... Water Resource Control Engineer
Steven Westholff ..... Attorney

6.2 Cardno

Laurie Warner Herson/Kendra Ryan ..... Project Manager
Keven Ann Colgate ..... Deputy Project Manager
Jeanette Price ..... Assistant Project Manager, Lead Author
Steve Pavich ..... Agriculture and Forestry Resources, Land Use and Planning
Brad Boyes/Elizabeth Shephard ..... Air Quality and Greenhouse Gas Emissions
Daniel Huang/Tom Taylor ..... Aquatic and Fisheries Resources
Keven Ann Colgate ..... Terrestrial Biological Resources
Josh Peabody/Ashley Hallock/Evan Elliott ..... Cultural Resources
Julia Hagan/Shruti Ramaker ..... Geology and Soils, Hazards and Hazardous Materials
Patrick Ritter/Elizabeth Sheppard ..... Greenhouse Gas Emissions
Virginia Mahacek ..... Hydrology and Geomorphology
Daniel Huang/Virginia Mahacek ..... Water Quality
Brad Boyes ..... Noise
Bill Spain ..... Recreation
Shruti Ramaker ..... Transportation/Traffic
Julia Hagen ..... Cumulative Impacts
Iris Eschen ..... Production Supervisor
Mireille Lajoie ..... Lead Production Specialist

6.3 ADH

Alessandro Hnatt ..... Recreation
Bob Carr ..... Aesthetics and Visual Resources

6.4 QUERCUS

Steven Towers ..... Terrestrial Biological Resources

This Page Intentionally Left Blank

Chapter 7 References

Bailey, E. H. (editor). 1966. *Geology of Northern California*. United States Geological Survey. Bulletin 190. California Division of Mines and Geology.

Baldwin, B.G. et al. [eds.]. 2012. Jepson Manual: Vascular Plant of California, Thoroughly Revised and Expanded. Second Edition. University of California Press. Berkeley and Los Angeles, CA.

Bat Conservation International (BCI). 2008. Bats in buildings: guidelines for excluding bats. Website (http://www.batcon.org/resources/for-specific-issues/bats-in-buildings) accessed on April 8, 2008, updated December 1, 2017. As cited in PG&E 2009. See EIR Appendix B-3.

Bay Area Air Quality Management District (BAAQMD). 1999. BAAQMD CEQA Guidelines - Assessing the Air Quality Impacts of Projects and Plans. Website (http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/Plans/CEQA%20Guide/ceqa_guide.ashx) accessed June 6, 2013.

Bowker, J.M., A. Askew, H.K. Cordell, C. Betz; S. Zarnoch, and L. Seymour (2012) Outdoor recreation participation in the United States - projections to 2060: *a technical document supporting the Forest Service 2010 RPA Assessment.* Gen. Tech. Rep. SRS-160. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 34 p.

Broch, Jens Trampe. 1971. Third Edison. The Application of the Brüel & Kjaer Measuring Systems to Acoustic Noise Measurements.

Bureau of Land Management (BLM). 2013. BLM Redding Field Office. Website (https://www.blm.gov/contact/california) accessed November 25, 2017.

Button, Mickey. 2013. CAL FIRE. Station 34, 30377 Oak Run to Forn Road, Whitmore, Ca. 96096. Personal commination with T. Omer, Staff Scientist, Cardno ENTRIX, August 15.

Cade, T.J., J.H. Enderson, and J. Linthicum 1996. Guide to Management of Peregrine Falcons at the Eyrie. The Peregrine Fund, Boise, Idaho, USA. As cited in PG&E 2009. See EIR Appendix B-3.

California Air Pollution Control Officers Association (CAPCOA). 2009. California Air Pollution Control Officers Association. Model Policies for Greenhouse Gases in General Plans A Resource for Local Government to Incorporate General Plan Policies to Reduce Greenhouse Gas Emissions.

California Air Pollution Control Officers Association (CAPCOA). 2016. California Emissions Estimator Model (CalEEMod), Version 2016.3.1.

California Air Resources Board (ARB). 2008. Climate Change Scoping Plan, A Framework for Change for the State of California. December.

_____. 2007. In-Use Off-Road Diesel-Fueled Fleets Regulation. Website (https://www.arb.ca.gov/msprog/ordiesel/ordiesel.htm) accessed November 30, 2017.

_____. 2009. Shasta County AQMD List of Current Rules. Website (http://www.arb.ca.gov/drdb/sha/cur.htm) accessed November 30, 2017.

_____. 2016a. California Ambient Air Quality Standards (CAAQS). May 4, 2016 Website (http://www.arb.ca.gov/research/aaqs/aaqs2.pdf) accessed November 13, 2017.

_____. 2017a. California Ambient Air Quality Monitoring Network. Page last reviewed August 22, 2017, Website (https://www.arb.ca.gov/aaqm/mldaqsb/amn.htm) accessed November 13, 2017.

_____. 2017b. Area Designations Maps / State and National. Page last reviewed October 18, 2017. Website (http://www.arb.ca.gov/desig/adm/adm.htm) accessed November 14, 2017.

_____. 2017c. Statewide Portable Equipment Registration Program. Website (http://www.arb.ca.gov/portable/portable.htm) accessed November 30, 2017.

_____. 2014. First Update to the Climate Change Scoping Plan – Building on the Framework. May 2014.

_____. 2017e. California Greenhouse Gas Emissions for 2000 to 2015, Trends of Emissions and Other Indicators. Website (https://www.arb.ca.gov/cc/inventory/pubs/reports/2000_2015/ghg_inventory_trends_00-15.pdf) accessed November 30, 2017.

California Department of Conservation. 2013a. Farmland Mapping and Monitoring Program. Website (http://www.conservation.ca.gov/dlrp/FMMP/Pages/Index.aspx) accessed October 25, 2013.

_____. 2013b. Williamson Act Program. Website (http://www.conservation.ca.gov/dlrp/lca/Pages/Index.aspx) accessed October 25, 2013.

California Department of Finance. 2013. Population Projections 2010-2060. Website (http://www.dof.ca.gov/Forecasting/Demographics/projections/) accessed July 2, 2013.

California Department of Fish and Game (DFG). 1997. Colleen Harvey, Files of California Department of Fish and Game.

California Department of Fish and Wildlife (CDFW). 2017a. Biogeographic Data Branch. California Natural Diversity Database, Rarefind 5, Commercial Version; April 1, 2017. Query for the following quadrangles: Clough Gulch; Bella Vista; Oak Run; Whitmore; Miller Mountain; Palo Cedro; Hagaman Gulch; Inwood; O'Brien; Minnesota Mountain; Devils Rock; Montgomery Mountain; Viola; Montgomery Creek; Burney Mountain West; Hatchet Mountain Pass; Jacks Backbone; Grays Peak; Manton; Shingletown; Tuscan Buttes N.E.; Balls Ferry; Cottonwood; Enterprise; Project City. Available online at: https://map.dfg.ca.gov/rarefind/view/RareFind.aspx. Accessed April 4, 2017 Wildlife Biogeographic Data Branch

_____. 2017b. Special Animals List. California Department of Fish and Wildlife, Natural Diversity Database. October 2017. Periodic publication. Website accessed November 26, 2017: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406&inline.

_____. 2017c. Wildlife Biogeographic Data Branch. California Natural Diversity Database. Special Vascular Plants, Bryophytes, and Lichens List. October 2017. Quarterly publication. 127 pp. Website (https://nrm.dfg.ca.gov/FileHandler.ashx? DocumentID=109383&inline) accessed November 26, 2017.

_____. 2017d. Fully Protected Animals. Website accessed November 26, 2017 http://www.dfg.ca.gov/wildlife/nongame/t_e_spp/fully_pro.html.

_____. 2018a. Fish Planting Schedule – Shasta County (https://www.dfg.ca.gov/m/FishPlantings/SelectWater?county=Shasta) accessed April 26, 2018.

_____. 2013b. License Statistics. (https://www.wildlife.ca.gov/Licensing/Statistics#Sport FishingLicenses) accessed April 26, 2018.

California Department of Forestry and Fire Protection (CAL FIRE). 2007. Shasta County Fire Hazard Severity Zones in State Responsibility Area (SRA). Adopted by CAL FIRE on November 7, 2007.

_____. 2010. California's Forests and Rangelands: 2010 Assessment, Fire and Resource Assessment Program. June 2010. (http://frap.fire.ca.gov/assessment/2010/assessment2010) accessed April 26, 2018.

_____. 2018. Personal communication between Cardno and CALFIRE and Deputy Chief Bret Gouvea and Shasta County Fire Department Fire Marshall Jimmy Zanotelli. May 29, 2018.

California Department of Toxic Substances Control. 2018. EnviroStor Database. Website (http://www.envirostor.dtsc.ca.gov/public/) accessed April 16, 2018.

California Department of Transportation (Caltrans). 2004. Transportation and Construction-Induced Vibration Guidance Manual. Website (http://www.dot.ca.gov/hq/env/noise/pub/vibrationmanFINAL.pdf) accessed June 17, 2013.

California Department of Water Resources (DWR). 2004. California's Groundwater Bulletin 118. Website (http://www.water.ca.gov/groundwater/bulletin118/index.cfm) accessed April 23, 2018.

_____. 2010. CEQA Climate Change Committee Model CEQA Climate Change Discussion and Impact Analysis Section.

_____. 2018. California Groundwater Monitoring Network Data. Website (http://www.water.ca.gov/waterdatalibrary/) accessed April 23, 2018.

California Energy Commission (CEC). 2011. Renewables Portfolio Standard Eligibility, Fourth Edition. CEC-300-2010-007-CMF.

California Environmental Protection Agency (Cal/EPA). 2010. Climate Action Team Report to Governor Schwarzenegger and the California Legislature. December.

California Geological Survey (CGS). 2013. CGS Seismic Hazard Zonation Program (SHDP) Data Access Page. Website (http://maps.conservation.ca.gov/cgs/informationwarehouse/) accessed June 25, 2013.

California Native Plant Society (CNPS). 2000. Inventory of rare and endangered plants of California (6th Edition, electronic version). Rare Plant Scientific Advisory Committee, David P. Tibor, convening editor. Sacramento: California Native Plant Society.

_____. 2009. Inventory of rare and endangered plants of California (7th Edition, online version). Website http://www.rareplants.cnps.org accessed on March 31, 2009 and May 19, 2009.

_____. 2013. Inventory of rare and endangered plants of California (8th Edition, online version). Website http://www.rareplants.cnps.org accessed September 24, 2013.

_____. 2017. California Native Plant Society, Rare Plant Program. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website (http://www.rareplants.cnps.org) accessed November 26, 2017.

California Public Utilities Commission (CPUC). 2017a. California Renewable Portfolio Standard Annual Report – November 2017. Website (http://www.cpuc.ca.gov/uploadedFiles/CPUC_Website/Content/Utilities_and_Industries/Energy/Reports_and_White_Papers/Nov%202017%20-%20RPS%20Annual%20Report.pdf) accessed April 2018.

California State Water Resources Control Board (State Water Board). 2018. GeoTracker Database. Website (http://geotracker.waterboards.ca.gov/) accessed April 16, 2018.

Call, M.W. 1978. Nesting habitats and surveys techniques for common western raptors. U.S.E.I., Bureau of Land Management, Technical Note TN-316. 115p. As cited in PG&E 2009. See EIR Appendix B-3.

Cardno ENTRIX. 2013. Kilarc-Cow Creek Hydroelectric Project License Surrender, Visual Resources. August 2013. See EIR Appendix C.

Central Valley Regional Water Quality Control Board (CVRWQCB). 2018. Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins. Fifth Edition. Website (https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/sacsjr_201805.pdf).

Climate Action Reserve (CAR). 2010. Forest Project Protocol. Version 3.2 August 31, 2010.

Clynne, M. A., J. E. Robinson, M. Nathenson, and L. J. P. Muffler. 2012. Volcano Hazards Assessment for the Lassen Region, Northern California. Scientific Investigations Report 2012-5176-A. Website http://pubs.usgs.gov/sir/2012/5176/a/ accessed July 9, 2013.

Cui, Y., E. Mahoney, and T. Herbowicz. 2013. Economic benefits to local communities from national park visitation, 2011. Natural Resource Report NPS/NRSS/EQD/NRTR—2013/631. National Park Service, Fort Collins, Colorado.

De Novo Planning Group. 2012. Final EIR for the Sierra Pacific Cogeneration Power Project. SCH# 2009072011. Prepared for Shasta County Department of Resource Management Planning Division.

Dirksen and Dirksen. 2004. *Recreational Lakes of California.* Aptos CA. Recreational Sales Publishing. As cited in Cardno ENTRIX 2013. See EIR Appendix C.

Dunk, J. R. 1995. White-tailed kite (Elanus leucurus). In The Birds of North America, No. 178, A. Poole and F. Gill, eds., Philadelphia: The Academy of Natural Sciences, and Washington, D.C.: The American Ornithologists' Union.

Enplan. 2010. Draft Environmental Impact Report. Panorama Planned Development. Shasta County, California. SCH No. 2008022104. April 19. Prepared for: Shasta County Department of Resource Management. Website (http://www.co.shasta.ca.us/index/drm_index/planning_index/eirs/Panorama/Panorama_DEIR.aspx) accessed July 8, 2013.

ENTRIX. 2008. Evaluation of Potential Copper Concentrations in Old Cow Creek as a result of Kilarc Diversion Dam Removal (Draft for Review), prepared for PG&E August 19, 2008 (included as Appendix N of PG&E 2009).

Erichsen, A. L. 1995. The white-tailed kite (*Elanus leucurus*): nesting success and seasonal habitat selection in an agricultural landscape. Thesis. University of California at Davis, Davis, California.

Federal Energy Regulatory Commission (FERC). 2009a. Form 80: Licensed Hydropower Development Recreation Report for Battle Creek Project (Includes: Lake Grace, Lake Nora, and McCumber Reservoir) (FERC Project No. 1121). Washington DC.

_____. 2009b. Form 80: Licensed Hydropower Development Recreation Report for Kilarc Forebay (FERC Project No. 606). Washington DC.

_____. 2011. Final Environmental Impact Statement for Hydropower License Surrender. Kilarc-Cow Creek Hydroelectric Project. FERC Project No. 606.

_____. 2014. Memorandum of Agreement Between the Federal Energy Regulatory Commission and the California State Historic Preservation Officer Regarding the Surrender of License for the Kilarc-Cow Creek Hydroelectric Project in Shasta County, California. FERC Project No. 606. Signed by SHPO April 25, 2014.

Fuller, M.R. and J.A. Mosher. 1987. Raptor survey techniques, In Raptor Management Techniques Manual, B.G. Pendleton, B.A. Millsap, K.W. Cline, W. Keith and D.M. Bird, eds. Washington, D.C.: National Wildlife Federation., pp. 37-65. As cited in PG&E 2009. See EIR Appendix B-3.

GANDA. 2009. Cultural Resources Inventory and Evaluation for the Kilarc-Cow Creek Hydroelectric Decommissioning Project, FERC No. 606, Shasta County, California (included as Appendix M of PG&E 2009).

Golla, Victor. 2007. Linguistic Prehistory. In California Prehistory: Colonization, Culture, and Complexity. Edited by Terry L. Jones and Kathryn A. Klar, pp. 71-82. AltaMira Press, United Kingdom.

Hansen, J. 2007. Tipping Point, Perspective of a Climatologist. 2008–2009 State of the Wild.

Healey, M.C. 1980. Utilization of the Nanaimo River Estuary by Juvenile Chinook Salmon, Oncorhynchus tshawytscha.

Holland, R.F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Sacramento: California Department of Fish and Game.

Hoover, Mildred Brooke et al. 2002. Historic Spots in California. Stanford University Press, Stanford.

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom, and New York, NY, USA.

Jackman, R.E., and J.M. Jenkins. 2004. Protocol for Evaluating Bald Eagle Habitat and Populations in California. Report by Pacific Gas and Electric Company for the U.S. Fish and Wildlife Service, Endangered Species Division, Sacramento, CA. As cited in PG&E 2009. See EIR Appendix B-3.

Johnson, Jerald Jay. 1978. Yana. In Handbook of North American Indians, Vol. 8: California, edited by R.F. Heizer, pp. 361-369. Smithsonian Institution, Washington, DC.

Kroeber, A.L. 1925. Handbook of the Indians of California. Dover Publications, Inc., New York, New York.

Levin, P.S. and M.H. Schiewe. 2001. Preserving Salmon Biodiversity: The number of Pacific salmon has declined dramatically. But the loss of diversity may be a bigger problem. American Scientist 89(3): 220-227. Website (http://www.bluefish.org/biodiver.htm) accessed November 25, 2017.

Levy, D.A. and T.G. Northcote. 1981. The distribution and abundance of juvenile salmon in marsh habitats of the Fraser River Estuary. Technical report No. 25. Vancouver, B.C. Canada: Westwater Research Centre, University of British Columbia.

Mayer, K.E., and W.F. Laudenslayer, Jr. (Editors). 1988. A Guide to Wildlife Habitats of California. California Department of Fish and Game, Sacramento, California. Website (https://www.wildlife.ca.gov/Data/CWHR/Wildlife-Habitats) accessed November 26, 2017.

McEwan, D.R. 2001. Central Valley Steelhead. In R.L Brown (Ed.), Fish Bulletin 179, Contributions to the Biology of Central Valley Salmonids. Volumes 1 &2 (pp 1-43), Department of Fish and Game, Sacramento, CA.

McEwan, D., and T.A. Jackson. 1996. Steelhead Restoration and management Plan for California. California Department of Fish and Game.

McGuire, Kelly R. 2007. Models Made of Glass: A Prehistory of Northeast California. In California Prehistory: Colonization, Culture and Complexity, edited by Terry L. Jones and Kathryn A. Klar, pp. 165-177. Smithsonian Institution, Washington, D.C.

Miller, C. D. 1980. Potential Hazards from Future Eruptions in the Vicinity of Mount Shasta Volcano, Northern California.

Moyle, P.B. 2002. Inland Fishes of California. Revised and expanded. University of California Press, Berkeley, California.

Moyle, P.B., R.M. Quinones, J.V. Katz, and J. Weaver. 2015. Fish Species of Special Concern in California. Sacramento: California Department of Fish and Wildlife and the Center for Watershed Sciences and Department of Wildlife, Fish and Conservation Biology, University of California, Davis. Website (https://www.wildlife.ca.gov/Conservation/SSC/Fishes) accessed November 26, 2017.

Nature. 2012. Olive Heffernan. “Grim picture of polar ice-sheet loss.” 29 November.

National Marine Fisheries Service (NMFS). 2011. Biological Opinion, Kilarc-Cow Creek Hydroelectric Project, FERC Project No. 606. March 1, 2011.

North State Resources, Inc. 2008a. Special-Status Plant Species Surveys for the Decommissioning of the Kilarc-Cow Creek Hydroelectric Project, FERC Project No. 606. Prepared for PG&E May 23, 2008 (included as Appendix L of PG&E 2009).

_____. 2008b. Kilarc Diversion Dam Geomorphic Assessment, prepared for PG&E May 20, 2008 (included as Appendix G of PG&E 2009).

_____. 2008c. South Cow Creek Diversion Dam Geomorphic Assessment, prepared for PG&E May 20, 2008 (included as Appendix H of PG&E 2009).

_____. 2011. Kilarc-Cow Creek Hydroelectric Project FERC Project No. 606 Final Draft Delineation of Waters of the United States. Prepared for PG&E April 5, 2011.

NY Times. 2013. New York Times. John M. Broder. E.P.A. “Will Delay Rule Limiting Carbon Emissions at New Power Plants?” Published: April 12, 2013.

Pacific Gas & Electric Company (PG&E). 2002a. Kilarc-Cow Hydroelectric Project FERC No. 606 First Stage Consultation Package.

_____. 2002b. A standardized approach for habitat assessments and visual encounter surveys for the foothill yellow-legged frog (Rana boylii). Pacific Gas and Electric Company, San Ramon, California.

_____. 2003. Kilarc-Cow Project FERC No. 606. Final Study Plans.

_____. 2004 (updated 2007). Kilarc-Cow Creek Project FERC No. 606 Habitat Assessment for the California Red-Legged Frog (*Rana aurora draytonii*) Habitat in the Kilarc-Cow Project Area (included as Appendix K of PG&E 2009).

_____. 2005. Kilarc-Cow Creek Project Agreement. See EIR Appendix B-1.

_____. 2007a. Kilarc-Cow Creek Project FERC Project No. 606 Aquatic Habitat and Fisheries Resources Report. Prepared for PG&E. Prepared by ENTRIX, Inc. November 2007 (included as Appendix J2 of PG&E 2009).

_____. 2007b. Kilarc-Cow Creek Project FERC No. 606 Botanical, and Terrestrial and Aquatic Wildlife Resources Report, prepared for PG&E. Prepared by ENTRIX. November 2007 (included as Appendix J1 of PG&E 2009).

_____. 2007c. Kilarc Cow Creek Recreational Resources Report. San Francisco, CA.

_____. 2007d. Information for Operation of Kilarc Forebay as a Recreation Facility. San Francisco, CA.

_____. 2009. Kilarc-Cow Creek Hydroelectric Project License Surrender Application (with Exhibits and Appendices). FERC Project No. 606. March, 2009.

Placer County Water Agency. 2010. Middle Fork American River Project (FERC No. 2079). CUL-1- Cultural Resources National Register of Historic Places Eligibility Report.

Plog, Barbara, Ed. 1988. Fundamentals of Industrial Hygiene - 3rd Edition. National Safety Council.

Quad Knopf. 2011. Final Environmental Impact Report – Volume I. Knighton and Churn Creek Commons Retail Center. GPA08-002 & Z08-003 (SCH #2009012088). Submitted to: County of Shasta Department of Resource Management. May.

Quinn, T.P. 2005. The Behavior and Ecology of Pacific Salmon and Trout. University of Washington Press, Seattle, WA.

Sacramento Valley Air Quality Engineering and Enforcement Professionals (EEP). 2013. Northern Sacramento Valley Planning Area 2012 Triennial Air Quality Attainment Plan. Website (https://www.co.shasta.ca.us/docs/libraries/resource-management-docs/aq-docs/2012_Triennial_Air_Quality_Attainment_Plan.pdf?sfvrsn=0) accessed November 13, 2017.

Science. 2012. Shepard et al. A Reconciled Estimate of Ice-Sheet Mass Balance Vol. 338 no. 6111 pp. 1183-1189.

Shasta County. 1995. Shasta County Oak Management Guidelines. Website (http://ucanr.edu/sites/oak_range/files/60630.pdf) accessed November 26, 2017.

_____. 2003b. Shasta County Code. Title 12.12 Grading Ordinance.

_____. 2004a. Shasta County General Plan, as amended through September 2004. Chapter 6.3, Minerals.

_____. 2004b. Shasta County General Plan, as amended through September 2004. Chapter 7.3, 2009-2014 Housing Element. Website (http://www.co.shasta.ca.us/index/drm_index/planning_index/housing_element.aspx) accessed October 24, 2013.

_____. 2004c. Shasta County General Plan, as amended through September 2004. Chapter 6.8, Scenic Highways.

_____. 2004d. Shasta County General Plan, as amended through September 2004. Chapter 6.9, Open Space and Recreation.

_____. 2004e. Shasta County General Plan, as amended through September 2004. Chapter 6.1, Agricultural Lands.

_____. 2004f. Shasta County General Plan, as amended through September 2004. Chapter 6.2, Timberlands.

_____. 2004g. Shasta County General Plan, as amended through September 2004. Chapter 6.5, Air Quality.

_____. 2004h. Shasta County General Plan, as amended through September 2004. Chapter 6.7, Fish and Wildlife Habitat.

_____. 2004i. Shasta County General Plan, as amended through September 2004. Chapter 6.10, Heritage Resources.

_____. 2004j. Shasta County General Plan, as amended through September 2004. Chapter 5.1, Seismic and Geologic Hazards.

_____. 2004k. Shasta County General Plan, as amended through September 2004. Chapter 7.0, Community Development Group.

_____. 2004l. Shasta County General Plan, as amended through September 2004. Chapter 7.4, Circulation.

_____. 2004m. Shasta County General Plan, as amended through September 2004. Chapter 5.5, Noise.

_____. 2012a. Shasta County 2012 Crop and Livestock Report. Available online: http://www.co.shasta.ca.us/ag/crop_reports/shasta2012.sflb.ashx, Accessed October 25, 2013.

_____. 2012b. Draft Shasta Regional Climate Action Plan, Appendix A, Shasta Countywide Emissions. (https://www.co.shasta.ca.us/index/drm_index/ag_index/programs/RCAP/Draft_RCAP.aspx) accessed December 1, 2017.

_____. 2016. Shasta County Code. Title 17 Zoning Plan. Website (https://library.municode.com/ca/shasta_county/codes/code_of_ordinances?nodeId=CD_ORD_TIT17ZO) accessed October 9, 2017.

Shasta County Office of Emergency Services (OES). 2014. Shasta County, California Emergency Operations Plan. Available online: (https://www.co.shasta.ca.us/docs/libraries/cao-docs/emergencies/shasta-eop_basic-plan_final-aug2015.pdf) accessed April 17, 2018.

Shasta County Department of Resource Management Planning Division. 2011. Environmental Initial Study. General Plan Amendment 09-002, Zone Amendment 09-013, Use Permit 09-018, and Reclamation Plan 09-001. Moody Flats Quarry, LLC. April 12.

_____. 2012. Public Scoping Report. Tierra Robles Planned Development. December. Website (http://www.co.shasta.ca.us/index/drm_index/planning_index/eirs/tierrarobleshome.aspx) accessed May 14, 2013.

Shasta County Environmental Health Division. 2018. Department of Resource Management. Hazardous Materials Area Plan. January.

_____. 2013. Facilities Management. Website (http://www.co.shasta.ca.us/index/pw_index/fac_mgmt.aspx) accessed July 15, 2013.

Shasta County Fire Department. 2013. Shasta County Fire Department, Area Map. Website (http://www.shastacountyfire.org/index.php?option=com_content&view=article&id=160&Itemid=345) accessed October 24, 2013.

Shasta County Sheriff. 2013. Shasta County Sheriff, Patrol Operations. Website (http://www.co.shasta.ca.us/index/sheriff_index/divisions/patrol.aspx) accessed October 24, 2013.

SHN Consulting Engineers & Geologists (SHN). 2001. Cow Creek Watershed Assessment. Prepared for the Western Shasta Resource Conservation District and Cow Creek Watershed Management Group.

Smith et al. 2006. Smith, James E.; Heath, Linda S.; Skog, Kenneth E.; Birdsey, Richard A. Methods for calculating forest ecosystem and harvested carbon, with standard estimates for forest types of the United States. Gen. Tech. Rep. NE-343. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. Table 4.

St Louis, et al. 2000. St Louis, V.L., Kelly, C.A., Duchemin, E., Rudd, J.W.M, and Rosenberg, D. M. Surfaces as Sources of Greenhouse Gases to the Atmosphere: A Global Estimate. BioScience, September 2000 / Vol. 50 No.9

Stebbins, R. C. 1951. Amphibians of Western North America. Berkeley, University of California Press.

Steinhurst et al. 2012. Steinhurst, W., Knight, P. and Schultz, M. Synapse Energy Economics, Inc. Hydropower Greenhouse Gas Emissions, State of the Research February 14.

Stewardship Council. 2007. *Land Conservation Plan.* Website (http://lcp.stewasrdshipcouncil.org) accessed April 25, 2018.

Stienstra T. 2008. *California Recreational Lakes & Rivers.* Avalon Travel, Berkeley, CA.

Teodoru et al. 2010. Teodoru, C.R, Prarrie, Y.T, del Giorgio, P.A. Spatial Heterogeneity of Surface CO_2 Fluxes in a Newly Created Eastmain-1 Reservoir in Northern Quebec, Canada.

U.S. Army Corps of Engineers (USACE). 1987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

USACE. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0), ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-10-3. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

United States Department of Agriculture Forest Service (USDA-FS). 2000. Water Quality Management for Forest System Lands in California. Best Management Practices. Pacific Southwest Region. September. Website http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5362512.pdf accessed July 9, 2013.

_____. 2011. Forest Service Handbook Southwest Region (Region 5) Vallejo, CA. Chapter 10 – Water Quality Management Handbook. December 5, 2011. Website (https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5399662.pdf) accessed April 24, 2018.

_____. 2012a. *Visitor Use Report - Shasta Trinity National Forest.* National Visitor Use Monitoring: Data Collected FY2008. Washington DC.

_____. 2012b. *Visitor Use Report – Lassen National Forest.* National Visitor Use Monitoring: Data Collected FY2005. Washington DC.

_____. 2013. Shasta-Trinity National Forest. Website (http://www.fs.usda.gov/stnf/) accessed July 15, 2013.

USDA Natural Resources Conservation Service (NRCS). 2013. Soil Map - Shasta County Area, California (Kilarc). Website (https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

U.S. Environmental Protection Agency (USEPA). 2009. EPA Finalizes the Nation's First Greenhouse Gas Reporting System/Monitoring to begin in 2010. Release date: 09/22/2009

_____. 2011. Fact Sheet -- Proposed Rule: Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule.

_____. 2017. *Nonattainment Areas for Criteria Pollutants (Green Book)*. September 30, 2017. Website (https://www.epa.gov/green-book) accessed November 14, 2017.

_____. 2012c. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011*. Website (http://epa.gov/climatechange/emissions/usinventoryreport.html) accessed June 6, 2013.

_____. 2013a. Air Pollutants Information. Website (http://www.epa.gov/air/airpollutants.html) accessed June 6, 2013.

_____. 2013b. Greenhouse Gas Reporting Program. Website (http://www.epa.gov/ghgreporting/index.html).

U.S. Department of Transportation - Federal Highway Administration (FHWA). 2006. Roadway Construction Noise Model User's Guide. Website http://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/rcnm.pdf accessed June 17, 2013.

U.S. Department of Transportation - Federal Transit Authority (FTA). 2006. Transit Noise and Vibration Impact Assessment. Website https://www.transit.dot.gov/regulations-and-guidance/environmental-programs/fta-noise-and-vibration-impact-assessment accessed June 17, 2013.

United States Fish and Wildlife Service (USFWS). 1997 (Revised 2005). Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frog.

_____. 2002. Recovery plan for the California red-legged Frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, Oregon. viii + 173 pp.

_____. 2007. National Bald Eagle Management Guidelines. United States Department of Interior, Fish and Wildlife Service, Arlington, Virginia. 23 pp.

_____. 2017. Information for Planning and Consultation (IPaC). Resource list generated for Shasta County. Website https://ecos.fws.gov/ipac/location/4AKGVE7V3RFV5C77MGBXAV2GPM/resources accessed November 26, 2017.

Western Shasta Resource Conservation District (WSRCD). 2016. Shasta County Communities Wildfire Protection Plan 2016. Website http://www.westernshastarcd.org/Docs/ShastaCWPPs-2016.pdf accessed April 17, 2018.

Williams, J.G. 2006. Central Valley Salmon: A perspective on Chinook and Steelhead in the Central Valley of California. San Francisco Estuary and Watershed Science 4(3)

Yoshiyama, R. M., E. R. Gerstung, F. W. Fisher, P. B. Moyle. 2001. Historical and Present Distribution of Chinook Salmon in the Central Valley Drainage of California. Brown, R.L., editor. Fish Bulletin 179: Contributions to the biology of Central Valley Salmonids.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M. White. 1988-1990. California's wildlife: Volume I-III. California Department of Fish and Game, Sacramento, California.

This Page Intentionally Left Blank