Proponent's Environmental Assessment

Application of Central Valley Gas Storage, L.L.C.
for a Certificate of Public Convenience and Necessity
for Construction and Operation of the
Central Valley Natural Gas Storage Facility,
Colusa County

July 2009

Prepared for:
California Public Utilities Commission

Submitted by:
Central Valley Gas Storage, L.L.C.

Prepared by:
ICF Jones & Stokes
an ICF International Company

central valley gas storage LLC

Proponent's Environmental Assessment

Application of Central Valley Gas Storage, L.L.C. for a Certificate of Public Convenience and Necessity for Construction and Operation of the Central Valley Natural Gas Storage Facility, Colusa County

Prepared for:

California Public Utilities Commission

Submitted by:

Central Valley Gas Storage, L.L.C.
3333 Warrenville Road, Suite 630
Lisle, IL 60532
(630) 245-7800

Prepared by:

ICF Jones & Stokes
630 K Street, Suite 400
Sacramento, CA 95814
Contact: Susan Bushnell
(916) 737-3000

July 2009

ICF Jones & Stokes. 2009. Proponent's Environmental Assessment—Application of Central Valley Gas Storage, L.L.C. for a Certificate of Public Convenience and Necessity for Construction and Operation of the Central Valley Natural Gas Storage Facility, Colusa County. July. (ICF J&S 01099.07) Sacramento, CA.

Contents

		Page
	Tables	viii
	Figures	xi
	Acronyms and Abbreviations	xiii
Executive Summary		**ES-1**
	Introduction and Project Overview	ES-1
	Primary Project Components	ES-1
	Purpose and Approach of the PEA	ES-2
	Major Areas of Impact and Conclusions of the PEA	ES-3
	List of Local, State, and Federal Permits	ES-4
	Public Outreach and Areas of Potential Controversy	ES-4
	Organization of the PEA and Chapter Description	ES-4
Chapter 1	**Purpose and Need**	**1-1**
	Purpose and Need of the Proposed Project	1-1
	Facility Overview	1-3
	Natural Gas Background	1-3
	Project Background	1-4
	Related Storage Facilities	1-4
	Project Application	1-5
Chapter 2	**Project Description**	**2-1**
	Project Background	2-1
	Project Ownership	2-2
	Site Description	2-2
	Location	2-2
	Land Uses and Environmental Setting	2-3
	Underground Formation Information	2-3
	Existing Facilities	2-5
	History of the Natural Gas Field	2-5
	Reservoir Development	2-5
	Central Valley Existing Operations	2-7
	Project Components	2-7
	Compressor Station	2-7
	Remote Well Pad	2-13
	Observation Well Conversions	2-16
	PG&E Line 172 Connection Line	2-16
	Gas Pipeline and Interconnection with PG&E Line 400/401	2-17
	Route Selection and Evaluation Process	2-19

Project Land Requirements 2-20
Construction Methods 2-21
Staging and Access 2-21
Construction and Delivery Schedule, Work Force, and Equipment 2-22
Construction Methods 2-26
Operation and Maintenance Program 2-35
Future Plans 2-41
Regulatory Requirements 2-41

Chapter 3 Environmental Setting and Impact Assessment 3-1
Introduction 3-1
Organization of the Environmental Analysis Sections 3-2

Section 3.1 Aesthetics 3.1-1
Environmental Setting 3.1-1
Concepts and Terminology 3.1-1
Regional Setting 3.1-2
Local Setting 3.1-2
Viewer Sensitivity 3.1-3
Regulatory Setting 3.1-4
State Regulations 3.1-4
Local Regulations 3.1-4
Impact Analysis 3.1-4
Significance Criteria 3.1-5
Impacts 3.1-6
Applicant-Proposed Measures 3.1-9

Section 3.2 Agricultural Resources 3.2-1
Environmental Setting 3.2-1
Regional Setting 3.2-1
Land Uses and Zoning 3.2-2
Farmland Classifications 3.2-2
Williamson Act Lands 3.2-2
Regulatory Setting 3.2-3
State Regulations 3.2-4
Local Regulations 3.2-6
Impact Analysis 3.2-8
Significance Criteria 3.2-8
Impacts 3.2-8
Applicant-Proposed Measures 3.2-11

Section 3.3 Air Quality 3.3-1
Environmental Setting 3.3-1
Climate and Topography 3.3-1
Air Pollutants and Ambient Air Quality Standards 3.3-2
Regulatory Setting 3.3-7
Federal Regulations 3.3-7
State Regulations 3.3-7
Local Regulations 3.3-11
Impact Analysis 3.3-12

Significance Criteria 3.3-12
Methods 3.3-13
Impacts....... 3.3-14
Applicant-Proposed Measures 3.3-22

Section 3.4 Biological Resources 3.4-1
Introduction 3.4-1
Environmental Setting 3.4-1
Methods 3.4-1
Existing Conditions 3.4-7
Regulatory Setting 3.4-20
Federal Regulations 3.4-20
State Regulations 3.4-24
Local Regulations 3.4-26
Impact Analysis 3.4-26
Significance Thresholds and Methodology 3.4-27
Impact Mechanisms 3.4-28
Criteria for Determining Significance 3.4-29
Impacts....... 3.4-29
Applicant-Proposed Measures 3.4-36

Section 3.5 Cultural and Paleontological Resources 3.5-1
Environmental Setting 3.5-1
Cultural Resources 3.5-1
Paleontological Resources 3.5-12
Regulatory Setting 3.5-14
Federal Regulations 3.5-14
State Regulations 3.5-14
Local Regulations 3.5-15
Impact Analysis 3.5-15
Significance Criteria 3.5-15
Impacts....... 3.5-17
Applicant-Proposed Measures 3.5-18

Section 3.6 Geology, Soils, and Seismicity 3.6-1
Environmental Setting 3.6-1
Regional Geology and Structure 3.6-1
Regional Faulting and Structure 3.6-1
Project Area Geology 3.6-3
Stratigraphy of the Gas Field 3.6-5
Project Faulting and Structure 3.6-7
Historic Seismicity 3.6-8
Soils 3.6-9
Potential Geologic and Soil Hazards 3.6-10
Surface Ground Rupture 3.6-11
Ground Shaking 3.6-11
Liquefaction and Lateral Spreading 3.6-12
Slope-Related Hazards 3.6-12
Subsidence 3.6-13
Soil Expansion Potential 3.6-14
Tsunami and Seiche 3.6-14

Regulatory Setting 3.6-15
State Regulations 3.6-15
Local Regulations 3.6-17
Impact Analysis 3.6-18
Thresholds of Significance 3.6-18
Impacts 3.6-18
Applicant-Proposed Measures 3.6-22

Section 3.7 Hazards and Hazardous Materials 3.7-1
Environmental Setting 3.7-1
Sensitive Receptors in the Project Vicinity 3.7-1
Hazards 3.7-1
Hazardous Materials and Hazardous Waste 3.7-2
Findings of Safety Record Study 3.7-5
Emergency Response Services and Times 3.7-6
Regulatory Setting 3.7-8
Federal Regulations—Pipeline Safety 3.7-8
Federal Regulations—Hazardous Materials and Wastes 3.7-12
State Regulations—Pipeline Safety 3.7-13
State Regulations—Hazardous Materials and Wastes 3.7-13
Local Regulations 3.7-16
Impact Analysis 3.7-17
Significance Criteria 3.7-17
Impacts 3.7-18
Applicant-Proposed Measures 3.7-23

Section 3.8 Hydrology and Water Quality 3.8-1
Environmental Setting 3.8-1
Climate 3.8-1
Surface Water 3.8-1
Groundwater 3.8-3
Water Quality 3.8-9
Flood Hazard Zones 3.8-10
Regulatory Setting 3.8-10
Federal Regulations 3.8-10
State Regulations 3.8-11
Local Regulations 3.8-13
Impact Analysis 3.8-15
Significance Criteria 3.8-15
Impacts 3.8-16
Applicant-Proposed Measures 3.8-21

Section 3.9 Land Use and Planning 3.9-1
Environmental Setting 3.9-1
Regional Setting 3.9-1
Existing Conditions 3.9-2
Affected Landowners 3.9-3
Regulatory Setting 3.9-4
Federal Regulations 3.9-4
State Regulations 3.9-4
Local Regulations 3.9-5

Impact Analysis 3.9-6
Significance Criteria 3.9-7
Impacts........ 3.9-7
Applicant-Proposed Measures 3.9-8

Section 3.10 Mineral and Energy Resources 3.10-1
Environmental Setting........ 3.10-1
Regional Setting........ 3.10-1
Local Setting........ 3.10-2
Regulatory Setting 3.10-3
State Regulations........ 3.10-3
Local Regulations 3.10-4
Impact Analysis 3.10-5
Significance Criteria 3.10-5
Impacts........ 3.10-5
Applicant-Proposed Measures 3.10-5

Section 3.11 Noise........ 3.11-1
Terminology 3.11-1
Noise Concepts 3.11-1
Vibration Concepts........ 3.11-3
Environmental Setting........ 3.11-4
Land Uses and Receptors Sensitive to Noise in the Project Vicinity 3.11-4
Existing Noise Conditions 3.11-5
Regulatory Setting 3.11-6
State Regulations........ 3.11-6
Local Regulations 3.11-6
Impact Analysis 3.11-8
Significance Criteria 3.11-8
Impacts........ 3.11-9
Applicant-Proposed Measures 3.11-16

Section 3.12 Population and Housing........ 3.12-1
Environmental Setting........ 3.12-1
Population 3.12-1
Housing 3.12-2
Regulatory Setting 3.12-3
Local Regulations 3.12-3
Impact Analysis 3.12-3
Significance Criteria 3.12-3
Impacts........ 3.12-4
Applicant-Proposed Measures 3.12-5

Section 3.13 Public Services........ 3.13-1
Environmental Setting........ 3.13-1
Law Enforcement........ 3.13-1
Fire Protection 3.13-1
Medical Facilities........ 3.13-2
Schools and Parks 3.13-2
Regulatory Setting 3.13-3

Local Regulations 3.13-3
Impact Analysis 3.13-3
Significance Criteria 3.13-4
Impacts.......... 3.13-4
Applicant-Proposed Measures 3.13-5

Section 3.14 Recreation 3.14-1
Environmental Setting.......... 3.14-1
Regional Setting.......... 3.14-1
Regulatory Setting 3.14-4
Local Regulations 3.14-4
Impact Analysis 3.14-4
Significance Criteria 3.14-4
Impacts.......... 3.14-4
Applicant-Proposed Measures 3.14-5

Section 3.15 Transportation and Traffic.......... 3.15-1
Environmental Setting.......... 3.15-1
Regional Circulation 3.15-1
Local Access 3.15-2
Level of Service 3.15-2
Regulatory Setting 3.15-3
State Regulations.......... 3.15-3
Local Regulations 3.15-3
Impact Analysis 3.15-4
Significance Criteria 3.15-4
Impacts.......... 3.15-5
Applicant-Proposed Measures 3.15-6

Section 3.16 Utilities and Service Systems.......... 3.16-1
Environmental Setting.......... 3.16-1
Regional Setting.......... 3.16-1
Local Setting.......... 3.16-3
Regulatory Setting 3.16-3
State Regulations.......... 3.16-3
Local Regulations 3.16-4
Impact Analysis 3.16-5
Significance Criteria 3.16-5
Impacts.......... 3.16-5
Applicant-Proposed Measures 3.16-7

Section 3.17 Cumulative Analysis and Growth-Inducing Impacts.......... 3.17-1
Cumulative Analysis 3.17-1
Growth-Inducing Impacts 3.17-2

Chapter 4 Alternatives.......... 4-1
CEQA Requirements 4-1
Project Objectives.......... 4-1
Gas Storage Field Alternatives 4-2
Facility Site Selection Criteria.......... 4-2
Project Component Alternatives 4-3

Electric Drive Compression Alternative 4-4
Gas Pipeline Alternatives and Preferred Route 4-5
No-Project Alternative 4-6

Chapter 5 References 5-1
Executive Summary 5-1
Chapter 1. Purpose and Need 5-1
Chapter 2. Project Description 5-2
Chapter 3. Environmental Setting and Impact Assessment 5-2
Chapter 4. Alternatives 5-18

Chapter 6 List of Preparers 6-1
ICF Jones & Stokes 6-1
ECO:LOGIC Engineering 6-1
Rimpo & Associates, Inc. 6-1
Valley Environmental Consulting LLC 6-2
Wallace-Kuhl & Associates 6-2
Egret Inc. 6-2
Rooney Engineering 6-2
Kleinfelder 6-2

Appendix A Landowner List

Appendix B Representative Photographs

Appendix C Geologic Maps

Appendix D Air Quality Emissions

Appendix E List of Drainages

Appendix F Impact Summary Checklist

Exhibit 1 Project Alignment Maps

Tables

		Page
ES-1	Summary of Potential Impacts and Applicant-Proposed Measures Identified in the PEA	follows ES-2
ES-2	List of Anticipated Permits and Approvals	follows ES-4
2-1	Princeton Reservoir Model Assumptions	2-6
2-2	Compressor Station Hazardous Fluids and Storage	2-11
2-3	Temporary and Permanent Acreages Required to Construct and Operate the Project	2-20
2-4	Anticipated Construction Schedule	2-22
2-5	Anticipated Workforce	2-23
2-6	Estimated Storage Well Pad Construction and Drilling Equipment	2-23
2-7	Estimated Compressor Station and PG&E Line 172 Connection Construction Equipment	2-24
2-8	Estimated Metering Station and Line 400/401 Interconnect Construction Equipment	2-25
2-9	Estimated Pipeline Construction Equipment	2-25
3.2-1	Williamson Act Parcels Within and Adjacent to the Project Area	3.2-3
3.3-1	Ambient Air Quality Standards Applicable in California	3.3-3
3.3-2	State and National Air Attainment Status Summary	3.3-4
3.3-3	Air Quality Monitoring Data at the Colusa-Sunrise Boulevard Monitoring Station (2006–2008)	3.3-5

3.3-4	Unmitigated Construction-Related Criteria Pollutant Emissions, including Rental Compression	3.3-15
3.3-5	Mitigated Construction-Related Criteria Pollutant Emissions, including Rental Compression	3.3-16
3.3-6	Operational Emission Estimates	3.3-18
3.3-7	Screening Health Risk Assessment Modeling Results	3.3-19
3.3-8	Greenhouse Gas Emissions from Construction and Rental Compression	3.3-20
3.3-9	Operational Greenhouse Gas Emissions (2010)	3.3-21
3.3-10	Comparison of CO_2 Content of Fuels Used for Stationary Combustion	3.3-22
3.4-1	Special-Status Plant Species Identified as Having the Potential to Occur in the Project Region	follows 3.4-4
3.4-2	Special-Status Wildlife Species Identified as Having the Potential to Occur in the Project Region	follows 3.4-4
3.4-3	Biological Communities Associated with Major Project Components	3.4-7
3.4-4	Summary of Acreage Impacts on Biological Communities in the Study Area	3.4-30
3.4-5	Summary of Impacts on Waters of the United States	3.4-31
3.6-1	Significant Faults and Associated Properties	3.6-2
3.6-2	Geologic Formation Correlations between Helley (1985) and Jennings (1960)	3.6-4
3.6-3	Summary of Soil Properties in Proposed Project Area	3.6-9
3.7-1	Hazardous Compressor Station Fluids and Estimated Quantities	3.7-2
3.11-1	Typical A-Weighted Noise Levels	3.11-2
3.11-2	Human Response to Ground Vibration	3.11-4
3.11-3	Summary of Measured Ambient Sound Level and the Calculated L_{dn} at the Closest NSAs	3.11-5

3.11-4	Noise Emission Levels Typical for Construction Equipment	3.11-10
3.11-5	Estimated Construction Noise in the Vicinity of Active Construction Sites	3.11-10
3.11-6	Predicted Noise Levels from Operation of Drill Rigs at the Proposed Storage Wells	3.11-12
3.11-7	Predicted Noise Levels from Operation of Service Rig at Existing Well Site	3.11-13
3.11-8	Predicted Noise Levels from Operation of the Temporary Compressor	3.11-13
3.11-9	Predicted Noise from Operation of the Permanent Compressor Facility	3.11-14
3.11-10	Predicted Noise Levels from Normal Blowdown Event	3.11-15
3.12-1	Characteristics of Colusa County Population	3.12-2
3.12-2	Characteristics of Housing in Colusa County	3.12-2
3.15-1	Level of Service Descriptions	3.15-4
3.16-1	Solid Waste Disposal Facilities in the Project Region	3.16-2
3.17-1	Anticipated Workforce	3.17-2
4-1	Facility Site Selection Criteria	4-2
4-2	Major Project Components and Feasible Alternatives Identified	4-3

Figures

Follows Page

1-1	Project Vicinity	1-4
1-2	Project Location	1-4
2-1	Stratigraphic Column for the Princeton Gas Field	2-4
2-2	Cross Section of the Princeton Gas Field	2-4
2-3	Proposed Location of Project Components	2-4
2-4	Preliminary Compressor Station Site Plan	2-8
2-5	Gas Well Injection Mode Compression	2-10
2-6	Gas Well Withdrawal Mode Compression	2-10
2-7	Preliminary Remote Well Pad Site Plan	2-14
2-8	Typical Gas Storage Well	2-14
2-9	Schematic of Gas Storage Reservoir and Wells	2-14
2-10	Gas Pipeline Alternatives	2-20
2-11	Pipeline Construction Detail	2-28
2-12	Typical Entry Site for a Horizontal Directional Drill	2-30
2-13	Typical Exit Site for a Horizontal Directional Drill	2-30
3.1-1	Looking North on McAusland Road from 0.05 Mile South of Southam Road: Existing View and Simulated View with Compressor Station	3.1-6
3.1-2	Looking West on Southam Road from 0.25 Mile East of McAusland Road: Existing View and Simulated View with Compressor Station	3.1-6

3.1-3 Looking Southwest from Paradise Road at Highway 45: Existing View and Simulated View with Compressor Station and Remote Well Pad 3.1-6

3.4-1 Recorded Occurrences of Special-Status Plants in the Project Region 3.4-2

3.4-2 Recorded Occurrences of Special-Status Wildlife in the Project Region 3.4-2

3.6-1 Faults and Historical Seismicity 3.6-2

3.6-2 Geologic Units in the Project Area.. 3.6-4

3.6-3 Soil Map Units in the Project Vicinity 3.6-10

3.6-4 Shrink-Swell Potential for Soils in the Project Area 3.6-14

3.7-1 Sensitive Receptor near the Project Components....................... 3.7-2

3.8-1 FEMA Flood Zones in the Project Vicinity.................................3.8-10

3.10-1 Natural Gas Fields in the Project Area 3.10-2

3.11-1 Land Uses near the Compressor Site and Long-Term Noise Monitoring Position 3.11-6

3.11-2 Colusa County Noise/Land Use Compatibility Guidelines .... on page 3.11-7

3.14-1 Hunting Areas in Project Vicinity 3.14-2

Acronyms and Abbreviations

$\mu g/m^3$	micrograms per cubic meter
AADT	Average Annual Daily Traffic
AB 32	California Global Warming Solutions Act of 2006
AB	Assembly Bill
ACHP	Advisory Council on Historic Preservation
AG	California Attorney General
ANSS	Advanced National Seismic System
APEFZ	Alquist Priolo Earthquake Fault Zones
ASTM	American Society of Testing and Materials
BACT	best available control technology
Basin Plan	*Water Quality Control Plan for the Sacramento and San Joaquin River Basins*
Bcf	billion cubic feet
bgs	below the ground surface
BMPs	best management practices
CAAQS	California ambient air quality standards
Cal/OSHA	California Occupational Health and Safety Administration
CalEPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CAT	Caterpillar
CAT	Climate Action Team
CBC	California Building Code
CCAPCD	Colusa County Air Pollution Control District
CCP	comprehensive conservation plan
CCR	Code of Regulations
CCTS	Central California Taxonomic System

CEC	California Energy Commission
Central Valley	Central Valley Gas Storage LLC.
Central Valley Water Board	Central Valley Regional Water Quality Control Board
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
CGR	California Gas Report
CH_4	methane
CIWMB	California Integrated Waste Management Control Board
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNPPA	California Native Plant Protection Act
CNPS	California Native Plant Society
CO	Carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
CPCN	Certificate of Public Convenience and Necessity
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CWA	federal Clean Water Act
dB	decibel
dBA	A-weighted decibel
DE	design earthquake
Delta	Sacramento–San Joaquin River Delta
DF	Designated Floodway
DFG	California Department of Fish and Game
DOC’s	California Department of Conservation’s
DOGGR	California Division of Oil, Gas, and Geothermal Resources
DTSC	Department of Toxic Substances Control
DWR	California Department of Water Resources
EAP II	Energy Action Plan II
EMS	Emergency Medical Services
EO	Executive Order

EPA	Environmental Protection Agency
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ESA	Environmental Site Assessment
ESD	emergency shutdown
FBE	Fusion Bond Epoxy
FEMA	Federal Emergency Management Agency
FESA	federal Endangered Species Act
FMMP	Farmland Mapping and Monitoring Program
FOIA	Freedom of Information Act
FSZs	farmland security zones
g	gravity
General Low Threat Discharge Permit	General Order for Dewatering and Other Low Threat Discharges to Surface Waters
GHG	greenhouse gas
GMP	groundwater management plan
gpm	gallons per minute
HCA	high consequence area
HCP	habitat conservation plan
HDD	horizontal directional drilling
HI	hazard index
HMI	human/machine interface system
Hot Spots Act	Air Toxics Hot Spots Information and Assessment Act
hp	horsepower
hp-hr	brake-horsepower hour
HRA	health risk assessment
I/E	instrumentation/electrical
I/W	injection/withdrawal
I-5	Interstate 5
IGC	International Gas Consulting
ISO	Independent System Operator
kV	kilovolt
kW	kilowatt
LCFS	low carbon fuels standard
L_{dn}	day-night sound level

LEL	lower explosive limit
L_{eq}	equivalent sound level
L_{max}	Maximum Sound Level
L_{min}	Minimum Sound Level
LOS	Level of service
L_{xx}	Percentile-Exceeded Sound Level
M	magnitude
MAOP	Maximum Allowable Operating Pressure
MBTA	Migratory Bird Treaty Act
MCE	maximum considered earthquake
MMscfd	million standard cubic feet per day
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NAHC	Native American Heritage Commission
NCCP	natural communities conservation plan
NGPSA	Natural Gas Pipeline Safety Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	Nitrogen dioxide
NOI	notice of intent
NO_x	nitrogen oxides
NPDES	Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	noise sensitive area
NSVAB	Northern Sacramento Valley Air Basin
NWP	nationwide permit
NWR	National Wildlife Refuge
O_3	Ozone
OHWM	ordinary high-water mark
OPR	California Office of Planning and Research
OPS	Office of Pipeline Safety

P&A	plugged and abandoned
Pb	Lead
PEA	Proponent’s Environmental Assessment
PG&E	Pacific Gas & Electric Company
PGA	peak ground acceleration
PHMSA	Pipeline and Hazardous Materials Safety Administration
PJUSD	Princeton Joint Unified School District
PLC	Progammable Logic Control
PM10	particulate matter 10 microns or less in diameter
PM2.5	particulate matter 2.5 microns or less in diameter
Porter-Cologne Act	Porter-Cologne Water Quality Control Act
ppm	parts per million
PPMP	pollution prevention and monitoring program
ppv	peak particle velocity
PRC	Public Resources Code
proposed project	Central Valley Natural Gas Storage Project
PSIA	Pipeline Safety Improvement Act
psig	pounds per square inch gauge
pVIC	potential vapor intrusion conditions
RCRA	Resource Conservation and Recovery Act
REC	recognized environmental condition
REL	reference exposure level
ROG	reactive organic gases
ROW	right-of-way
RSC	Rural Service Center
RWQCB	Regional Water Quality Control Board
SAA	streambed alteration agreement
SARA	Superfund Amendment and Reauthorization Act Title III
SB	Senate Bill
SCADA	Supervisory Control and Data Acquisition
SCGC	Southern California Gas Company
SCR	selective catalytic reduction
SHPO	State Historic Preservation Officer
SIP	state implementation plan

SNGS	Sacramento Natural Gas Storage LLC
SO_2	Sulfur dioxide
SO_x	Sulfur Oxides
SR	State Route
SRA	State Recreation Area
SRCA	Sacramento River Conservation Area
State Water Board	State Water Resources Control Board
SVP	Society of Vertebrate Paleontology
SWANCC ruling	Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers 121 S.CT. 675,2001
SWPPP	stormwater pollution prevention plan
TAC	toxic air contaminant
TDS	total dissolved solids
TEG	tri-ethylene glycol
tpy	tons per year
UPS	uninterruptible power supply
USA	Underground Service Alert
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
V/C	volume to capacity
VELB	valley elderberry longhorn beetle
WDR	waste discharge requirement
Williamson Act	California Land Conservation Act of 1965
WKA	Wallace-Kuhl & Associates

Executive Summary

Introduction and Project Overview

This Proponent's Environmental Assessment (PEA) has been prepared to support an application by Central Valley Gas Storage, L.L.C. (Central Valley) to the California Public Utilities Commission (CPUC) for a Certificate of Public Convenience and Necessity (CPCN). The application requests authorization to develop, construct, and operate an underground natural gas storage facility located near the unincorporated town of Princeton in Colusa County, California. For the purpose of this PEA and the pre-construction permitting processes, the natural gas facility and all associated components are referred to as the Central Valley Natural Gas Storage Project (proposed project).

The proposed project is located in a rural agricultural area, with historic and ongoing gas storage and delivery operations. The project area is approximately 60 miles north and west of the City of Sacramento. The project area is situated along the west side of the Sacramento Valley, immediately west of the Sacramento River. It is generally bound by State Route (SR) 45 and the Sacramento River to the east and the base of the North Coast Ranges foothills to the west. The Sacramento National Wildlife Refuge Complex is located north of the project area, and the Delevan National Wildlife Refuge is found south of the project area. Both of these wildlife refuges are federal lands that are managed by the United States Fish and Wildlife Service, Pacific Region.

The proposed project involves the conversion of the depleted Princeton Gas Field, into a high-deliverability storage field. The field ultimately will be developed to 8 billion cubic feet (Bcf) of working gas capacity and will be designed to achieve a maximum withdrawal and injection capability of up to 300 million standard cubic feet per day. As part of this conversion, Central Valley will construct a facility that allows the storage of gas in the Princeton Gas Field and provides a connection to Pacific Gas & Electric's (PG&E's) Line 400/401 Transmission System.

Primary Project Components

The proposed project consists of the following primary components.

- A 10-acre compressor station and associated facilities.

- A 4-acre remote well pad site containing nine injection/withdrawal wells, one or two salt water disposal wells, and a 380,000 gallon salt water storage tank.
- A 1,400-foot-long, dual 16-inch gathering line system that connects the injection/withdrawal wells on the remote well pad to the compressors station.
- A 300-foot-long, 12-inch gas pipeline, meter skid, and a rental compressor unit for a temporary connection to PG&E Line 172.
- A 14.7-mile-long, 24-inch-diameter gas pipeline that connects the compressor station to PG&E Line 400/401.
- Conversion of up to four existing wells (Southam #3, Southam #4, Sara Louise #1 and a test well drilled in May 2009); and re-entry of up to two plugged gas wells (Southam #2 and Zumwalt #1-36) to convert to observation wells.
- A 1-acre metering station near PG&E Line 400/401.

Each of these primary project components and their associated facilities is described in detail in Chapter 2 of this PEA.

Purpose and Approach of the PEA

CPUC will serve as the lead agency under the California Environmental Quality Act (CEQA) for purposes of environmental review of the proposed project. This PEA has been prepared in conformity with CPUC's Proponent's Environmental Assessment Checklist for Underground Gas Storage Facilities (California Public Utilities Commission 2008). The purpose of the PEA is to provide CPUC with the necessary information to conduct an independent evaluation of the proposed project and support their preparation of an environmental document that complies with CEQA.

Various design, construction, management, and operations measures, and applicant-proposed measures will be implemented as part of the proposed project to avoid and minimize potential effects on environmental resources. The project design and operation-related measures are described in Chapter 2 "Project Description". Applicant-proposed measures that will be implemented as part of the proposed project to avoid, minimize, and compensate for potentially significant impacts are described in Chapter 3 "Environmental Setting and Impact Assessment." A detailed discussion of potentially significant impacts, growth-inducing impacts, and cumulative impacts is also provided in Chapter 3.

Potentially significant impacts and associated applicant-proposed measures identified for each environmental resource topic are summarized in Table ES-1.

Potential Impacts	Applicant-Proposed Measures (APM)	CEQA Level of Significance before Implementation of APM	CEQA Level of Significance after Implementation of APM
3.1 Aesthetics Resources			
Impact 3.1-1: Temporary impacts resulting from construction activities	AES-1: Implement measures to minimize visual impacts	PS	LTS
Impact 3.1-2: Potential to damage scenic resources along a county-designated scenic roadway	None proposed	LTS	LTS
Impact 3.1-3: Potential to degrade the existing visual character of the area	AES-1: Implement measures to minimize visual impacts	PS	LTS
Impact 3.1-4: Potential to create new sources of substantial light and glare that would adversely affect nighttime views in the project area	AES-1: Implement measures to minimize visual impacts	LTS	LTS
3.2 Agricultural Resources			
Impact 3.2-1: Direct conversion of prime farmland, farmland of statewide importance, or unique farmland to nonagricultural uses	AGRI-1: Compensate landowners for land acquired for easements and structures, crops, and improvements removed for project construction	PS	LTS
Impact 3.2-2: Conflicts with existing zoning for agricultural use on project parcels or in surrounding areas	AGRI-1: Compensate landowners for land acquired for easements and structures, crops, and improvements removed for project construction AGRI-2: Restore agricultural fields to preconstruction condition	PS	LTS
Impact 3.2-3: Inconsistency with Colusa County planning goals, objectives, and policies related to agriculture	None proposed	LTS	LTS
Impact 3.2-4: Conflicts with Williamson Act contracts	None proposed	LTS	LTS
3.3 Air Quality			
Impact 3.3-1: Construction-related emissions exceed NO_x and PM10 thresholds	AIR-1: Implement measures to reduce PM10 dust generated by construction activities AIR-2: Require measures to reduce NO_x emissions from all diesel powered construction equipment, including support equipment AIR-3: Central Valley will purchase NO_x credits from the Colusa County Air Pollution Control District	PS	LTS

Potential Impacts	Applicant-Proposed Measures (APM)	CEQA Level of Significance before Implementation of APM	CEQA Level of Significance after Implementation of APM
Impact 3.3-2: Potential exceedance of operational emission thresholds for NO_x, ROG, and PM10	None proposed	LTS	LTS
Impact 3.3-3: Potential health risks from project operation	None proposed	LTS	LTS
Impact 3.3-4: Potential release of odorized natural gas during project operation	None proposed	LTS	LTS
Impact 3.3-5: Potential greenhouse gas emissions from project construction and operation	None proposed	LTS	LTS
3.4 Biological Resources			
Impact 3.4-1: Potential inadvertent loss or disturbance of woody riparian communities during construction of the gas pipeline	BIO-1: Develop and implement a worker environmental awareness program BIO-2: Obtain and comply with state, federal, and local permits BIO-3: Install temporary construction barrier fencing to protect sensitive biological resources adjacent to the construction zone BIO-4: Minimize potential for the long-term loss of woody riparian vegetation BIO-5: Compensate for the loss of woody riparian vegetation at a ratio of 2:1	PS	LTS
Impact 3.4-2: Potential effects on wetlands and other waters during construction of the compressor station, remote well pad, and gas pipeline	BIO-1: Develop and implement a worker environmental awareness program BIO-2: Obtain and comply with state, federal, and local permits BIO-3: Install temporary construction barrier fencing to protect sensitive biological resources adjacent to the construction zone BIO-6: Avoid and minimize disturbance of waters of the United States, including wetlands HYDRO-1: Prepare and implement a storm water pollution prevention plan	PS	LTS

Potential Impacts	Applicant-Proposed Measures (APM)	CEQA Level of Significance before Implementation of APM	CEQA Level of Significance after Implementation of APM
	HYDRO-2: Prepare and implement a dewatering and discharge plan		
Impact 3.4-3: Potential disturbance of western burrowing owl foraging and nesting habitat during construction of the metering station, PG&E interconnection, and gas pipeline	BIO-1: Develop and implement a worker environmental awareness program	PS	LTS
	BIO-7: Conduct preconstruction surveys for active burrowing owl burrows and implement the California Department of Fish and Game guidelines for burrowing owl mitigation, if necessary		
Impact 3.4-4: Potential loss or disturbance of nesting habitat for special-status and non-special-status raptors and migratory birds during construction of all project components	BIO-1: Develop and implement a worker environmental awareness program	PS	LTS
	BIO-8: Avoid disturbance of tree-, shrub-, or ground-nesting white-tailed kite, northern harrier, loggerhead shrike, and non-special-status migratory birds and raptors		
Impact 3.4-5: Potential disturbance of habitat for valley elderberry longhorn beetle during construction of the gas pipeline	BIO-1: Develop and implement a worker environmental awareness program	PS	LTS
	BIO-2: Obtain and comply with state, federal, and local permits		
	BIO-3: Install temporary construction barrier fencing to protect sensitive biological resources adjacent to the construction zone		
	BIO-9: Establish a minimum 20-foot-wide buffer around all elderberry shrubs prior to construction in the area around the shrub		
Impact 3.4-6: Potential disturbance of Swainson's hawk nests during construction of all project components	BIO-1: Develop and implement a worker environmental awareness program	PS	LTS
	BIO-2: Obtain and comply with state, federal, and local permits		
	BIO-3: Install temporary construction barrier fencing to protect sensitive biological resources adjacent to the construction zone		
	BIO-10: Conduct preconstruction surveys for Swainson's		

Potential Impacts	Applicant-Proposed Measures (APM)	CEQA Level of Significance before Implementation of APM	CEQA Level of Significance after Implementation of APM
	hawk nests and implement appropriate restrictions		
Impact 3.4-7: Potential disturbance of western pond turtle during construction of the gas pipeline	BIO-1: Develop and implement a worker environmental awareness program	PS	LTS
	BIO-3: Install temporary construction barrier fencing to protect sensitive biological resources adjacent to the construction zone		
	BIO-6: Avoid and minimize disturbance of waters of the United States, including wetlands		
	BIO-11: Conduct a preconstruction survey for western pond turtles and implement measures to avoid impacts		
Impact 3.4-8: Potential permanent and temporary effects on giant garter snake habitat during construction of the compressor station, remote well pad, and gas pipeline	BIO-1: Develop and implement a worker environmental awareness program	PS	LTS
	BIO-2: Obtain and comply with state, federal, and local permits		
	BIO-3: Install temporary construction barrier fencing to protect sensitive biological resources adjacent to the construction zone		
	BIO-6: Avoid and minimize disturbance of waters of the United States, including wetlands		
	BIO-12: Implement avoidance and minimization measures during construction activities in giant garter snake habitat		
	BIO-13: Compensate for the temporary disturbance of giant garter snake habitat		
Impact 3.4-9: Potential disturbance of seasonal wetland habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp during construction of the metering station and gas pipeline	BIO-1: Develop and implement a worker environmental awareness program	PS	LTS
	BIO-2: Obtain and comply with state, federal, and local permits		
	BIO-3: Install temporary construction barrier fencing to protect sensitive biological resources adjacent to the construction zone		
	BIO-6: Avoid and minimize disturbance of waters of the		

Potential Impacts	Applicant-Proposed Measures (APM)	CEQA Level of Significance before Implementation of APM	CEQA Level of Significance after Implementation of APM
	United States, including wetlands		
	BIO-14: Implement avoidance and minimization measures during construction activities near vernal pool fairy shrimp and vernal pool tadpole shrimp habitat		
Impact 3.4-10: Potential disturbance or loss of common wildlife species habitat during construction of all project components	None proposed	LTS	LTS
Impact 3.4-11: Potential interference with the movement of fish or wildlife species or their movement corridors during construction of all project components	None proposed	LTS	LTS
3.5 Cultural and Paleontological Resources			
Impact 3.5-1: Potential disturbance to known cultural resources during project construction	None proposed	LTS	LTS
Impact 3.5-2: Potential disturbance to previously unidentified cultural resources during project construction	CR-1: Conduct additional field investigations and implement measures if sensitive cultural resources are found	PS	LTS
	CR-2: Conduct archaeological monitoring and stop work if buried resources are discovered inadvertently		
Impact 3.5-3: Inadvertent discovery of Native American human remains	CR-3: Implement measures to comply with state laws relating to Native American remains	PS	LTS
Impact 3.5-4: Potential disturbance of buried paleontological resources from project construction	CR-4: Implement measures to avoid effects on paleontological resources during construction	PS	LTS
3.6 Geology, Soils, and Seismicity			
Impact 3.6-1: 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	None proposed	LTS	LTS
Impact 3.6-2: Potential to expose people or structures to potential substantial adverse effects from strong seismic ground shaking	GEO-1: Develop site-specific seismic stress guidelines into facility design	PS	LTS
	GEO-2: Assess pipeline response to seismic ground accelerations and ground deformation resulting from		

Potential Impacts	Applicant-Proposed Measures (APM)	CEQA Level of Significance before Implementation of APM	CEQA Level of Significance after Implementation of APM
	seismic events		
	GEO-3: Construct project in accordance with state and county building and construction codes related to earthquake safety and structural stability		
	GEO-4: Conduct geotechnical studies and implement specific measures in potential liquefaction-prone and expansive soil areas		
Impact 3.6-3: Potential to expose people or structures to potential substantial adverse effects from seismic-related ground failure, including liquefaction	GEO-4: Conduct geotechnical studies and implement specific measures in potential liquefaction-prone and expansive soil areas	PS	LTS
Impact 3.6-4: Potential to expose people or structures to potential substantial adverse effects from landslides	GEO-5: Assess pipeline response to surface deformation due to landslides or slumping at channel and canal pipeline crossings	PS	LTS
Impact 3.6-5: Potential for substantial soil erosion or the loss of topsoil	HYDRO-1: Prepare and implement a storm water pollution prevention plan	PS	LTS
Impact 3.6-6: Potential for the project to be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project	GEO-3: Construct project in accordance with state and county building and construction codes related to earthquake safety and structural stability	PS	LTS
	GEO-4: Conduct geotechnical studies and implement specific measures in potential liquefaction-prone and expansive soil areas		
Impact 3.6-7: Potential for expansive soil effects	GEO-3: Construct project in accordance with state and county building and construction codes related to earthquake safety and structural stability	PS	LTS
	GEO-4: Conduct geotechnical studies and implement specific measures in potential liquefaction-prone and expansive soil areas		
Impact 3.6-8: Potential for on-site or off-site subsidence	None proposed	LTS	LTS

Potential Impacts	Applicant-Proposed Measures (APM)	CEQA Level of Significance before Implementation of APM	CEQA Level of Significance after Implementation of APM
3.7 Hazards and Hazardous Materials			
Impact 3.7-1: Potential to create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials	HAZ-1: Implement equipment maintenance and refueling restrictions HAZ-2: Prepare and implement a construction and operation safety and emergency response plan	PS	LTS
Impact 3.7-2: Potential to create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment	HAZ-1: Implement equipment maintenance and refueling restrictions HAZ-2: Prepare and implement a construction and operation safety and emergency response plan	PS	LTS
Impact 3.7-3: Potential for the project to be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5	None proposed	LTS	LTS
Impact 3.7-4: Potential for the project to result in a safety hazard for people residing or working in the project area near a private airstrip	None proposed	LTS	LTS
Impact 3.7-5: Potential to expose people or structures to a significant risk of loss, injury, or death involving wildland fires	HAZ-2: Prepare and implement a construction and operation safety and emergency response plan	PS	LTS
3.8 Hydrology and Water Quality			
Impact 3.8-1: Potential for general construction effects on water quality in local waterways	HAZ-1: Implement equipment maintenance and refueling restrictions HAZ-2: Prepare and implement a construction and operation safety and emergency response plan	PS	LTS
Impact 3.8-2: Potential for short-term degradation of shallow groundwater during construction from pipeline trenching and boring	HYDRO-1: Prepare and implement a storm water pollution prevention plan HYDRO-2: Prepare and implement a dewatering and discharge plan	PS	LTS

Potential Impacts	Applicant-Proposed Measures (APM)	CEQA Level of Significance before Implementation of APM	CEQA Level of Significance after Implementation of APM
Impact 3.8-3: Potential water quality impacts on local waterways from inadvertent release of directional drilling mud	None proposed	LTS	LTS
Impact 3.8-4: Potential degradation of surface waters during hydrostatic testing of the pipeline	HYDRO-2: Prepare and implement a dewatering and discharge plan	PS	LTS
Impact 3.8-5: Potential short-term depletion of groundwater supply during construction	None proposed	LTS	LTS
Impact 3.8-6: Potential impacts on groundwater supplies during gas well operations	None proposed	LTS	LTS
Impact 3.8-7: Potential for degradation of groundwater and surface water during facility operation	HAZ-1: Implement equipment maintenance and refueling restrictions HAZ-2: Prepare and implement a construction and operation safety and emergency response plan HYDRO-1: Prepare and implement a storm water pollution prevention plan	PS	LTS
Impact 3.8-8: Placement of structures within a flood hazard area	None proposed	LTS	LTS
3.9 Land Use and Planning			
Impact 3.9-1: Potential for physical division of an established community	None proposed	LTS	LTS
Impact 3.9-2: Potential inconsistency with plans and policies	None proposed	LTS	LTS
Impact 3.9-3: Potential conflict with habitat conservation plan or natural community conservation plan	None proposed	LTS	LTS
3.10 Mineral and Energy Resources			
None identified	None proposed	LTS	LTS

Potential Impacts	Applicant-Proposed Measures (APM)	CEQA Level of Significance before Implementation of APM	CEQA Level of Significance after Implementation of APM
3.11 Noise			
Impact 3.11-1: Exposure of noise-sensitive land uses to noise from construction activities other than well drilling	NOI-1: Implement noise control measures	PS	LTS
Impact 3.11-2: Exposure of noise-sensitive land uses to noise from well drilling and work over activities	None proposed	LTS	LTS
Impact 3.11-3: Exposure of noise-sensitive land uses to continuous noise from operation of the temporary compressor	None proposed	LTS	LTS
Impact 3.11-4: Exposure of noise-sensitive land uses to continuous noise from operation of the permanent compressor facility	None proposed	LTS	LTS
Impact 3.11-5: Exposure of noise-sensitive land uses to intermittent noise from operation of the natural gas facility	None proposed	LTS	LTS
Impact 3.11-6: Exposure of noise-sensitive land uses to ground-borne noise and vibration	None proposed	LTS	LTS
3.12 Population and Housing			
Impact 3.12-1: Demand for temporary housing	None proposed	LTS	LTS
3.13 Public Services			
Impact 3.13-1: Potential increase in demand for emergency response in the project area	None proposed	LTS	LTS
Impact 3.13-2: Potential need for response to a catastrophic event	None proposed	LTS	LTS
3.14 Recreation			
Impact 3.14-1: Potential disturbance of recreational uses during construction	REC-1: Coordinate with adjacent national wildlife refuges and landowners and implement measures to avoid conflicts with seasonal recreation activities	PS	LTS

Potential Impacts	Applicant-Proposed Measures (APM)	CEQA Level of Significance before Implementation of APM	CEQA Level of Significance after Implementation of APM
3.15 Transportation and Traffic			
Impact 3.15-1: Potential for increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system	None proposed	LTS	LTS
Impact 3.15-2: Temporary disruption of circulation by facility construction	TRA-1: Prepare and implement a construction traffic plan	PS	LTS
Impact 3.15-3: Potential for interference with emergency response routes	TRA-1: Prepare and implement a construction traffic plan	PS	LTS
3.16 Utilities and Service Systems			
Impact 3.16-1: Minimal increase in demand for landfill space associated with generation of waste during project construction and operation and maintenance	None proposed	LTS	LTS
Impact 3.16-2: Potential interference with existing utility infrastructure	None proposed	LTS	LTS

Notes:
CEQA significance determinations:
LTS = Less than significant.
PS = Potentially Significant.

Major Areas of Impact and Conclusions of the PEA

As described in this PEA, Central Valley is proposing to develop an existing natural gas reservoir in a rural area that contains a variety of existing natural gas facilities. In an attempt to minimize impacts on agricultural operations, private and public land uses, and environmental resources, Central Valley is proposing to construct the gas pipeline immediately adjacent to the Wild Goose Storage, LLC, gas pipeline corridor. At the western end of the project area, the metering station would also be constructed in an area that is heavily disturbed and supports existing natural gas facilities, including PG&E's Delevan Compressor Station, Wild Goose Storage Meter Station, and PG&E's Colusa Generating Station (currently under construction). The compressor station and associated facilities will be constructed at the eastern end of the project area within a cultivated agricultural field.

This PEA supports a conclusion that there are no potentially significant impacts that cannot be reduced to less-than-significant levels through design, construction, management, and operations measures, and applicant-proposed measures (including best management practices). As will be discussed in the PEA, the proposed project has been designed to avoid or minimize potential short-term and long-term environmental effects through the implementation of these measures.

In addition to the avoidance of potentially significant environmental impacts, the proposed project will provide a variety of regional and statewide benefits, including those listed here.

- The proposed project would provide statewide benefits by expanding the existing natural gas supply infrastructure in California and, more specifically, by increasing the total amount of natural gas storage capacity in northern California where storage is in high demand.
- The proposed project would add to the vital infrastructure needed to help meet the growing demand for natural gas in residential, commercial, industrial, and power generation markets in the northern regions of the state.
- The proposed project would mitigate potentially costly conditions related to California's reliance on imported gas.
- Price shocks would be reduced because storage acts as a physical hedge, allowing purchasers to buy gas when the supply is adequate and the price is low, inject it into the proposed project for storage, and withdraw it and use it when supply is short and prices are higher.
- Disruptions in the gas supply upstream from the proposed project would have a reduced impact on customers, because customers would be able to withdraw gas from storage to supply their needs.
- Customers would have the ability to increase utilization of potential supplies from new natural gas facilities that are under development on the west coast, such as new interstate pipelines and liquefied natural gas facilities.

List of Local, State, and Federal Permits

A list of permits and approvals that may be required to construct and operate the proposed project is provided in Table ES-2.

Public Outreach and Areas of Potential Controversy

Central Valley has been contacting landowners as part of their efforts to secure easements for the proposed project. In addition to this ongoing landowner coordination, Central Valley held two public meetings; one in Princeton, California on June 10, 2009 and one in Maxell, California on June 11, 2009. The purpose of these meetings was to provide information to local community members regarding the proposed project and the environmental processes. Approximately 100 people were in attendance over the two days. None of the attendees stated opposition to the proposed project. To date, no areas of controversy have been identified. Central Valley and their environmental and engineer consultants have been in contact with a variety of local, state, and federal agencies (as discussed in various sections of this PEA). They will continue to communicate with the community and appointed officials, and other stakeholders regarding project developments. If any areas of controversy are identified in the future, Central Valley will make every attempt feasible to resolve issues as they arise.

Organization of the PEA and Chapter Description

This PEA has been organized into the following chapters:

- **Executive Summary**. The Executive Summary provides an overview of the proposed project; lists the potential impacts and applicant-proposed measures that will be implemented as part of the proposed project; summarizes the potential permits and authorizations; and identifies the major conclusions of the PEA.
- **Chapter 1, Purpose and Need**. This chapter describes the purpose and need for the proposed project, including a description of the facility and general background information on natural gas usage in California, types of natural gas storage facilities, and the anticipated CPUC application process for the proposed project.
- **Chapter 2, Project Description.** This chapter provides an overview of the proposed project and describes the project location, project components, and construction methods.
- **Chapter 3, Environmental Setting and Impact Assessment**. This chapter is divided into seventeen sections that describe existing conditions for each environmental resource area. Each section evaluates the environmental impacts of the proposed project and identifies applicant-proposed measures for potentially significant impacts. One section considers whether the

Table ES-2. List of Anticipated Permits and Approvals

Agency	Type of Permit or Approval
Federal	
U.S. Army Corps of Engineers (USACE)	Section 404 of the Clean Water Act—Letter authorizing the use of nationwide permits (possibly No. 12 and 33) for the discharge of fill material into waters of the United States
U.S. Fish and Wildlife Service (USFWS)	Section 7 of the Federal ESA—Biological Opinion for potential take of federally listed species
State	
California Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR)	Permit to drill wells and conduct well operations Authorization to inject produced water Permit to operate Princeton Gas Field as a storage field
California Department of Fish and Game (DFG)	Streambed Alteration Agreement under Section 1602 of the California Fish and Game Code to trench through drainages that qualify as waters of the State Concurrence under Section 208 for potential impacts on state-listed wildlife species
California Department of Transportation (Caltrans), District 3	Encroachment permits for installing the pipeline under I-5
California Public Utilities Commission (CPUC)	CPCN—Approval to construct and operate the natural gas facility CEQA—Adoption of a mitigation negative declaration or certification of an environmental impact report for the proposed project
Reclamation Board	Encroachment permit for installation of the gas pipeline under the Colusa Trough
Central Valley Region Water Quality Control Board (RWQCB)	Section 401 of the CWA—Water Quality Certification required as part of Section 404 permit from USACE
State Water Resources Control Board (SWRCB)	Section 402 of the CWA—National Pollutant Discharge Elimination Systems Permit for the disturbance of more than 1 acre of land
State Historic Preservation Office (SHPO)	Section 106 of the National Historic Preservation Act (NHPA)—required to comply with Section 404 of the CWA
Local	
Colusa County Air Pollution Control District (CCAPCD)	Authority to Construct/Permit to Operate (to cover compressor station emissions)
Colusa County Environmental Health Department	Water well permit for the compressor station
Colusa County Planning and Building Department	Building permits for compressor station and metering station
Colusa County Public Works Department	Grading permit for all project components Encroachment and transportation permits may be required for construction within a public right of way and for hauling any loads that exceed legal limits Non-residential development permit to construct a structure (compressor station) in an area determined to be a special flood hazard (Zone A)
Glenn-Colusa Irrigation District	Conduit crossing/encroachment permit to install the gas pipeline under the Glenn-Colusa Canal

proposed project, when considered with other closely related past, present, and reasonably foreseeable probable future projects, results in cumulative impacts.

- **Chapter 4, Alternatives**. This chapter describes the alternatives that were considered for the proposed project, including the "no-project" alternative.
- **Chapter 5, References**. This chapter lists the references and personal communications cited in the various resource sections.
- **Chapter 6, List of Preparers**. This chapter lists the environmental and engineering consultants who prepared technical sections or provided technical assistance and/or peer review for the PEA.
- **Appendices**. The appendices provide additional information to support the project description and environmental analysis.
- **Exhibit 1, Project Alignment Maps**. Exhibit 1 contains aerial photographs (scale 1 inch = 600 feet) of the project area. The primary project components, including any proposed work spaces are identified on these project alignment maps.

Chapter 1
Purpose and Need

This chapter provides a description of the purpose and need of the proposed Central Valley Natural Gas Storage Project. It also provides a description of the facility and general background information on natural gas usage in California, types of natural gas storage facilities, and the anticipated California Public Utilities Commission (CPUC) application process for Central Valley Gas Storage, L.L.C. (Central Valley).

Purpose and Need of the Proposed Project

The purpose of the Central Valley Gas Storage Project (proposed project) is to add high-deliverability natural gas storage in northern California connected to Pacific Gas & Electric Company's (PG&E's) Lines 400 and 401. As described in more detail below, the proposed project would accomplish this by converting a depleted natural gas field in Colusa County into a natural gas storage facility that would ultimately be developed to 8 billion cubic feet (Bcf) of working gas capacity, with a designed maximum withdrawal and injection capability of up to 300 million standard cubic feet per day.

The CPUC has recently stated that there is a need for additional natural gas storage capacity in California. The Energy Action Plan II (EAP II), adopted by CPUC and the California Energy Commission (CEC) in 2005, states that a "key action" for California is to "Encourage the development of additional in-state natural gas storage to enhance reliability and mitigate price volatility." (California Energy Commission and California Public Utilities Commission 2005:13.) In the 2008 Energy Action Plan Update, CPUC and CEC reaffirmed that: "[A]dequate natural gas transmission and storage infrastructure are important to ensuring the reliability of California's natural gas supplies." (California Energy Commission and California Public Utilities Commission 2008 EAP Update, p. 17).

Northern California and California as a whole are heavily dependent on natural gas for many essential services, including electric generation, residential space and water heating, and commercial and industrial processes. According to CEC's website, "Natural gas provides almost one-third of the state's total energy requirements and will continue to be a major fuel in California's supply portfolio." In 2007, more than 45% of the electricity used in California was generated by natural gas. PG&E alone delivers natural gas to approximately 4.2 million customers.

The importance of natural gas to California is not likely to decrease as the state moves into a potentially carbon-constrained future. In fact, natural gas may be relied upon even more.[1] As CPUC and CEC have stated,

> A diverse portfolio of natural gas supplies and reliable deliveries of those supplies will be particularly important as we increasingly rely on natural gas as the lowest-emission fossil fuel for thermal power plants and other industrial, commercial, and residential applications (California Energy Commission and California Public Utilities Commission 2008 EAP Update, p.17).

A recent CEC draft staff paper, to be used in preparing the CEC's 2009 California Gas Report addressed the uncertainties regarding the adequacy of California's gas infrastructure given the ongoing changes to the electric and gas demand profiles in California and neighboring states. Assuring adequate gas supply to California is a concern. California receives 87% of the natural gas it consumes from out-of-state, and that percentage is trending higher. California is at the tail end of the pipelines serving its consumers. Though pipelines serving California have expanded into the West Coast region and the California gate stations, much of that capacity is being utilized by the fast growing markets adjacent to California, particularly during high demand periods.[2] As CEC has stated, "Our reliance on imported gas leaves the state vulnerable to price shocks and supply disruptions."

The proposed project would mitigate these potentially costly conditions. Price shocks would be reduced because storage acts as a physical hedge, allowing purchasers to buy gas when the supply is adequate and the price is low, inject it into the proposed project for storage, and withdraw it and use it when supply is short and prices are higher. Disruptions in the gas supply upstream from the proposed project due to increased demand, loss of production, or pipeline outages would have a reduced impact on customers, because customers would be able to withdraw gas from storage to supply their needs.

Additional in-state storage is considered the most economical means to meet projected California Gas Report (CGR) peak winter conditions, rather than constructing additional pipeline capacity to the state from various supply basins.[3] These peak conditions are expected to be impacted by California's greater reliance on Renewables for electricity generation. The intermittency of electric power generated from Renewables creates a need for either: 1) on-site energy storage technologies or 2) low emission, quick response electric generation facilities. Natural gas fired turbines are currently the facility of choice. These "back-up" electric generating facilities would rely on natural gas from local storage fields to provide the gas supply without affecting other gas consumers.[4]

---

[1] See, e.g. *The Pickens Plan*, www.pickensplan.com.
[2] CEC-200-2009-SD at 1
[3] CEC-200-2009-SD at p. 13
[4] CEC-200-2009-004-SD at p. 17

Need for the project was clearly demonstrated when Central Valley received a robust response to its open season held in May, 2008. During the open season, Central Valley received 17 bids totaling 26 Bcf of working capacity interest equating to 325% of the field capacity. Central Valley expects to provide services to California's wholesale gas market and its customers will potentially include utilities, power generators, producers and marketers looking to balance their daily requirements. The connection to PG&E's Lines 400 and 401 would provide Central Valley customers with access to Alberta, Rockies, San Juan, and Permian supplies through the many pipelines that tie into the PG&E system. Customers would also have access to potential supplies from new natural gas facilities that are under development on the west coast, such as new interstate pipelines and liquefied natural gas facilities. Central Valley is currently in the process of negotiating binding storage services agreements for the full capacity required to move forward with the proposed project.

The proposed project would provide statewide benefits by expanding the existing natural gas supply infrastructure in California and, more specifically, by increasing the total amount of natural gas storage capacity in northern California where storage is in high demand due to continuing seasonal residential load growth and the expected completion of incremental gas-fired power generation plants.

Facility Overview

Natural Gas Background

Natural gas is a naturally occurring accumulation of gases in geologically enclosed spaces, such as the permeable material covered by cap rock beneath the Princeton Gas Field. It consists primarily of methane, which is created by decomposing organic materials. Other components are ethane; propane; butane; and pentane, hexane, and heptane. When it first comes out of the ground, natural gas also can contain liquid hydrocarbons and water, which must be removed before transportation.

After natural gas is extracted from the ground and treated, it is compressed into a network of intrastate and interstate gas pipelines that can deliver the gas across wide distances—for example, from the mountains of British Columbia to southern California. In 2006, California produced 13.5% of the natural gas consumed in the state, 40% was from the southwestern United States, 23.5% was from Canada, and 23% was from the Rocky Mountain region (California Energy Commission 2007). Because of changes in the natural gas industry over the past several years, many private companies no longer deal with only one company when purchasing natural gas services. Instead, many California companies arrange to purchase gas directly from producers and marketers across the western half of North America, and then contract with PG&E and other pipeline owners to transport the gas to the endpoint in California.

For years, the state's two largest natural gas utilities, PG&E and Southern California Gas Company (SCGC), have stored natural gas in various storage facilities around the state as a method of alleviating the effects of a supply shortage. Other private, non-utility companies are also allowed to build such facilities and compete directly with the utilities in offering natural gas services, including storage services, provided they meet all applicable laws and regulations.

Project Background

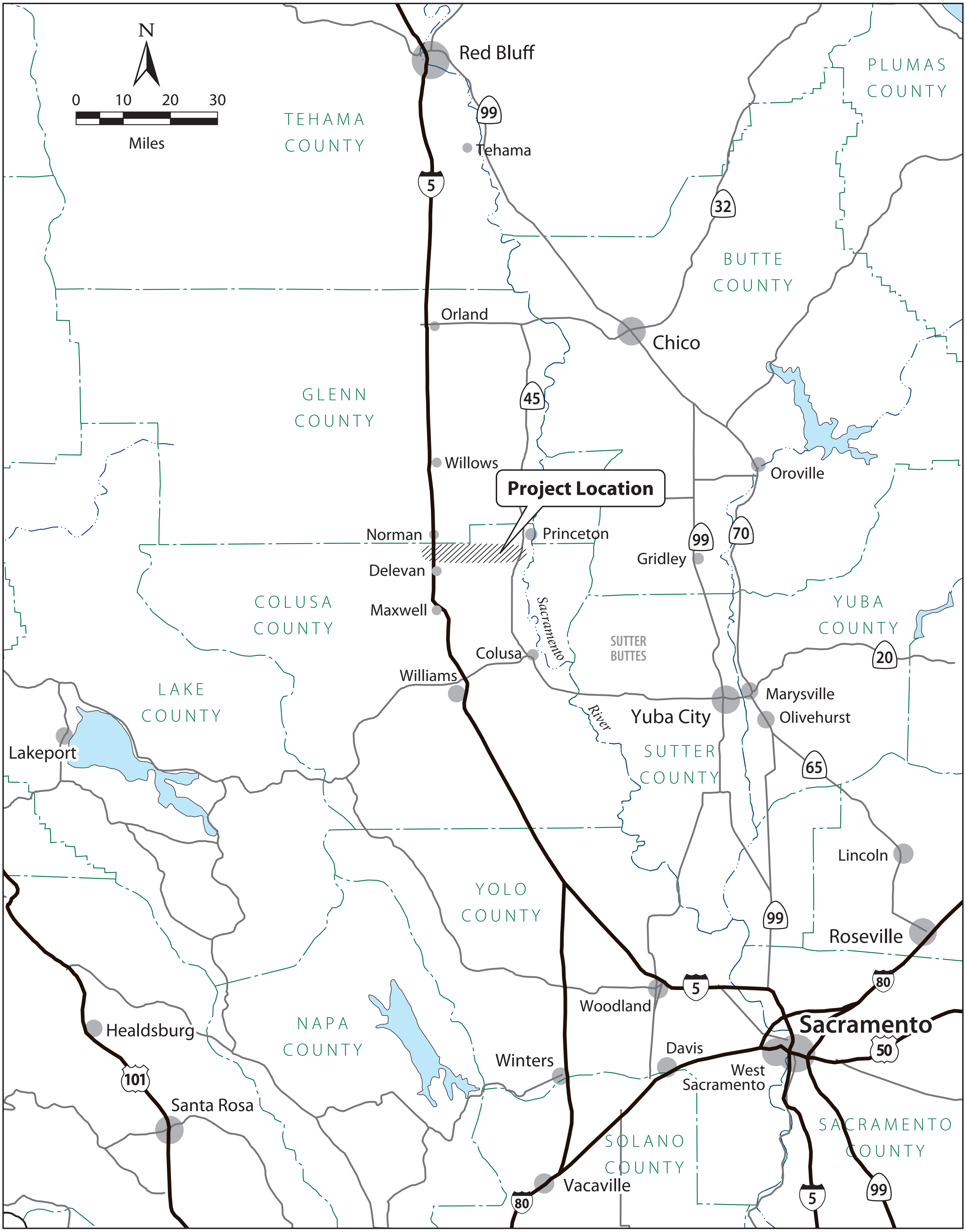
Central Valley is proposing to convert the depleted Princeton Gas Field near the unincorporated town of Princeton in Colusa County, California (Figure 1-1), into a high-deliverability storage field. Central Valley was presented the opportunity to develop the Princeton Gas Field by an outside third party developer that held the oil and gas leases for the property. In its depleted state, the developer identified the potential to use the Princeton Gas Field as a storage facility and sought out a company to develop the field. Central Valley evaluated the opportunity and determined the field suitable because of its geological characteristics and its location relative to the existing natural gas transmission infrastructure and relative to potential markets. The field was identified as having the capability to perform at high deliverability and injection rates.

The Princeton Gas Field produced approximately 9.7 Bcf from 1954 to 1991. Because the field once held gas naturally, the reservoir is a proven container for gas and exhibits the reservoir quality needed for a high-deliverability gas storage field. The field ultimately will be developed to 8 Bcf of working gas capacity and will be designed to achieve a maximum withdrawal and injection capability of up to 300 million standard cubic feet per day. As part of this conversion, Central Valley will construct infrastructure that will facilitate the storage of gas in the field and provide a connection to PG&E's Transmission System, located west of Interstate 5 (I-5) near PG&E's Delevan Compressor Station and Wild Goose Storage, Inc.'s Delevan meter station and interconnect.

The working gas capacity of 8 Bcf will be phased in over 4 years, with a 5.5-Bcf capacity in the first year of service. The primary facilities needed to operate the storage field are a 10,650-horsepower compressor station, gas dehydration facilities, an approximately 14.7-mile gas pipeline to connect the storage field to the PG&E transmission system, a metering station at the PG&E connection point, nine directionally drilled injection/withdrawal wells at a remote well pad, and a gas gathering system to connect the injection/withdrawal wells to the compressor station (Figure 1-2).

Related Storage Facilities

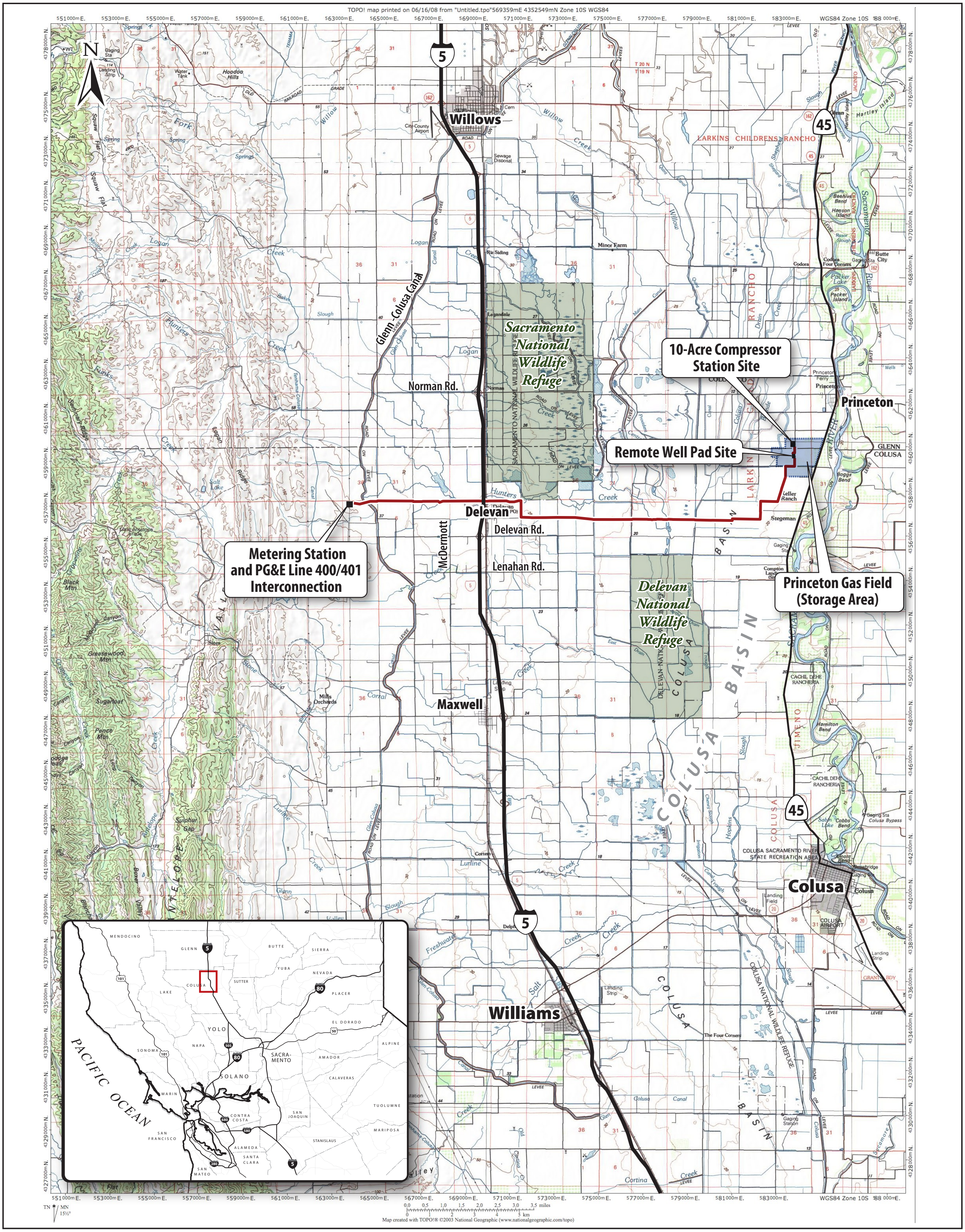
Three types of storage facilities are currently in use in the United States: abandoned/newly developed salt caverns, aquifers, and depleted oil and gas production fields. In California, only depleted production fields are currently



Graphics ... 01099.07 (10-08)

ICF Jones & Stokes
an ICF International Company

Figure 1-1
Project Vicinity



Graphics ... 01099.07 (7-13-09) tm

ICF Jones & Stokes
an ICF International Company

Figure 1-2
Project Location

used as storage facilities. A depleted production field is for several reasons considered by storage facility developers to be the most desirable type of facility. Because the field was already used for gas production, the geology of the reservoir is generally well known. Also, the cap rock that covers the permeable reservoir seals in natural gas, while water below keeps it pressurized for easier withdrawal.

Currently, four companies own natural gas storage fields in California: PG&E; SCGC; Lodi Gas Storage L.L.C; and Wild Goose Storage Inc. PG&E and SCGC own and operate several natural gas storage fields in northern and southern California. PG&E's storage fields include the Pleasant Creek (Yolo County), McDonald Island (San Joaquin County), and Los Medanos (Contra Costa County) storage facilities in northern California (Pacific Gas & Electric Company 2006). SCGC owns the Honor Rancho, La Goleta, Aliso Canyon, and Playa Del Rey storage facilities in southern California (Southern California Gas Company 2008).

Lodi Gas Storage operates the Lodi Gas Storage Facility northeast of Lodi in San Joaquin County and the Kirby Hills Natural Gas Storage Facility in Solano County. Wild Goose Storage began operations at its facility in Butte County in the late 1990s; this facility is in the same region as the proposed Central Valley Gas Storage Project. As described in Chapter 2, Central Valley is proposing to place the natural gas pipeline parallel to the Wild Goose Storage Expansion Project gas pipeline.

There are currently two proposed underground gas storage facilities that have CPCN applications before the CPUC. Sacramento Natural Gas Storage, L.L.C is proposing to construct and operate the Sacramento Natural Gas Storage Project in south Sacramento County. Gill Ranch Storage, L.L.C has submitted a CPCN application for a natural gas storage project in Madera and Fresno Counties. In addition, Wild Goose Storage is planning to expand their existing facility.

Project Application

In its application to the CPUC, Central Valley is requesting authorization to construct and operate a new natural gas storage facility near the town of Princeton. Central Valley intends to offer its customers flexible, multi-cycle, market-based storage services with the ability to inject or withdraw gas into and out of the Central Valley Gas Storage Facility on demand. Customers would make their own arrangements for purchasing the gas, transporting it to and through PG&E's natural gas pipeline system for delivery to the storage facility, and delivery from the storage facility to the customer.

CPUC will consider the application and determine whether to issue a Certificate of Public Convenience and Necessity (CPCN) to Central Valley, authorizing it to construct and operate the new facility. In considering an application that would result in construction of physical facilities, CPUC conducts both a standard administrative proceeding that looks at issues such as need, rates, and services, and also an environmental review process under the California Environmental Quality Act (CEQA).

CEQA requires all government agencies in California to assess potential impacts on the environment whenever they make a discretionary decision. The lead agency (in this case, CPUC) must determine whether the proposed project would result in significant impacts on the environment and whether those impacts could be avoided, eliminated, compensated for, or reduced to less-than-significant levels. This Proponent's Environmental Assessment (PEA), along with other information collected and requested by CPUC, will form the basis of the CEQA document prepared by CPUC. The CEQA document will become part of the record that CPUC will rely upon in deciding whether to approve the application.

Chapter 2
Project Description

This chapter provides an overview of the proposed project and describes the project location, project components, and construction methods.

Project Background

Central Valley is proposing to convert the depleted Princeton Gas Field, near the unincorporated town of Princeton in Colusa County, California, into a high-deliverability, multi-cycle storage field. The field would ultimately be developed to provide 8 Bcf of working gas capacity. The working capacity would be phased in over 4 years, commencing with 5.5 Bcf in the first year. The field would be designed to achieve a maximum withdrawal and injection capability of up to 300 million standard cubic feet per day (MMscfd)[1].

Central Valley would connect the storage field into the PG&E Transmission System Line 400/401 near PG&E's Delevan Compressor Station, approximately 14 miles west of the storage field. The PG&E transmission system runs north–south along the western end of the project area. It transports natural gas from PG&E's connections with interstate pipelines, state gas fields, and local distribution infrastructure to the utility's local transmission and distribution system. The proposed project involves constructing facilities necessary to convey natural gas from Line 400/401 to the Princeton Gas Field, storing the gas in the existing natural reservoir, withdrawing the stored gas, and conveying the withdrawn gas to Line 400/401 for delivery to customers.

The connection into PG&E would provide Central Valley customers with access to Alberta, Rockies, San Juan, and Permian supplies through the many pipelines that connect to PG&E. Customers holding Central Valley capacity would also have access to potential supplies from new natural gas facilities under development on the West Coast.

The project would be designed to meet the seismic safety standards of the 2007 California Building Code, which became effective January 1, 2008. Specific design measures may include (but are not limited to) special foundation design,

[1] A standard cubic foot is a measure of quantity of gas, sometimes but not always defined as a cubic foot of volume at 60°F and 14.7 pounds per square inch (PSI) of pressure.

additional bracing and support of upright facilities (e.g., tanks, exhaust stacks), and weighting the pipeline in areas of potential liquefaction. Automated shutdown and venting controls would limit the secondary effects of equipment damage. Project facilities and foundations would be designed to withstand changes in soil density. The project would be designed to meet the requirements of 49 CFR Part 192 of the U.S. Department of Transportation's (USDOT's) Office of Pipeline Safety (which provides oversight of pipeline and natural gas facility construction, operation, and safety) and the California Department of Conservation's Division of Oil, Gas and Geothermal Resources (DOGGR) (which provides oversight of design, installation, and operation of gas wells and underground gas injection projects).

The project would also be regulated by CPUC as an intrastate gas storage operator, providing open-access service with market-based rates. Central Valley proposes to sell firm and interruptible storage services under a CPUC-approved tariff.

Project Ownership

Once constructed, the project facilities would be owned and operated by Central Valley, with the exception of the custody transfer metering station and the utility power line, both of which would be owned and operated by PG&E. The project facilities operated by Central Valley would include the underground storage facility, wells, pipelines, and compressor station. The lands that are occupied by the project facilities within the confines of the storage field and the use of the underground formation for storage would be leased from the property owners through underground gas storage lease agreements. The storage leases would remain in effect until Central Valley chooses to surrender them.

Central Valley holds certain oil and gas leases and certain gas storage agreements, and is in the process of securing further gas storage agreements, mineral owner consents, and pipeline easements. As required by CPUC, "a list of the names and mailing addresses of all owners of land over, under or on which the project, or any part of the project, may be located, and owners of land adjacent thereto" is provided in Appendix A of this PEA. This appendix also contains figures (Figures A-1 and A-2) showing the location of all property owners within 300 feet of the project area.

Site Description

Location

The project area encompasses approximately 246.5 acres and is located approximately 60 miles north and west of the City of Sacramento, in Colusa County (Figure 1-1). The project area is situated in the west side of the Sacramento Valley, immediately west of the Sacramento River; it is generally bounded by State Route (SR) 45 and the Sacramento River to the east and the foothills of the North Coast Ranges to the west. The Sacramento National Wildlife Refuge is located north of the project area, and the Delevan National Wildlife Refuge is south of the project area (Figure 1-2). Both of these wildlife refuges (units of the Sacramento National Wildlife Refuge Complex) are federal lands managed by the U.S. Fish and Wildlife Service, Pacific Region.

Land Uses and Environmental Setting

The project corridor runs from the proposed compressor station site at the eastern end of the corridor (approximately 1.2 miles south of the unincorporated town of Princeton) to a point of interconnection with PG&E Line 400/401 at the western end of the project area. Between those points, it crosses through agricultural lands of the Colusa Basin (Figure 1-2), which are predominantly rice fields with widely scattered rural residences and agricultural operations. The project area has been farmed for many decades and now supports very little undisturbed natural habitat—except for the western end of the project area near the metering station and PG&E interconnection, which contains nonnative annual grasslands. This area is relatively flat and ranges from 55 to 150 feet in elevation.

As described above, Central Valley would be securing temporary surface use agreements and permanent right-of-way (ROW) easements from landowners. The entire project area (estimated at approximately 246.5 acres) would require acquisition of new ROW (both temporary work space and permanent ROW). This acreage encompasses the areas needed to construct the project components, access roads, and staging areas.

A more detailed description of the land uses and environmental settings associated with each project component is provided below in “Project Components.” Representative photographs of the project area are presented in Appendix B.

Underground Formation Information

Central Valley intends to convert the depleted Princeton Gas Field to gas storage. The aerial extent of the field, including buffer area, is 677 acres and is shown on Figure 2-3. The productive gas reservoir is composed of a sequence of five hydrologically separate sandstone layers that lie within the Kione Formation of the late Cretaceous age. The structural tops of the five sandstone layers range in depth from 1,980 to 2,280 feet below the surface and are commonly referred to as the “Wild Goose Sands.” The thick lower sand (pale yellow band on the cross-section) is referred to as the “Massive Sand,” and the four thinner upper sand layers are simply named the “1st,” “2nd,” “3rd,” and “1980” sand (collectively called the “Upper Sands”).

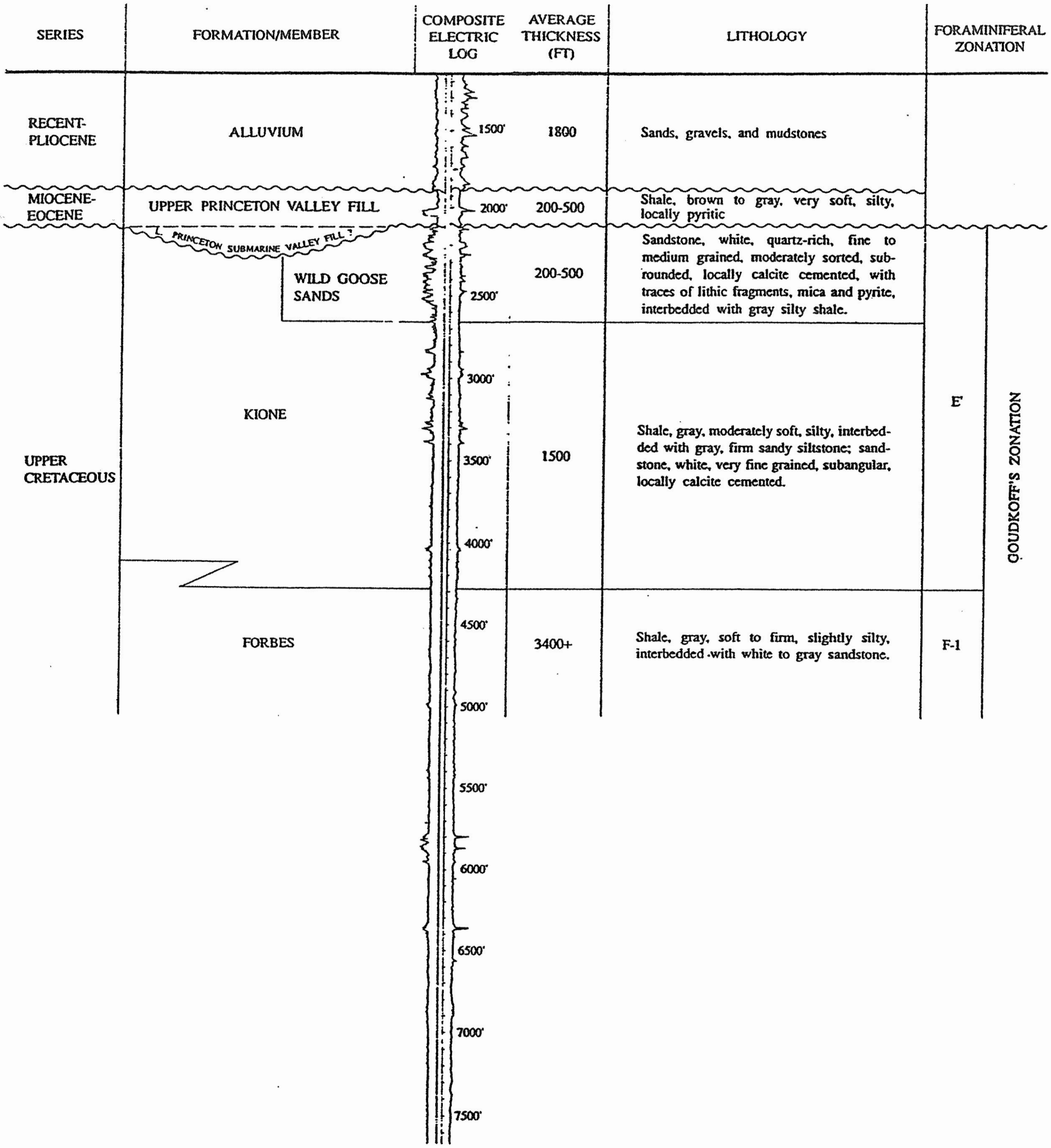
The description of the stratigraphy and structural geology is primarily adapted from R. S. Thesken, Bounde Creek and Princeton Gas Fields (1993) and

DOGGR's report on *California Oil and Gas Fields, Central California* (1998). A stratigraphic column depicting the subsurface strata is reproduced from Thesken in Figure 2-1.

Publicly available wireline logs from all wells completed in the vicinity of the Princeton Gas Field were used in the structural and thickness mapping of the field. Wireline logs for all wells drilled in the vicinity of the Princeton Gas Field can be downloaded at the California Department of Conservation, Division of Oil, Gas and Geothermal Resources website link: *http://www.consrv.ca.gov/DOG/Pages/index.aspx*. In addition, wireline logs were used to study the net and gross thickness, porosity and sand quality of each sand. Geologic maps showing the gross thickness for all sands are shown in Appendix C. Cross-sections were constructed to study the structural relationship and connectivity of each of the sandstone layers in the Princeton Gas Field as shown in Figure 2-2. The logs also provide the thickness of the caprock layer, which is greater than 200 feet thick. Seismic data was not used in the geological interpretation. Wireline logs from the following eleven wells were used to study the Princeton Gas Field:

1. Southam #1: former gas production now plugged and abandoned
2. Southam #2: former gas production now plugged and abandoned
3. Southam #3: existing well - shut-in gas production
4. Southam #4: existing well - shut-in gas production
5. Sara Louise #1: existing well - demonstrated wet in productive sand in 2001
6. Zumwalt #1–36: former gas production now plugged and abandoned
7. Poage #1–25: dry hole—productive sands were absent
8. Gomes #1–25: dry hole—productive sands were absent
9. Rheem Capital #1–30: demonstrated wet in productive sand and plugged
10. Intex Capital #1–30: demonstrated wet in productive and plugged
11. Rheem Capital #1–31: demonstrated wet in productive sand and plugged

The Massive Sand, the lowest of the sandstone layers, has a gross thickness ranging from 200 to 350 feet and is continuous across the field. Prior to gas production, this sand contained a gas/water contact at 2,174 feet subsea level. Production and pressure history from wells producing from the Massive Sand supported a strong water drive mechanism. The Lower Massive is watered out and can no longer produce commercial quantities of gas. The upper four sand layers are much thinner; each layer ranges in thickness from 5 to 20 feet. The sand layers are separated by shale and are not always continuous across the field. Similarly, the upper sands are also depleted and can no longer produce commercial quantities of gas as all wells have watered out, most recently evidenced by an existing well (Sara Louise #1) in 2001. This well attempted to produce gas but no commercial quantities were recovered.



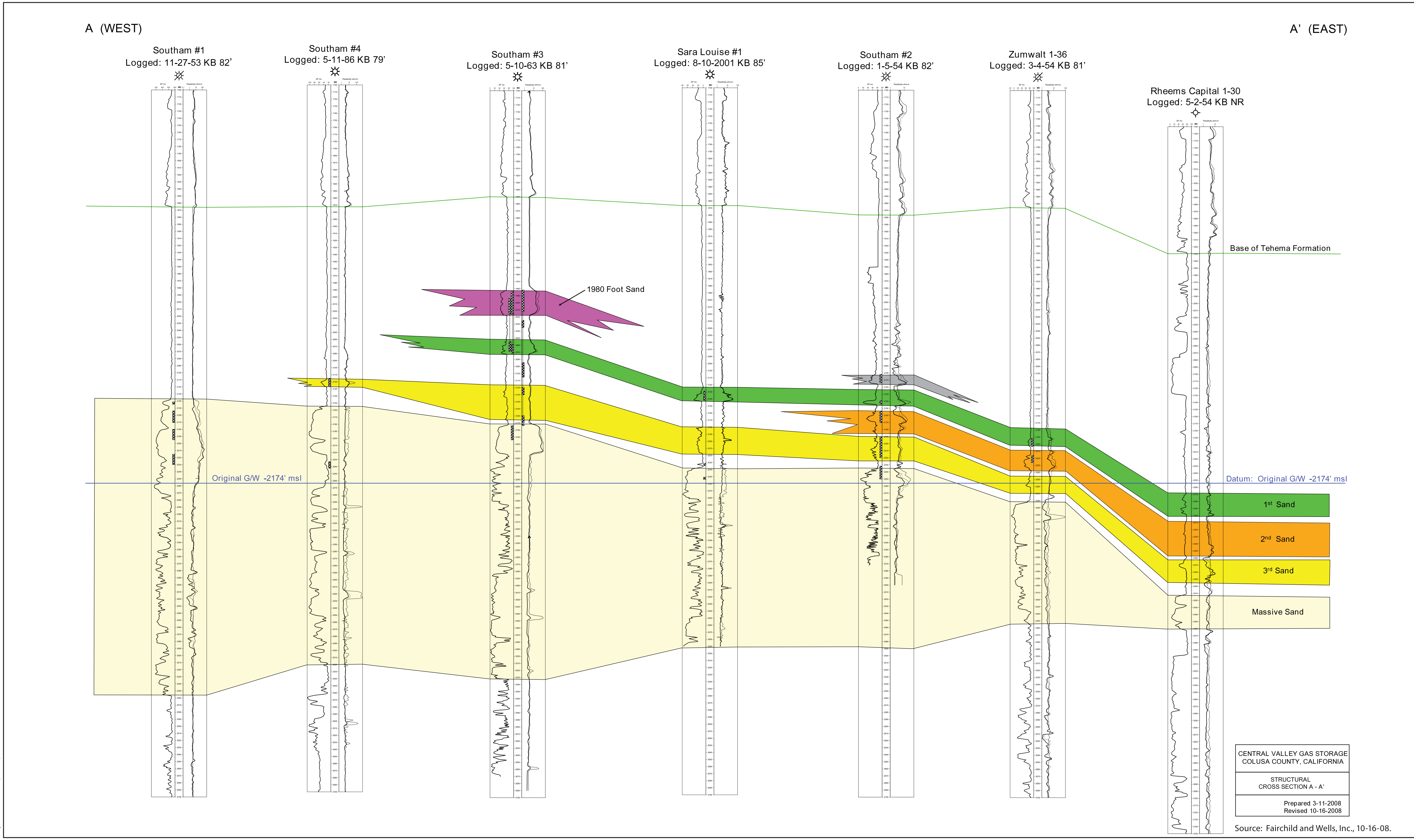
Stratigraphic column, Princeton Gas field.

Source: Department of Conservation Division of Oil, Gas and Geothermal Resources, Publication No. TR45, Princeton Gas Field, R. Thesken, date unknown.

Graphics ... 01099.07 (10-08)

ICF Jones & Stokes
an ICF International Company

Figure 2-1
Stratigraphic Column for the Princeton Gas Field



Source: Fairchild and Wells, Inc., 10-16-08.

Graphics ... 01099.07 (11-6-08)

ICF Jones & Stokes
an ICF International Company

Figure 2-2
Cross Section of the Princeton Gas Field

Graphics ... 01099.07 (7-13-09) tm

ICF Jones & Stokes
an ICF International Company

Figure 2-3
Proposed Location of Project Components

The reservoir is vertically bounded by an impermeable cap rock made up of a 200- to 500-foot-thick shale layer known as the Upper Princeton Valley Fill. The cap rock acts as a productive seal to prevent the vertical migration of hydrocarbons. The lateral productive limits of the sands are controlled primarily by structural closure toward the east and stratigraphic trapping to the north, west, and south. The log data from offset wells were the basis for delineation of the Princeton Gas Field boundary and the estimation of the original gas-water contact in Southam #1 defined the gas extents at original conditions. Offset wells that did not indicate reservoir development in the Upper Kione or found to be water bearing in the structure provided data points in mapping the gas extents and outer limits of the geological structure. The total amount of gas produced in the field versus volumetric capacity of the field further supports the maximum limits of the field. This reservoir is ideal for storage because the Kione sandstone exhibits the high porosity and permeability that are needed for high rates of storage injection and withdrawal.

Existing Facilities

History of the Natural Gas Field

The Princeton Gas Field produced approximately 9.7 Bcf of natural gas from five wells from 1954 to 1991. The field was discovered in December 1953 with the drilling of Southam #1(S-1) at an initial wellhead pressure of 960 pounds per square inch gauge (psig), which converts to a reservoir pressure of 1,015 psi. In the following year, Southam #2 (S-2) and Zumwalt #1-36 (Z-1) were drilled. Southam #3 (S-3) and #4 (S-4) and Sara Louise #1 (SL-1) were drilled in 1963, 1986, and 2001, respectively. No commercial production was recovered from SL-1. S-1, S-2, and Z-1 have all since been adequately plugged and abandoned in accordance with DOGGR regulations. S-1 was plugged in 1974 and S-2 and Z-1 were plugged in 1981. S-2 and Z-1 are proposed to be reopened as observation wells as part of the proposed project.

Reservoir Development

Central Valley is proposing to convert the depleted Princeton Gas Field into a high-deliverability, multi-cycle storage field. The field would ultimately be developed to provide 8 Bcf of working gas capacity and would be phased over 4-four years, commencing with 5.5 Bcf in the first year. The field and surface facilities would be designed to achieve a maximum withdrawal and injection capability of 300 MMscfd. For the field to meet its design withdrawal rates, Central Valley projects that a base gas injection of 0.5 Bcf will be required. No base gas is anticipated to be injected into the Massive Sand because of its strong water drive characteristics.

Central Valley arrived at its estimates of working capacities, base gas capacity, injection and withdrawal rates, and storage well requirements by completing detailed reservoir simulation studies. The model grid consists of 3,055 grid blocks, each 100 foot square. The total grid dimensions are 6,500 feet x 4,700 feet. Since all five model layers are separated by shale it was assumed that there was no vertical communication between layers. Each grid block had a unique thickness based on sand isopach mapping. Other rock properties were constant by layer as shown in Table 2-1. Porosity was determined from well logs. Permeability values were estimated based on well deliverability performance and model history matching.

Table 2-1. Princeton Reservoir Model Assumptions

Sand Layer	Porosity (%)	Permeability (millidarcies)	Trapped Gas (%)
1980 Sand	24	50	30
1st Sand	26	75	28.5
2nd Sand	32	100	28.5
3rd Sand	28	100	28.5
Massive	28	400	30

The model was calibrated by history-matching available gas production, pressure data from the field during the primary production cycle and movement of gas-water contact over time. A reasonable history match of the primary performance was achieved. The historical individual well gas rates were input into the model and the model solved for pressure and saturation with time for each grid block. The model-calculated gas-water contact with time was also history matched to historical water production performance. The calculated contacts compared favorably with the contacts determined from the perforated intervals in the Massive Sand and well performance. Once a history match was achieved, the model was used for predictive purposes and for running sensitivities on number and placement of injection/withdrawal wells.

Central Valley anticipates operating within a reservoir pressure range of 500–1,400 psi to achieve the design working capacities and to displace water from the reservoir. The maximum operating pressure of 1,400 psi reflects a pressure gradient of approximately 0.65 psi/ft (reservoir pressure divided by the depth to the top of the reservoir), or approximately 40% more than original pressure. In accordance with DOGGR Section 1724.9 requirements for gas storage projects and prior to commencing gas injections, Central Valley would recover core from the cap rock and conduct threshold pressure tests[2] to confirm that the planned maximum operating pressures would not compromise the integrity of the storage reservoir and that an adequate margin of safety in the maximum operating pressure is established.

Central Valley drilled a test well in May 2009 and recovered core samples for cap rock testing. They used this information to conduct a comprehensive wireline logging program to acquire additional reservoir data to assist in well

[2] Threshold pressure testing is conducted in a laboratory environment on a cap rock core sample to determine the ability of the cap rock structure to contain gas at progressively increasing pressures. The threshold pressure is reached when the gas begins to permeate through the cap rock.

planning and field development. Several wire line logs and pressure tests were run in order to acquire additional reservoir data to assist in well planning and field development. Central Valley drilled the test well with permits from Colusa County and DOGGR. As described later in this chapter, Central Valley may use this well as a storage injection/withdrawal well or as an observation well.

Central Valley Existing Operations

Although the Princeton Gas field is an existing reservoir, the proposed project is not an expansion of an existing storage facility.

Project Components

The proposed project comprises the components listed below.

- A 10-acre compressor station and associated facilities.
- A 4-acre remote well pad site containing nine injection/withdrawal wells, one or two salt water disposal wells, and a 380,000 gallon salt water storage tank.
- A 1,400-foot-long, dual 16-inch gathering line system that connects the injection/withdrawal wells on the remote well pad to the compressors station.
- A 300-foot-long, 12-inch gas pipeline, meter skid, and a rental compressor unit for a temporary connection to PG&E Line 172.
- A 14.7-mile-long, 24-inch-diameter gas pipeline that connects the compressor station to PG&E Line 400/401.
- Conversion of up to four existing wells (S-3, S-4, SL-1 and the test well drilled in May 2009); and re-entry of up to two plugged gas wells (S-2 and Z-1) to convert to observation wells.
- A 1-acre metering station near PG&E Line 400/401.

Each of the major project components is described below and is shown in Figure 2-3.

Compressor Station

The compressor station would be located on a 10-acre site at the eastern end of the project area (Figure 2-3; Sheet 1 in Exhibit 1). The site is within the Princeton Gas Field, approximately 1.2 miles south of the unincorporated town of Princeton. The proposed site is presently a rice field.

The compressor station would consist of the elements listed below.

- Three 3,550 horsepower (hp) natural gas engines and compressors.

- Three dehydration units and reboilers (natural gas-fuelled).
- Three natural gas aftercoolers.
- Safety and emergency shutdown devices.
- A 640-kilowatt (kW) standby generator (natural gas-fuelled).
- Metering and regulation facilities.
- An auxiliary building housing the control room, office, and shop area.
- A motor control center and utility building.
- An electrical distribution line.
- A domestic water well.

The preliminary compressor station site plan is provided in Figure 2-4.

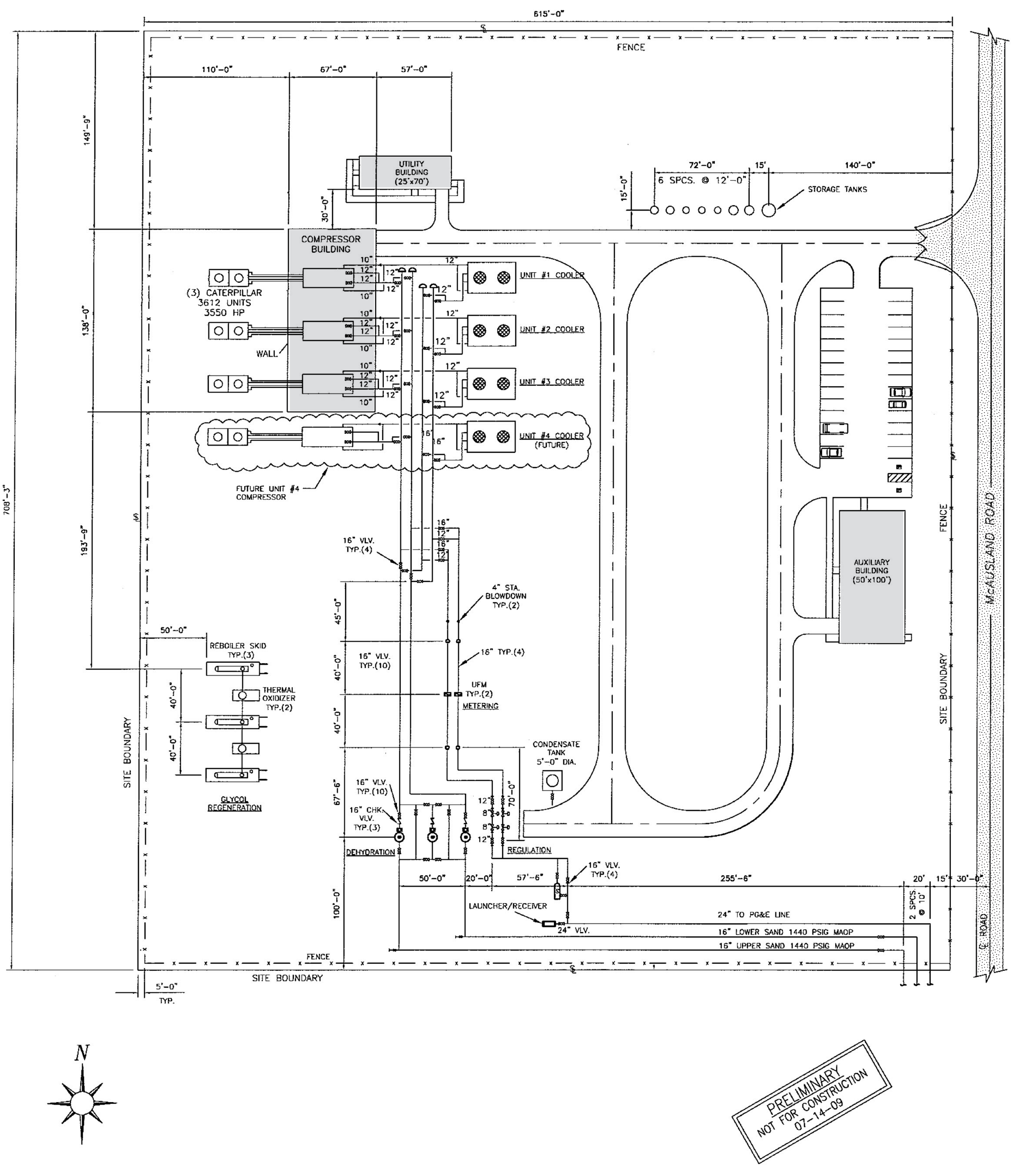
Compressor Units and Piping

Central Valley proposes to install three 3,550- hp Caterpillar (CAT) 3612 LE natural gas engines with a combined total output of approximately 10,650 hp coupled to drive three Ariel JGC/6 reciprocating gas compressors. The compressor drivers would be equipped with Best Available Control Technology (BACT) emission controls in order to meet Colusa County Air Pollution Control District (CCAPCD) emission requirements. Central Valley would be required to obtain a permit of operation from CCAPCD for operation of the facility.

The three compressor units would be enclosed in a building designed to minimize noise emissions. Central Valley has completed a noise impact evaluation (Hoover & Keith, Inc., May 2009) and will use the consultant's recommendations in the design of the building and facilities such that the equipment noise does not exceed applicable Colusa County noise standards.

The compressor building would be guarded by fire, heat, and gas detection systems that, when activated, would commence an alarm sequence with automatic shut down controls of the compressor station.

The gas piping and all pressure-containing facilities at the compressor station would be designed in accordance with 49 CFR Part 192 requirements utilizing a 0.50 design factor in order to meet a maximum allowable operating pressure of 1,440 psig. The main gas valves and flanges will be either ANSI 600 # or 900# class. The current development plan to 8 Bcf working capacity requires that three units be installed initially. Central Valley has incorporated future expansion provisions for a fourth unit in its design. Installation of the fourth expansion unit is contingent upon market demand and reservoir technical considerations and would be subject to a future application to the CPUC.



Graphics ... 01099.07 (7-15-09)

Source: EN Engineering, 7-14-09.

ICF Jones & Stokes
an ICF International Company

Figure 2-4
Preliminary Compressor Station Site Plan

Compressor Operation

The process flow diagrams for injection and withdrawal modes are shown in Figures 2-5 and 2-6, respectively. The compressors would be used for both injection and withdrawal purposes and would be available 24 hours per day, 7 days per week. When prevailing pressures on PG&E are less than the storage field pressure, compressors would boost the pressure of natural gas received from PG&E for injection into the storage reservoir; and when storage field pressures are less than prevailing pressures on PG&E, compressors would boost the pressure of the gas withdrawn from the storage reservoir so that it can be delivered into the PG&E system. Compression would take place as conditions dictate; several factors determine the need to run one or more units, including prevailing pipeline pressures on PG&E, the customers' daily nominations (volumes and whether gas is injected or withdrawn), and pressure in the storage reservoir. Central Valley predicts a performance profile for the field assuming that customers use their capacity for three full cycles per year—injecting their capacity until full, followed by withdrawing the same, and repeating three times per year—60 days in and 60 days out. All three compressors are designed to operate during peak flow times for both injection and withdrawal.

Back Up Power, Control and Communications Systems

The compressor station would also contain a 640 kW natural gas–fuelled engine generator set in order to support power requirements of a normal operation of the compressor station in the event of grid power loss. The generator would startup automatically when a loss of power supply to the compressor station is detected. Central Valley expects that the generator would be driven by a CAT G3512 LE engine. The engine generator set would be installed and operated to meet all CCAPCD air quality and Colusa County noise requirements.

In addition, all critical systems related to communications and control will be provided with an uninterruptible power supply (UPS) to insure continuity of operation. The fire and gas detection and alarm system will also be provided with an UPS. The emergency shutdown system will also be protected by an uninterruptible power supply. The UPS will not depend on the availability of the generator set. However, the generator set may be used to supplement the uninterruptible power systems.

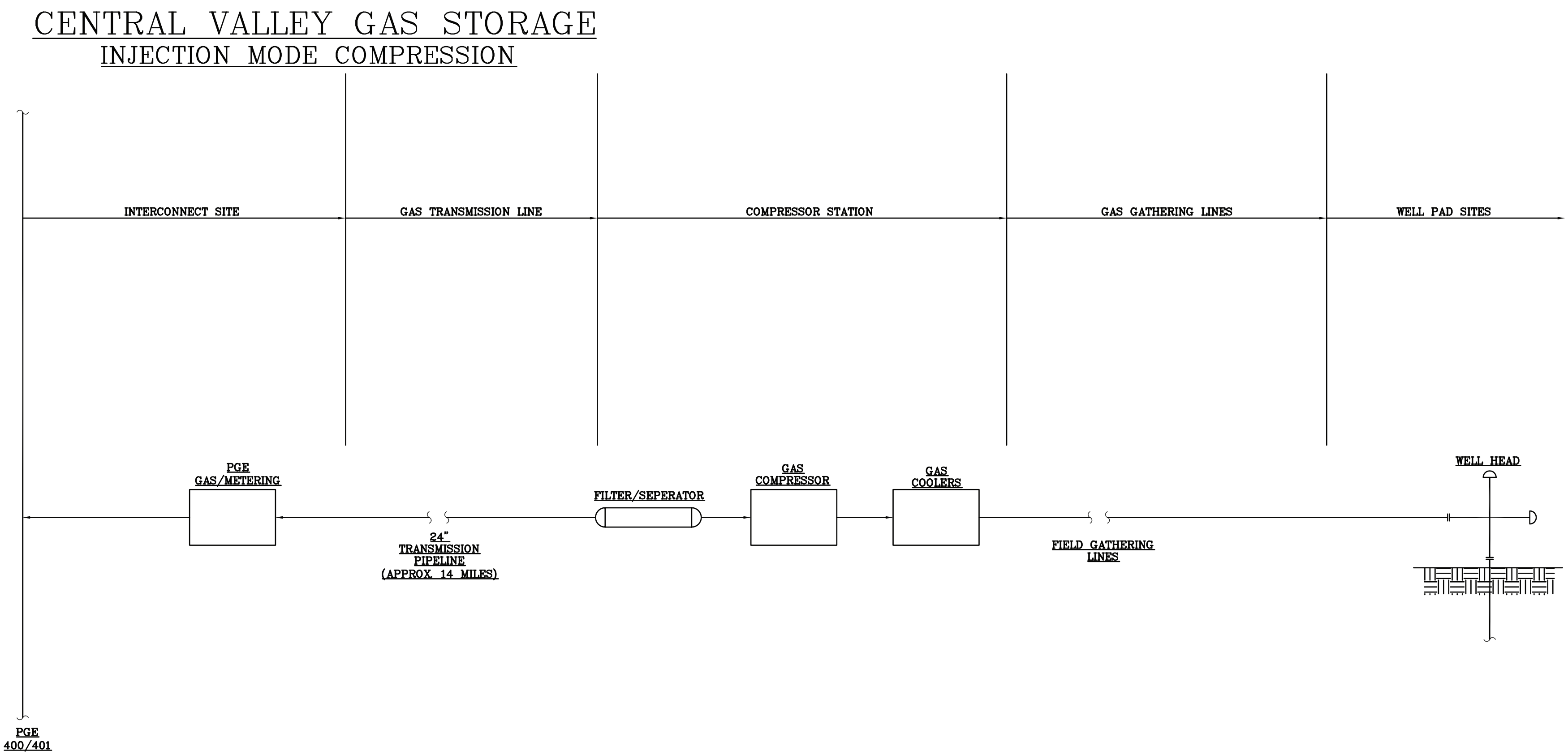
The compressor station control room will be equipped with two redundant computer workstations, which will serve as the human/machine interface system (HMI). The HMIs will communicate with the station programmable logic controllers, including fire and gas detection PLC and unit control PLCs via a dedicated plant wide Ethernet network. These workstations will run graphical operator interface software which will provide operators the capability to monitor and control the entire facility from a central point in the control room.

Safety and Emergency Shutdown Devices

The compressor building would be guarded with fire, heat, and gas detection. Compressor station gas process temperatures, pressures and flows would be measured at each compressor unit and at other points in the station and monitored by instrumentation connected to the Programmable Logic Control (PLC) panel in the control room. An alarm would be activated to alert the operator of an abnormal operating condition by one or more of the parameters being monitored by the control system. An emergency shutdown (ESD) sequence would be triggered if an elevated alarm condition is registered. All main valves controlling gas flow into and out of the compressor station would be automatically actuated to the closed position and cause the compressor station to be isolated from the main pipeline and gathering system to the remote well pad. Once the station is isolated, the ESD vents would immediately blow down the station piping to atmospheric pressure at a very high rate, usually in about 3–5 minutes. Similarly, if the alarm can be isolated to the compressor building or to one compressor unit, then the ESD and blow down would be limited to just that area, eliminating the need to vent the entire plant.

Central Valley proposes to install two ESD vents and six compressor unit vents. ESD vents and compressor unit vents are similar pieces of equipment. The unit vents are used to blow down individual compressor unit gas piping. The ESD vents are designed to vent the plant gas piping system in the case of an emergency. These vents consist of a valve and automatic actuator mounted on the piping with a vertical blow down stack connected to the valve to divert flow away from the piping and equipment. These vents can be manually controlled to purge gas piping and compressors for planned maintenance or can be automatically actuated in the event of an abnormal operating condition. Due to the noise that these vents can make during a rapid release of natural gas to the atmosphere, compressor unit blow down vents would be equipped with silencers in order to meet local noise standards.

Relief vents are safety devices that would be installed in various locations on the aboveground piping and pressure vessels (e.g., wellhead separators, dehydration towers) within the compressor and meter station to protect from an accidental overpressure situation and are required by American Society of Mechanical Engineers codes. When the pressure in the piping system reaches the preset release pressure of the relief valve, usually slightly above the maximum operating pressure, a small amount of natural gas is vented to the atmosphere until the pressure returns to normal. An extended overpressure condition is audible to the operators, who can take immediate steps to rectify the situation by isolating the piping from the high-pressure gas source as necessary. These devices are also used to protect the lower pressure–rated pipe if there are two pipe systems with different pressure rating connected together.

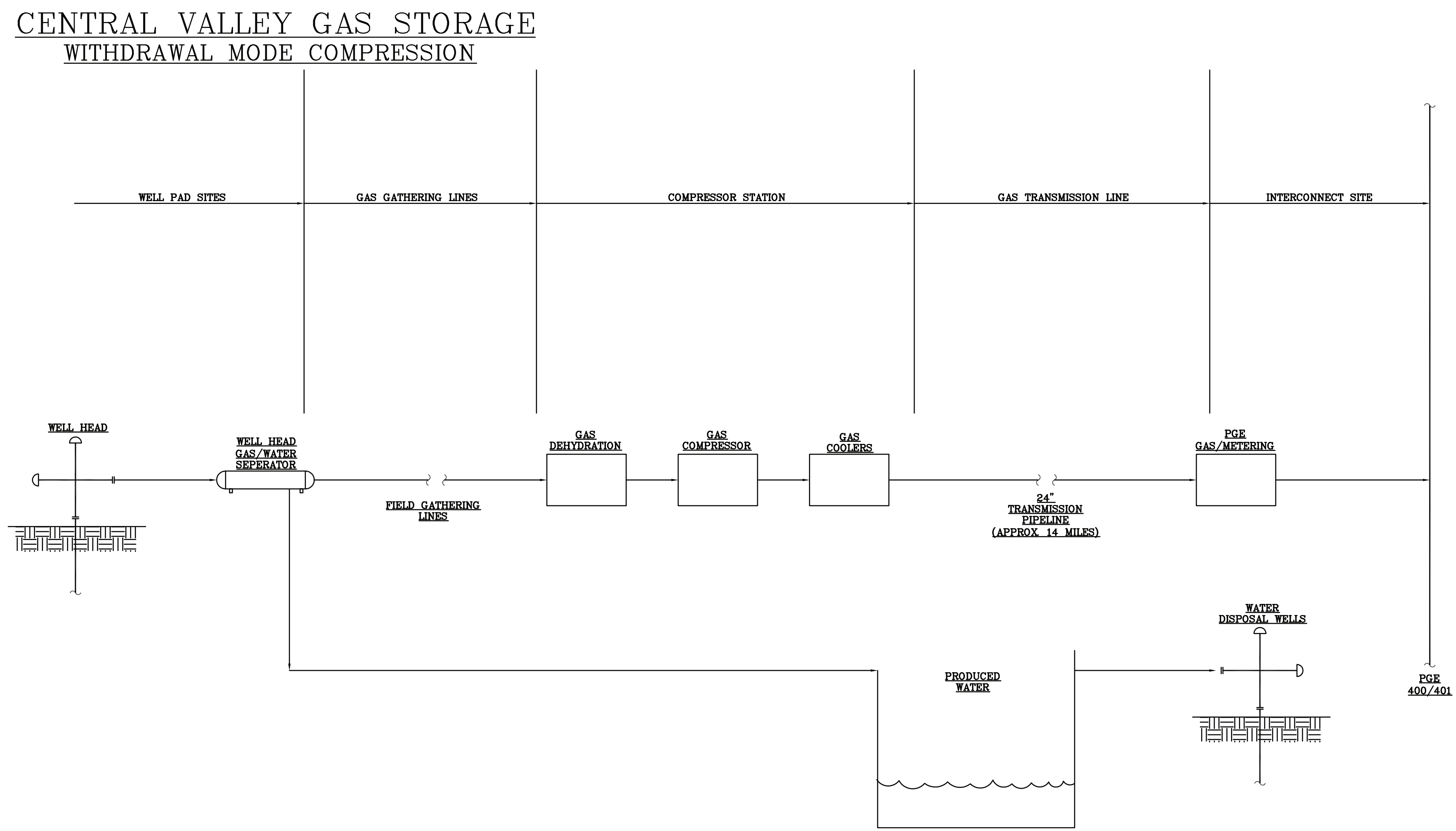


Source: EN Engineering, 10-16-08.

Graphics … 01099.07 (10-08) tm

ICF Jones & Stokes
an ICF International Company

Figure 2-5
Gas Well Injection Mode Compression



Source: EN Engineering, 10-16-08.

Graphics ... 01099.07 (10-08) tm

ICF Jones & Stokes
an ICF International Company

Figure 2-6
Gas Well Withdrawal Mode Compression

Dehydration Units

The compressor station would contain three tri-ethylene glycol (TEG) dehydration units rated at 100 MMscfd each and each equipped with a 2.0-MMBTU/hr TEG reboiler. Gas emissions from the units will be treated using a thermal oxidizer before being vented. The TEG pumps would be electric motor driven. Dehydration units would be used only in the withdrawal mode and are designed to strip excess moisture from the gas stream before the gas enters the pipeline. Each unit would be approximately 10 feet in diameter and 30 feet tall.

Hazardous Materials Use and Storage

Table 2-2 identifies the expected hazardous fluids to be permanently stored on-site at the compressor station. In addition, there will be small quantities of other fluids used for maintenance purposes including, but not limited to, paints, solvents, and cleaning solutions that will be properly stored in sealed containers within the utility/shop area.

Table 2-2. Compressor Station Hazardous Fluids and Storage

Material	Estimated Quantity on Site (gallons)
Clean tri-ethylene glycol	2,500
Used Tri-ethylene glycol	2,500
Compressor lube oil	1,000
Engine lube oil	1,000
Used lube oil	800
Engine Coolant	1,500
Methanol (at well pad)	1,000

Central Valley would prepare a Construction and Operation Safety and Emergency Response Plan (described in Section 3.07, Hazards and Hazardous Materials) that addresses use and storage of hazardous materials during construction and operation of the facility. A copy of this plan would be provided to CPUC prior to construction of the project.

Facility Protection

The compressor station site, meter station site and remote well pad would be protected by a 7-foot-tall chain-link fence and graveled for access control, fire control, and maintenance purposes. Individual sites where liquid is to be stored (e.g., tanks) would be fully encircled by earthen or concrete berms to prevent uncontrolled runoff from the site.

Plant Metering and Regulation

Gas metering at the compressor facility would be for check-metering purposes and would have bidirectional flow metering capability. There would be separate meters for the Upper Sands and Massive Sand storage zones. Dedicated metering of the total gas flow into each storage zone would provide the independent gas volume measurement necessary for accurate inventory management and control purposes. The measurement facilities would be electronically connected to the control room where real-time flow and pressure information would be displayed to the operator.

Regulation facilities would consist of two control valves to regulate the flow into and out of the main pipeline at the compressor station. The Upper Sands and Massive Sand storage zones would have separate flow control capability. Flow control would be used if the pressure differential from gas flowing from PG&E into storage is high enough to flow without the use of compression, or if the pressure of flows leaving storage is high enough to flow unassisted into the pipeline. The control valves would also regulate pressures on the mainline pipeline to stay consistent with prevailing pressures on PG&E Line 400/401 system. These valves would be electronically connected to the PLC control system and can be remotely operated from the control room. In addition, the flow control facilities would be in communication with the PG&E meter station pressure monitoring system and would automatically adjust to maintain pressure equilibrium on the mainline pipe.

Electrical Distribution Line

In order to provide power to serve the need of the compressor station, Central Valley anticipates connecting into an existing 12-kilovolt (kV) PG&E line along Dodge Road (Figure 2-3 and Sheet 1 in Exhibit 1). PG&E would design, install, and maintain this component. Power would be routed to the compressor station by a 3,500-foot-long distribution line that would run south from the compressor station along McAusland Road to the PG&E line at Dodge Road. The power line connection may be a buried cable or an overhead line on existing poles along McAusland Road, depending upon PG&E requirements and finalization of design details.

Water Well

A water well will be drilled within the 10-acre compressor station site to supply water to the auxiliary building. The water system will be specified to provide a 25-gpm supply to the facility at 70 psig. The equipment shall include: well water pump and motor, pressure tank, cartridge filter assembly complete with one complete spare set of filters, and associated pressure gauges, switches, valves, etc.

Except for the domestic use of water in the auxiliary building and occasional use through hose bibs, the gas storage facility would not consume water as part of the gas storage operation.

Remote Well Pad

Central Valley is proposing to drill nine injection/withdrawal (I/W) wells on a 4-acre remote well pad site located south of the compressor station (Figure 2-3). In addition to these nine I/W wells, Central Valley is also proposing to install a saltwater disposal well and 380,000-gallon saltwater storage/surge tank to collect the excess water.

Figure 2-7 shows the preliminary site plan for the remote well pad and the associated nine I/W wells, saltwater disposal well, and storage/surge tank. The remote well pad would be connected to the compressor station by a 1,400-foot-long, dual 16-inch high-pressure gas gathering line system (shown on Figures 2-3 and Figure 2-7). The remote well pad site would be enclosed by a 7-foot-tall chain link fence with access provided from an unpaved road along the south boundary of the site. Each of the components that will be located on the remote well pad site is described below.

Injection/Withdrawal Wells

Central Valley intends to develop the field using one vertical well and eight directional wells within the remote well pad (shown in Figure 2-7). Figure 2-9 schematically shows the profile view of the gas storage reservoir and the concept of vertical and directionally drilled I/W wells. A plan view of the I/W wells and trajectories of the directionally drilled wells are shown superimposed on geologic maps of the five target storage sands (Appendix C). These maps were derived from data extracted from electric logs taken from wells in the field and depict the geologic footprint and thickness contour of each sand layer. Not all wells would be drilled into the same sand layers. As shown on the maps, four of the I/W wells would penetrate the lower Massive Sand; the other five would be drilled into the Upper Sands. Central Valley intends to operate the Massive Sand separately from the Upper Sands due to the different reservoir characteristics and strong water drive associated with the Massive Sand. Moreover, because the Massive and the Upper Sand are hydrologically isolated, the reservoir pressure of the layers may differ at any given time depending upon the gas inventory in each. To achieve the separation, a dual gas gathering system would be constructed and the compressor units and flow control facilities would be configured to allow dedicated operations to the Massive and Upper Sands as required on any given day.

A typical well-bore completion diagram is shown in Figure 2-8. In general, I/W wells would first be drilled to around 400 feet and a $13^{3}/_{8}$-inch casing would be set and cemented to the surface. The well would then be deepened to the top of the storage zone and an $8^{5}/_{8}$-inch production casing would be set and cemented to the surface. The cemented casing isolates the storage zone from higher strata and protects freshwater aquifers in accordance with DOGGR requirements. The well would then be drilled to total depth through the storage zones (sands) and completed open-hole with a gravel pack and screen set on a packer. The depth of each well would depend on where the well encounters the top of the reservoir structure and the sand layer in which the well would be completed. Some of the bottom-hole targets may be refined subject to ongoing reservoir analysis and modeling efforts.

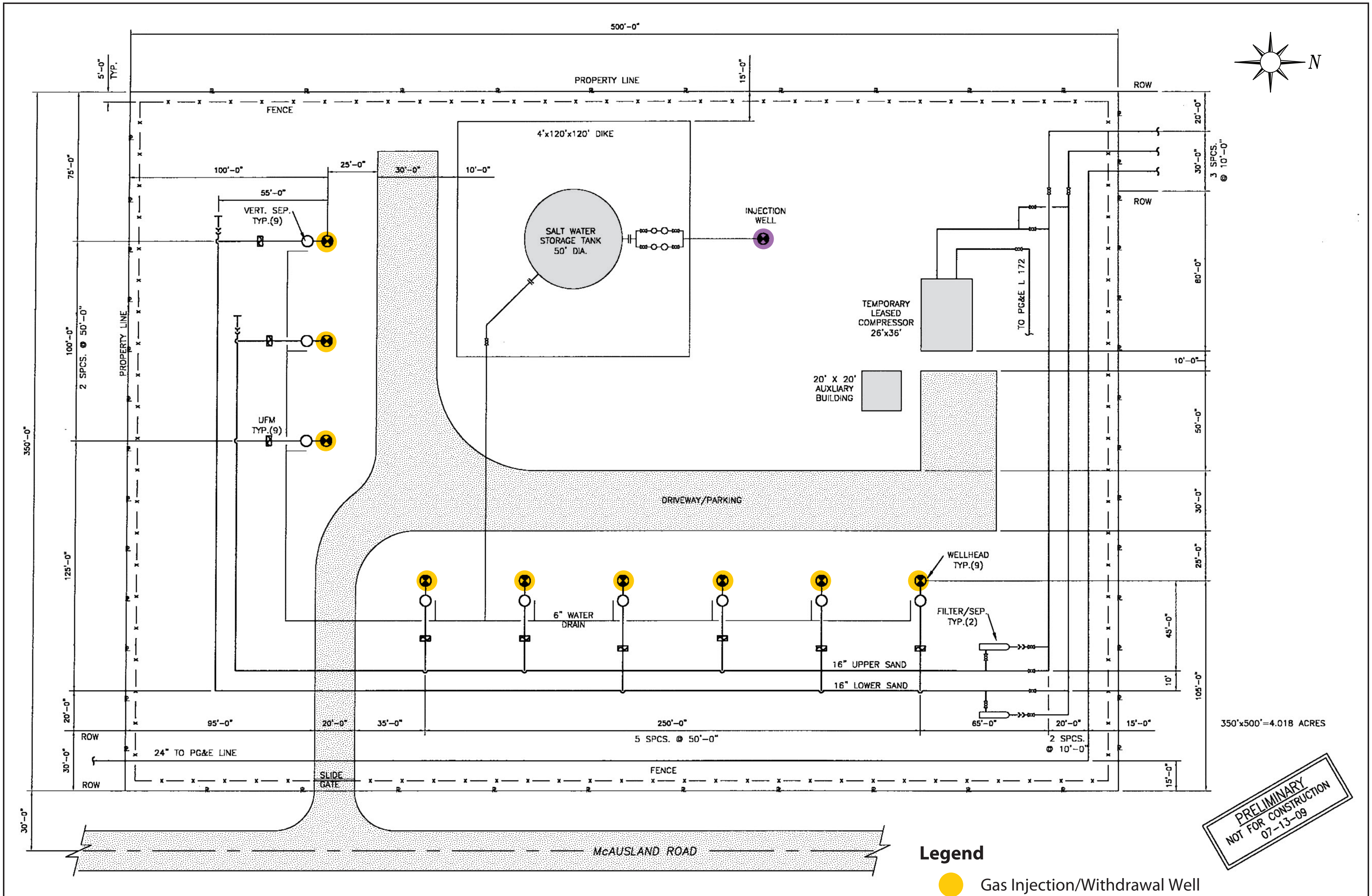
DOGGR is responsible for wells drilled into an underground gas storage facility. In accordance with DOGGR regulations (Sections 1724.7 and 1724.9), Central Valley would prepare an application for approval to operate a gas storage field and would submit the application to DOGGR for approval. The application addresses the proposed well drilling and abandonment plans; integrity of plugged and abandoned wells; reservoir characteristics, cap rock, and boundaries; all geologic units, protection of fresh water aquifers, and oil and gas zones; proposed saltwater disposal method; and monitoring system to ensure that injected gas is confined to the intended zone. In addition, Central Valley would obtain requisite drilling permits from Colusa County and DOGGR and would post a security bond with DOGGR before drilling any of the wells.

Each of the I/W wells would be equipped with a block valve on the flowline that extends from the wellhead and, when in the closed position, would isolate well pad facilities from the gas gathering line. Each well would be equipped with a gas/water separator that would remove the saltwater that is produced with the gas during storage withdrawal. In addition, each well would have dedicated metering and instrumentation that would transmit the data in real time to a panel in the central control room where gas flows and pressures would be monitored by the operator.

Saltwater Disposal Well and Tank

Based on the characteristics of the storage reservoir, it is anticipated that saltwater would be produced during the withdrawal of gas. The majority of the production is expected to emanate from the Massive Sand layer due to the large underlying saltwater aquifer and strong water drive characteristics. Central Valley is proposing initially to install one saltwater disposal well on the 4-acre remote well pad to dispose of saltwater that is produced during gas storage withdrawals (Figure 2-5). This saltwater would be injected into the water-bearing Upper Kione formation that lies structurally lower than the target storage zone (Figure 2-9). Injection depth is anticipated to be between 2,400 and 2,500 feet below ground surface. The saltwater would be injected into a depth below freshwater aquifers and would not require treatment. In the event the saltwater recovered exceeds injection well capacity or maintenance is required on the injection wells, necessitating a temporary stoppage or reduction in water injection, a 380,000-gallon saltwater storage/surge tank will be constructed onsite to collect the excess water (shown in Figure 2-7).

The first 1–2 years of operation would likely have the largest volumes of salt water recovered. The volume is expected to decline annually after completing a



Legend

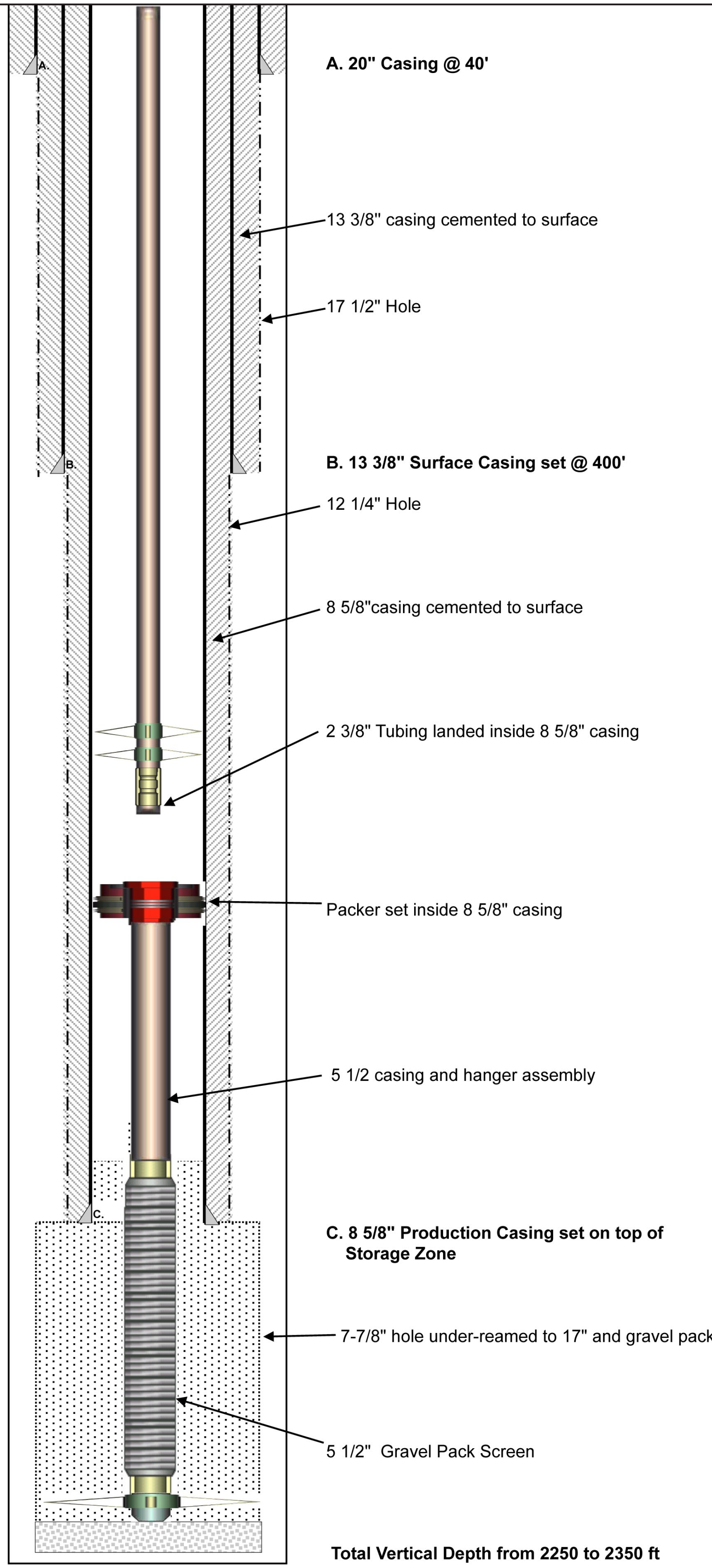
- Gas Injection/Withdrawal Well
- Saltwater Injection Well

Source: EN Engineering, 7-2-09.

Graphics ... 01099.07 (7-13-09) tm

ICF Jones & Stokes
an ICF International Company

Figure 2-7
Preliminary Remote Well Pad Site Plan

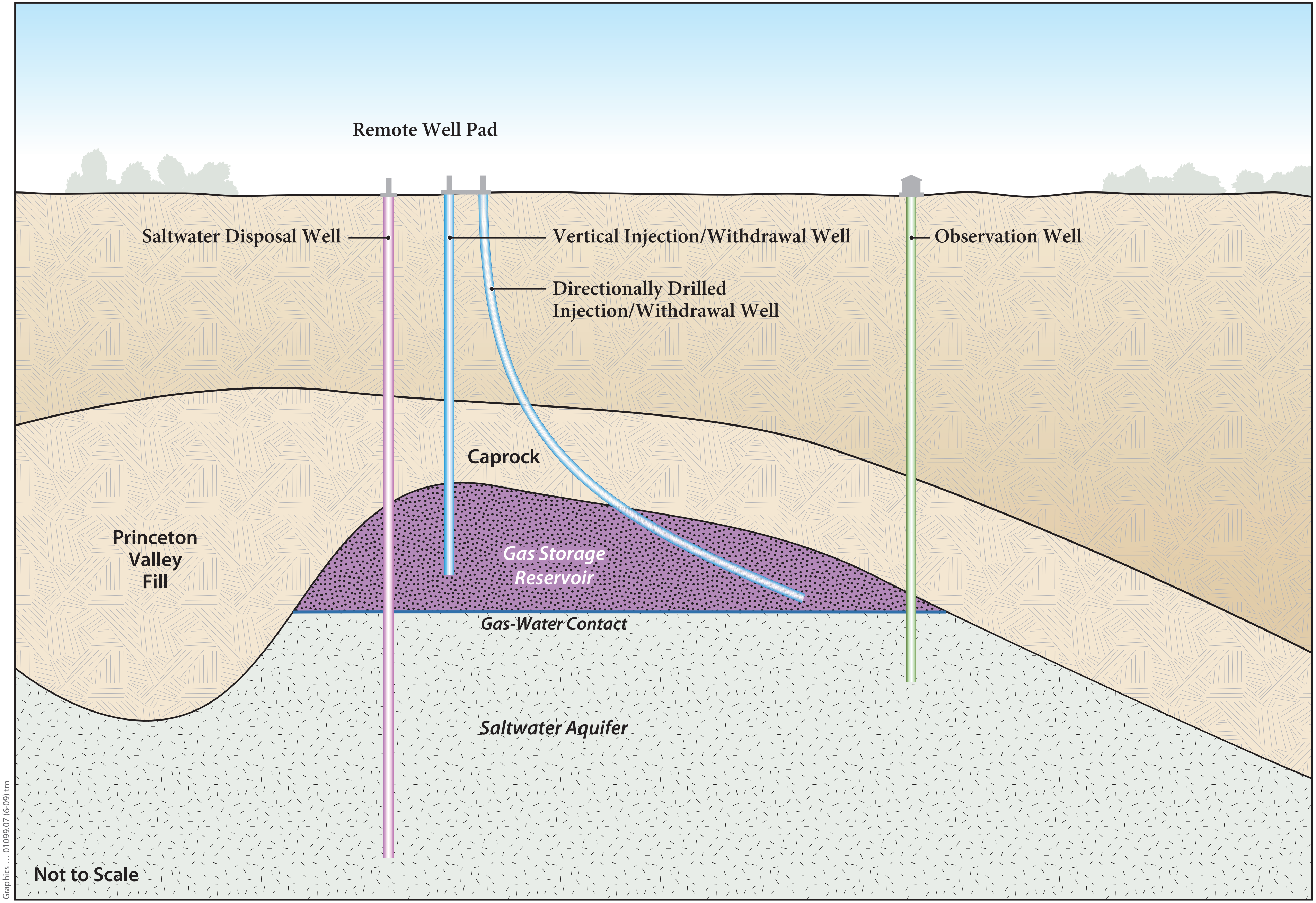


Note: Diagram not to scale.
Depths are approximate.

Graphics ... 01099.07 (11-12-08)

ICF Jones & Stokes
an ICF International Company

Figure 2-8
Typical Gas Storage Well



ICF Jones & Stokes
an ICF International Company

Figure 2-9
Schematic of Gas Storage Reservoir and Wells

number of dry gas injection cycles. A second well would be initiated if, based on actual water volume trends, the water volumes are anticipated to continue in excess of the capacity of the first well.

The disposal well would be designed and constructed in accordance with DOGGR regulations. Like those of gas injection wells, the disposal well design standards are intended to protect freshwater aquifers. Central Valley would obtain the requisite U.S. Environmental Protection Agency (EPA) Class II injection well permits from DOGGR to drill and operate these wells.

Central Valley has included the following in its design basis in order to protect wells, piping and other equipment from internal corrosion that may result from saltwater production in the gas stream:

- Pipe design to maintain flow velocity and keep liquids suspended in the gas stream.
- Assessment of in-line pressure reducing devices that would trigger liquid fallout.
- Pipe design to minimize dead ends and low areas.
- Wellhead water separation to include an open skirt for ultrasonic wall thickness measurements and access ports for cleaning and/or insertion of monitoring equipment (coupons or probes) in both the liquid and gas phase.
- Dehydration equipment to be installed upstream of the compression equipment.
- Non-metallic piping system for the salt water disposal gathering system (6-inch nominal) from the wellhead to the salt water storage tank and through to the water injection well.
- Non-metallic or metallic salt-water storage tank that has an internal protective coating.
- Construction of the gathering lines in a manner that would allow the passage of internal inspection and cleaning tools.
- Design consideration of injection points to facilitate the future injection of biocides or inhibitor fluids.
- Active O&M plan to monitor for corrosion environments and perform mechanical cleaning and internal tooling at effective intervals.

Dual Gas Gathering Line System

A 1,400-foot-long, dual 16-inch gas gathering pipeline system will be constructed to transport gas from the remote well pad to the compressor station site (see Figure 2-3). The dual gas gathering line system will run along the west side of McAusland and will be placed in the same trench as the 24-inch gas pipeline.

Observation Well Conversions

As part of the project, Central Valley would convert existing and previously plugged and abandoned production wells in the natural gas field into storage observation wells (Figure 2-3 and Sheet 1 in Exhibit 1). This entails converting up to four existing wells (S-3, S-4, SL-1, and 2009 test well [described previously and below]) and re-entry of up two plugged gas wells (S-2 and Z-1). Prior to converting these wells, Central Valley would determine the integrity of the well casing and wellhead equipment and, if necessary, conduct remedial work to upgrade the well for gas storage use. This work may involve pressure testing of the casing and/or running electric wire-line logs to inspect the condition of the casing and cement sheath. If a well fails integrity testing and cannot be repaired, it would be plugged and abandoned in accordance with DOGGR regulations.

The observation wells would be used to monitor the location and pressure of the gas in the storage formation through direct pressure readings and/or electric wire-line logging of the well bore. These observation well measurements are used to ensure the proper placement and containment of the gas as it is cycled in and out of the storage formation, and to assist in determination of the storage inventory. The observation wells will be used to monitor all sand layers. Central Valley intends to operate the 1980 sand (the upper most reservoir sand), 1St 2nd and 3rd sands as one commingled reservoir and the lower Massive as a separate reservoir. Observation wells will be completed in the each of these reservoirs for pressure observation. In addition, wells situated lower on the structure, such as S-2 and Z 1, could be used to monitor changes in gas/ water contact. The actual function of each observation well and sand layer it will be completed in has not been determined and will be contingent upon further study.

As described previously, Central Valley drilled a reservoir test well (test well) in May 2009 (shown in Sheet 1 in Exhibit 1). This test well may be used as a storage I/W well or as an observation well but would not be used for such purposes until Central Valley receives all required authorizations from the CPUC and DOGGR. Once all those authorizations have been received, the well would be completed for use in the storage operation.

Central Valley would obtain all required permits from DOGGR to begin work for this project component. Each of these observation wells would occupy a finished squared-off area of approximately 30 by 30 feet (900 square feet or 0.02 acre), would be protected by a 7-foot chain-link fence, and the site graveled. These three wells and associated access roads are located in cultivated agricultural fields that do not support any natural habitats.

PG&E Line 172 Connection Line

Central Valley would install a 12-inch gas pipeline to temporarily connect with PG&E's Line 172, a distribution line that runs along the east side of McAusland Road. The majority of the approximately 300-foot-long connector pipeline would be located inside the remote well pad site and would run east toward McAusland

Road and connect to the existing PG&E Line 172. A temporary meter skid and a rental compressor package will be installed as part of this component and located on the 4-acre remote well pad (shown in Figure 2-7). The rental unit currently proposed is a Waukesha 9390 GSI rated at 1,485 HP. This is a rich burn engine that will be equipped with an air/fuel controller and 3-way catalyst to minimize air emissions. Central Valley would be required to obtain a permit of operation from CCAPCD for operation of this unit and would install noise abatement to meet applicable Colusa County noise standards. Central Valley has included the rental compressor unit in the air quality and noise impact assessments.

A connection into the PG&E Line 172 would allow Central Valley to receive and inject gas on an interruptible basis before the 14.7-mile, 24-inch pipeline to the PG&E Line 400/401 has been completed. Gas received from Line 172 would provide for the necessary base gas injections and early injection and conditioning cycle to displace the water in the reservoir so Central Valley can meet its startup schedule. This connection is for injection only and not for the delivery of gas back into Line 172. The connection would be temporary and PG&E would require that Central Valley disconnect and remove the meter facilities upon completion of this initial phase. Central Valley anticipates operating in this configuration from September 2010 through the end of October 2011 prior to the completion of the main pipeline. During the fall/winter 2011–2012, Central Valley would be able to make its first deliveries in Line 400/401 via the new 24-inch main pipeline.

Gas Pipeline and Interconnection with PG&E Line 400/401

Central Valley proposes to connect to the PG&E Transmission System several hundred feet south of PG&E's Delevan Compressor Station via a 24-inch-diameter, 14.7-mile-long gas pipeline (Figure 2-3). The pipeline would be bidirectional, allowing natural gas to flow to and from the gas field. The permanent pipeline easement would be 30 feet wide (except for a 1,400-foot-long segment between the compressor station and remote well pad which will be 50-feet-wide).

The pipeline design would be in accordance with 49 CFR 192.5 of USDOT, which establishes criteria for pipeline design based on risks to the surrounding population. The regulations establish four design classification areas: Class 1 areas have the lowest risk (e.g., sparsely populated rural areas); Class 2 areas have some areas of risk to populations; and Class 3 and 4 areas are the higher risk areas. The proposed pipeline is located entirely in a Class 1 area and is not within any high consequence areas (HCAs). This is discussed further in Section 3.7, Hazards and Hazardous Materials, of this PEA. The gas pipeline would be designed and constructed in accordance with USDOT requirements to meet a maximum allowable operating pressure of 1,070 psig and to meet potential seismically induced stresses discussed in the Geology, Soils, and Seismicity section of the PEA. The pipeline is expected to be constructed of API 5L grade X-60 or X-65 pipe with 14–16 mil thickness Fusion Bond Epoxy (FBE) coating as the primary method of defense against corrosion. The pipeline block valves and flanges at the compressor station and metering station will be ANSI 600 # class. Due to the short length of the pipeline of approximately 14.6 miles between the metering site and the station, there are no intermediate block valves required in accordance with USDOT requirements.

Cathodic protection would also be employed as an additional method of corrosion protection. The pipeline system would comprise the components listed below.

- **Pig launching and receiving stations to facilitate pipeline maintenance and inspection.** These facilities would be located inside the security fencing at the compressor station and PG&E metering station sites. Regular pipeline pigging, testing, and inspection would be performed as specified by USDOT 49 CFR 192. The pigging facilities would be installed aboveground within concrete containment basins. Any liquids and/or wastes generated by pigging operations would be collected in the pigging vessels and then transferred by a vacuum truck to a suitable disposal site.
- **Actuated isolation valves at the compressor station and PG&E meter station sites per USDOT standards for natural gas pipelines.** These valves can be operated remotely from the control room at the compressor station. They can be operator controlled or automatically controlled in the event of an ESD triggered by an immediate increase or loss of pressure on the pipeline or an emergency event at the compressor station that would require the blocking of the line. An immediate loss of pressure would be an indication of an unintentional gas release, and the actuated isolation valves would close in less than a minute to halt the source of gas.
- **Supervisory Control and Data Acquisition (SCADA) system.** This system will control isolation valves and provide real-time measurements from the PG&E meter station for flow, temperature, gas quality, and pressure.

Proposed Pipeline Route

From the southeast corner of the compressor station site, the preferred pipeline alignment runs south and crosses Southam and Dodge Roads, and approximately 1 mile of agricultural fields until it reaches a point just north of the Wild Goose Storage pipeline easement. Here, the alignment turns west and parallels the Wild Goose pipeline. This western portion of the alignment crosses the Colusa Trough, Willow Creek, Hunters Creek (three crossings), several unnamed tributary creeks, several agricultural irrigation and drainage canals, railroad tracks, and Old Highway 99. The alignment continues west, crosses under I-5, and crosses through rice fields, unpaved agricultural roads, and paved public roads (Dirks and Delevan Roads) until it reaches the Glenn-Colusa Canal. After crossing under the canal, the alignment continues west through approximately 1,000 feet of nonnative annual grasslands until it reaches the proposed metering station site and PG&E Line 400/401.

The preferred pipeline alignment is shown in Exhibit 1.

Metering Station and PG&E Interconnect

The purpose of metering station at the PG&E interconnect is to accurately measure the amount of natural gas withdrawn from and returned to the PG&E 400/401 pipeline at the point of custody transfer. The metering station would include bi-directional meter equipment, chromatograph that measures the gas composition for heat-value measurement, an odorant tank and injection facility to add odorant to the gas as well as instrumentation and controls that would interface with PG&E's system for local data logging and transmission of telemetry to the Central Valley control room at the compressor station. The odorant will be stored, handled and injected by PG&E at the PG&E metering station. The odorant will only be added to the storage withdrawal gas stream prior to being delivered into the Line 400/401. All gas delivered to Central Valleyfor injection would have already had odorant added to it at a point upstream of the project on the PG&E 400/401 transmission system (e.g. Malin, Oregon).

PG&E would design, install, and operate the metering, odorization facilities, instrumentation, and telemetry for PG&E to remotely monitor and control the facilities.

PG&E would also complete the tap connection into its Line 400/401 and install all below-grade piping between the meter site and PG&E Line 400/401. Central Valley would install at the main 24-inch pipeline terminus a pig launcher/receiver, a block valve with an actuator for remote and ESD operation, and a pressure relief valve to provide overpressure protection to PG&E. A telemetry system would be installed to monitor meter readings and control the block valve at the meter site from the control room at the compressor station.

The proposed project's metering station site would be graveled for maintenance purposes and surrounded by a 7-foot chain-link fence to prevent unauthorized access.

Route Selection and Evaluation Process

Central Valley identified several potential alternatives for the pipeline alignment during the early planning phase of this project. ICF Jones & Stokes evaluated these alternatives as part of an environmental constraints analysis. The purpose of the environmental constraints analysis was to identify potentially sensitive resource issues and constraints and to assist Central Valley in designing the project to meet the project objectives, minimize potential impacts on landowners and environmental resources, and avoid the Sacramento and Delevan National Wildlife Refuges. The alternative pipeline alignments that were considered as part of the initial route evaluation phase are shown in Figure 2-10.

These alternative pipeline alignments were eliminated from further consideration because of sensitive biological resource issues (primarily wetlands and special-status species habitat), land use issues, and federal land use and permitting requirements associated with the Sacramento and Delevan National Wildlife Refuges. As described in Chapter 4, Alternatives, the preferred project (Figure 2-3) was determined to be the best project layout because it meets the objectives of the project and avoids or substantially lessens any of the significant impacts of the project by following an existing pipeline alignment (Wild Goose Storage Inc.'s Gas Storage Expansion Project pipeline alignment is shown as the "existing pipeline" in the parcel map, Appendix A). The pipeline alignment and facility locations avoid or minimize resource impacts and meet the various landowners' needs and restrictions (where possible).

Project Land Requirements

The project land requirements associated with each of the components and associated work areas are shown in Table 2-3.

Table 2-3. Temporary and Permanent Acreages Required to Construct and Operate the Project

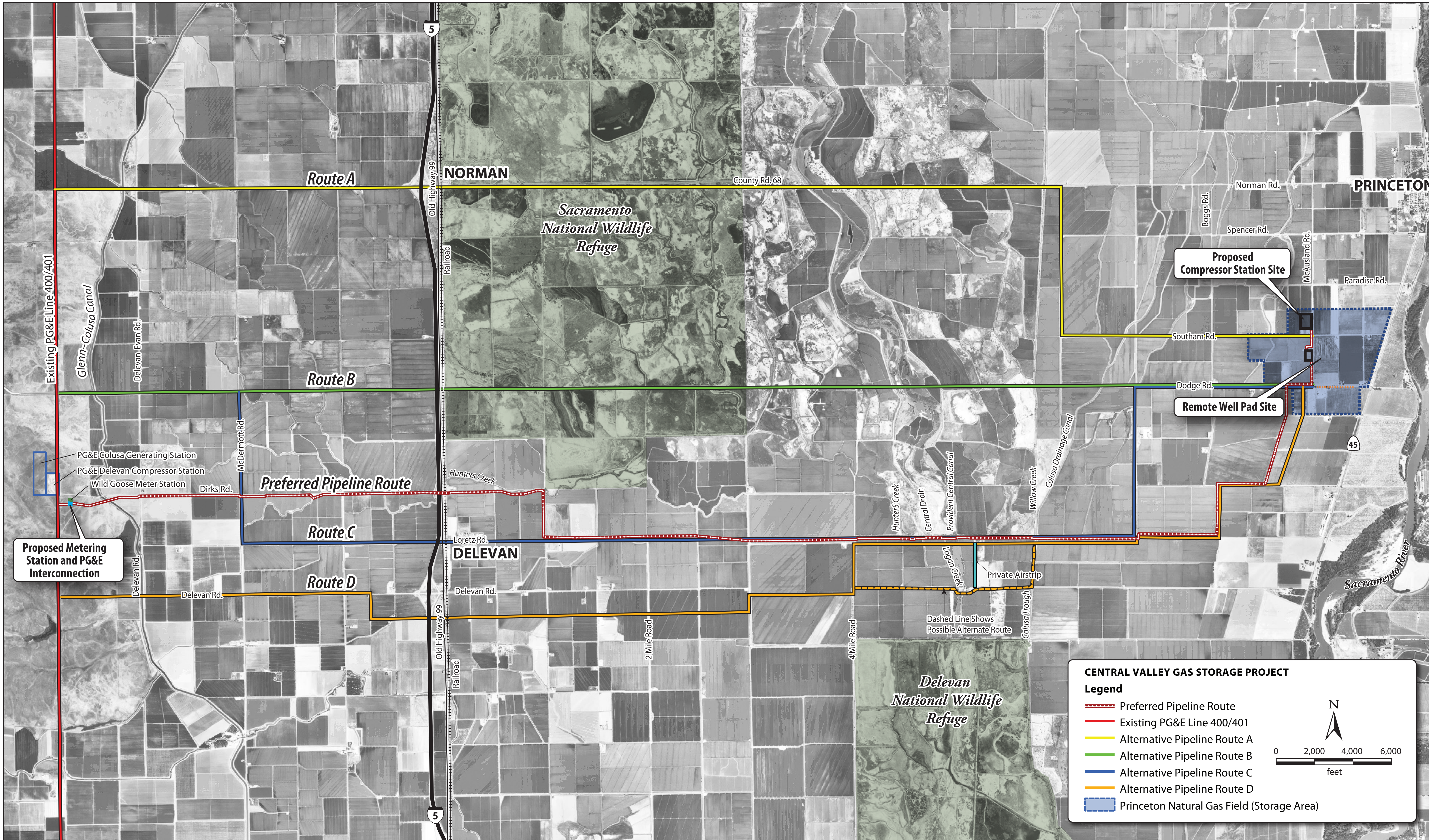
Component	Permanent	Temporary	Total
Compressor station	10.0	–	10.0
Remote well pad (includes 9 injection/withdrawal wells, saltwater storage tank, and saltwater disposal wells)	4.0	1.0	5.0
24-inch-diameter gas pipeline (includes the 1,400 feet of 16-inch dual gathering line system between the remote well pad and compressor station)	54.2 [a]	130.2[b]	184.4
PG&E Line 172 connection pipeline, temporary meter skid, and rental compression[c]	–	–	–
Electric distribution line[d]	–	–	–
Observation wells	0.1	3.0	3.1
Metering station at PG&E Interconnection	0.8	0.2	1.0
Temporary material and equipment staging areas	0.0	15.0	15.0
Existing access roads (primarily agricultural roads)	26.0	0.0	26.0
New access roads	2.0	0.0	2.0
Total project land requirements	97.1	149.4	246.5

[a] The permanent right of way for the 24-inch gas pipeline will be 30 feet except for the 1,400-foot-long gas gathering line system which will have a permanent right of way of 50 feet to accommodate future maintenance of the 16-inch dual gathering line and 24-inch gas pipeline.

[b] The temporary construction right of way for the 24-inch gas pipeline will be 100 feet except for the 1,400-foot-long gas gathering line system which will be 120 feet to accommodate the three pipelines.

[c] The PG&E Line 172 connection facilities and rental compression would be located on the remote well pad site.

[d] The electric distribution line would be installed on existing poles, or if buried armored cable is required then the line will be installed within temporary working space for the pipeline.



Graphics ... 01099.07 (7-13-09) tm

ICF Jones & Stokes
an ICF International Company

Figure 2-10
Gas Pipeline Alternatives

Construction Methods

Staging and Access

Proposed Equipment and Material Staging Areas

The locations of potential material and equipment staging areas are shown on the Exhibit 1 maps. In general, equipment and materials (along with vehicles) will be staged within the facility boundaries and adjacent work areas for the compressor station and metering station. Equipment and materials also would be staged for short periods within the 100-foot-wide pipeline construction corridor and within the designated well work areas.

Central Valley is anticipating that the contractors may require up to 15 acres of additional land for establishing equipment and material staging areas, as well as horizontal directional drilling and auger bore work areas outside the designed construction work areas. A 10-acre staging area has been identified immediately adjacent to the proposed metering station site (Sheet 10 in Exhibit 1). The staging areas would contain laydown areas for equipment, pipes, and other construction-related supplies as well as vehicle parking. The contractors would install a temporary trailer for use as a field office. The main equipment and material staging areas would be secured with a chain-link fence around the perimeter.

If the contractor identifies any new staging areas prior to construction, they would be evaluated by the environmental consultant to ensure that the proposed areas do not contain any sensitive environmental resources. This evaluation would be documented and the results provided to CPUC to support its approval of all unanticipated staging areas.

Proposed Access Roads

Central Valley is proposing to use approximately 10.5 miles (an estimated 26 acres) of existing agricultural roads to provide access to the project components (primarily the pipeline corridor, as shown in Exhibit 1). These existing roads may be improved by minimal grading and gravelling to provide adequate access for heavy construction equipment and maintenance vehicles.

An estimated 2 acres of new access roads would be required to support construction of the project and are primarily associated with the metering station and three of the potential observation wells (S-2, SL-1, and Z-1), as shown in Sheets 1 and 10 of Exhibit 1.

Construction and Delivery Schedule, Work Force, and Equipment

Construction and Delivery Schedule

The construction schedule presented in this PEA is tentative. It is subject to CPUC issuance of a Certification of Public Convenience and Necessity, CPUC approval of the environmental document, construction issues, contractor availability, material lead times, and ROW access. Pending the receipt of necessary project approvals, Central Valley intends to begin drilling of the injection/withdrawal wells construction of the well pad gathering system and a pipeline to allow connection into PG&E Line 172 during summer months of 2010. Civil and foundation work for the compressor station is expected to commence in the fall of 2010 with the main mechanical construction activities and to follow in the spring and summer of 2011. Construction of the 14.7-mile pipeline and metering station would be completed during fall of 2011. In total, a 14-16 month construction period is anticipated. Table 2-4 shows the estimated durations of the main project activities.

Table 2-4. Anticipated Construction Schedule

Project Activity	Anticipated Window
Permit to construct decision adopted and effective (Certificate of Public Convenience and Necessity)	June 2010
Acquisition of required permits	August 2009–May 2010
ROW/property acquisition completed	September 2009
Final engineering/surveying completed	October 2009
Remote well pad preparation, I/W wells, and gathering line system	July–September 2010
Observation well conversions	July–September 2010
Construction window for compressor station	September 2010–October 2011
Connection pipe and meter into PG&E Line 172 (including rental compressor)	August–September 2010
Begin to receive gas from PG&E Line 172	September 2010
Preparation of 24-inch gas pipeline ROW	March–April 2011
Construction window for 24-inch gas pipeline	April–October 2011
Construction window for metering station at PG&E	June–October 2011
Project connected to PG&E Line 400/401	November 2011
Cleanup and restoration	April–June 2012

Construction activities associated with project components would generally occur Monday through Saturday between 7 a.m. and 7 p.m. except for well drilling, which would occur 7 days per week, 24 hours per day.

Construction Work Force

Central Valley would retain construction contractors to install all components of the project. The workforce estimates are identified in Table 2-5.

Table 2-5. Anticipated Workforce

Phase	Total Peak Workforce	Estimated Duration	Construction Year
Pipeline construction	230	3–4 months	2011
Compressor station (this includes Line 172, gathering lines, and electric distribution line)	75	12-14 months	2010-2011
Metering station and interconnect into PG&E Line 400/401	30	2–3 months	2010
Well pad preparation, drilling and observation well conversions	15	3 months	2010
Site cleanup/restoration	20	2–3 months	2012
Project totals	370		

Construction Equipment

Tables 2-6 through 2-9 identify the equipment that may be used during construction of each major project component. Some of the equipment identified in these tables may be used to construct multiple components.

Table 2-6. Estimated Storage Well Pad Construction and Drilling Equipment

Activity	Quantity of Equipment
Site clearing/improvements	1 – Dozer 1 – Backhoe
Drilling—New wells	1 – Conventional drill rig 6 – Service company trucks (casing delivery, wireline, cementing) 1 – Water truck 5 – Pickup trucks
Well Conversions	1 – Conventional service rig 3 – Service company trucks (e.g., wireline, cementing) 1 – Boom truck 1 – Water truck 4 – Pickup trucks
Mechanical	1 – Welding rig 2 – Pickup trucks 1 – Crew truck
Fence	1 – Crew truck
Cleanup/Restoration	1 – Crew truck

Table 2-7. Estimated Compressor Station and PG&E Line 172 Connection Construction Equipment

Activity	Quantity of Equipment
Overhead crew	1 – Office trailer 1 – Tool trailer 1 – 45 kw generator 4 – Pickup trucks
Site clearing	1 – Motor grader 1 – Dozer 1 – Trackhoe
Civil	1 – Rubber tire hoe 1 – Boom truck 1 – Pile driver 2 – Pumps 1 – Water truck 4 – Crew trucks 1 – Tractor trailer 1 – Front end loader 4 – Pickup trucks 1 – 25-ton crane
Mechanical	1 – 80-ton cranes 1 – Sideboom 8 – Welding rigs 8 – Pickup trucks 1 – Forklift 1 – Crew truck
Sandblast and paint	1 – Air compressor 1 – Pickup truck 1 – Crew truck
Insulation	1 – Pickup truck 1 – Crew truck
Electrical	1 – Rubber-tired backhoe 3 – 10 kw generators 1 – Bender 1 – Threading machine 1 – Tool trailer
Building	2 – Man-lifts 1 – 25-ton crane 1 – Pickup truck 1 – Crew truck
Fence	1 – Crew truck
Cleanup	2 – Crew trucks

Table 2-8. Estimated Metering Station and Line 400/401 Interconnect Construction Equipment

Activity	Quantity of Equipment
Overhead crew	1 – Office trailer 1 – Tool trailer 1 – 45 kw generator 4 – Pickup trucks
Site clearing	1 – Motor grader 1 – Dozer 1 – Track hoe
Hot tap	1 – Track hoe 2 – Welding rigs 1 – Boom truck 2 – Crew trucks 1 – Hydraulic pump 1 – Tapping machine 3 – Pickup trucks
Civil	1 – Rubber tired backhoe 1 – Boom truck 1 – Water truck 4 – Crew trucks 1 – Tractor trailer 1 – Front end loader 4 – Pickup trucks
Mechanical	1 – 25-ton crane 2 – Welding rigs 4 – Pickup trucks 1 – Crew truck
Sandblast and paint	1 – Air compressor 1 – Pickup truck 1 – Crew truck
Insulation	1 – Pickup truck 1 – Crew truck
Electrical	1 – Rubber-tired backhoe 3 – 10 kw generators 1 – Bender 1 – Threading machine 1 – Tool trailer
Fence	1 – Crew truck
Cleanup	2 – Crew trucks

Table 2-9. Estimated Pipeline Construction Equipment

Equipment	Quantity of Equipment
Pickup truck	23
Flatbed truck	2
Winch truck	1
Bus	6

Equipment	Quantity of Equipment
Fuel truck	1
Water truck	1
Truck and lowboy	3
Truck and pole trailer	6
Skid truck	1
Excavator (trackhoe)	5
Ditching machine	1
Bulldozer	5
Pipelayer (sideboom)	14
Wheel loader	4
Motor grader	1
Tractor mounted tack rig	2
Welding rig	10
X-ray rig	4
Air compressor	2
Pump	4
Bending machine	1
Parts van	6
Boring machine	1
Directional drilling machine	1

Construction Methods

Pipeline Construction

This section describes the methods that Central Valley may use to install the 14.7-mile, 24-inch gas pipeline and 1,400-foot-long dual 16-inch gas gathering line.

Surveying Right-of-Way and Construction Easement

The pipeline alignment would be surveyed and identified before construction activity begins. Alignment identification would entail staking the centerline of the pipeline, utility line crossings, and limits of the construction work area. As part of this preconstruction phase, environmentally sensitive areas (e.g., wetlands, special-status species habitat, cultural resources) also would be staked and flagged.

Except in areas that support sensitive resources (e.g., wetlands), the construction easement for the 24-inch gas pipeline would be 100 feet wide, with a permanent easement width of 30 feet. For the 1,400-foot gas alignment between the compressor station and the remote well pad, the temporary construction easement will be 120 feet to accommodate the three pipelines (24-inch gas pipeline and 16-inch dual pipeline system). In areas that contain sensitive biological or cultural resources, the pipeline corridor would be redirected or reduced to avoid direct and indirect impacts on adjacent sensitive resources (where possible).

Underground Facilities Coordination

To avoid or minimize construction conflicts with existing utilities and public services, Central Valley would coordinate closely with the Colusa County Public Works Department during final project design to identify any potential utility conflicts and initiate relocation efforts. Central Valley would also contact Underground Service Alert (USA) at least 2 full working days before construction activity begins. USA would contact all owners of underground pipelines and utilities that are registered with USA and inform them that construction is about to begin in their service area. This notice allows those owners to mark the areas near the construction site where their underground facilities are located so that these areas can be avoided during project construction.

Central Valley would coordinate construction activities with Wild Goose Storage to ensure that construction does not interfere with Wild Goose Storage’s operation of its expansion gas pipeline. Central Valley anticipates utilizing a portion of the Wild Goose ROW for temporary placement of topsoil or subsoil piles.

Right-of-Way Preparation

Central Valley anticipates that preparation of the pipeline ROW within rice fields would be carried out in March/April 2011 prior to the fields being flooded. The top 12 inches of native topsoil would be removed first and used to construct a berm on both sides of the trench in rice fields to protect those areas of the pipeline ROW that are subject to rice production flooding (Figure 2-11). Where the pipeline crosses through non-rice fields, the topsoil excavated during trenching would be stockpiled adjacent to the trench and would be segregated from the subsoil.

As part of the stormwater pollution prevention plan (SWPPP) that would be prepared for the proposed project, sediment control devices such as silt fences and straw bales would be installed as necessary around water bodies, roads, and other areas during clearing and grading.

Open-Cut Trenching

Most pipeline construction would be conducted by open-cut trenching in agricultural areas, with a small amount of boring in areas where trenching is not practical. In areas where the trench width is limited, soil conditions necessitate, or the alignment crosses major roads (e.g., I-5), drainage channels (e.g., Glenn-Colusa Canal), or railroad tracks, boring or horizontal directional drilling methods would be used (described below).

The anticipated pipeline construction method is shown in Figure 2-11. Once the topsoil has been stripped, the trench would be excavated to a depth sufficient to provide 5 feet of cover. Typically, trenching activities would involve a trenching machine or trackhoes.

After the pipe is placed into the trench, the trench would be backfilled with the previously excavated material. The subsoil would be backfilled first and then the topsoil would be replaced. A soil mound would be left over the trench to allow for soil settlement, unless otherwise required by the landowner.

Trench Dewatering

Dewatering would occur in rice fields and other areas where the groundwater intercepts the trench or storm runoff flows into the trench. The water would be pumped into nearby agricultural ditches. As described in this PEA (Section 3.8, Hydrology and Water Quality), Central Valley would be prepare a groundwater dewatering plan that describes how water would be removed from the pipeline trench and where it would be discharged.

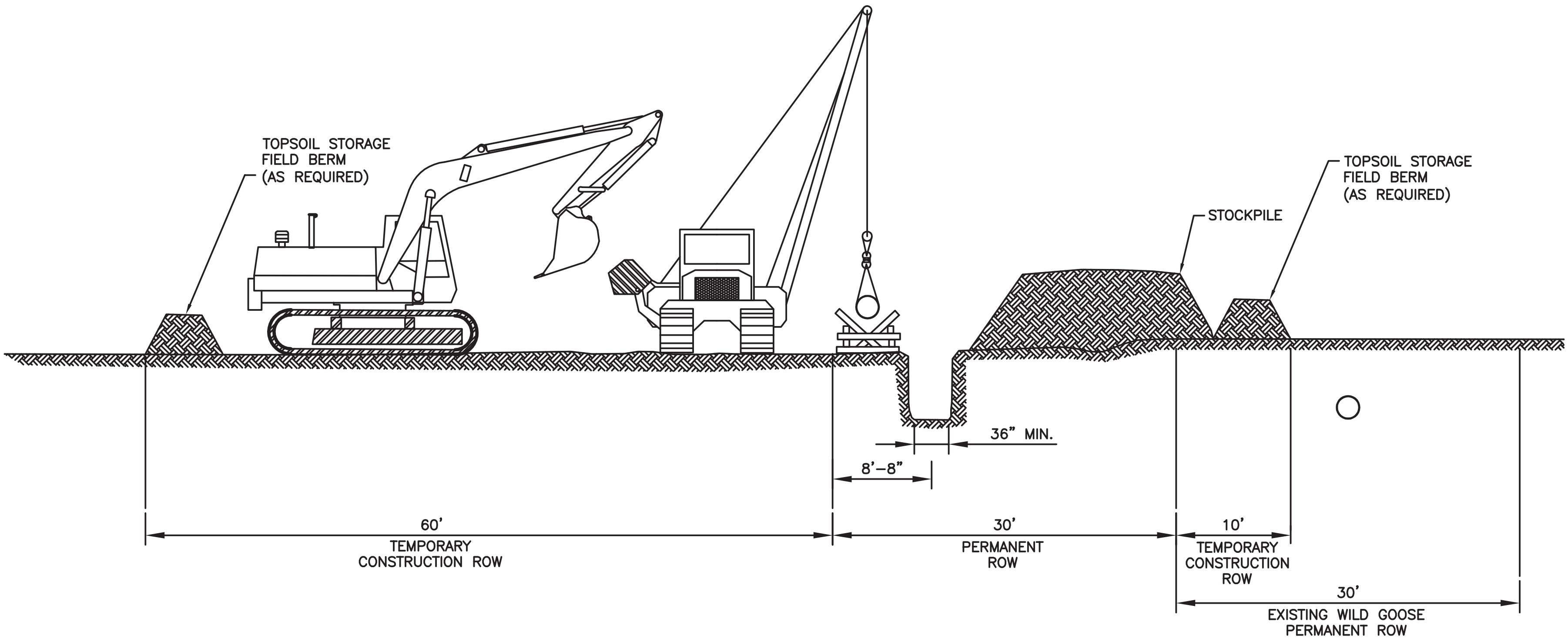
Trench Spoils Disposal

Central Valley, in coordination with the construction contractor and CPUC's environmental inspector, would ensure that excess trench spoils from excavation, if any, would be hauled to an appropriate offsite disposal location or used within the construction ROW, where feasible. Spoils materials would not be placed in sensitive habitat areas, such as wetlands.

Stringing, Welding, and Installation

Pipe would arrive on the job site by highway trucks along with pipe offloading equipment. The trucks would travel down the ROW, being offloaded as they travel; they would place joints of pipe end to end, supported by wooden skids. A sideboom crawler tractor or other suitable hoisting machine would lift each joint of pipe to abut and align with the bevel of the previous joint so they can be welded together. The welds would be radiographically or ultrasonically inspected for defects. Welds that are defective beyond code limits would be repaired, or they would be removed and rewelded.

Welding would be performed in accordance with the American Petroleum Institute Standard Number 1104, USDOT pipeline safety regulations 49 CFR Part 192 (latest editions). The welded joints would be coated with either a powdered epoxy applied to induction-heated weld areas; with a liquid epoxy; or



Source: Rooney Engineering, 10-08.

Graphics … 01099.07 (10-08) tm

ICF Jones & Stokes
an ICF International Company

Figure 2-11
Pipeline Construction Detail

with a mastic sleeve that, when heated, would shrink to form a snug fit on the pipe. The pipe would be visually checked and electrically tested by an audible signal for damaged coating, and damaged areas would be repaired by means of melting a stick form of epoxy onto the damaged area.

Pipeline sections that are ready to be installed into the trench would be lowered in by means of nylon straps or wheeled "cradles" suspended from sideboom tractors or other hoisting equipment. Where rock is encountered, the bottom of the ditch would be padded with sand or fine-grained soils. Inspectors would ensure that the minimum required cover is attained. This would be accomplished by measuring the pipe depth.

Right-of-Way Restoration

Central Valley would require the construction contractor to restore the pipeline construction zone to preconstruction site conditions. To expedite site restoration after construction, the top 12 inches of topsoil would be stockpiled and replaced after the pipe has been installed. In areas that require immediate stabilization, nonvegetative techniques that allow native species to reestablish may be used (through coordination with the landowner), such as use of weed- and disease-free mulch, erosion blankets, or rolled organic fiber material.

Central Valley would prepare a SWPPP prior to construction that describes when, where, and how the site reclamation would occur. Erosion control seed mixes may be necessary on selected sites. If sites need to be stabilized through seeding, the seed mix would include native or sterile seed varieties that are appropriate for stabilizing local site conditions. Site-specific erosion control measures (nonvegetative or mechanical techniques) would be determined on a site-specific basis through coordination with the landowner.

Agricultural Landowner Coordination

Central Valley has been and will continue to work closely with landowners to avoid structures, agricultural facilities, and semi-permanent and temporary hunting camps as much as possible. Any fences, drainages, conveyance features, water lines, and dikes that are damaged or removed during construction would be repaired or replaced to original condition. If any agricultural facility is inadvertently damaged during construction, the onsite lead construction inspector would ensure that the damage is immediately reported to the landowner and repaired.

Auger Boring and Horizontal Directional Drilling

Currently, Central Valley is planning to avoid potential waters of the United States and major roads and railroads (including I-5, Glenn-Colusa Canal, Colusa Trough, and Hunters Creek) by boring under these features. Auger boring and horizontal directional drilling (HDD) methods that may be used as part of the proposed project are described below. Drainages that will be crossed using the auger bore or HDD method are identified in Appendix E and shown on the Exhibit 1 sheets.

Auger Boring Method

The auger boring method would be used for crossings that are typically less than 300 feet wide and no deeper than 20 feet below grade. This method involves the excavation of bore pits on each side of the crossing to a depth below the invert elevation of the pipe. Then, an auguring machine is lowered into the bore pit; a hole is augured along the alignment; and a pilot pipe is jacked forward, behind the auger head. When the auger reaches the bore pit on the opposite side, the carrier pipe is pulled or jacked through as the pilot pipe is removed.

Horizontal Directional Drilling Method

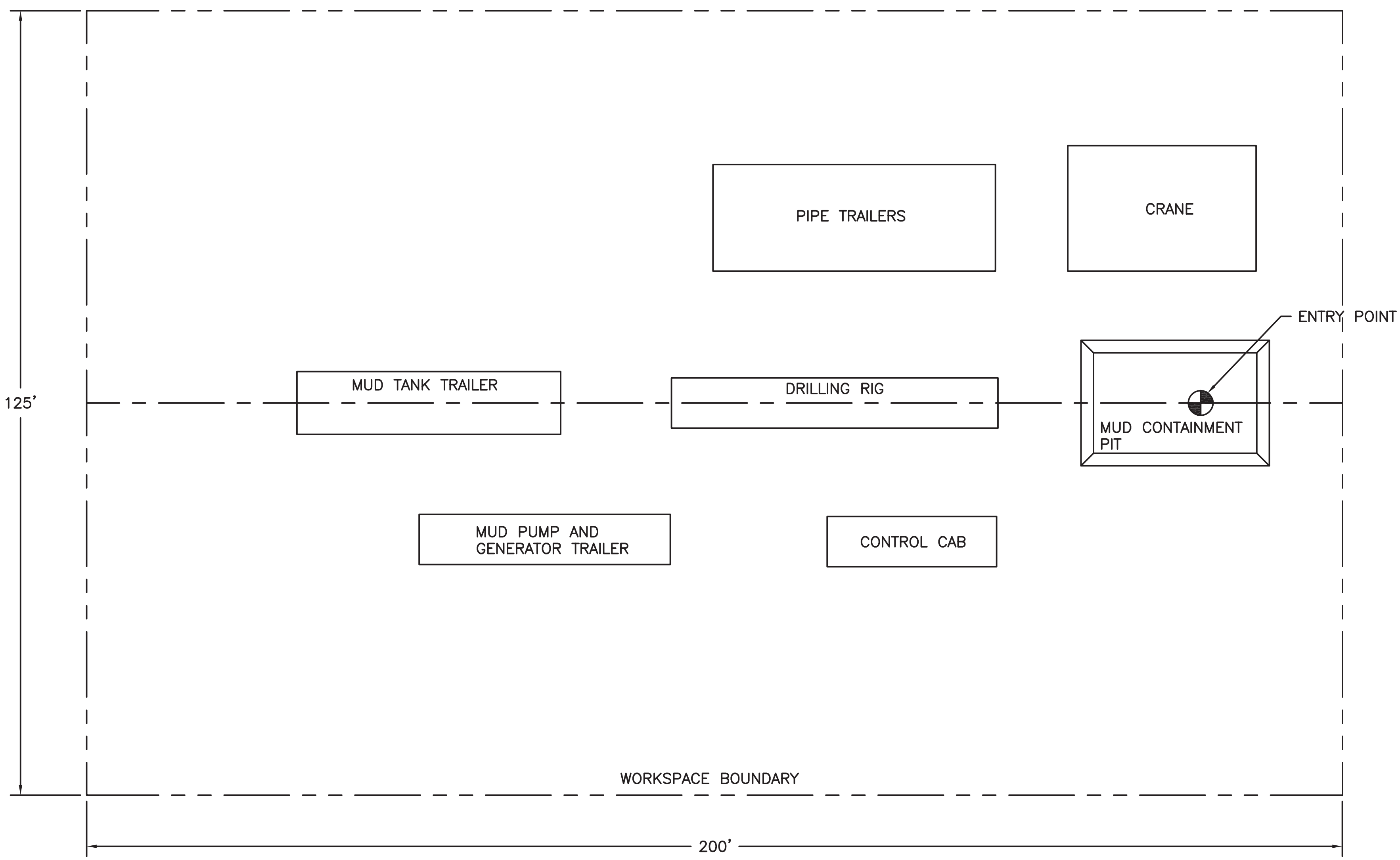
Figures 2-12 and 2-13 illustrate the workspace that is anticipated for typical horizontal directional drill entry and exit sites. The horizontal directional drilling method would be used for longer (more than 300 feet) and deeper (more than 20 feet below grade) crossings. This method requires a pilot hole that may be wet-bored by hydraulic cutting action using a jet nozzle, then reamed to the appropriate diameter with a reaming bit. These types of guided bores typically use bentonite, a fine, nontoxic clay that, when mixed with water, provides the necessary lubricant and operating fluid for the drilling process. The mixture is injected into the drill under pressure and recirculated back to the surface, where it is filtered and reused.

Spill prevention measures specified in the SWPPP would be developed and implemented to minimize the risk of bentonite entering waterways during boring. Although bentonite contamination occurs rarely, bentonite can reach the ground surface and enter surface waters if the bore encounters a rock fracture during high-pressure boring operations. Such an event is termed a *frac-out*. The risk of bentonite reaching the surface or surface waters would be minimized because boring would occur during summer, when many of the drainages may be dry or contain minimal flowing water.

Central Valley's engineering consultant would prepare a bore plan that contains detailed drawings and a frac-out contingency plan. The plan would focus on minimizing the potential for a frac-out; providing for the timely detection of frac-outs; and ensuring an organized, timely, and "minimum-impact" response in the event of a frac-out and release of drilling mud (bentonite clay) in a waterway.

Pipeline Testing and Discharge of Test Water

Before the pipelines are placed in service, the completed pipelines would be hydrostatically tested. Hydrostatic testing would be conducted in accordance with the requirements of USDOT pipeline safety regulations (49 CFR Part 192), Central Valley testing specifications, and applicable permits. An estimated 1.7 million gallons of water would be used for hydrostatic testing. This water would be obtained from existing public or private water supplies (local purveyors, local

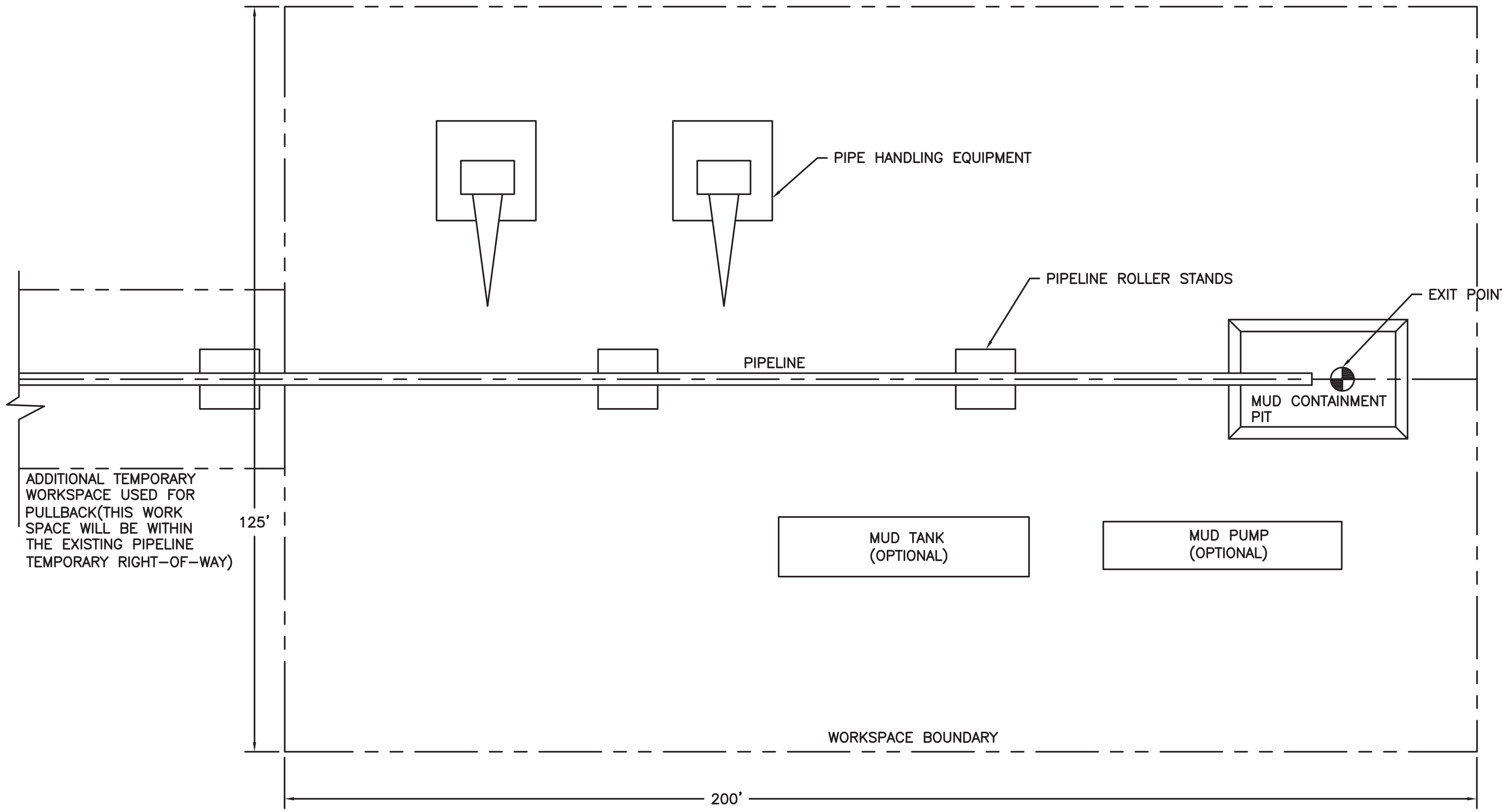


Source: Rooney Engineering, 10-08.

Graphics ... 01099.07 (10-08) tm

ICF Jones & Stokes
an ICF International Company

Figure 2-12
Typical Entry Site for a Horizontal Directional Drill



Source: Rooney Engineering, 10-08.

Graphics ... 01099.07 (10-08) tm

ICF Jones & Stokes
an ICF International Company

Figure 2-13
Typical Exit Site for a Horizontal Directional Drill

groundwater, or municipal sources), which have not been identified. The test water would be discharged at one time, released into an onsite filtering system (composed of hay bales), and discharged into existing drainage ditches in agricultural areas.

Compressor Station Construction

The anticipated 10-acre work area required for constructing the compressor station is shown on Sheet 1 in Exhibit 1. Construction activities for the compressor station would entail clearing and grading the site with drainage and runoff to a collection point, if necessary, to control stormwater drainage as specified in the SWPPP, which would be developed prior to construction. Completion of site preparation would be followed by constructing building foundations; installing the perimeter fencing; erecting structures to house the compressors and associated facilities; installing equipment and piping; and cleaning up and restoring the site. Construction of the compressor station is anticipated to take 12–14 months, depending on weather and equipment delivery. Central Valley anticipates that site preparation and construction of the compressor station would occur between September 2010 and October 2011.

Due to the very level terrain, and pending completion of the geotechnical analysis and detailed grading and drainage plans, it is anticipated that normally occurring drainage from adjacent properties would not warrant special measures to protect the site from run-on from adjacent properties.

Construction activities and storage of construction material and equipment would be confined to the 10-acre compressor station site. Excavation required for the foundations would be performed as needed, and all backfill would be compacted in place. Pending completion of the geotechnical analysis and related soils report, the volume of required imported fill material has not yet been estimated. Based on field observations to date, it is anticipated that native soils would not be suitable for subsurface foundations. Any excess native soils would be used onsite or disposed of in an approved offsite area.

Compressor building construction would begin after the compressor/engine units are installed on concrete foundations. Typically, the steel frame of the building is erected, followed by installation of the roof, exterior casing, and insulation as needed for noise attenuation. The compressor building would be designed to meet Colusa County noise requirements.

A temporary leased compressor will be installed to inject gas from PG&E Line 172 at the 4-acre remote well pad site (see Figure 2-7). The compressor engine package would be delivered preassembled on a skid. The skid would sit on a poured concrete slab on grade to maintain a level stance. A prefabricated enclosure would be installed over the equipment if necessary to meet Colusa County noise requirements.

Gas pressure piping at the compressor station, including the connecting pipeline into the PG&E Line 172, would involve welded construction, except where the piping connects to flanged components. The piping work may begin in an offsite fabrication shop. If offsite fabrication is used, the prefabricated pieces would be shipped to the site and installed in place. Piping installed below grade would be coated for corrosion protection before backfilling, and a cathodic protection system would be installed to protect underground piping. Aboveground valves and piping would be installed on concrete pipe supports and protected from external corrosion by paint coatings.

Equipment such as the glycol dehydration units, reboilers, and coolers would be installed on pads or skids. Pig launcher/receivers would be installed on pads. The aboveground storage tanks would be installed within diked areas or otherwise installed within secondary containment. Before the compressor station is placed in service, the gas pipeline system (both above and below ground) would be hydrostatically tested. Controls and safety devices, such as the ESD system, relief valves, gas and fire detection facilities, and other protection and safety devices, would be checked and tested.

After completion of startup and testing, the compressor station site would be graded, and disturbed areas would be graveled or revegetated with an appropriate seed mix. Cleanup and restoration of various parts of the site would be completed as work on the area is finished. The access roads and parking areas would be graded and graveled, or other aggregate would be spread on the surfaces.

Metering Station Construction

The anticipated one-acre work area required for constructing the metering station is shown on Sheet 10 in Exhibit 1. An approximate 400-foot-long access road would be constructed along the east side of the Wild Goose meter station to provide permanent access to the facility. Construction activities for the metering station and permanent access road would involve clearing and grading the site, constructing equipment and piping foundations, installing the perimeter fencing, installing equipment and piping, and cleaning up and restoring the site. Construction of the metering station is estimated to take 2 to 3 months. Central Valley anticipates that construction of the metering station would occur between June and September 2011.

The site for the metering station would be cleared of vegetation and graded as necessary to create a level surface for the movement of construction vehicles and to prepare the area for the construction of foundations. Construction activities and storage of construction material and equipment would be confined to the 0.8-acre metering station site plus an additional approximately 0.2 acre of temporary work space, as needed.

Excavation for the foundations would be performed as needed, and all backfill would be compacted in place. Excess soil would either be used onsite or disposed of in an approved offsite area.

Gas pressure piping at the metering station would involve welded construction, except where the piping connects to flanged components. The piping work may begin in a fabrication shop offsite. If offsite fabrication is used, the prefabricated pieces would be shipped to the site and installed in place. Piping installed below grade would be coated for corrosion protection before backfilling, and a cathodic protection system would be installed to protect underground piping. Aboveground valves and piping would be installed on concrete pipe supports and protected from external corrosion by paint coatings.

Equipment such as the meter runs, an odorant injection unit, and the meter building are expected to be installed on pads or skids. A pig launcher/receiver would be installed on pads. Before the metering station is placed in service, the pipeline would be hydrostatically tested. Controls and safety devices would be checked and tested.

After completion of startup and testing, the metering station site would be graded, and disturbed areas would be graveled or revegetated with a sterile grass.

Well Pad Construction and Drilling

Well pad construction would entail preparation of the well pad sites for drilling equipment, drilling of the I/W and saltwater disposal wells, reworking and conversion of existing wells, and installation of well pad surface facilities. Construction of the well pads, well drilling, and facility installation is estimated to take place within a 3-month window (July to September 2010) and is subject to weather and equipment availability.

Well Pad Preparation

The remote well pad would be cleared of surface materials and vegetation, then leveled and graded to accommodate drilling equipment. The well pad would then be graded and leveled within the designated 4-acre work space. Because the well pad sites are level, import or export of fill is expected to be minimal. Drainage and runoff would be contoured to a collection point in order to control stormwater discharge if required in the SWPPP.

Well Drilling

Once the site is prepared, the mobile drilling rig and associated equipment and tanks would be driven to the site. Typical equipment associated with the rig includes pipe racks, the substructure, a mud system, changing quarters, a “doghouse” and tool pusher trailer, and a power pack. Drilling activities typically involve the use of the rig’s rotary table to turn the drilling bit and attached drill pipe. As the bit advances deeper into the subsurface, additional pipe is added in the pipe segments. Drilling mud is used to lubricate the bit, bring drill cuttings back to the surface, and control down hole formation pressure. All fluids used in or for the drilling operation would be contained in temporary mobile tanks or drums stored within a containment area. Fluid and mud circulation systems are based on closed-loop designs, which result in no discharge. After the well has been drilled, the open hole is lined with three concentric strings of steel casing and cemented in place to isolate the well from structurally higher geologic strata and freshwater aquifers. Once the well has been completed, surface valving, piping, and monitoring equipment are installed and tested.

The drilling rig would operate 24 hours per day, 7 days per week until each well is completed. After the well has been drilled, the drilling rig would be relocated to the next well position. It is expected that drilling each well would take from 6 to 10 days. Equipment and materials would typically be delivered during daylight hours.

Surface Facilities

New surface facilities would be constructed at each well pad at the completion of drilling. New surface facilities would include a 6-foot-tall wellhead, gas/water separator, gas flow meters, and miscellaneous piping and valves.

Dual Gas Gathering and Water Gathering Pipelines

Saltwater collected and separated at the wellheads would be piped from the wellheads to water storage and injection facilities site via a buried 6-inch-diameter water line all within the well pad area. There are two independent high-pressure gas gathering pipelines—one for the Upper Sands and one for the Massive Sand—in order to provide for independent operation of the two sands as described earlier. As described previously, a 1,400-foot-long, 16-inch diameter pipeline would transport gas from the remote well pad to the compressor station site. All gathering pipelines would be buried 5 feet below ground.

Construction of the gas gathering pipeline within the well pad area would occur during well drilling and would take approximately one to two months, subject to weather and equipment availability. The dual 16-inch diameter gathering lines extending from the well pad to the compressor station will be co-located within the same pipeline corridor as the 24-inch diameter main pipeline and will be constructed at the same time using the pipeline construction techniques described earlier. A temporary work corridor 100 feet wide is required for the installation of the dual gathering lines and 24-inch diameter pipeline. The permanent easement will be 50 feet to accommodate future maintenance of the three pipelines.

Observation Well Conversions

Up to four existing wells (S-3, S-4, SL-1 and Test Well) are proposed to be converted to storage observation wells. Up to two previously plugged and abandoned wells (S-2 and Z-1) are proposed to be reopened and converted to storage observation wells. The locations of the wells are shown on Sheet 1 in Exhibit 1.

The existing well sites and access roads would be graded and improved to accommodate a service rig, trucks for well logging and cementing operations, and other equipment needed for the conversion. Typical work-over activities could include running electronic logs to check casing integrity, perforating the well casing to complete new intervals in the formation, and replacing or repairing casing or upgrading wellhead equipment. Two of the conversions involve reentering wells that have been plugged and abandoned (S-2, and Z-1); new access roads would need to be constructed to these sites. The site and access roads would be cleared of vegetation, graded, and improved to promote drainage and dust control and to accommodate a service rig, trucks for well logging and cementing operations, and other equipment needed for the conversion. A work-over rig equipped with drilling capability would be required to drill and ream out the cement plugs and reopen the well. All of the work for this component would occur from Monday to Saturday between the hours of 7 a.m. and 7 p.m.

During the well work-over activities and depending on the equipment needed, an additional temporary work space of up to 0.5 acre may be required at each of the observation well sites. Once the well work has been completed, the temporary work space would be restored, the permanent well site finished to a 30- by 30-foot graveled area (0.02 acre area), and a 7-foot-tall chain-link fence installed.

Operation and Maintenance Program

This section describes the personnel requirements of the project and the general systems and procedures that would be implemented during the operational life of the project.

Operations Personnel and Training

Central Valley estimates that 6-8 full time employees will be required to operate and maintain the facilities. The Operations Manager would represent Central Valley onsite and would be accountable for the safe and reliable operation of the compressor station and pipeline facilities. All operations, maintenance, and instrumentation/electrical (I/E) staff report to the Operations Manager. The Operations Manager would plan and coordinate the station activities, manage public and community relations, and ensure that all operational and safety issues are addressed.

The I/E staff would develop and manage preventative maintenance programs. I/E staff would program, test, and troubleshoot control systems to ensure that the facility can operate safely and reliably within the design parameters. The I/E staff would also provide the necessary knowledge and expertise to identify and repair, as appropriate, electrical systems, control panels, and instrumentation within the facility, at the wells, and on the pipeline.

Mechanical maintenance personnel would develop and manage the preventative maintenance and provide support to the operations team to troubleshoot and repair mechanical equipment including engines, compressors, pumps, and other ancillary equipment.

An auxiliary building containing an office, control room, utility and workshop area would be located at the central compressor site. Operations and maintenance personnel would be present at the facility during normal daytime hours. Operations and maintenance personnel would be on call after hours. Operations staff would have the means to stay in communication with the facility from home and be able to travel to the facility as required on short notice. There would be times when the facility would be manned 24 hours. These may include times when there are equipment problems; ongoing special projects; issues relating to the operation of the PG&E pipeline system; or any time that ensuring a safe, reliable operation dictates.

A written operator qualification plan would be developed prior to the compressor station commencing operation, as required by the Office of Pipeline Safety and CPUC. Central Valley's affiliate Nicor Gas has an existing gas storage operator qualification plan that would be utilized for this purpose. The plan would outline the tasks to be performed by the operator relating to either the pipeline system or the central compressor station and well pad sites. All operations and maintenance personnel would be required to participate in either formal training sessions or an online training program, and then pass a qualification examination. Requalification would be required periodically in accordance with the written plan.

An emergency response plan would be developed prior to the start of commercial operations. The plan would identify how personnel would respond to emergency situations related to the storage operations and would train personnel to recognize and identify abnormal operating conditions. The plan would contain a structured on-call list of people to notify depending on the seriousness of the emergency. For example, a level one emergency may not warrant the immediate notification of the senior people within the company, while a level three emergency may warrant notification of senior company personnel. All personnel would be properly trained regarding when to initiate the emergency response plan. A mock exercise to be performed on an annual basis would demonstrate the strengths and weaknesses of the plan in dealing with emergency situations and evaluate the operating staff's capability in carrying out the plan.

Regular safety meetings would be conducted to ensure that operations and maintenance personnel are knowledgeable of and committed to all safety procedures within the facility and generally trained in safety practices. All onsite operating and maintenance personnel would be trained in firefighting skills, particularly as they pertain to natural gas.

A damage prevention program that complies with the RP1162–Public Awareness Program, which includes a mechanism for letting property owners know the 24-hour number to call in case of a site-related emergency, would be developed. Information pamphlets and letters would be sent to property owners periodically as a reminder to call the facility operator before digging near or over the pipeline.

General System Monitoring and Control

Modern gas facility control systems enhance operational efficiencies and provide for greater safety. The control room at the central compressor site would serve as the focal point for project systems monitoring, control, and operation. The remote well pad site and PG&E meter station monitoring and control functions would be connected to the control room computer system through a Supervisor Control and Data Acquisition Remote Terminal Unit located in the control building. Control and monitoring functions for equipment and operations at the central compressor site would be monitored by means of hardwired control systems connected to the control room computer system.

Well Pad Site Monitoring and Control

The flow of gas in and out of the individual storage wells would be check metered so that the characteristics and performance of the gas storage reservoir may be properly monitored. The 16-inch dual gathering lines to the well pads would be equipped with emergency shutdown valves to close off the flow of gas from the well to the central compressor facility under certain predetermined conditions (e.g., fire). All main wellhead valves can be actuated by communication with the central compressor facility or manually at the valve location.

Saltwater Disposal Monitoring and Control

The saltwater disposal well would be metered during operations so that the characteristics and performance of the disposal operations may be properly monitored. The injection facilities would be equipped with emergency shutdown systems to close off the flow of water from the surface storage tanks to the injection well facility and under certain conditions (e.g., excessive flow, abnormal pressure) from the wells to the surface storage tank.

Central Compressor Facility Monitoring and Control Systems

Redundant safety systems would be installed at the central compressor facility. Gas, fire, and heat sensors would monitor operations and would automatically alarm and, if needed, shut down the facility if unusual conditions are detected.

Operations and maintenance personnel would be on call after the normal working hours to address any abnormal conditions.

Control Room Technology

The heart of the control room are omputers and the PLC system, which provide automation of the control and monitoring functions as well as data collection, recording, and storage. This system would provide continuous monitoring of critical systems parameters and would have the capability for shutdown of either individual areas or the entire operation when abnormal operating conditions exist. The system would be connected to graphic display monitors in the operator's console that would provide an overview of key parameters such as real-time flows and pressures at well pads, the compressor station, and the PG&E meter site.

Systems operating parameters that typically would be monitored include flow, temperature, and pressure of the gas flow between the PG&E's Line 400/401, the central compressor site, and the well sites. In addition, major valve status or position for pressure control, flow control, and emergency shutdown valves on the pipelines would be indicated and monitored. The presence of gas in the compressor building would also be monitored. Dew point analyzers would monitor the water content of the gas.

Plant Operation

The compressor units can be started from a local control panel or remotely by the operator in the control room. The mainline valves at the compressor site and at the meter station near PG&E's Line 400/401 can be remotely actuated from the control room. The compressor inlet/outlet valves that direct flow into the suction and discharge sides of the compressor units can also be remotely actuated. Gas flow under free-flow conditions would be controlled by regulation facilities located at the compressor station. When compression is required, the level of flow would be set by any combination of three operator-controlled conditions from the control room: (1) the number of compressor units running (between 1 and 3), (2) the running speed of the engines, and (3) the volumetric capacity control on each compressor cylinder. The startup of other major pieces of equipment, such as the dehydrators, would be done manually by an operator from local control panels at the equipment. This ensures that the operators regularly inspect the condition and operation of the equipment and facilities prior to and during startup operations.

Facility Inspection and Survey

The regular inspection of the pipelines, equipment, wells, instrumentation, and control and support systems is critical to the safe, efficient, and economical operation of the facility. Early identification of items in need of maintenance, repair, or replacement ensures continued safe operation of the gas storage systems. Written procedures for the operation, inspection, maintenance, and repair of the pipelines, equipment, and facilities would be established in an Operating and Maintenance Plan as required by DOT (49 CFR 192, Subparts L and M). The project would meet or exceed minimum requirements.

Pipeline Inspections

The pipeline would be inspected on a regular basis for ground disturbances along the ROW. These ground surveys would include inspection for encroachments and reduced cover, as well as the condition of vegetation, warning signs, cathodic protection test stations, and piping. A report summarizing the results of the inspections would be prepared and maintained by the operator at the central compressor station.

Pig launcher/receivers would be installed on both ends of the mainline (metering station and compressor station sites). These facilities would be used to launch internal pipeline inspection tools (smart pigs), which measure dents and metal loss due to corrosion. Inspection runs would be performed in accordance with 49 CFR 192.

Well Pad Site Inspections

The well pad sites would be inspected several times per week by site personnel. The inspection would include evidence of vandalism, erosion control, grading and drainage facilities, cathodic protection system, piping, valves, and well head instrumentation and control equipment. The results of these inspections would be summarized in a monthly report and maintained by the operator at the central compressor site.

Central Compressor Site Inspections

Inspection of the central compressor site and equipment would be conducted daily. The operator is responsible for walking the site at the start of each shift and noting the condition of fencing, drainage facilities, tanks and containment, piping, valves, instrumentation and control systems, equipment, site lighting, and buildings. Conditions observed during the inspections would be included in the operator’s daily log and summarized in a monthly report.

The Plant Manager would be notified of any conditions revealed during the inspections that require further inspection, repair, or replacement. Depending on the severity of the condition, the Plant Manager can cause operations to cease or be reduced to a safe level until the condition is corrected.

Maintenance and Repair Procedures

Maintenance of the sites, equipment, facilities, and pipelines would be part of the daily operations of the Project. Minimum requirements for maintenance, repair and record keeping of gas pipelines, pressure regulating and relief valves and compressor stations are established by 49 CFR, Part 192 and would be included in the Operating and Maintenance Plan.

Normal maintenance, repair, overhaul, and testing of equipment assemblies and subassemblies would be conducted by site personnel at the maintenance shop located at the central compressor site. Major equipment assemblies and subassemblies that require extensive repair, rebuilding, and testing beyond the capabilities of the onsite shop's equipment would be removed from service and shipped offsite for repair at the manufacturer or a qualified service center. The implementation of scheduled maintenance and refurbishment of the equipment reduces the chances of complete system downtime by scheduling major repairs during nonoperational periods.

Scheduled Site Maintenance

Scheduled site maintenance of the central compressor station and the well pad sites includes maintenance of site access roads, drainage facilities, fencing, site lighting, landscaping, equipment, and aboveground piping painting. Site access roads and surface areas would be regraded and resurfaced as often as necessary to maintain a smooth surface, manage dust control, and promote drainage. Regular mowing and periodic clean-out of ditches and culverts would ensure that the drainage systems operate at their design capacities. Site fencing would be inspected regularly and repaired as necessary to prevent unauthorized access to project facilities. All equipment, storage tanks and aboveground piping, valves, and fittings would be painted upon completion of construction and would be repainted regularly. The housekeeping and maintenance procedures employed at the project would provide a clean work environment and ensure that the central compressor site and well pad sites perform properly while providing a professional appearance. Much of the maintenance work described above would be provided by local service companies.

Parts and Materials

To service and maintain the pipelines, equipment, and facilities, an adequate inventory of service, repair, and replacement parts and materials would be maintained at the central compressor site in storage space in or near the generator and maintenance buildings. The service and repair inventory would include items not generally available locally on short notice. Maintenance and repair items that can readily be obtained locally, such as fencing, standard hardware, paints, concrete, gravel, and culverts, would not be warehoused onsite.

Electric Power Line

The proposed electric power line would be integrated into PG&E's existing distribution system. PG&E operations and maintenance personnel would maintain the new power line as a part of their regional distribution system operations.

Future Plans

At this time, Central Valley does not have any expansion plans for the facility. However, provision to install a fourth compressor unit has been incorporated into the compressor station design. Installation of the expansion unit is contingent upon market demand, reservoir technical considerations, and CPUC approval.

Regulatory Requirements

CPUC will use this PEA as the basis for a CEQA document to disclose the proposed project's potential environmental impacts; to determine whether there is substantial evidence that the project would create significant environmental impacts; and, if such impacts are likely, to determine whether they could be mitigated to less-than-significant levels. This document may be used by regulatory agencies that are responsible for issuing permits and approvals that may be needed to proceed with the project. A list of local, state, and federal agencies that may issue permits and authorizations is provided in Table ES-2 in the Executive Summary. Detailed descriptions of the regulatory requirements, permits, and authorizations that may be required to construct and operate the proposed project are discussed under the various environmental topics in Chapter 3.

Chapter 3
Environmental Setting and Impact Assessment

Introduction

As required by CPUC Rule 17.1 and General Order 131-D, the CEQA Initial Study Checklist was used to focus the impact analysis for the proposed project. The methods used for determining standards of significance for environmental issues in the PEA were obtained from the Appendix G CEQA Guidelines. The impact analysis for each of the environmental issues discussed in this chapter of the PEA is based on these significance standards and applicable agency standards and thresholds.

Appendix F contains the initial study checklist and a list of the associated applicant-proposed measures that will be implemented as part of the proposed project to minimize, avoid, and compensate for potentially significant impacts.

This chapter describes the project area setting, impacts associated with the proposed project, and applicant-proposed measures designed to reduce significant impacts to less-than-significant levels for the following issue areas.

- 3.1 Aesthetics
- 3.2 Agricultural Resources
- 3.3 Air Quality
- 3.4 Biological Resources
- 3.5 Cultural and Paleontological Resources
- 3.6 Geology, Soils, and Seismicity
- 3.7 Hazards and Hazardous Materials
- 3.8 Hydrology and Water Quality
- 3.9 Land Use and Planning
- 3.10 Energy and Mineral Resources
- 3.11 Noise

- 3.12 Population and Housing
- 3.13 Public Services
- 3.14 Recreation
- 3.15 Transportation and Traffic
- 3.16 Utilities and Services Systems
- 3.17 Cumulative Analysis and Growth-Inducing Impacts

Organization of the Environmental Analysis Sections

Each resource section in Chapter 3 is organized as discussed below.

- **Environmental Setting.** The environmental setting for the resource is discussed; this information is used to define baseline environmental conditions (i.e., conditions present before the proposed project is implemented). Changes that would result from the proposed project are compared to the baseline conditions to assess and measure the degree and severity of change. To the extent appropriate, selected setting information from the *Wild Goose Storage, Inc. Expansion Project Draft Supplemental Environmental Impact Report* (California Public Utilities Commission 2002) was used to prepare various setting sections for the Central Valley Gas PEA. Information from this Supplemental EIR is summarized and incorporated by reference, where appropriate. ICF Jones & Stokes determined that the use of the setting information and associated supporting technical studies (e.g., geotechnical and seismic studies) is appropriate given that it is a natural gas storage project immediately adjacent to Central Valley's proposed project.
- **Regulatory Setting.** Existing laws and regulations that pertain to the proposed project are identified, including regulations, ordinances, and permit conditions required by federal, state, or local agencies with relevant jurisdiction.
- **Impact Analysis.** The impact analysis for each environmental resource section addresses (where appropriate) construction-period impacts, impacts resulting from operation and maintenance, and impacts associated with potential incompatibility of the proposed project with applicable plans and policies. Construction impacts, which would be temporary, constitute changes that would occur during construction of the project facilities (particularly those effects associated with the buried gas pipeline). Operation and maintenance impacts involve long-term operation of the project facilities and any changes resulting from construction that cannot be guaranteed to be returned back to the original state.

  The methods used to assess potential impacts are presented, the criteria used to determine the significance of impacts are identified, each impact evaluated in this PEA and its associated level of significance are described, and applicant-proposed measures (APMs) are described to reduce potentially significant impacts.

- **Applicant-Proposed Measures**. Central Valley has identified a variety of APMs for avoiding, minimizing, or compensating for potentially significant environmental impacts. These measures include conducting additional studies to better define the resource issues and assist in the future engineering design phase; the development and implementation of best management practices and plans; avoidance measures; and compensatory measures.

Section 3.1
Aesthetics

This section describes the character of the landscape in the project area, as well as the local government planning and policy guidelines that are relevant to the physical appearance of components of the proposed project. This section also considers the project's compatibility with local scenic highways and byways, and the measures and methods available for reducing visual impacts.

Environmental Setting

Concepts and Terminology

The term *aesthetics* typically refers to the perceived visual character of an area, such as a scenic view, open space, or architectural façade. The aesthetic value of an area is a measure of its visual character and visual quality combined with viewer response (Federal Highway Administration 1983). This combination may be affected by the components of a project (e.g., buildings constructed at a height that obstructs views, hillsides cut and graded, open space changed to an urban setting), as well as by changing elements such as light, weather, and the length and frequency of viewer exposure to the setting. Aesthetic impacts are thus defined as changes in viewer response that result from project construction and operation. Perceived visual character is a combination of visual quality and visual character as modified by viewer response. These elements are described in more detail below.

Visual Character

Visual character is the appearance of the physical form of the landscape, encompassing both natural and human-made elements (e.g., topography, water, vegetation, structures, roads, infrastructure, and utilities) and the relationships between these elements in terms of form, line, color, and texture.

Visual Quality

Visual quality is evaluated on the relative degree of vividness, intactness or uniformity of appearance, and unity as modified by viewer sensitivity. Vividness refers to the visual power or memorability of landscape components as they combine to form distinctive visual patterns. Intactness refers to the visual integrity of the landscape and the presence or lack of encroaching elements. Unity refers to the visual coherence and compositional harmony of the setting considered as a whole; it frequently attests to the careful design of individual components in the artificial landscape (Federal Highway Administration 1983).

Viewer Response

Viewer response refers to the psychological response of a person to visible changes in the viewshed. A viewshed is defined as all of the surface area visible from a particular location (e.g., an overlook) or a series of locations and duration of views. Viewer sensitivity is also affected by viewer activity, awareness, and visual expectation in relation to the number of viewers and the viewing duration.

Regional Setting

The project region, in the upper Sacramento River Valley, is relatively homogeneous in aesthetic characteristics. The terrain is relatively flat and allows for expansive views of the chiefly rural setting. Agricultural lands, predominantly rice fields and orchards, characterize the project region.

The Colusa General Plan acknowledges the role of open space in defining community character. The combination of small towns, open fields, and hillsides untouched by development are the essence of the county's rural quality. The county's lifestyle depends on maintenance of open space (Colusa County 1989). As stated in the Open Space Element of the general plan:

> The role of open space really occurs on two levels: on a county-wide level, maintain[ing] open space becomes important to preserve particular views, such as the Sutter Buttes or Snow Mountain, and to maintain the integrity of the landscape. The undulating foothills of the Coast Range[s], the riparian corridors of the Sacramento River, the agricultural uses along the freeway, and the expansive upland valleys combine to create a landscape that is uniquely Colusa County. On a smaller scale, open space in the county helps to delineate the differences between communities, as well as each community's absolute boundaries. Designated open space areas around a community can encourage infill development and reduce urban sprawl.
>
> By recognizing the important role that open space plays in Colusa County and developing policies to preserve its key aspects, future development can be encouraged to "fit" the existing landscape without disturbing unique features.

Local Setting

The project area is located in a rural agricultural area on the valley floor of Colusa County. The country road network throughout the area influences its visual character. Foreground and middle views in the project area are primarily of agricultural uses. During clear daylight hours, distant background views are of the Coast Ranges to the west and the Sutter Buttes and Sierra Nevada to the east.

The Sacramento River is outside the eastern boundary of the project area. The river is not generally visible to motorists on SR 45, which parallels the river; the view of the river is obscured by the river levees. A cleared navigational channel is maintained between the cities of Colusa and Sacramento, allowing boats up to 40 feet long to navigate the river. Traveling along the river, with its tree-lined banks, wild grapevines, and overhanging foliage, is a picturesque experience. There is presently no organized trail system along the river (Colusa County 1989). As noted above, levees block views from the river to SR 45 and the proposed compressor station.

The westernmost boundary of the project area encompasses PG&E's existing Delevan Compressor Station, Wild Goose Storage Meter Station, and PG&E's Colusa Generating Station (currently under construction) (see representative photographs 13, 14, and 15 in Appendix B). These facilities are in open nonnative annual grassland and are surrounded by chain link fence. The proposed location of the metering station is immediately south of and adjacent to the existing Wild Goose Storage Meter Station.

Viewer Sensitivity

The largest number of viewers of the project area would be travelers heading south on SR 45 and travelers on local, unpaved roads such as Paradise, Southam, Dodge, and McAusland Roads. Travelers move through the area at varying speeds: normal roadway speeds differ depending on the traveler's familiarity with the route and roadway conditions (e.g., presence/absence of rain). Travelers on SR 45 have varying sensitivity depending on their purpose of travel. Viewers who frequently travel these routes, such commuters or business travelers, generally possess moderate visual sensitivity to their surroundings. The passing landscape becomes familiar to these viewers, and their attention is typically not focused on the passing views but on the roadway, roadway signs, and surrounding traffic. However, viewers traveling for pleasure are likely more sensitive to their surroundings.

Residents of the town of Princeton would not have views of the project site due to orchards, landscaping, and distance that obscure views. However, rural residences on farmsteads have views to the site from along Paradise, Southam, Dodge, and McAusland Roads. Most of these residences have vegetation planted around their perimeters for shade in the open fields and for privacy. Residents have differing views based on proximity to the site and existing orchards or vegetation that act to obscure views. These residents are accustomed to seeing existing buildings (e.g., silos and barns) associated with agricultural productions.

Regulatory Setting

No federal goals, objectives, or policies relate to the potential effects of the project on visual resources. The state and local plans and policies discussed below have been developed to preserve visual resources and protect scenic values within the project area.

State Regulations

California Department of Transportation Scenic Highway Program

The California Department of Transportation (Caltrans) has implemented a statewide scenic highway program to preserve and enhance the beauty of California. There are currently no officially designated State Scenic Highways or Historic Parkways in Colusa County (California Department of Transportation 2008). Although SR 45 has been proposed for designation as a State Scenic Highway, it has not been officially designated as such.

Local Regulations

Relevant goals and policies of the Colusa County General Plan are listed below.

- **Land Use Objective (g).** To upgrade the visual appearance and quality of development on the approaches to Colusa and Williams and prevent development which degrades the aesthetic quality of scenic roadways elsewhere.
- **LU-7.** The proposed development pattern should protect the scenic values of Colusa County. More restrictive design standards should be developed within the communities to encourage visually attractive development and lessen the visual impact of existing non-conforming uses.
- **CIRC-49.** Any earthmoving or road reconstruction project should be followed by seeding and vegetation, which restores a natural appearance.
- **OS-13.** Views of regional focal points, such as the Sutter Buttes, the Sacramento River, Snow Mountain, and St. John Mountain should be preserved wherever possible.
- **OS-17.** All resource extraction activities should include mitigation measures which ensure that their effect on scenic views is minimized.

Impact Analysis

The visual character of a facility is determined by how the facility blends with other facilities and the visual character of the area. For example, a mirrored-glass office building does not blend well with the visual character of a predominantly agricultural or rural area. An industrial building that is similar in appearance to a hay barn, packing facility, or milking house could be consistent with the visual character of an agricultural area.

The level of significance of impacts on visual resources was assessed primarily by the exposure of sensitive viewers to permanent changes in the quality or character of the landscape. Structures with limited visibility or that are consistent with other structures or land uses in a sensitive viewing area were not considered to cause a significant impact. Temporary visual impacts related to the presence of construction equipment or temporary construction activities were not considered significant.

Specific project impacts visible from three representative locations have been illustrated through photo simulations and are provided in Figures 3.1-1, 3.1-2, and 3.1-3. Photographs from selected vantage points were taken to represent as accurately as possible (a) existing conditions and (b) proposed conditions. Additional photographs of existing conditions in the project area are provided in Appendix B.

The analysis of visual impacts considers construction-period impacts, impacts of operation and maintenance, and impacts associated with potential incompatibility of the proposed project with applicable plans and policies. Construction-period impacts address changes that would occur during construction. Impacts of operation and maintenance activities can result from the construction of permanent structures or any change resulting from construction that cannot be guaranteed to be returned back to its original state. Impacts associated with incompatibility with applicable plans and policies were determined through examination of the Colusa County General Plan.

Significance Criteria

Criteria for determining the significance of impacts on visual resources were based on questions contained in the environmental checklist form in Appendix G of the State CEQA Guidelines. Based on these checklist questions, a project may have a significant effect on the environment if it would result in any of the conditions listed below.

- A substantial adverse effect on a scenic vista.
- Substantial damage to scenic resources along a scenic highway, including, but not limited to, trees, rock outcroppings, and historic buildings.
- Degradation of the existing visual character or quality of the site and its surroundings.
- Creation of a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area.

For the purposes of assessing the significance of visual resource impacts associated with the proposed project, an impact was considered significant if the project would result in a conflict with the goals and policies of the Colusa County General Plan (Colusa County 1989).

Impacts

There are no scenic vistas in the project area; accordingly, impacts on scenic vistas are not discussed further.

Impact 3.1-1: Temporary impacts resulting from construction activities

The potential for the project to result in temporary construction impacts is discussed separately for each of the major project components**.**

Gas Pipelines

Construction of the proposed gas pipeline system would create temporary changes in views of and from the project area. Construction of the PG&E Line 172 connection, gathering lines, and PG&E Line 400/401 connection would be minor because of the length and location of these pipelines. Construction activities associated with the 14.7-mile gas pipeline would introduce considerable heavy equipment and associated vehicles, including dozers, graders, scrapers, and trucks, into the viewshed of the local roadways, rural residences, and agricultural properties where there is already active disturbance. Construction of the pipeline would be of relatively short duration along the 14.7-mile route, and the disturbed area would revegetate quickly. Consequently, rural residents would not be significantly affected by pipeline construction activities because of distance from the site and familiarity with heavy farm equipment. In addition, these residents would be buffered from construction activities by vegetation, including orchards, and landscaping surrounding their homes. Central Valley will implement applicant-proposed measure AES-1 to ensure that visual impacts resulting from construction of the gas pipelines would be temporary and less than significant.

Compressor Station

Construction activities related to the compressor station would require the highest degree of disturbance because of the size (10-acre construction site) and openness of the site. However, viewer groups in the project area and vicinity are accustomed to seeing agricultural activities and heavy equipment used in these practices, and their sensitivity to the presence of heavy machinery and its effects would be moderate. Because construction activities would generally take place Monday through Saturday between the hours of 7 a.m. and 7 p.m., the use of high-intensity lights for construction in the dark would not be required. In addition, construction activities would take place over a relatively short period (approximately 12 months) and would only create temporary changes in the visual character within the project area.

Metering Station

Construction of the metering station would occur in a developed area that currently supports an existing compressor station, meter station, and power lines. Construction impacts would be less than significant given the developed character of the area.

ICF Jones & Stokes
an ICF International Company

Figure 3.1-1
Looking North on McAusland Road from 0.05 Mile South of Southam Road: Existing View and Simulated View with Compressor Station

Existing View (5-11-09)

Simulated View

Graphics .... 01099.07 (7-14-09) tm

ICF Jones & Stokes
an ICF International Company

Figure 3.1-2
Looking West on Southam Road from 0.25 Mile East of McAusland Road: Existing View and Simulated View with Compressor Station

Graphics ... 01099.07 (7-14-09) tm

ICF Jones & Stokes
an ICF International Company

Figure 3.1-3
Looking Southwest from Paradise Road at Highway 45:
Existing View and Simulated View with Compressor Station and Remote Well Pad

Wells

Construction activities associated with conversion of the existing wells to observation, installation of nine new injection/withdrawal wells, and installation of up to two new saltwater wells would involve disturbance to relatively small areas (observation well sites would be 0.3 acre and the injection/withdrawal wells and saltwater wells would be constructed on the 4 acre remote well pad site). Impacts resulting from well construction and conversion activities are considered less than significant because viewer groups in the area, having become accustomed to seeing agricultural activities and heavy equipment used in such activities, as well as having witnessed past gas well drilling and servicing activity, would have only moderate sensitivity to well drilling and work-over equipment. In addition, well conversion and construction activities would take place over a relatively short period and would create only temporary changes in the visual character of the project area.

Central Valley will implement applicant-proposed measure AES-1 as part of the proposed project. Consequently, these potential impacts are considered less than significant, and no additional mitigation is necessary.

Impact 3.1-2: Potential to damage scenic resources along a county-designated scenic roadway

While SR 45 is a County proposed designated scenic roadway, there are no roadways in or near the project area that are officially designated in state or local plans as a scenic highway or route worthy of protection for maintaining and enhancing scenic viewsheds. Therefore, implementation of the proposed project will not damage scenic resources, such as trees, rock outcroppings, and historic buildings, along a scenic highway. There will be no impact.

Impact 3.1-3: Potential to degrade the existing visual character of the area

None of the proposed project elements would be visible from the Sacramento River, as views from the river are obscured by its levees and riparian vegetation that generally limit views to the immediate river corridor. The potential for the proposed project to degrade the existing visual character of the site is discussed separately below for each of the major project components.

Gas Pipelines

The gas pipelines run through primarily rice fields and other agricultural areas and would be buried. The area disturbed to accommodate the pipeline would revegetate quickly and appear the same as prior to disturbance. As described below under applicant-proposed measure AES-1, Central Valley will implement measures to ensure that gas pipelines would not degrade the existing visual character of the area.

Compressor Station

The compressor station would be constructed on a 10-acre site that is currently a rice field. The station would include a large structure that would be visible from limited areas along SR 45. Most of the views of the compressor station from SR 45 would be blocked by existing orchards that occur between SR 45 and the compressor station, and views would mostly be present when traveling along SR 45 directly east of the compressor station. Figure 3.1-3 shows the existing and simulated view traveling south from the town of Princeton (approximately 1.25 miles north of the site). While the compressor station can be seen by travelers heading south on SR 45 near Paradise Road, it is not readily distinguishable in the middle ground. The nearby farm structures and orchards help to partially obscure the facility. In addition, the tree line in the background helps to reduce the verticality of the structure against the horizon line.

Traveling north from Stegeman toward the project site, orchards generally screen the compressor station from views. However, the compressor station can be seen from SR 45 over low growing or fallow fields located north of the facility. Rural residences and agricultural operation can see the compressor station over open fields located to the west, north, and south of the site except where orchards and existing vegetation or landscaping block those views.

Figures 3.1-1 and 3.1-2 show the existing and simulated views of the compressor station. The compressor station is a prominent feature, but its scale and massing are similar to the adjacent silos agricultural buildings located south of the compressor station site (along McAusland Road). In addition, the roadways providing physical and direct visual access to the compressor station are gravel roadways traveled by local viewers who are going to and from rural residences and agricultural fields. It does not receive a great deal of, nor steady, traffic.

The compressor station would be a large structure in the area but the potential to degrade the existing agricultural setting would be minimized through the implementation of the following measures described in applicant-proposed measure AES-1:

- The compressor station will be painted with non-glare, earth-tone colors to blend with the surrounding vegetation/landscape.
- Shielded, non-glare lighting will be used at facilities.

Metering Station

The metering station occurs at the western end of the project area and would be constructed adjacent to PG&E's Delevan Compressor Station and Wild Goose Storage Meter Station. The existing visual character of this area is already degraded because of the presence of these facilities. This area is visible from local public roads west of I-5 and is barely visible from I-5. The new facility would be constructed adjacent to the Wild Goose Storage Meter Station and would blend with the existing facilities in the area.

Wells

The wells and their associated apparatuses occur near the 10-acre compressor station site, primarily within open agricultural fields. These wells have minimal above-ground components (wellhead approximately 6-feet-tall) in relation to the compressor station, which would be the main visual focus, and would not degrade the visual character of the area.

Central Valley will implement applicant-proposed measure AES-1 as part of the project to minimize disturbance of the visual character of the site. Consequently, potential impacts related to degradation of the existing visual character of the site are considered less than significant, and no mitigation is necessary.

Impact 3.1-4: Potential to create new sources of substantial light and glare that would adversely affect nighttime views in the project area

The proposed compressor station will have three light poles with low intensity lights (5 foot-candles). These lights will illuminate the facility at all times. The facility will also have high-intensity floodlights (30 foot-candles) for nighttime servicing. These lights, however, will be illuminated only for work areas and when necessary.

The meter station will have low glare lights (5 foot candles) and will be shielded and directed downward and likely will be unnoticeable from distances greater than 0.25 mile. In addition, the lights will be illuminated only when nighttime activities are necessary.

Although the compressor station component of the project would introduce new light sources into the area, these lights are similar to those commonly used for farm or rural residential lighting. Because these facilities would be located in areas with existing rural residential development and most of the lights would only be used intermittently, they would not substantially alter nighttime views.

Central Valley will implement applicant-proposed measure AES-1 that requires the use of non-glare paint and earth-toned colors that would reduce the potential for glare as part of the project to minimize daytime and nighttime glare of the site. Therefore, this impact is considered less than significant, and no additional mitigation is necessary.

Applicant-Proposed Measures

AES-1: Implement measures to minimize visual impacts

The following measures will be implemented as part of the proposed project to minimize visual impacts of the project and to be consistent with Colusa County General Plan policies.

- Construction disturbances will be minimized to help reduce contrast between exposed soils and naturally vegetated areas, and clearing of vegetation and trees at facility sites will be minimized.
- Disturbed agricultural land will be replanted following pipeline construction, if requested by the landowner.
- The compressor station will be painted with non-glare, earth-tone colors to blend with the surrounding vegetation/landscape.
- Shielded, non-glare lighting will be used at facilities.

Section 3.2
Agricultural Resources

This section discusses the agricultural resources in the project area, the relevant and applicable plans and policies in Colusa County, and the compatibility of the proposed project with these resources and plans and policies.

Environmental Setting

As discussed in Chapter 2, approximately 246.5 acres of land will be acquired to construct the proposed project. Most of this acreage consists of agricultural lands, including rice, walnut, and row crops. A small amount of grazing lands occurs at the western end of the project area, east of the Glenn-Colusa Canal.

Regional Setting

Agriculture is the major industry in Colusa County. According to the California Department of Finance (2007), slightly more than 485,000 acres in Colusa County, nearly two-thirds of the county's total land area, were in agricultural production in 2005. This acreage encompasses a total of 821 farms, most of which are large. In 2006, agriculture, forestry, and fishing businesses made up 25% of all industries in the county, compared to only 3% in the state, indicating the relative importance of agriculture in Colusa County (Colusa County Economic Development Corporation 2008).

The land in Colusa County is primarily flat and is used for rice production, orchards, and row crops. Crops such as pistachios, Asian pears, almonds, prunes, walnuts, wine grapes, tomatoes, rice, corn, cotton, safflower, wheat, beans, sunflowers, melons, alfalfa, pumpkins, and onions are commonplace in the fields of the county's small towns. For decades, rice has been the leading crop in the county, with perennial crops, like grapes and walnuts, growing in popularity (Colusa California Online Guide 2008). Fruit and nut orchards and row crops are planted near the Sacramento River and along the western end of the project corridor. The annual grasslands found west of the Glenn-Colusa Canal are used for livestock grazing.

In 2006, the total value of agricultural crops in Colusa County was about $422.7 million, putting Colusa County in 20th place among California counties. The highest value crops in 2006 were rice ($164.6 million), almonds ($111.7 million), processing tomatoes ($42.4 million), walnuts ($12.7 million), and cattle/calves ($12.2 million) (California Farm Bureau Federation 2008a).

Land Uses and Zoning

The specific land uses and zoning of parcels in the project area are described in Section 3.9, Land Use and Planning.

Farmland Classifications

The pipeline alignment, located in northeastern Colusa County, generally crosses prime and unique farmland, as identified under the State's Farmland Mapping and Monitoring Program (FMMP). Prime farmland is present at the western and eastern ends of the alignment, and unique farmland is present in the middle portion (California Department of Conservation 2008a). Areas designated as prime farmland and unique farmland are shown in Figures A-1 and A-2 in Appendix A. These classifications are described further in Farmland Mapping and Monitoring Program below.

The Farmland Mapping and Monitoring Program monitors changes in farmland use on a gross scale within Colusa County. In 1998, there were 201,910 acres of prime farmland identified in the county. In 2006, the amount of prime farmland had been reduced to 200,183 acres. About 188 acres of this change was due to urbanization. The remainder was either land being converted to farmland of local importance or to wetlands and agricultural processing areas. The FMMP converts prime farmland to farmland of local importance when the land is left idle for three or more update cycles. In 1998, the FMMP identified 125,083 acres of unique farmland in Colusa County. In 2006, this had decreased to 123,318 acres. The change is largely attributed to conversion to wetland and agricultural processing areas. About 22 acres of the change is attributed to urbanization (California Department of Conservation 2008a).

Williamson Act Lands

The California Land Conservation Act of 1965 (Williamson Act) enables counties and cities to designate agricultural preserves, generally called Williamson Act lands, and offer preferential taxation to agricultural landowners based on the income-producing value of their property in agricultural use, rather than its assessed market value. Additional background on the Williamson Act is provided in Regulatory Setting below.

Several parcels within or adjacent to the project area are covered by Williamson Act contracts, according to Linda Walker, Assessment Clerk II in the Colusa County Assessor's office. On August 18, 2008, she provided a fax transmittal to Chris Small, ICF Jones & Stokes, regarding properties under Williamson Act contracts. Three of these parcels, including two that form part of the compressor station site, are farmland security zones (FSZs) as designated by the Super Williamson Act. Williamson Act parcels are listed in Table 3.2-1 and shown in Figures A-1 and A-2 in Appendix A.

Table 3.2-1. Williamson Act Parcels Within and Adjacent to the Project Area

Assessor Parcel Number	Landowner[a]	Approximate Acres	Agricultural Production
011-050-010	Nelepovitz	80.00	Rice
011-050-017[b]	Kalfsbeek	580.42	Rice
011-050-023	L&J Farms	89.22	Rice
011-050-024	Azevedo	72.72	Rice
011-060-001	Thurman	247.33	Rice
011-060-007	Thurman	32.00	Rice
011-140-021	Azevedo	70.54	Grazing
011-230-009	Sutton	240.00	Rice
011-230-051	Sutton	98.70	Rice
012-110-017[b]	Sunrise/Southam	40.00	Wheat
012-110-052[b]	Sunrise/Southam	49.84	Row Crop
012-110-050 (102/103)[c]	Weller/Colusa Farms	624.93	Walnut/Row Crop
012-150-029	Vierra/Conner	178.73	Rice
012-160-040	Yerxa	141.84	Rice/Row Crops

[a] As designated on Colusa County Assessor's maps.

[b] Super Williamson Act properties.

[c] Parcel 012-110-50 has been divided into two parcels: -102 and -103.

Regulatory Setting

No federal goals, objectives, or policies relate to the potential effects of the project on agricultural resources.

State Regulations

California Department of Conservation's Farmland Mapping and Monitoring Program

The California Department of Conservation's (DOC's) FMMP produces maps and statistical data used to analyze impacts on California's agricultural resources. The maps are updated every 2 years with the use of aerial photographs, a computer mapping system, public review, and field reconnaissance (California Department of Conservation 2007a).

The FMMP rates agricultural land according to soil quality, irrigation status, and importance. Importance is used as a means to include lands that are not irrigated and have lower quality soils, but that are nonetheless productive. Vineyards can fall into this category. The highest quality land is called prime farmland. Other FMMP categories include farmland of statewide importance, unique farmland, farmland of local importance, and grazing land. Specific definitions of these categories are provided on the FMMP website (California Department of Conservation 2007b).

According to DOC (2008b), the land categories listed below are included in the farmland of local importance category in Colusa County.

- All farmable lands within the county that do not meet the definitions of prime farmland, farmland of statewide importance, or unique farmland, but are currently irrigated pasture or nonirrigated crops.
- Nonirrigated land with soils qualifying for prime farmland or farmland of statewide importance.
- Lands that would have prime or statewide designation and have been improved for irrigation, but are now idle.
- Lands with a general plan land use designation for agricultural purposes.
- Lands that are legislated to be used only for agricultural (farmland) purposes.

Government Code Section 51200 et.seq.—Williamson Act

The Williamson Act (Government Code Section 51200, et seq.) empowers counties and cities to designate agricultural preserves and offer preferential taxation rates to agricultural landowners within those preserves based on the income-producing value of their property in agricultural use, rather than on its assessed market value. In return for a preferential property tax rate, the landowner is required to sign a contract with the county or city agreeing not to develop the land for a minimum period of 10 years. Contracts are automatically renewed annually unless a party to the contract files for nonrenewal or petitions for cancellation.

Lands under Williamson Act contracts must comply with regulations pertaining to parcel size, allowable development, and compatible uses. The term “compatible uses” is defined broadly under the Williamson Act as "any use determined by the county or city administering the preserve pursuant to [Government Code] Section 51231, 51238, or 51238.1 or by this act to be compatible with the agricultural, recreational, or open-space use of land within the preserve and subject to contract.” Colusa County Resolution No. 98-51 establishes the Valley Floor Agricultural Preserve and the list of compatible uses for properties under contract within the Preserve. This list includes “drilling and operating of oil and gas wells” and the “erection, construction, alteration, or maintenance of gas, electric, water, or communication utility facilities.”

A significant change was made to farmland protection in August 1998 with the passage of SB 1182, the “Super Williamson Act.” This act amended the Williamson Act to provide for the establishment of FSZs, enabling landowners to receive an additional 35% tax reduction in the land’s value for property tax purposes. This additional tax reduction can be earned only if farmers and ranchers keep their property in the conservation program for at least 20 years. FSZ contracts are comparable to the Williamson Act contracts in that each year, another year is added to the agreement unless the landowner or county decides not to renew the contract (California Farm Bureau Federation 2008b).

The Williamson Act discourages the use of contracted agricultural land for non-agricultural uses when there is non-contracted land available for that purpose. Government Code Section 51290 provides that:

> (a) It is the policy of the state to avoid, whenever practicable, the location of any federal, state, or local public improvements and any improvements of public utilities, and the acquisition of land therefore, in agricultural preserves.
>
> (b) It is further the policy of the state that whenever it is necessary to locate such an improvement within an agricultural preserve, the improvement shall, whenever practicable, be located upon land other than land under a contract pursuant to this chapter.
>
> (c) It is further the policy of the state that any agency or entity proposing to locate such an improvement shall, in considering the relative costs of parcels of land and the development of improvements, give consideration to the value to the public, as indicated in Article 2 (commencing with Section 51220), of land, and particularly prime agricultural land, within an agricultural preserve.

Government Code Section 51291

Government Code Section 51291 states that "whenever it appears that land within an agricultural preserve may be required by a public agency or person for a public use, the public agency or person shall advise the Director of Conservation and the local governing body responsible for the administration of the preserve of its intention to consider the location of a public improvement within the preserve." A public agency is defined as: "any department or agency of the United States or the state, and any county, city, school district, or other local public district, agency, or entity." "Person" is defined as: "any person authorized to acquire property by eminent domain."

Section 51291.5 provides: "The notice requirements of subdivision (b) of Section 51291 shall not apply to the acquisition of land for the erection, construction, or alteration of gas, electric, piped subterranean water or wastewater, or communication facilities." Based on the language contained in this section, the proposed project may be exempted under 51291.5.

However, even though a project may be a compatible use, it is not exempt from the notice requirement when Section 51291 applies. Government Code Section 51293.1 states that any public agency or person requiring land in an agricultural preserve for a use which has been determined by a city or county to be a "compatible use" pursuant to subdivision (e) of Section 51201 in that agricultural preserve shall not be excused from the provisions of subdivision (b) of Section 51291 if the agricultural preserve was established before the location of the improvement of a public utility was submitted to the city, county, or Public Utilities Commission for agreement or approval and that compatible use shall not come within the provisions of Section 51293 unless the location of the improvement is approved or agreed to pursuant to subdivision (a) of Section 51293 or the compatible use is listed in Section 51293."

Local Regulations

The Colusa County General Plan (Colusa County 1989) sets forth goals, objectives, and policies to preserve agricultural resources in the county. The following goals, objectives, and policies are relevant to the proposed project.

- **Land Use Objective "c":** To conserve and protect agricultural land through a variety of strategies, including taxation, zoning, and general planning.
- **Land Use Objective "d":** To withhold development permits which would cause direct interference with viable agricultural operations.
- **Community Character Objective "c":** To recognize the contribution of agriculture to the heritage and lifestyle of the county, and preserve an understanding of agricultural needs.
- **Resource Conservation Goal:** Encourage a balanced mix of conservation, utilization, and development of Colusa County's natural resources.

- **Resource Conservation Objective "d":** To recognize that agricultural land is the county's greatest natural asset and to take appropriate measures to safeguard Class I and II soils in the future.
- **Land Use Policy LU-4.** Agriculture and resources management should be the primary land uses outside of the designated communities. Freestanding subdivisions isolated from existing communities and lacking urban services should be prohibited.
- **Land Use Policy LU-9.** The proposed development pattern should protect the integrity of agriculture and shall not in any way create a hardship for the county's farmers. Lands presently in agricultural uses that do not adjoin existing communities should be protected through the county's land use regulations. In addition, the CEQA initial study checklist should consider the potential impact of proposed development on existing and adjoining agricultural operations and water supply.
- **Land Use Policy LU-20.** Lands designated for General or Upland Agriculture should continue to be used for agriculture at least for the duration of the planning period (1987–2010). Such period may be extended by future revisions of the plan.
- **Land Use Policy LU-25.** Exploration and extraction of oil, gas, and other mineral resources should be conducted in such a way that conflicts with agricultural uses are minimized and permanent interference with agricultural operations is avoided, and in a way that is consistent with the land use compatibility requirements of the Williamson Act, for those lands that are now under contract.
- **Land Use Policy LU-28.** Preservation of agricultural land under the Williamson Act should be an option available to all those who qualify.
- **Open Space Policy OS-1.** Land designated as Resource Conservation (R-C), Agriculture General (A-G), and Agriculture Upland (A-U) in the Land Use Element should be preserved in open space uses for the duration of the planning period unless development of these areas is consistent with applicable community plans or land use policies.
- **Open Space Policy OS-8.** The Sacramento Valley agricultural lands should be preserved to the maximum extent possible to ensure recharge of the Sacramento River ground water basin and water-bearing soils.

The project is designated as A-G (Agricultural General) in the Colusa County General Plan's Land Use Element. This designation is intended to be used for orchards and crop production. Oil and natural gas facilities are a compatible and acceptable use in A-G designations, as long as they do not interfere with the viability of agriculture or create environmental hazards. Accessory facilities involving oil and natural gas are proposed as part of this project.

The Colusa County Zoning Ordinance allows for pipelines and associated facilities in all zoning districts, contingent on Colusa County Planning Commission review and approval. Colusa County has established agricultural preserves and participates in both the Williamson Act and "Super Williamson Act" preferential taxation programs. As stated above, oil and gas production is a compatible use within the project area under the County's Williamson Act Resolution No 98-51.

Impact Analysis

This impact analysis addresses temporary and permanent conversion of farmland to nonagricultural use. Construction impacts, which would be temporary, constitute changes that would occur during construction of the project facilities. Operation and maintenance impacts involve long-term operation of the project facilities and any changes resulting from construction that cannot be guaranteed to be returned back to the original state. Potential conflicts with designated agricultural land uses relate to land use and zoning defined by Colusa County and the Williamson Act.

Significance Criteria

According to Appendix G of the State CEQA Guidelines, a project would result in a significant impact on agricultural resources if it would result in any of the following outcomes.

- Conversion of prime farmland, unique farmland, or farmland of statewide importance, as shown on the maps prepared in accordance with the FMMP, to nonagricultural use.
- Conflicts with existing zoning for agricultural use or a Williamson Act contract.
- Other changes in the existing environment that, because of their location or nature, could result in conversion of farmland to nonagricultural use.

Impacts

Impact 3.2-1: Direct conversion of prime farmland, farmland of statewide importance, or unique farmland to nonagricultural uses

Construction of the remote well pad would result in the permanent conversion of approximately 4 acres of prime farmland currently used for rice production. Up to an additional 0.1 acre of prime farmland may also be permanently removed during conversion of the wells to observation wells. As shown in Figure A-1 in Appendix A, the 4.1 acres are designated as prime farmland according to the FMMP (California Department of Conservation 2008a). According to the FMMP conversion data for 1998–2006 and 2004–2006, there is very little farmland being converted to nonagricultural or non-agriculture-related uses in

Colusa County. For example, in the period of 2004–2006, a total of 188 acres of prime farmland was urbanized countywide. Viewed against the County's stock of about 200,000 acres of prime farmland, conversion of 188 acres to nonagricultural uses is not a substantial quantity of Colusa County's farmland. A substantial amount of prime farmland would remain in the surrounding area; consequently, the conversion of this prime farmland to nonagricultural uses is considered less than significant.

Approximately 54.2 acres of permanent easements would be required for the proposed gas pipeline system. As shown by the FMMP, the affected parcels are generally either prime or unique farmland. However, the pipeline would be located subsurface and would not result in the permanent loss of agricultural capabilities. Once construction is complete, normal agricultural activities would be able to resume over the easement, because there is generally little need for access to maintain the pipeline. Accordingly, long-term disruptions to agricultural lands resulting from the pipeline are expected to be minimal. Implementation of applicant-proposed measure AGRI-1 would help to ensure that agricultural activities could continue as they did before construction of the project. Overall, this impact from the pipeline is considered less than significant.

Impact 3.2-2: Conflicts with existing zoning for agricultural use on project parcels or in surrounding areas

Of the total 246.5 acres required to construct and operate the proposed project, approximately 149.4 acres of temporary construction easements would be necessary to install the proposed project facilities. Construction of these facilities could result in temporary conflicts and construction-related nuisances at construction sites, including localized construction noise, dust, and traffic that would temporarily inconvenience residents and agricultural operations in the project area. However, disturbances to agricultural activities would be temporary, and would not preclude crop production from resuming on the pipeline easement after construction is completed. Because crop production is a seasonal activity, the temporary disruption in farming on these sites would not constitute a substantial disruption.

As described in Chapter 2, Central Valley intends to work closely with landowners to avoid structures, improvements, and agricultural facilities as much as possible. Any fences, drainage conveyance features, water lines, and dikes that are damaged or removed during construction will be repaired or replaced to original condition. If any agricultural facility is inadvertently damaged during construction, the onsite lead construction inspector will ensure that the facility is immediately reported to the landowner and repaired.

In addition, through implementation of applicant-proposed measures AGRI-1 and AGRI-2, Central Valley has committed to working with landowners to restore the ROW through agricultural areas and compensate them for land acquired or crops and facilities lost as a result of the project. Consequently, this impact is considered less than significant. No additional mitigation is necessary.

Impact 3.2-3: Inconsistency with Colusa County planning goals, objectives, and policies related to agriculture

The proposed project would not conflict with the Colusa County General Plan goals, objectives, and policies referenced in "Regulatory Setting." The Colusa County Land Use Plan designates oil and natural gas facilities as a compatible and acceptable use in A-G zones, as long as such uses do not interfere with the viability of agriculture or create environmental hazards. In particular, the proposed project would comply with General Plan Land Use Policy LU-25, which states that exploration and extraction of oil, gas, and other mineral resources should be conducted in a way that minimizes conflicts with agricultural uses, avoids permanent interference with agricultural operations, and is consistent with the land use compatibility requirements of the Williamson Act (for those lands that are now under contract). Per the County's Williamson Act resolution, oil and gas facilities are compatible uses within the agricultural preserve. In agricultural areas, Central Valley will work with landowners to minimize disruption to agricultural operations during construction and to facilitate the return of preconstruction agricultural operations to the ROW. Accordingly, this impact is considered less than significant. No mitigation is necessary.

Impact 3.2-4: Conflicts with Williamson Act contracts

The 4-acre remote well pad will be located on a Williamson Act parcel (APN 012-110-017) and the pipeline would cross several Williamson Act (as listed in Table 3.2-1 and shown in Figures A-1 and A-2 in Appendix A). Wells and pipeline facilities are considered compatible uses on lands under Williamson Act contracts within this portion of Colusa County, pursuant to County Resolution No. 98-51. Operation of the project facilities is not expected to foster development in the project vicinity or accelerate nonrenewal or termination of existing Williamson Act contracts. Construction of the proposed facilities could result in temporary conflicts with agricultural operations, but none of these conflicts would require termination or nonrenewal of the contracts.

This area of Colusa County consists largely of farmland and Williamson Act contracted land is common throughout. The pipeline could not cross this area without temporarily affecting farmland during construction and, because Williamson Act contracts are so common here, there is no practical alternative route that would avoid crossing Williamson Act land. Wells and other facilities located on contracted land are sited in the most practical locations given the requirements of drilling and of facility placement. Where possible, contracted land has been avoided in the siting of these facilities.

Overall, this impact is considered less than significant. No mitigation is necessary.

Applicant-Proposed Measures

AGRI-1: Compensate landowners for land acquired for easements and structures, crops, and improvements removed for project construction

As a public utility, Central Valley is required to offer appropriate compensation for land held in private ownership as part of the acquisition of utility easements. Central Valley will compensate landowners for any permanent crop losses at aboveground facility sites and temporary crop losses in the year of construction and, if applicable, will compensate for the permanent removal of any structures and agriculture-related improvements that is necessary to construct the project.

AGRI-2: Restore agricultural fields to preconstruction condition

Following construction, agricultural fields will be surveyed and regraded to their original elevation where needed, and all rice field dikes and check boxes will be repaired or replaced. Although the trench backfill in agricultural areas will be compacted to minimize settling, follow-up elevation surveys and finish grading will be provided, if necessary, to ensure that the field grading and irrigation flows are not adversely affected. Fences and irrigation facilities will be replaced or repaired to their original condition following construction.

Section 3.3
Air Quality

This section describes the environmental and regulatory setting for air quality and evaluates the proposed project's construction and operational impacts on air quality. As directed by the CPUC and recommended by the California Office of Planning and Research's (OPR's) Technical Advisory on CEQA and Climate Change (California Office of Planning and Research 2008), this section also includes an evaluation of the proposed project's construction-related greenhouse gas (GHG) emissions.

ICF Jones & Stokes also reviewed the CPUC's *Interim Guidance for Addressing GHG in CPUC PEAs* (2008). This guidance memo includes 18 "suggested" applicant-proposed measures to address GHG emissions. Measures 1–6 focus on mitigating construction emissions, and Measures 7–12 focus on mitigating operational emissions. The air quality analysis presented in this section includes measures that are in compliance with the six construction mitigation measures (Measures 1 through 6). Except for Measure 9 (which requires a complete GHG emissions audit and is included in this section), the operational mitigation measures are not applicable to the proposed project.

Environmental Setting

Climate and Topography

The proposed project would be built and operated in Colusa County, located in the north central portion of the Sacramento Valley—a broad, flat valley bounded by the Coast Ranges to the west and the Sierra Nevada to the east. The proposed project is within the Northern Sacramento Valley Air Basin (NSVAB). The NSVAB consists of Shasta, Tehama, Glenn, Butte, Colusa, Yuba, and Sutter Counties. This air basin is predominantly rural, with few major urban areas.

The climate of the project area is characterized by hot, dry summers and cool, wet winters. During the summer months from mid-April to mid-October, significant precipitation is unlikely and temperatures range from daily maxima approaching 100°F to evening lows in the 50s and low 60s. Winter conditions are characterized by occasional rainstorms interspersed with stagnant and sometimes foggy weather. Winter daytime temperatures average in the low 50s, and nighttime temperatures average in the upper 30s.

Wind direction is primarily up- and down-valley due to the channeling effect of the mountains on either side of the valley. During summer, surface air movement is from the south, particularly during the afternoon hours. During winter, wind direction is more variable.

Prevailing wind patterns control the dispersion rate of local emissions. Colusa County experiences two types of inversion layers that affect air quality. The first type contributes to photochemical smog problems by confining pollution to a shallow layer near the ground. This occurs in summer, when sinking air forms a "lid" over the region. The second type of inversion occurs when the air near the ground cools while the air aloft remains warm. These inversions occur during winter nights and can cause localized air pollution "hot spots" near emission sources because of poor dispersion.

Air Pollutants and Ambient Air Quality Standards

Table 3.3-1 shows California and national ambient air quality standards (CAAQS and NAAQS, respectively). Although Colusa County is in attainment for all federal ambient air quality standards, it is a nonattainment area for the state ozone and inhalable particulate matter standards (Table 3.3-2). Colusa County is in attainment for all other state ambient air quality standards.

There are no air quality monitoring stations in the project area. The closest air quality monitoring station is in the city of Colusa. Table 3.3-3 summarizes the three most recent years of monitoring data for the Colusa monitoring station.

Ozone

Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and can cause substantial damage to vegetation and other materials. Ozone is a severe eye, nose, and throat irritant. Ozone also attacks synthetic rubber, textiles, plants, and other materials; it causes extensive damage to plants, such as leaf discoloration and cell damage.

State standards for ozone have been set for a 1-hour averaging time. The state 1-hour ozone standard is 0.09 parts per million (ppm), not to be exceeded. The U.S. Environmental Protection Agency (EPA) recently replaced the 1-hour federal ozone standard with an 8-hour standard of 0.08 ppm, while the California Air Resources Board (CARB) recently enacted a state 8-hour standard of 0.07 ppm.

Ozone is not emitted directly into the air but is formed by a photochemical reaction in the atmosphere. Ozone precursors, including reactive organic gases (ROGs) and nitrogen oxides (NO_x), react in the atmosphere in the presence of sunlight to form ozone. Because photochemical reaction rates depend on the intensity of ultraviolet light and air temperature, ozone is primarily a summer air pollution problem. The ozone precursors ROG and NO_x are emitted by mobile sources and stationary combustion equipment.

The monitoring results in Table 3.3-3 show no violations of the state 1-hour ozone standards during the 3 most recent years. However, the results show that the federal 8-hour ozone standard was violated twice during the 3-year monitoring period while the California 8-hour ozone standard was violated 8 times during this 3 year period.

Table 3.3-1. Ambient Air Quality Standards Applicable in California

Pollutant	Averaging Time	CAAQS[a]	NAAQS[b]
Ozone (O_3)	1 hour	0.09 ppm	NA
	8 hour	0.070 ppm	0.075 ppm
Carbon monoxide (CO)	1 hour	20 ppm	35 ppm
	8 hour	9.0 ppm	9 ppm
Nitrogen dioxide (NO_2)	1 hour	0.18 ppm	NA
	Annual	0.030 ppm	0.053 ppm
Sulfur dioxide (SO_2)	1 hour	0.25 ppm	NA
	3 hour	NA	0.5 ppm
	24 hour	0.04 ppm	0.14 ppm
	Annual	NA	0.03 ppm
Inhalable particulate matter (PM10)	24 hour	50 $\mu g/m^3$	150 $\mu g/m^3$
	Annual	20 $\mu g/m^3$	NA
Fine particulate matter (PM2.5)	24 hour	NA	35 $\mu g/m^3$
	Annual	12 $\mu g/m^3$	15 $\mu g/m^3$
Sulfates	24 hour	25 $\mu g/m^3$	NA
Lead (Pb)	30 day	1.5 $\mu g/m^3$	NA
	Calendar quarter	NA	1.5 $\mu g/m^3$
Hydrogen sulfide	1 hour	0.03 ppm	NA
Vinyl chloride	24 hour	0.010 ppm	NA

ppm = parts per million by volume.
µg/m3 = micrograms per cubic meter.
NA = not applicable.
[a] The California ambient air quality standards (CAAQS) for O_3, CO, SO_2 (1-hour and 24-hour), NO_2, PM10, and PM2.5 are values not to be exceeded. All other California standards shown are values not to be equaled or exceeded.
[b] The national ambient air quality standards (NAAQS), other than O_3 and those based on annual averages, are not to be exceeded more than once a year. The O_3 standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.
Source: California Air Resources Board 2008a.

Table 3.3-2. State and National Air Attainment Status Summary

Pollutant	Attainment Status – Colusa County
O_3	Attainment for National Ambient Air Quality Standards (NAAQS) 8-hour Nonattainment for California Ambient Air Quality Standards (CAAQS) 1-hour and 8-hour
CO	Attainment for state and federal standards
NO_2	Attainment
SO_2	Attainment
Suspended particulate matter	Attainment for NAAQS Nonattainment for CAAQS
Particulate matter	Attainment for NAAQS Attainment for CAAQS
Sulfates	Unclassified
Pb	Attainment
Hydrogen sulfide	Unclassified
Source: California Air Resources Board 2008b.	

Carbon Monoxide

Carbon monoxide (CO) is essentially inert to plants and materials but can significantly affect human health. CO is a public health concern because it combines readily with hemoglobin and thus reduces the amount of oxygen transported in the bloodstream. Effects on humans range from slight headaches and nausea to death.

State and federal CO standards have been set for both 1-hour and 8-hour averaging times. The state 1-hour standard is 20 ppm, and the federal 1-hour standard is 35 ppm. Both state and federal standards for the 8-hour averaging period are 9 ppm.

Motor vehicles are the dominant source of CO emissions in most areas. High CO levels develop primarily during winter, when light winds combine with the formation of ground-level temperature inversions (typically from evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures.

Table 3.3-3. Air Quality Monitoring Data at the Colusa-Sunrise Boulevard Monitoring Station (2006–2008)

	Monitoring Data by Year		
Pollutant	2006	2007	2008
O_3			
Highest 1-hour average, ppm	0.084	0.080	0.091
Highest 8-hour average, ppm	**0.076**	0.067	**0.081**
Days > state 1-hour standard	0	0	0
Days > federal 8-hour standard	1	0	1
Days > state 8-hour standards	2	0	6
Percent of year covered	98	96	97
PM10			
Highest 24-hour average, µg/m^3	**68.0**	43.0	**90.3**
Days > state standard	4	0	10
Days > federal standard	0	0	0
Percent of year covered	75	86	93
PM2.5			
Highest 24-hour average, µg/m^3	50.0	30.0	54.5
Days > federal standard [b]	1	0	1
Percent of year covered	100	87	52

ppm = parts per million by volume.

µg/m3 = micrograms per cubic meter.

Note: **Bolded** values represent those in excess of the applicable California ambient air quality standards. Underlined values represent those in excess of the applicable federal ambient air quality standards.

Source: California Air Resources Board 2009.

Nitrogen Oxides

NO_x contributes to smog and can injure plants and animals and affect human health. NO_x also contributes to acidic deposition and reacts with ROG in the presence of sunlight to form photochemical smog. NO_x concentrations result in a brownish color because they absorb into the blue-green area of the visible spectrum, greatly affecting visibility.

The state NO_x standard is 0.25 ppm on a 1-hour average. The federal NO_x standard is 0.053 ppm on an annual average.

NO_x is emitted primarily by combustion sources, including both mobile and stationary sources. NO_x is also emitted by a variety of area sources, ranging from wildfires and prescribed fires to water-heating and space-heating systems powered by fossil fuels.

Particulate Matter

Health concerns associated with suspended particulate matter focus on those particles small enough to reach the lungs when inhaled. Particulate matter can damage human health and retard plant growth, as well as reduce visibility, soil buildings and other structures, and corrode materials. PM10 is particulate matter 10 microns or less in diameter; PM2.5 is particulate matter 2.5 microns or less in diameter.

The state PM10 standards are 50 micrograms per cubic meter ($\mu g/m^3$) as a 24-hour average and 30 $\mu g/m^3$ as an annual geometric mean. The federal PM10 standards are 150 $\mu g/m^3$ as a 24-hour average. The federal annual PM10 standard of 50 $\mu g/m^3$ was recently dropped.

The federal PM2.5 standards are 35 $\mu g/m^3$ as a 24-hour average and 15 $\mu g/m^3$ as an annual average. The state PM2.5 standard is 12 $\mu g/m^3$ as an annual average.

PM10 and PM2.5 emissions are generated by a wide variety of sources, including agricultural activities, industrial emissions, dust suspended by vehicle traffic, and secondary aerosols formed by reactions in the atmosphere.

Table 3.3-3 shows 14 violations of the California PM10 standards during the past 3 years of monitoring. No violations of the federal PM10 standards were recorded. There were 2 monitored violations of the federal PM2.5 standards during the past 3 years.

Sulfur Dioxide

The major health concerns associated with exposure to high concentrations of sulfur dioxide (SO_2) include effects on breathing, respiratory illness, alterations in pulmonary defenses, and aggravation of existing cardiovascular disease. Children; the elderly; and people with asthma, cardiovascular disease, or chronic lung diseases—such as bronchitis or emphysema—are most susceptible to adverse health effects associated with exposure to SO_2. SO_2 is a precursor to sulfates, which are associated with acidification of lakes and streams, accelerated corrosion of buildings and monuments, reduced visibility, and other adverse health effects.

EPA’s health-based NAAQS for SO_2 is 0.03 ppm measured as an annual arithmetic mean concentration, 0.14 ppm measured over a 24-hour period, and 0.5 ppm measured over a 3-hour average period. California’s SO_2 standard is 0.04 ppm measured over a 24-hour average period. There are no SO_2 monitoring stations in the project area.

SO_2 belongs to the family of gases called sulfur oxides (SO_x). These gases are formed when fuel containing sulfur (mainly coal and oil) is burned and during metal smelting and other industrial processes.

Regulatory Setting

The project area is within the boundaries of the Colusa County Air Pollution Control District (CCAPCD). CCAPCD administers air quality regulations developed at the federal, state, and local levels. The federal, state, and local air quality regulations applicable to the proposed project are described below.

Federal Regulations

Federal air quality laws regulate air pollutants, typically through industry-specific standards and planning requirements. The primary legislation that governs federal air quality regulations is the Clean Air Act Amendments of 1990. Industrial pollution sources are required to obtain air quality permits and to adhere to performance standards. In this way, federal air quality laws regulate criteria, toxic, and nuisance air emissions from industrial sources. Criteria pollutants are substances for which EPA has established a NAAQS. Criteria pollutants are CO, nitrogen dioxide (NO_2), SO_2, O_3, PM2.5 and PM10, and lead (Pb). Non-criteria air pollutants, also known as toxic air contaminants (TACs), are airborne substances capable of causing adverse health effects as a result of short-term (acute) or long-term (chronic) exposure. Nuisance pollutants are substances that can result in complaints from the population about adverse impacts on quality of life. The nuisance pollutants regulated by the air districts are odors and visible plumes (smoke). Generally, federal permitting requirements for industrial sources are enforced locally by the air districts.

The federal Clean Air Act Amendments of 1990 provide for air toxics to be regulated at the federal level. Before the Clean Air Act Amendments of 1990 were enacted, air toxics were controlled at the federal level using the source-specific New Source Performance Standards.

State Regulations

Criteria Pollutants

CARB, which is part of the California Environmental Protection Agency (CalEPA), develops air quality regulations at the state level. The state regulations mirror federal regulations by establishing industry-specific pollution controls for criteria, toxic, and nuisance pollutants. California also requires areas to develop plans and strategies for attaining state ambient air quality standards as set forth in the California Clean Air Act of 1988. As described above, California has developed ambient standards for the criteria pollutants equal to or more stringent than the federal standards. Local districts must prepare air quality plans demonstrating the means by which the CAAQS will be attained and maintained.

The federal Clean Air Act requires that state implementation plans (SIPs) be prepared for all areas that are in nonattainment for one or more NAAQS. CARB reviews and coordinates preparation of the SIP. Local air districts must adopt new rules (and/or revise existing rules) and demonstrate that emission reductions, in conjunction with reductions in mobile source emissions, will result in attainment of the NAAQS. However, CARB does not need to prepare a SIP for Colusa County because the county is currently in attainment for all of the NAAQS.

Air Toxics

State requirements specifically address air toxics issues through Assembly Bill (AB) 1807 (known as the Tanner Bill), which established the state air toxics program, and AB 2588 (Connelly), the Air Toxics Hot Spots Information and Assessment Act (Hot Spots Act). The air quality regulations developed from these bills have been modified recently to incorporate the federal regulations associated with the federal Clean Air Act Amendments of 1990.

The Hot Spots Act was enacted in September 1987. Under this bill, stationary sources of emissions are required to report the types and quantities of certain substances that their facilities routinely release into the air. Emissions of interest are those that result from the routine operation of a facility and those that are predictable, including but not limited to, continuous and intermittent releases and process upsets or leaks.

The goals of the Hot Spots Act are to collect emissions data, identify facilities with localized impacts, ascertain health risks, and notify nearby residents of significant risks. In September 1992, the Hot Spots Act was amended by Senate Bill (SB) 1731 (Calderon) to address the reduction of significant risks. The bill requires that owners of significant-risk facilities reduce their risks below the level of significance. Owners of facilities found to pose significant risks by an air district must prepare and implement risk reduction audits and plans within 6 months of the determination.

The Hot Spots Act requires CARB to compile and maintain a list of substances posing chronic or acute health threats when present in the air. The Hot Spots Act currently identifies by reference more than 600 substances that are required to be subject to the program. CARB may remove substances from the list if criteria outlined in the law are met. A facility is subject to the act if it:

1. manufactures, formulates, uses, or releases a substance subject to the act (or a substance that reacts to form such a substance) and emits 10 tons or more per year of total organic gases, particulate matter, nitrogen oxides, or sulfur oxides;
2. is listed in any air district's existing toxics use or toxics air emission survey, inventory, or report released or compiled by an air district; or
3. manufactures, formulates, uses, or releases a substance subject to the act (or a substance that reacts to form such a substance); emits less than 10 tons per year (tpy) of criteria pollutants; and is subject to emission inventory requirements.

The Hot Spots Act specifies that each local air district must prioritize the facilities under its jurisdiction. Those designated by an air district as “high priority” are required to submit a health risk assessment within 150 days. In addition, an air district may require any facility to prepare and submit a risk assessment according to district priorities established for purposes of the Hot Spots Act.

Greenhouse Gas Emissions and Global Climate Change

Executive Order S-3-05

On June 1, 2005, Governor Schwarzenegger issued Executive Order S-3-05. It included the following GHG emission reduction targets: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; by 2050, reduce GHG emissions to 80% below 1990 levels. To meet the targets, the Governor directed several state agencies to cooperate in the development of a Climate Action Plan. The Secretary of CalEPA leads a Climate Action Team (CAT) whose goal is to implement global warming emission reduction programs identified in the Climate Action Plan and to report on the progress made toward meeting the emission reduction targets established in the Executive Order.

The first report to the governor and the legislature was released in March 2006; subsequent reports will be issued biannually. The CAT report to the governor contains recommendations and strategies to help ensure that the targets in Executive Order S-3-05 are met (California Environmental Protection Agency 2006).

California Global Warming Solutions Act of 2006 (Assembly Bill 32)

In 2006, the California State Legislature adopted the California Global Warming Solutions Act of 2006 (AB 32). AB 32 establishes a cap on statewide GHG emissions and sets forth the regulatory framework to achieve the corresponding reduction in statewide emission levels. Under AB 32, GHGs are defined as carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

AB 32 requires that CARB undertake the actions listed below.

- Adopt early action measures to reduce GHGs.
- Establish a statewide GHG emissions cap for 2020 based on 1990 emissions.
- Adopt mandatory report rules for significant GHG sources.
- Adopt a scoping plan indicating how emission reductions will be achieved through regulations, market mechanisms, and other actions.

- Adopt regulations needed to achieve the maximum technologically feasible and cost-effective reductions in GHGs.

Early Action Measures

ARB has adopted several early action measures to reduce GHG. They include things such as improvements to landfill methane capture, a vehicle tire pressure program, improvements to heavy duty truck efficiency, and a low carbon fuels standard (LCFS). On April 23, 2009, the California Air Resources Board adopted a LCFS. This standard requires that all fuels sold in California must have a reduced carbon content that will lower emissions by 10% by 2020.

California's Scoping Plan and GHG Emissions Cap

In its recently adopted Climate Change Scoping Plan, ARB lays out the GHG reductions that need to be achieved, and the types of measures that will be used to reach them. The Plan shows that California's 1990 GHG emissions equaled 427 million metric tons CO_2e, and 2020 GHG emissions would equal 596 million metric tons CO_2e under business as usual conditions. Consequently, compared to 1990, 2020 emissions would need to be reduced by 169 million metric tons CO_2e or 28.4 percent. (California Air Resources Board 2008b).

Senate Bill 97

SB 97, signed in August 2007, acknowledges that climate change is an important environmental issue that requires analysis under CEQA. The bill directs OPR to prepare, develop, and transmit to the Resources Agency guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions, by July 1, 2009. The Resources Agency is required to certify or adopt those guidelines by January 1, 2010.

Actions Taken by California Office of Planning and Research

In June 2008, OPR issued a Technical Advisory on CEQA and Climate Change (California Office of Planning and Research 2008). For projects subject to CEQA, this document recommends that emissions be calculated and mitigation measures be identified to reduce those emissions. The OPR report does not identify emission thresholds for GHGs, but instead recommends that each lead agency develop its own thresholds.

Actions Taken by California Attorney General's Office

The California Attorney General (AG) has filed comment letters under CEQA about a number of proposed projects. The AG also has filed several complaints and obtained settlement agreements for CEQA documents covering general plans and individual programs that the AG contends either failed to analyze GHG emissions or failed to provide adequate GHG mitigation. The AG's office prepared a report listing the measures that local agencies should consider under CEQA to offset or reduce global warming impacts. The AG's office has also prepared a chart of modeling tools to estimate impacts of GHG emissions associated with projects and plans. Information on the AG's actions and related information on quantifying emissions and adopting mitigation measures can be found on the California Department of Justice Office of Attorney General web site (California Department of Justice 2008).

California Air Pollution Control Officers Association Guidance

The California Air Pollution Control Officers Association (CAPCOA) released a report in January 2008 that describes methods to estimate and mitigate GHG emissions from projects subject to CEQA. The CAPCOA report evaluates several GHG thresholds that could be used to evaluate the significance of a project's GHG emissions. The CAPCOA report, however, does not recommend any one threshold. The report is designed as a resource for public agencies as they establish agency procedures for reviewing GHG emissions from projects subject to CEQA (California Air Pollution Control Officers Association 2008).

Local Regulations

At the local level, air quality is managed through land use and development planning practices. These practices are established in Colusa County through its general planning processes. The CCAPCD is responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and state air quality laws.

The project is subject to CCAPCD's Regulation 2, "Prohibitions," especially those that limit opacity and nuisance conditions. Also, the project would be subject to Regulation 3, "Permits." One or more permits will be needed for the project. An Air Quality permit will be required to operate the temporary compressor, according to T.J. Gomez of the Colusa County Air Pollution Control District, in an October 23, 2008 phone conversation regarding permit applicability for the proposed temporary compressor. In addition, Central Valley will be required to obtain an Authority to Construct permit from the CCAPCD prior to construction. Central Valley would also need to obtain one or more permits to operate. These permits will require that Central Valley install best available control technology (BACT) as specified in CCAPCD's Regulation 3.

CCAPCD Rule 2-10 consists of a nuisance provision that provides "a person shall not discharge from any source whatsoever such quantities of air contaminants or other materials which cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such person or the public or which cause or have a natural tendency to cause injury or damage to business or property."

Impact Analysis

Significance Criteria

Project-related impacts are considered temporary (construction) and permanent (operation). Criteria for determining the significance of air quality impacts were based on the State CEQA Guidelines. According to Appendix G, a project may cause a significant effect on the environment if it would result in any of the outcomes listed below.

- Violate any air quality standard or contribute substantially to an existing or projected air quality violation, including normal operational and accidental releases.
- Expose sensitive receptors to substantial pollutant concentrations.
- Result in substantial air emissions or deterioration of air quality.
- Create objectionable odors affecting a substantial number of people.
- Result in a cumulatively considerable net increase in any criteria pollutant for which the project region is a nonattainment area with regard to an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors).

Criteria Pollutant Emission Thresholds

The CCAPCD recommends using CEQA thresholds of 137 pounds per day for the non-attainment area pollutants ROG, NO_x, and PM10 (Les Fife, Fife Environmental, e-mail on June 20, 2009).

In addition to these daily thresholds, the CCAPCD's Rule 3.6 (*Standards for Authority to Construction* [New Source Review]) requires emission offsets for nonattainme*nt area pollutants with emissions excee*ding 25 tpy after installation of BACT. Consequently, ROG, NO_x, or PM10 emissions exceeding 25 tpy are also considered a significant impact.

Toxic Air Contaminant Significance Thresholds

TACs include substances that cause acute (short-term) and chronic (long-term) non-cancerous health effects and substances that cause cancer. Three separate significance thresholds are used in this document to evaluate the project's TAC impacts.

For chronic TACs, a hazard index (HI) is determined by dividing the annual exposure level by the reference exposure level (REL). The REL is the dose at or below which no adverse health effects are anticipated. If the HI is less than 1, the chronic health impact is considered less than significant.

For acute substances, an HI is determined by dividing the 1-hour exposure level by the substance's REL. If the resulting HI is less than 1, the acute health impact is considered less than significant.

For TACs that are carcinogenic, the project is considered to result in a significant impact if the project would increase the cancer risk by more than 10 in one million (California Environmental Protection Agency 2003).

Greenhouse Gas Significance Thresholds

Significance thresholds for GHG emissions have not been established by Colusa County; CCAPCD; or any other county, city, or state agency. (Les Fife, Fife Environmental, e-mail on June 22, 2009). This analysis uses a GHG reduction goal of 30% from business-as-usual conditions to determine significance. This is based on ARB's GHG emission reduction goal listed in its GHG Climate Change Scoping Plan, which says that under business as usual conditions, 2020 statewide GHG emissions will need to be reduced by 28.4 percent to reach 1990 GHG emission levels. To be conservative, this analysis uses a 30 percent goal as the significance threshold.

Methods

Construction and future operations of the proposed project could result in temporary and permanent impacts on air quality. In assessing the magnitude of possible effects on air quality, the following assumptions were made.

- During construction, Central Valley will implement best management practices (BMPs) that are consistent with CCAPCD guidelines for reducing construction impacts to a less-than-significant level.
- Central Valley will install BACT to reduce emissions from the three natural gas compressor units.

Construction emissions were estimated using a combination of the URBEMIS2007 model (for off-road emissions), the EMFAC2007 model (for on-road emissions), and vendor guarantees and EPA emission factors for the temporary compressor engine. The modeling results, along with the estimates of the type of equipment that would be used for each phase, are summarized in Appendix D.

Operational emissions assume implementation of BACT. BACT is required by CCAPCD Rule 3.6 for stationary source projects with emissions exceeding 25 ppd of ROG or NO_x, 80 ppd of PM10, or 500 ppd of CO.

Estimated TAC emissions from the natural gas fueled reciprocating compressors and the glycol reboilers have the potential to cause health impacts, based on CalEPA guidance for TACs (California Environmental Protection Agency 2003). Consequently, a screening-level health risk assessment was conducted to assess the project's health risk potential. A spreadsheet is included in Appendix D, showing the calculations used to evaluate project health risks.

The screening-level health risk assessment conducted for this analysis is based on the methodology recommended in the CalEPA Office of Environmental Health Hazard Assessment (2003). The SCREEN3 model, an extremely conservative air dispersion model, was used for this analysis. SCREEN3 assumes worst-case meteorological conditions and is used to calculate the worst-case 1-hour concentrations. The maximum 1-hour concentrations produced by SCREEN3 were converted to annual concentrations by multiplying by 0.10 (Bay Area Air Quality Management District 2007).

Impacts

Table 3.3-4 shows unmitigated construction emissions. Unmitigated average daily emissions of all pollutants except NO_x and PM10 would be less than the significance threshold of 137 ppd. Unmitigated NO_x and PM10 emissions would exceed this threshold.

Impact 3.3-1: Construction-related emissions exceed NO_x and PM10 thresholds

As shown in Table 3.3-4, construction-related NO_x emissions of 169 ppd in 2010 and 384 ppd in 2011 would exceed the significance threshold of 137 ppd. Construction-related NOx emissions of 29 tons per year in 2011 would exceed the 25 tpy threshold. Construction would generate PM10 emissions of 227 ppd in 2010, which exceeds the 137 ppd threshold. This impact is considered potentially significant. The primary cause of the high daily NO_x emissions is the overlap of site grading activities with well drilling in 2010 and pipeline construction in 2011. The primary cause of PM10 emissions are grading activities. Central Valley will implement applicant-proposed measures AIR-1 and AIR-2 as part of the proposed project. AIR-1 measures are consistent with the PM10-related construction mitigation measures included in the Butte County Air Quality Management District's Indirect Source Review Guidelines (2008). AIR-2 measures are similar to the NO_x-related construction mitigation measures included for the PG&E Colusa Generating Station (California Energy Commission 2007). As part of AIR-2, Central Valley chose to adopt the idling limits set forth in the newly published CPUC guidelines (California Public Utilities Commission 2008). Similar to the proposed project, the PG&E Colusa Generating Station includes both linear pipeline and stationary source construction components (California Energy Commission 2007), although the Colusa Generating Station's emissions will occur in a much more concentrated area as compared to the proposed project.

Implementation of applicant-proposed measures AIR-1 and AIR-2 would substantially reduce PM10 and NO_x emissions, respectively. With implementation of AIR-1, PM10 emissions related to construction would be less than significant, and no additional mitigation is necessary (see Table 3.3-5). However, even with the implementation of AIR-2 (use of Tier 2 diesel powered construction equipment), NO_x emissions (ppd) would still exceed the daily significance thresholds in 2011. Central Valley proposes to implement AIR-3, which consists of purchasing NO_x emission offset credits. AIR-3 would reduce NO_x emissions to a less-than-significant level.

Table 3.3-4. Unmitigated Construction-Related Criteria Pollutant Emissions, including Rental Compression

Emissions	ROG	NO_x	CO	PM10	PM2.5
Construction Emissions (pounds per day)					
2010					
Maximum pounds per day (unmitigated)	26.1	168.9	115.4	227.2	51.8
Significance threshold	137	137	NA	137	NA
Exceed threshold?	No	Yes	NA	Yes	NA
2011					
Maximum pounds per day (unmitigated)	72.8	384.0	296.3	38.1	20.5
Significance threshold	137	137	NA	137	NA
Exceed threshold?	No	Yes	NA	No	NA
Construction Emissions (tons per year)					
2010					
Tons per year (unmitigated)	1.5	6.0	6.5	2.4	0.7
Significance threshold	25	25	NA	25	NA
Exceed threshold?	No	No	NA	No	NA
2011					
Tons per year (unmitigated)	5.3	29.2	22.3	1.5	1.3
Significance threshold	25	25	NA	25	NA
Exceed threshold?	No	Yes	NA	No	NA

Notes: Detailed emission estimates are found in Appendix D. Pounds-per-day and tons-per-year construction estimates for off-road equipment are based on URBEMIS2007, Version 9.2.4. Emission estimates for on-road equipment were estimated using EMFAC2007 and estimates of average vehicle miles traveled per day. Daily emissions for rental compression unit based on 1485 hp generator set operating at 24 hours per day, and are based on vendor estimates for ROG, NO_x, and CO (DCL International 2008). Rental compression emission estimates for PM10, PM2.5, and CO_2 are based on AP-42 emission factors (U.S. EPA).

NA = not applicable.

Table 3.3-5. Mitigated Construction-Related Criteria Pollutant Emissions, including Rental Compression

Emissions	ROG	NO_x	CO	PM10	PM2.5
Construction Emissions (pounds per day)					
2010					
Maximum pounds per day (mitigated)	26.1	122.3	115.4	29.4	10.4
Significance threshold	137	137	NA	137	NA
Exceed threshold?	No	No	NA	Yes	NA
2011					
Maximum pounds per day (mitigated)	72.8	316.3	296.3	16.7	13.5
Significance threshold	137	137	NA	137	NA
Exceed threshold?	No	Yes	NA	No	NA
Construction Emissions (tons per year)					
2010					
Maximum pounds per day (mitigated)	1.5	4.5	6.5	0.5	0.3
Significance threshold	137	137	NA	137	NA
Exceed threshold?	No	No	NA	Yes	NA
2011					
Maximum pounds per day (mitigated)	5.3	23.8	22.3	1.2	1.1
Significance threshold	25	25	NA	25	NA
Exceed threshold?	No	No	NA	No	NA

Notes: Detailed emission estimates are found in Appendix D. Pounds-per-day and tons-per-year construction estimates for off-road equipment are based on URBEMIS2007, Version 9.2.4. Emission estimates for on-road equipment were estimated using EMFAC2007 and estimates of average vehicle miles traveled per day. Daily emissions for rental compression unit based on 1485 hp generator set operating at 24 hours per day, and are based on vendor estimates for ROG, NO_x, and CO (DCL International 2008). Rental compression emission estimates for PM10, PM2.5, and CO_2 are based on AP-42 emission factors (U.S. EPA).

NA = not applicable.

Impact 3.3-2: Potential exceedance of operational emission thresholds for NO_x, ROG, and PM10

Controlled operational emissions of NO_x, ROG, and PM10 are summarized in Table 3.3-6 and include emissions from the compressor engines, dehydration reboilers, blow down vents, still vents (with emissions controlled using a thermal oxidizer), and a standby generator. Those emissions reflect probable BACT emission limits for the project, which would limit emissions from the compressors to 0.09 gram ROG, 0.30 gram CO, and 0.056 gram NO_x per brake-horsepower hour (hp-hr). Emissions for the remaining pollutants—SO_x PM10, PM2.5, CO_2, and CH_4—were based on emission factors developed by EPA (2000). Before obtaining an Authority to Construct Permit and a Permit to Operate, Central Valley must obtain the agreement of the CCAPCD concerning which technologies constitute BACT. If controlled emissions (after installation of BACT) exceed specific trigger levels, emission offsets or credits must be obtained for the project.

The emissions from the Central Valley's stationary sources, with implementation of BACT, will be less than the CCAPCD's operational emission thresholds. As described in Chapter 2, Central Valley will provide the CPUC with evidence that it has complied with the requirements of the CCAPCD. This evidence will be in the form of a final permit from the CCAPCD. The final permit will be provided to the CPUC prior to the beginning of construction of the compression facility.

A BACT determination for compressor engines proposed for the Wild Goose Gas Storage Project in Butte County specified controlled emission rates of 0.06 gram NO_x per hp-hr, 0.3 gram CO per hp-hr, and 0.09 gram ROG per hp-hr (Butte County Air Pollution Control District 2002). Assuming these same BACT emission rates for Central Valley's proposed project, emissions would be reduced from uncontrolled by 92% for NO_x, by 64% for ROG, and by 88% for CO.

The emission estimates in Table 3.3-6 are based on emission levels after application of BACT. For the Wild Goose Gas Storage Project, the BACT was determined to be selective catalytic reduction (SCR). Other control technologies are capable of reducing ROG, NO_x, and CO emissions. Those technologies include clean burn technology, catalytic combustion, nonselective catalytic reduction, and selective noncatalytic reduction.

With installation of BACT, facility-wide emissions of ROG, NO_x, and PM10 would be less than the significance threshold of 137 pounds per day and 25 tpy. These facility-wide emissions also include on-road vehicle trips associated with employees, area source emissions (natural gas used for space and water heating), and blow down emissions. Blow down emissions assume two emergency plant blow down events per year, venting a maximum of 1 million standard cubic feet of gas per event, and one maintenance blow down event per month, venting 0.06 million standard cubic feet each (Butte County Air Pollution Control District 2006). No significance thresholds have been established for CO because Colusa County is in attainment for the state and federal CO standards.

Because BACT will be implemented as part of the proposed project, the project's operational emissions are less than significant, and no mitigation is necessary.

Table 3.3-6. Operational Emission Estimates

Source	ROG	NO_x	CO	PM10	PM2.5
Operational Emissions (pounds per day)					
On-road emissions	0.19	0.18	2.87	0.55	0.10
Area sources	0.00	0.01	0.01	0.00	0.00
Stationary sources with best available control technology	60.78	72.17	204.13	23.18	23.18
Blowdown	6.58	–	–	–	–
Total	67.54	72.36	207.01	23.73	23.28
Significance threshold	137	137	NA	137	NA
Exceed threshold?	No	No	NA	No	NA
Operational Emissions (tons per year)					
On-road emissions	0.04	0.04	0.52	0.10	0.02
Area sources	0.00	0.00	0.00	0.00	0.00
Stationary sources with best available control technology	6.77	6.76	23.44	2.81	2.81
Blowdown	1.20	–	–	–	–
Total	8.01	6.80	23.96	2.91	2.83
Significance threshold	25	25	NA	25	NA
Exceed threshold?	No	No	NA	No	NA

Notes: Detailed emission estimates are found in Appendix D.

On-road emissions were estimated using URBEMIS2007, Version 9.2.4.

Stationary source emissions were estimated separately for natural gas compressors, reboiler engines, natural draft burner, still vent, and emergency backup engine.

Blow down emissions consist of planned and unplanned natural gas releases from compressor unit and emergency shutdown vents. Emission estimates assume two emergency plant blow downs per year, venting a maximum of 700,000 standard cubic feet of gas each, and monthly compressor shutdown and blow down venting approximately 11,000 standard cubic feet (Butte County Air Pollution Control District 2006).

Impact 3.3-3: Potential health risks from project operation

The results of the SCREEN3 health risk assessment are shown in Table 3.3-7. Appendix D contains additional details on the calculation of health risks. The health risk assessment (HRA) accounts for the inhalation health risks associated with the compressors, reboilers, and oxidizer that would be used to control emissions from the glycol dehydrator.

The combined cancer risk of 6.62 per million is less than the significance threshold of 10 per million. This cancer risk represents a worst case using the extremely conservative SCREEN3 model. The cancer risk estimates are based on the maximum predicted downwind concentration of TACs emitted by all sources and assume that all emission sources are co-located.

The closest sensitive receptor is a residence located approximately 2,000 feet southwest of the compressor station. A few additional residences in the vicinity of the compressor station are located more than 2,000 feet from compressor station boundary (see Figure 3.7-1 in Section 3.7, Hazards and Hazardous Materials, for a map showing sensitive receptors).

The highest estimated concentrations from the reboilers and oxidizer occurs at this closest residence, while the highest concentration from the compressors occurs approximately 3,600 feet downwind. The town of Princeton, located approximately 1 mile northeast of the compressor station, includes both residences and schools. The health risks to Princeton's residents are expected to be much lower than shown in Table 3.3-7 due to the greater distances from the compressor station. Because this analysis shows that the project would not result in a significant impact no mitigation is necessary.

Table 3.3-7. Screening Health Risk Assessment Modeling Results

Screening Criterion	Risk
Cancer risk (significant if greater than 10 per million)	6.62 per millimillion
Chronic HHI (significant if greater than 1)	0.00783
Acute HHI (significant if greater than 1)	0.00891

The chronic and acute health hazards indices shown in Table 3.3-7 represent the total risk of all TACs that would be emitted by the project's stationary sources. The project would not pose a significant health risk to the maximally exposed individual because those indices, both individually and combined, are less than 1. This conservative screening analysis indicates that the project does not pose a significant health risk to residents living in the project vicinity. This impact is considered less than significant, and no mitigation is necessary.

Impact 3.3-4: Potential release of odorized natural gas during project operation

Processing of natural gas at the compressor facility and at the injection/ withdrawal wells has the potential to release odorized natural gas. Odorized gas could be emitted from piping components such as valves and flanges (fugitive emissions). Such leaks are unlikely, would be small, and would quickly be dissipated by even light winds. Nevertheless, Central Valley will implement measures to prevent and repair such leaks.

Also, emergency releases during blow down events could release odorized gas. However, these releases would occur infrequently and, because such releases would be under pressure, the gas would dissipate rapidly. These events are unlikely to result in significant odor impacts.

As described in Chapter 2, aboveground piping components will be maintained to minimize leakage of odorized gas. Piping connections will be welded to the extent practicable given design considerations. Valves, flanges, and other piping components will be monitored for leaks by operations personnel as part of facility operations. Because these measures have been incorporated into the project description, this potential impact is considered less than significant, and no mitigation is necessary.

Greenhouse Gas Emissions

Impact 3.3-5: Potential greenhouse gas emissions from project construction and operation

Table 3.3-8 summarizes the project's construction-related GHG emissions. Emissions are shown for the GHG pollutants CO_2, methane (CH_4), nitrous oxide (N_2O), and carbon dioxide equivalents (CO_2e). Emissions in 2011 would be higher than in 2010 because the natural gas pipeline would be installed in 2011 and the temporary compressor would operate for in the last quarter of 2010 and during 2011.

Table 3.3-9 summarizes the project's operational GHG emissions. An extremely small percentage of the GHG emissions (less than 0.1%) would be generated by on-road vehicle trips. Approximately 4% of total CO_2e emissions would be generated by planned and unplanned blow down emissions consisting of methane. The emission estimates assume two emergency blow down events per year and one maintenance blow down per month. Valves and flanges represent another source of fugitive methane emissions. However, the total number of valves and flanges is expected to be relatively low, and fugitive emissions from these sources are expected to be negligible.

Table 3.3-8. Greenhouse Gas Emissions from Construction and Rental Compression

Year	CO_2e (metric tpy)
2010	1,392.4
2011	3,635.4

Notes: CO_2 emissions were estimated using URBEMIS2007, Version 9.2.4 for off-road equipment and EMFAC2007 for on-road equipment. Temporary compressor emissions estimated using U.S. EPA AP-42 emission factors. Additional detail is found in Appendix D.
A metric ton equals 2,204 pounds.

Table 3.3-9. Operational Greenhouse Gas Emissions (2010)

Source	Carbon Dioxide (tpy)	Methane (tpy)	Nitrous Oxide (tpy)	Carbon Dioxide Equivalents (metric tpy)
On-Road	50.85	0.00	0.00	46.57
Area Sources (excluding electricity)	2.92	0.00	0.00	2.65
Electricity (direct + indirect [for water])	0.34	0.00	0.00	0.31
Stationary Sources w/BACT	28,430.49	2.49	0.06	25,862.39
Blowdown	0.00	30.96	0.00	589.89
Totals	28,484.60	33.45	0.06	26,501.80

BACT = Best available control technology.
NA = Not applicable.
metric tpy = Metric tons per year.
Notes: Carbon dioxide (CO_2) on-road emissions are based on URBEMIS2007, Version 9.2.4 model results.
Additional detail is found in Appendix D.
CO_2 equivalent (CO_2e) measurements assume that each unit of CH_4 equals 21 units of CO_2 and that each unit of N_2O equals 310 units of CO_2, based on the global warming equivalents of each gas (California Climate Action Registry 2009). There are 2,204 pounds in a metric ton.
Stationary source emissions are based on U.S. Environmental Protection Agency AP-42 emission factors, vendor-supplied estimates, and information for a similar project (Wild Goose Gas Storage Project) located in Butte County (Environmental Protection Agency 1998, 2000; Caterpillar 2008; Butte County Air Pollution Control District 2002).
Blowdown emissions are based on similar calculations made for the Wild Goose Gas Storage Project (Butte County Air Pollution Control District 2006).

The majority of the project's GHG emissions would be generated by natural gas combustion in the compressors, which constitutes 96% of total project CO_2e emissions. Although several CO_2 mitigation measures have been identified in recent reports (California Air Pollution Control Officers Association 2008; California Department of Justice 2008; California Office of Planning and Research 2008), these focus on transportation and land use measures associated with urban development. None of the mitigation measures listed in CAPCOA, OPR, or DOJ documents specifically address GHG emissions from stationary sources such as those associated with the proposed project.

The project's proposed use of natural gas to meet the majority of its energy demand will result in much lower CO_2 emissions per million Btu of energy content compared to other fuels typically used for stationary combustion. As shown in Table 3.3-10, natural gas represents the most CO_2-efficient way to supply the project's energy needs. Competing fuels (including electricity) would result in higher emissions of CO_2. Assuming that electricity use represents business as usual conditions, the project's use of natural gas for its energy requirements would reduce GHG emissions by 43.8 percent (see Table 3.3-10). This percentage reduction exceeds the GHG significance threshold of 30 percent. (The project's actual emission reductions compared to electricity use would be slightly lower than 43.8 percent due to on-road and blowdown emissions. However, by using natural gas to power the compressors, the GHG reductions would still substantially exceed the 30 percent significance threshold.) Consequently, GHG emission impacts are considered less than significant. No mitigation is necessary.

Table 3.3-10. Comparison of CO2 Content of Fuels Used for Stationary Combustion

Fuel Type	Pounds CO_2 per million Btu
Natural Gas	116.7
Bituminous Coal	205.6
Electric Power	207.8
Distillate Fuel Oil	160.9
Propane	138.8
Source: California Climate Action Registry 2009 [Table C.7].	

Applicant-Proposed Measures

AIR-1: Implement measures to reduce PM10 dust generated by construction activities

The following measures will be implemented as part of the proposed project to minimize dust emissions and reduce short-term construction impacts to a less-than-significant level:

- Water all active construction areas (subject to vehicle travel) at least twice (as necessary) daily.
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet of freeboard.
- Water (as necessary) unpaved access roads, parking areas, and staging areas at construction sites that receive regular vehicle travel.
- Sweep daily with water sweepers all paved public roads where the pipeline ROW intersects the road.
- Sweep paved streets daily with water sweepers if visible soil material is carried onto adjacent public streets.
- Enclose, cover, water twice daily, or apply non-toxic soil binders to exposed stockpiles (e.g., dirt and sand).
- Limit traffic speeds on unpaved roads to 15 miles per hour.
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
- Replant vegetation in disturbed areas as quickly as possible, where determined appropriate and in consultation with the landowner.
- Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site.

- Limit the area subject to excavation, grading, and other construction activity at any one time.

Central Valley will notify the CPUC that it has been issued its "Authority to Construct" air permit before beginning construction of the compression facility.

AIR-2: Require measures to reduce NO_x emissions from all diesel powered construction equipment, including support equipment

Central Valley will implement the following measures to reduce NO_x emissions from all diesel powered construction equipment.

- To the extent feasible, all construction diesel engines rated at 100 hp or more shall meet, at a minimum, the Tier 2 California Emissions Standards for Off-Road Compression-Ignition Engines as specified in Title 13 California Code of Regulations Section 2423(b)(1) unless such engine is not available for a particular type of equipment. In the event a Tier 2 engine is unavailable, that engine shall meet the Tier 1 standards. In the event that a Tier 1 engine is unavailable for any off-road engine larger than 100 hp, that engine shall be equipped with a catalyzed diesel particulate filter (soot filter), unless certified by the engine manufacturer that the use of such devices is not practical for specific engine types. For purposes of this mitigation, the use of such devices is considered not practical if:

    1. There is no available soot filter that has been certified by either the California Air Resources Board or the U.S. Environmental Protection Agency for the engine in question; or
    2. The construction equipment is intended to be on-site for 10 days or less.
    3. The use of a soot filter may be terminated immediately if one of the following conditions exists:
    4. The use of the soot filter is excessively reducing normal availability of the construction equipment due to increased downtime for maintenance and/or reduced power output due to an excessive increase in backpressure.
    5. The soot filter is causing or is reasonably expected to cause significant engine damage.
    6. The soot filer is causing or is reasonably expected to cause a significant risk to workers or the public
    7. Any other seriously detrimental cause that has the approval of the CPUC prior to the termination being implemented.

- All heavy earthmoving equipment and heavy duty construction-related trucks with engines shall be properly maintained and the engines tuned to the engine manufacturer's specifications.

- To the extent feasible, unnecessary construction vehicle and idling time will be minimized. The ability to limit construction vehicle idling time is dependent upon the sequence of construction activities and when and where vehicles are needed or staged. Certain vehicles, such as large diesel powered vehicles, have extended warm-up times following start-up that limit their availability for use following startup. Where such diesel powered vehicles are required for repetitive construction tasks, these vehicles may require more idling time. The Proposed Project will apply a "common sense" approach to vehicle use; if a vehicle is not required for use immediately or continuously for construction activities, its engine will be shut off. Construction foremen will include briefings to crews on vehicle use as part of preconstruction conferences. Those briefings will include discussion of a "common sense" approach to vehicle use.

AIR-3: Central Valley will purchase NO_x credits from the Colusa County Air Pollution Control District

Central Valley will purchase NO_x emission credits from the CCAPCD in an amount that offsets all construction-related NO_x emissions exceeding CCAPCD's significance threshold of 137 pounds per day, after implementation of AIR-2. Based on the NO_x pounds per day emission estimates for each construction phase, and the length of those phases, NO_x emissions would exceed the CCAPCD threshold by a total of 28,438 pounds, or 14.2 tons (see Appendix D). Consequently, Central Valley will need to purchase emission credits to offset this amount of NO_x emissions.

Section 3.4
Biological Resources

Introduction

This section provides information on biological resources in the project study area. For the purpose of this PEA, biological resources comprise vegetation; wildlife; and waters of the United States, including wetlands.

Potential biological resource impacts associated with the project components are analyzed on a project level in this section. Potential impacts associated with each of these project components are described at a qualitative level in the "Impact Analysis" section. Specific and detailed applicant-proposed measures to avoid, minimize, or compensate for potential significant impacts on biological resources are described for each potential impact, as necessary.

Environmental Setting

This section provides an overview of the biological communities and special-status species documented or identified as having potential to occur in the project area, as well as the methods used to identify them.

Methods

For purposes of the biological resource analysis, the study area is identified in the project alignment maps contained in Exhibit 1. The survey corridor includes the areas that could be directly or indirectly affected by project construction and operation activities. The study area boundary extends 250 feet beyond the construction footprint (except for existing agricultural and public access roads) and takes into account potential indirect effects on the federally listed valley elderberry beetle, giant garter snake , and invertebrate species that are known to occur in the project region.

The methods used to identify biological resources in the study area comprised a prefield investigation, coordination with the resource agencies (discussed throughout this section), and various levels of field surveys. Each of these elements is described below.

Prefield Investigation

The sources of information listed below were reviewed to identify potential biological resources in the project region.

- California Department of Fish and Game's (DFG's) California Natural Diversity Database (CNDDB) records search of U.S. Geological Survey (USGS) 7.5-minute quadrangles (California Natural Diversity Database 2009) (CNDDB occurrences are shown in Figures 3.4-1 and 3.4-2).
- California Native Plant Society's (CNPS's) online *Inventory of Rare and Endangered Plants of California* (2008).
- California list of noxious weed species (California Department of Food and Agriculture 2007) and invasive plant inventory (California Invasive Plant Council 2006, 2007).
- U.S. Fish and Wildlife Service (USFWS) species list for Colusa County.
- *Draft Supplement EIR for the Wild Goose Storage Expansion Project* (California Public Utilities Commission 2002).
- *Application for Certification for Colusa Generating Station, Colusa County, California prepared for E&L West Coast, LLC.* (URS Corporation 2006).
- *Revised Biological Assessment (Application for Certification 06-AFC-9) for Colusa Generating Station, Colusa County, California* (URS Corporation 2007a).
- *Draft U.S. Army Corps of Engineers Permit Application for the Colusa Generating Station, Colusa County, California* (URS Corporation 2007b).
- *Biological Assessment for the Wild Goose Gas Storage Project, Butte County, California* (Essex Environmental 1997).
- *Wetland Delineation Report and Functions and Values Assessment for the Wild Goose Storage Inc. Gas Storage Facilities Expansion* (Essex Environmental 2001).
- Section 404 permit (Permit Number 200100383) for the Wild Goose Gas Storage, Inc. expansion project (December 2002) and modification to the permit (April 2006).
- Section 404 permit (Permit Number SPK-2006-00897) for PG&E's Colusa Generating Station (July 2008).
- USFWS Biological Opinion (Number 8140-2008-F-0836-1) for PG&E's Colusa Generating Station (March 14, 2008).
- NMFS letter of concurrence (Number 2007/04155) for PG&E's Colusa Generating Station (August 2, 2007).

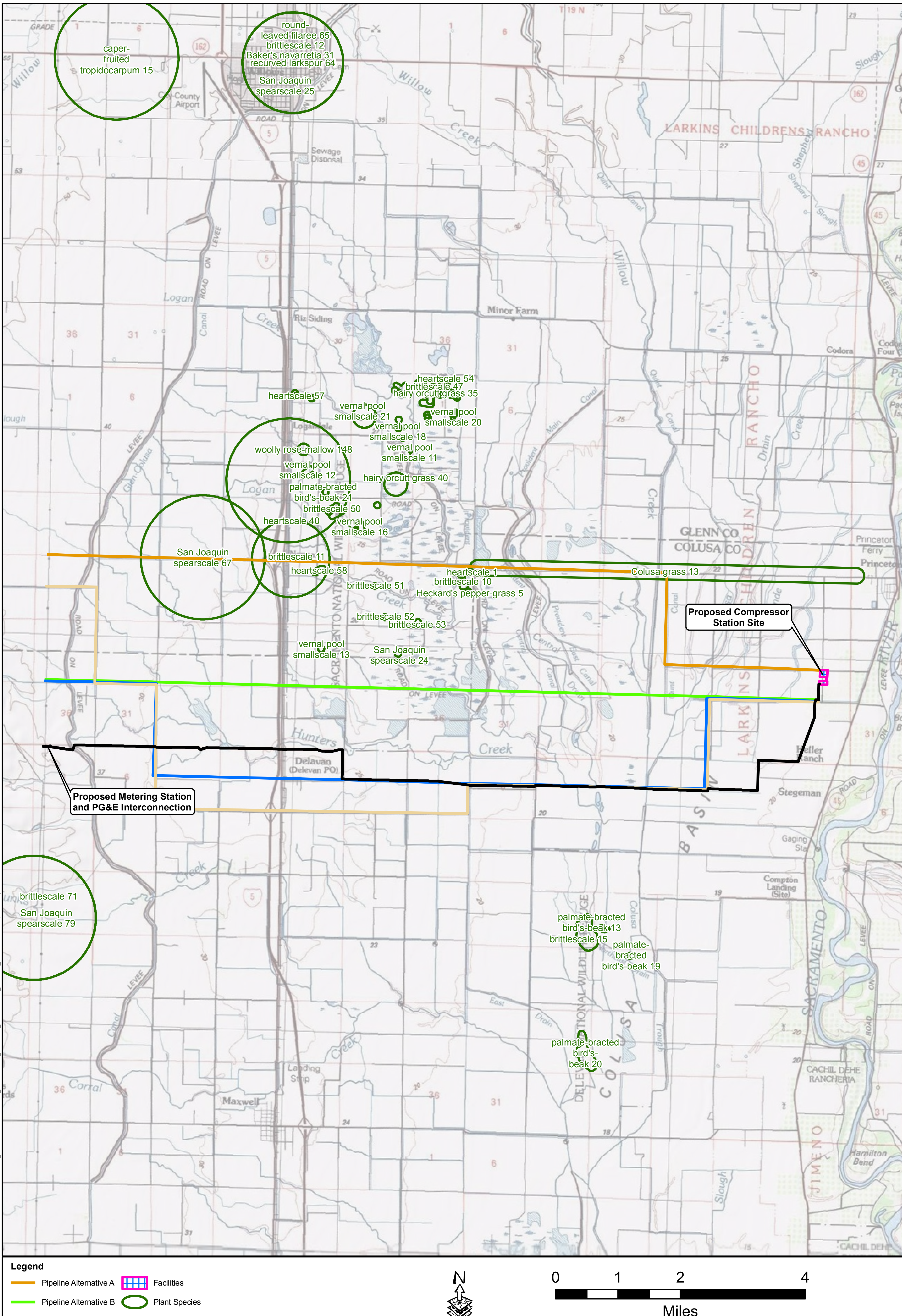


Figure 3.4-1
Recorded Occurrences of Special-Status Plants in the Project Region

S: \ GIS \ PROJECTS \ NICOR \ 01099_07 \ MAPDOC \ CNDDB_PRINCETON_20071106_ALIGNMENT_PLANTS_ONLY.MXD SS (02-18-09)

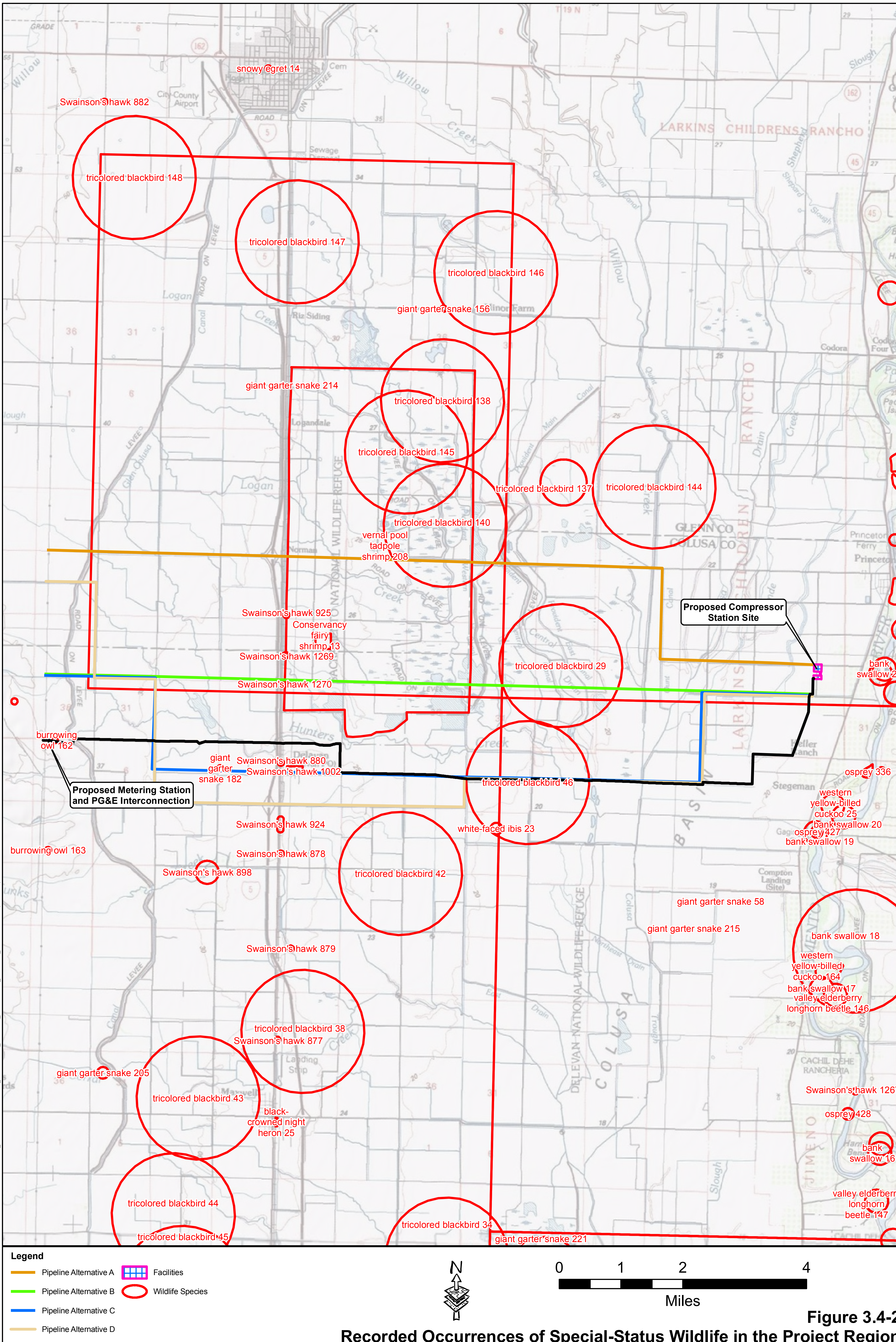


Figure 3.4-2

Recorded Occurrences of Special-Status Wildlife in the Project Region

- USACE wetland verification letter for PG&E's Colusa Generating Station (August 10, 2007) (Note: verification expires August 10, 2012). These verified waters of the United States are shown on the project alignment maps (Sheet 31 of Exhibit 1).
- USACE Individual Permit Application (July 12, 2001) and subsequent application revisions (November 26 and December 7, 2001) for the Wild Goose Gas Storage Facilities Expansion Project (submitted by Matrix Environmental Planning on behalf of Wild Goose Gas Storage, Inc.).
- National Cooperative Soil Survey Web Soil Survey (Natural Resources Conservation Service 2007).

This information was used to develop lists of special-status species and other sensitive biological resources (e.g., waters of the United States) that could be present in the project area and determine potential mitigation and permit requirements. Species were included in these lists if they were known to occur in the project region and if their habitats could be located in the project area. Special-status plant and wildlife species identified as having potential to occur in the project region are listed in Tables 3.4-1 and 3.4-2.

Field Surveys

The ICF Jones & Stokes' biological team consisted of wildlife biologists, botanists, and wetlands ecologists. Biological resource surveys included driving, walking, and scanning areas that were accessible at the time of the field surveys. Field surveys were conducted in May 2008, July 2008, January 2009, March 2009, and June 2009.

Because private property access was limited along some portions of the pipeline alignment and many of the rice fields were flooded and not accessible during the field surveys, most of the pipeline alignment study area was viewed from existing agricultural and public roads during the 2008 and 2009 field surveys. This level of survey was determined to be adequate given the extent of agricultural lands and lack of native habitats.

During the various surveys, biological communities, native trees, and areas that could provide suitable habitat (including nesting, foraging, and roosting habitat) for special-status species were mapped on 1 inch = 600 feet aerial photographs (Exhibit 1, Project Alignment Maps).

A description of the special-status and wetland surveys that have been conducted to support this biological resources section is provided below.

Special-Status Species

For the purpose of this PEA, the term special-status species refers to plant, animal, and fish species that are legally protected under the federal FESA, California Endangered Species Act (CESA), or other regulations, as well as species considered sufficiently rare by the scientific community to qualify for such listing. Field surveys were conducted for special-status species that meet any of the criteria listed below.

- Species listed or proposed for listing as threatened or endangered under the FESA (50 CFR 17.12 [listed plants]; 50 CFR 17.11 [listed animals]; various notices in the FR [proposed species]).
- Species that are candidates for possible future listing as threatened or endangered under the FESA (FR 75176, December 10, 2008).
- Species listed or proposed for listing by the State of California as threatened or endangered under CESA (14 CCR 670.5).
- Species that meet the definitions of rare or endangered under CEQA (CEQA Guidelines Section 15380).
- Plants listed as rare under the California Native Plant Protection Act (California Fish and Game Code Section 1900 et seq.).
- Plants considered by CNPS to be “rare, threatened, or endangered in California” (Lists 1B and 2, California Native Plant Society 2008).
- Plants listed by CNPS as plants about which more information is needed to determine their status, and plants of limited distribution (Lists 3 and 4, California Native Plant Society 2008), which may be included as special-status species on the basis of local significance or recent biological information.
- Animal species of special concern to DFG, as identified and defined in the CNDDB (California Department of Fish and Game 2008).
- Animals fully protected in California (California Fish and Game Code Sections 3511 [birds], 4700 [mammals], and 5050 [amphibians and reptiles]).

Wildlife Surveys

ICF Jones & Stokes wildlife biologists conducted several rounds of walking and driving field surveys in the 250-foot biological study area (as shown in Exhibit 1). Areas that were not accessible by foot or where property access was restricted were evaluated from existing access roads using binoculars. This was determined to be appropriate given the monotypic habitat types present and the long-range visibility of agricultural areas from existing roads.

During the January 2009 field surveys, an ICF Jones & Stokes biological team walked a 300-foot buffer around the proposed metering station site and associated access road to confirm the location of previously delineated seasonal wetlands (as shown on Sheet 1 in Exhibit 1) and determine the distance from these project components to the seasonal wetlands and associated invertebrate habitat. This information was then provided to the project engineers to assist in locating the meter station and access road outside of areas that could directly or indirectly affect seasonal wetlands. This information will be incorporated into

Table 3.4-1. Special-Status Plant Species Identified as Having the Potential to Occur in the Project Region

Common Name *Scientific Name* [a]	Status[a] Fed/State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	Potential for Occurrence in the Project Area
Ferris's milk vetch* *Astragalus tener* var. *ferrisiae*	–/–/1B.1	Historic range included the Central Valley from Butte to Alameda Counties; currently only occurs in Butte, Glenn, Colusa and Yolo Counties	Seasonally wet areas in meadows and seeps, subalkaline flats in valley and foothill grassland; 5–75 meters	Mar–Jun	Low; no suitable habitat present in the project area
Heartscale* *Atriplex cordulata*	–/–/1B.2	Western Central Valley and valleys of adjacent foothills	Saline or alkaline soils in chenopod scrub, meadows and seeps, sandy areas in valley and foothill grassland; below 375 meters	Apr–Oct	Low; no suitable habitat present in the project area
Brittlescale* *Atriplex depressa*	–/–/1B.2	Western and eastern Central Valley and adjacent foothills on west side of Central Valley	Alkaline clay soils in chenopod scrub, playas, valley and foothill grasslands, vernal pools; below 320 meters	May–Oct	Low; no suitable habitat present in the project area; this species was documented in alkali grassland that occur northwest of the project area (west of the Delevan Compressor Station) during botanical surveys conducted for the PG&E Colusa Generating Station project
San Joaquin spearscale* *Atriplex joaquiniana*	–/–/1B.2	Western edge of Central Valley from Glenn to Tulare Counties	Alkaline soils in chenopod scrub, meadows and seeps, playas, valley and foothill grassland; below 835 meters	Apr–Oct	Low; no suitable habitat present in the project area
Vernal pool smallscale (or persistent-fruited saltscale)* *Atriplex persistens*	–/–/1B.2	Central Valley from Glenn to Tulare Counties	Dry beds of vernal pools on alkaline soils; 10–115 meters	Jun–Oct	Low; no suitable habitat present in the project area
Big-scale balsamroot *Balsamorhiza macrolepis* var. *macrolepis*	–/–/1B.2	Scattered occurrences in the Coast Ranges and Sierra Nevada foothills	Sometimes on serpentine soils in chaparral, cismontane woodland, valley and foothill grassland; 90–1,400 meters	Mar–Jun	Low; little or no suitable habitat and soil types are present
Round-leaved filaree *California macrophylla*	–/–/1B.1	Scattered occurrences in the Great Valley, southern North Coast Ranges, San Francisco Bay area, South Coast Ranges, Channel Islands, Transverse Ranges, and Peninsular Ranges	Cismontane woodland, valley and foothill grassland on clay soils; 15–1,200 meters	Mar–May	Moderate; potential habitat present in annual grasslands at the western end of the project area
Fox sedge *Carex vulpinoidea*	–/–/2.2	Scattered locations in the southeast Klamath Range, northern High Cascade Range, and northern Sacramento Valley; Arizona, Oregon	Freshwater marshes and swamps, riparian woodland; 30–1,200 meters	May–Jun	Low; only a small amount of marginally suitable habitat is present
Pappose tarplant *Centromadia parryi* ssp. *parryi*	–/–/1B.2	North and central Coast Ranges, southern Sacramento Valley; occurrences in Butte, Colusa, Glenn, Lake, Napa, San Mateo, and Solano Counties	Coastal prairie, meadows and seeps, coastal salt marshes and swamps, alkaline soils in vernally mesic valley and foothill grassland; 2–420 meters	Jun–Nov	Low; only a small amount of marginally suitable habitat is present
Hoover's spurge *Chamaesyce hooveri*	T/–/1B.2	Central Valley from Butte to Tulare Counties	Below the high water mark of large northern hardpan and volcanic vernal pools; 25–250 meters	Jul–Aug	Low; no large vernal pools oc present in the project area

Common Name *Scientific Name* [a]	Status[a] Fed/State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	Potential for Occurrence in the Project Area
Palmate-bracted bird's-beak* *Cordylanthus palmatus*	E/E/1B.1	Livermore Valley and scattered locations in the Central Valley from Colusa to Fresno Counties	Alkaline sites in chenopod scrub and valley and foothill grassland; 5–155 meters	May–Oct	Low; no suitable habitat present in the project area. Suitable habitat is present in alkali wetlands that occur west of the Colusa Generating Station; however, this species was not located during the 2006 and 2007 botanical surveys conducted for this PG&E project (URS Corporation 2007a)
Rose-mallow* *Hibiscus lasiocarpus*	–/–/2.2	Scattered locations in central and southern Sacramento Valley, deltaic Central Valley from Butte to San Joaquin Counties	Freshwater marshes along rivers and sloughs; below 120 meters	Jun–Sep	Low to Moderate; occurs along Sacramento River east of the project area
Heckard's pepper-grass* *Lepidium latipes* var. *heckardii*	–/–/1B.2	Southern Sacramento Valley; Glenn, Solano, and Yolo Counties	On margins of alkali scalds in annual grassland; below 200 meters	Mar–May	Low; no alkali scalds present in project area
Milo Baker's lupine *Lupinus milo-bakeri*	–/T/1B.1	North Coast Ranges in Colusa and Mendocino County	Valley and foothill grasslands, along streams, ditches, and often along roads in foothill woodlands; 395–430 meters	Jun–Sep	Low; no suitable habitat present in project area
Little mousetail *Myosurus minimus* ssp. *apus*	–/–/3.1	Central Valley and south coast from Butte to San Diego Counties; Baja California and Oregon	Valley and foothill grassland, alkaline vernal pools; 20–640 meters	Mar–Jun	Low; known to occur in the project region (California Public Utilities Commission 2002); suitable habitat occurs north of the meter station but not within the project area
Baker's navarretia *Navarretia leucocephala* ssp. *bakeri*	–/–/1B.1	Inner North Coast Ranges, western Sacramento Valley: Colusa, Glenn, Lake, Marin, Mendocino, Napa, Solano, Sonoma, Tehama, and Yolo Counties	Vernal pools and swales in woodland, lower montane coniferous forest, mesic meadow and grassland; below 1,740 meters	May–Jul	Low; no suitable habitat present in the project area
Colusa grass* *Neostapfia colusana*	T/E/1B.1	Central Valley with scattered occurrences from Colusa to Merced Counties	Adobe soils of vernal pools; 5–200 meters	May–Aug	Low; no suitable deep basin vernal pool habitat is present om the project area;
Hairy Orcutt grass* *Orcuttia pilosa*	E/E/1B.1	Scattered locations along east edge of Central Valley and adjacent foothills from Tehama to Merced Counties	Vernal pools at 55–200 meters	May–Sep	Low; no suitable deep basin vernal pool habitat is present. This species was not located during the 2006 and 2007 botanical surveys conducted for the PG&E Colusa Generating Station Project (URS Corporation 2007a)
Sanford's arrowhead *Sagittaria sanfordii*	–/1B.2	Widespread but infrequent; reported from Del Norte, Fresno, Sacramento, Santa Barbara, and Ventura Counties	Sloughs and sluggish streams with silty or muddy substrate, associated with emergent marsh vegetation	May–June	High; potential habitat present along drainages and canals that cross the gas pipeline alignment

Common Name *Scientific Name* [a]	Status[a] Fed/State/ CNPS	Geographic Distribution	Habitat Requirements	Blooming Period	Potential for Occurrence in the Project Area
Wright's trichocoronis *Trichocoronis wrightii* var. *wrightii*	–/–/2.1	Scattered locations in the Central Valley and southern coast; Texas	On alkaline soils in floodplains, meadows and seeps, marshes and swamps, riparian forest, and vernal pools; 5–435 meters	May–Sep	Low; no suitable habitat present in the project area
Greene's tuctoria *Tuctoria greenei*	E/R/1B.1	Scattered distribution along eastern Central Valley and foothills from Shasta to Tulare Counties	Dry vernal pools at 30–1,070 meters	May–Sep	Low; suitable habitat may be present in vernal pools north of the proposed meter station. This species was not located during the 2006 and 2007 botanical surveys conducted for the PG&E Colusa Generating Station Project (URS Corporation 2007a)
Columbian watermeal *Wolffia brasiliensis*	–/–/2.3	Few occurrences along the Sacramento River in Butte and Glenn Counties	Shallow freshwater marshes and swamps; 30–100 meters	Apr–Sep	Low; only a small amount of marginally suitable habitat is present

Note: An ***** indicates that the species has been recorded in the project region by DFG's California Natural Diversity Database (2008), as shown in Figure 3.4-1.

[a] Status explanations:

Federal

- E = listed as endangered under the federal Endangered Species Act.
- T = listed as threatened under the federal Endangered Species Act.
- C = candidate: species for which USFWS has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list, but issuance of the proposed rule is precluded.
- – = no listing.

State

- E = listed as endangered under the California Endangered Species Act.
- T = listed as threatened under the California Endangered Species Act.
- FP = designated as fully protected under the California Fish and Game Code.
- R = listed as rare under the California Endangered Species Act. This category is no longer used for newly listed plants, but some plants previously listed as rare retain this designation.
- – = no listing.
- SSC = California Species of Special Concern

California Native Plant Society (CNPS)

- 1B = List 1B species: rare, threatened, or endangered in California and elsewhere.
- 2 = List 2 species: rare, threatened, or endangered in California but more common elsewhere.

CNPS Code Extensions

- .1 = seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat
- .2 = fairly endangered in California (20- 80% of occurrences threatened)
- .3 = not very endangered in California (<20% of occurrences threatened or not current threats known)

Table 3.4-2. Special-Status Wildlife Species Identified as Having the Potential to Occur in the Project Region

Common Name *Scientific Name*	Status [a] Fed/State	Geographic Distribution	Habitat Requirements	Potential for Occurrence in the Project Area
Invertebrates				
Conservancy fairy shrimp* *Branchinecta conservation*	E/–	Disjunct occurrences in Solano, Merced, Tehama, Ventura, Butte, and Glenn Counties	Large, deep vernal pools in annual grasslands	Low; no deep vernal pools are present in the project area. The USFWS made a determination for the PG&E Colusa Generating Station project that suitable habitat does not occur on the project site (Biological Opinion 8140-2008-F-0836-1, March 14, 2008)
Valley elderberry longhorn beetle* *Desmocerus californicus dimorphus*	T/–	Streamside habitats below 3,000 feet throughout the Central Valley	Riparian and oak savanna habitats with elderberry shrubs; elderberry is the host plant	High; two elderberry shrubs were located during the 2008 field surveys; one of these shrubs occurs within 100 feet of the gas pipeline alignment (see Sheet 8 in Exhibit 1)
Vernal pool fairy shrimp *Branchinecta lynchi*	T/–	Central Valley, central and south Coast Ranges from Tehama to Santa Barbara Counties; isolated populations in Riverside County	Common in vernal pools; also found in sandstone rock outcrop pools	Low -Moderate; potential habitat (seasonal wetlands) present occurs north and south of the Delevan Compressor Station access road (see Sheets 10 in Exhibit 1). Seasonal wetlands along I-5 are swale features that would not provide suitable habitat for this species
Vernal pool tadpole shrimp *Lepidurus packardi*	E/–	Shasta County south to Merced County	Vernal pools and ephemeral stock ponds	Low-Moderate; see comments above for vernal pool fair shrimp
Amphibians and Reptiles				
California tiger salamander *Ambystoma californiense*	T/C	Central Valley, including Sierra Nevada foothills, up to approximately 1,000 feet, and coastal region from Butte to northeastern San Luis Obispo Counties	Small ponds, lakes, or vernal pools in grasslands and oak woodlands for larvae; rodent burrows, rock crevices, or fallen logs for cover for adults and for summer dormancy	Low; suitable upland habitat present in the annual grasslands west of the Glenn–Colusa Canal. One potential breeding pond is approximately 0.5 mile southwest of the proposed metering station site (URS 2007a). However, there have been no observations of California tiger salamanders north of Yolo County within the last 40 years and according to Mark Jennings, salamanders are unlikely to be in the project vicinity (URS 2007a). Based on the information provided to the USFWS to support the Biological Opinion 8140-2008-F-0836- (March 14, 2008) for the PG&E Colusa Generating Station Project, the USFWS determined that the proposed action would not likely adversely affect the California tiger salamander because the species is unlikely to occur in the area. Based on this recent USFWS decision for this species, this PEA assumes that there is a low potential to occur in the project area

Common Name *Scientific Name*	Status [a] Fed/State	Geographic Distribution	Habitat Requirements	Potential for Occurrence in the Project Area
Western spadefoot (*Scaphiopus hammondii*)	–/SSC	Found in Sierra Nevada foothills, Central Valley, Coastal Ranges, coastal counties in southern California	Shallow streams with riffles and seasonal wetlands, such as vernal pools in annual grasslands and oak woodlands	Low-Moderate; potential habitat occurs north and south of Delevan Compressor Station access road
Giant garter snake* *Thamnophis couchi gigas*	T/T	Central Valley from the vicinity of Burrel in Fresno County north to near Chico in Butte County; has been extirpated from areas south of Fresno	Sloughs, canals, low-gradient streams and freshwater marsh habitats where there is a prey base of small fish and amphibians; also found in irrigation ditches and rice fields; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter	High; giant garter snake has been documented in the project region and suitable aquatic and upland habitat occurs throughout the project area
Western pond turtle *Actinemys marmorata*	–/SSC	Oregon border of Del Norte and Siskiyou Counties south along the coast to San Francisco Bay, inland through the Sacramento Valley, and on the western slope of Sierra Nevada	Ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation in woodlands, grasslands, and open forests	High; species has not been documented in the project area but suitable habitat is present in drainages that cross the gas pipeline corridor
Birds				
Bank swallow* *Riparia riparia*	–/T	Nests along the Sacramento River from Tehama to Sacramento Counties; along the Feather and lower American Rivers; in the Owens Valley; and in the plains east of the Cascade Range in Modoc, Lassen, and northern Siskiyou Counties; small populations near the coast from San Francisco to Monterey Counties	Nests in bluffs or banks, usually adjacent to water, where the soil consists of sand or sandy loam	None; bank swallows occur along the Sacramento River, east of the project area; however, there are no suitable bluffs or banks in the project area
Northern harrier *Circus cyaneus*	–/SSC	Occurs throughout lowland California; has been recorded in fall at high elevations	Grasslands, meadows, marshes, and seasonal and agricultural wetlands	Moderate; suitable habitat occurs throughout the project area
Osprey *Pandion haliaetus*	–/SSC	Nests along the north coast from Marin to Del Norte Counties, east through the Klamath and Cascade Ranges, and in the upper Sacramento Valley; important inland breeding populations at Shasta Lake, Eagle Lake, and Lake Almanor and small numbers elsewhere south through the Sierra Nevada; winters along the coast from San Mateo to San Diego Counties	Nests in snags, trees, or utility poles near the ocean, large lakes, or rivers with abundant fish populations	Low; potential nesting habitat along the Sacramento River
Swainson's hawk* *Buteo swainsoni*	–/T	Lower Sacramento and San Joaquin Valleys, Klamath Basin, and Butte Valley; highest nesting densities occur near Davis and Woodland, Yolo County	Nests in oaks or cottonwoods in or near riparian habitats; forages in grasslands, irrigated pastures, and grain fields	High; known to nest along the Sacramento River (east of the project area) and along I-5

Common Name *Scientific Name*	Status[a] Fed/State	Geographic Distribution	Habitat Requirements	Potential for Occurrence in the Project Area
Tricolored blackbird* *Agelaius tricolor*	–/SSC	Permanent resident in Central Valley from Butte to Kern Counties; breeds at scattered coastal locations from Marin to San Diego Counties and at scattered locations in Lake, Sonoma, and Solano Counties; rare nester in Siskiyou, Modoc, and Lassen Counties	Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grainfields; habitat must be large enough to support 50 pairs; probably requires water at or near the nesting colony.	High; known to occur in several locations around the proposed gas pipeline alignment and this species was observed during the field surveys
Western burrowing owl* *Athene cunicularia hypugea*	–/SSC	Lowlands throughout California, including the Central Valley, northeastern plateau, southeastern deserts, and coastal areas; rare along south coast	Level, open, dry, heavily grazed or low-stature grassland or desert vegetation with available burrows	High; known to occur in annual grasslands west of the proposed metering station site and PG&E interconnection; however, this entire area has been disked and there is substantial disturbance in the area related to construction of the PG&E facility (as of July 2009)
Western yellow-billed cuckoo* *Coccyzus americanus occidentalis*	C/E	Nests along upper Sacramento, lower Feather, south fork of the Kern, Amargosa, Santa Ana, and Colorado Rivers	Nests in wide, dense riparian forests with a thick understory of willows for nesting; sites with a dominant cottonwood overstory are preferred for foraging; may avoid valley-oak riparian habitats where scrub jays are abundant	Low; areas of riparian woodland in the project area may be too small to provide suitable nesting habitat
White-tailed kite *Elanus leucurus*	–/FP	Lowland areas west of Sierra Nevada from the head of the Sacramento Valley south, including coastal valleys and foothills to western San Diego County at the Mexico border	Nests in low foothills or valley areas with valley or live oaks, riparian areas, and marshes near open grasslands for foraging	Moderate; potential nesting and foraging habitat present throughout the project region
White-faced ibis *Plegadis chihi*	–/SSC	Both resident and winter populations on the Salton Sea and in isolated areas in Imperial, San Diego, Ventura, and Fresno Counties; breeds at Honey Lake in Lassen County, at Mendota Wildlife Management Area in Fresno County, and near Woodland in Yolo County	Prefers freshwater marshes with tules, cattails, and rushes, but may nest in trees and forage in flooded agricultural fields, especially flooded rice fields	High; known ot nest on Sacramento NWR north of the project area; suitable nesting and foraging habitat is present in project area
Loggerhead shrike *Lanius ludovicianus*	-/SSC	Resident and winter visitor in lowlands and foothills throughout California; rare on coastal slope north of Mendocino County, occurring only in winter	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches	High; potential habitat occurs throughout the proejct area
Mammals				
American badger *Taxidea taxus*	–/SSC	The badger is an uncommon, permanent resident found throughout most of the state, with the exception of the northern North coast area.	They are most abundant in the drier open stages of most shrub, forest, and herbaceous habitats with friable soils. Badgers are generally associated with treeless regions, prairies, park lands and cold desert areas	Low-Moderate; potential habitat in annual grasslands near the proposed metering station site and PG&E interconnection; however, this area is heavly disturbed from disking and construction activities

Note: An ***** indicates that the species has been recorded in the project region by DFG's California Natural Diversity Database (2009) and shown in Figure 3.4-1.

[a] Status explanations:

Federal

E = listed as endangered under the federal Endangered Species Act.

T = listed as threatened under the federal Endangered Species Act.

C = candidate: species for which USFWS has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list, but issuance

Common Name *Scientific Name*	Status [a] Fed/State	Geographic Distribution	Habitat Requirements	Potential for Occurrence in the Project Area

of the proposed rule is precluded.

–	=	no listing.
State		
E	=	listed as endangered under the California Endangered Species Act.
T	=	listed as threatened under the California Endangered Species Act.
FP	=	designated as fully protected under the California Fish and Game Code.
C	=	candidate for threatened or endangered statusunder CESA; extending legal protection to the species for one year (up in February 2010 for California tiger salamander).
–	=	no listing.
SSC	=	California Species of Special Concern

the future Biological Assessment that will be prepared for the proposed project to comply with Section 7 of the federal Endangered Species Act (FESA).

Botanical Surveys

After conducting a reconnaissance-level survey of the project area and reviewing existing information (including the CNDDB occurrence records), ICF Jones & Stokes botanists determined that the spring and summer botanical surveys should focus on natural habitats that support suitable conditions for special-status plants known to occur in the project region. DFG's *Guidelines for assessing the effects of proposed projects on rare, threatened, and endangered plants and natural communities* (2000) and CNPS botanical survey guidelines (2001) state that it is appropriate to conduct a botanical field survey to determine if, or to the extent that, rare, threatened, or endangered plants will be affected by a proposed project when:

> a. Natural vegetation occurs on the site, it is unknown if rare, threatened, or endangered plants or habitats occur on the site, and the project has the potential for direct or indirect effects on vegetation; or
>
> b. Rare plants have historically been identified on the project site, but adequate information for impact assessment is lacking.

The project area is primarily agricultural lands and supports very little natural habitat. Although there are many known occurrences of special-status plants north and south of the project area on National Wildlife Refuge lands, there is little to no suitable habitat in the project area. Therefore, the botanical surveys focused on areas in the project footprint that contained natural habitats including, wetland drainages (unmanaged drainages with freshwater marsh and riparian vegetation), non-native annual grasslands, and seasonal wetlands. These communities were identified as having some level of potential to support special-status plants and therefore were the focus of the spring and summer field surveys. No pedestrian surveys were conducted in developed areas or agricultural fields which have no potential to support special-status plants. This approach is consistent with the DFG and CNPS survey guidelines referenced above.

Waters of the United States, Including Wetlands Delineation

The term *waters of the United States* is an encompassing term used by USACE for areas that are subject to federal regulation under Section 404 of the federal Clean Water Act (CWA). Waters of the United States are categorized as *wetlands* or *other waters of the United States*. Each of these categories is described below.

USACE defines *wetlands* as areas that are inundated or saturated by surface water or groundwater at a frequency and duration that is sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR 328.3[b]; 40 CFR 230.3).

For a wetland to qualify as a jurisdictional aquatic site, and therefore be subject to regulation under CWA Section 404, it must support a prevalence of hydrophytic vegetation, hydric soils, and wetland hydrology.

On January 9, 2001, a federal court ruling in *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers* (121 S.CT. 675,2001) (SWANCC ruling) resulted in a determination that isolated wetlands (e.g., vernal pools) are no longer regulated by USACE under CWA Section 404. Counsel for EPA and USACE published guidance on "[n]on-navigable, isolated [and] intrastate waters" on January 19, 2001, in response to the ruling. The guidance essentially resulted in a determination that USACE does not regulate non-navigable, isolated waters. Jurisdictional status would be considered as part of the wetland delineation and future permitting process for the proposed project.

Other waters of the United States are sites that typically lack one or more of the three wetland indicators identified above. Other waters of the United States that occur in the project area include open water portions of Hunters Creek, Logan Creek, Colusa Trough, agricultural ditches, and canals (shown in Exhibit 1).

ICF Jones & Stokes met with the USACE (Mr. Brian Vierria) on November 6, 2008 and July 7, 2009 to discuss the proposed project and obtain concurrence on the proposed wetland delineation and future permitting approach. ICF Jones & Stokes submitted a Freedom of Information Act (FOIA) request to the USACE to obtain wetland delineation and permitting information for the Wild Goose Gas Storage Expansion and PG&E Colusa Generating Station Projects. Information obtained as part of this FOIA request is listed above under "Prefield Investigation".

On January 15, 2009, a wetland team (consisting of a botanist and soils scientist) conducted a wetland delineation on the proposed compressor station site, remote well pad site, gathering line, and meter station to determine if there were any waters of the United States (including agricultural wetlands) present on these sites. The delineation confirmed that there are no potential waters of the United States (including adjacent or isolated wetlands) on these sites. This wetland delineation information will be incorporated into the wetland delineation report.

A wetland delineation is currently being conducted for the gas pipeline system, compressor station, and remote well pad. A detailed description of the methods used to delineate waters of the United States, including wetlands, will be provided in the wetland delineation report. The report will be submitted to USACE for verification and to support acquisition of the CWA Section 404 permit compliance for the proposed project.

Existing Conditions

Biological Communities

The project area is located in the Sacramento Valley subregion of the Central Valley. The area was historically open grassland community with interspersed vernal pools, seasonal wetlands, emergent wetlands, and intermittent and perennial creeks with riparian habitat and valley oak woodlands. Currently, the area supports very little natural habitat and has been substantially altered by agricultural activities. The project area is predominantly rice, row crops, orchards, and other agricultural operations. Large wetland systems are present north and south of the project area in the Sacramento and Delevan National Wildlife Refuges (NWRs).

Seven general biological communities occur in the project area (Table 3.4-3). These biological communities were classified using a combination of DFG's *List of California Terrestrial Natural Communities Recognized by the California Natural Diversity Database* (California Department of Fish and Game, Biogeographic Data Branch, Vegetation Classification and Mapping Program, September 2003 edition) and professional judgment for habitat types that occur in the study area but are not described in the DFG classification system (e.g., seasonal wetland, agricultural lands, and drainages).

Table 3.4-3. Biological Communities Associated with Major Project Components

	Project Component			
Biological Community Type	Compressor Station	Injection/Withdrawal, Saltwater, and Observation Wells	Metering Station and PG&E Interconnection	Gas Pipelines
Non-native annual grassland			X	
Agricultural land	X	X		X
Fremont cottonwood riparian woodland				X
Freshwater marsh				X
Seasonal wetland				X
Drainage (wetland and non-wetland)				X
Horticultural plantings				X

Notes: Gas pipelines include the 14.9-mile pipeline, gathering line, and PG&E Line 172 connection pipeline. The gathering line and PG&E Line 172 connection cross through agricultural fields only.

Non-native Annual Grassland

Non-native annual grassland is a relatively uncommon community in the project study area, occurring primarily in the western portion of the project area, west of the Glenn-Colusa Canal. Small areas of non-native annual grasslands also occur along drainages and the I-5 corridor. Non-native annual grasslands consist of dense to sparse covers of annual grasses that often grow in association with a variety of showy annual forbs (both native and non-native). Germination occurs with the onset of the late fall rains. Growth, flowering, and seed-set occur from winter through spring. Plants are typically senescent through the summer and fall dry season (Holland 1986). Common plant species are wild oats (*Avena* spp.), bromes (*Bromus* spp.), annual fescues (*Vulpia* spp.), barbed goatgrass (*Aegilops triuncialis*), Italian ryegrass (*Lolium multiflorum*), mustards (*Brassica* spp.), filarees (*Erodium* spp.), yellow star-thistle (*Centaurea solstitialis*), and other forbs.

Non-native annual grassland provides significant value to a variety of native terrestrial vertebrates. Grasslands support insects, amphibians, reptiles, and small birds and mammals, including red-tailed hawks (*Buteo jamaicensis*), golden eagles (*Aquila chrysaetos*), northern harriers (*Circus cyaneus*), American kestrels (*Falco sparverius*), great-horned owls (*Bubo virginianus*), California voles (*Microtus californicus*), deer mice (*Peromyscus* spp.), California ground squirrels (*Spermophilus beecheyi*), American badger (*Taxidea taxus*), and coyotes (*Canis latrans*). Most of the non-native annual grassland in the project area is heavily disturbed from agricultural and development activities. Such disturbance increases the number of non-native and invasive plant species present, reduces the quality of the habitat for wildlife, and decreases the number of different species expected to occur in this community.

Western burrowing owls (*Athene cunicularia*) are known to occur in the non-native annual grassland around the proposed metering station site (California Natural Diversity Database 2009) (Figure 3.4-1). In addition, non-native annual grassland provides suitable upland habitat for western spadefoot toads (*Spea hammondii*), which could breed in vernal pools north of the proposed metering station site.

Agricultural Land

For the purpose of this PEA, agricultural lands include both currently cultivated lands (rice, row crops, orchards) and fallow fields. Rice fields are the dominant agricultural crop in the project area and are used by a variety of wildlife, depending on the geographic area and adjacent habitats. Ground nesting birds, including waterfowl and pheasant, nest in and adjacent to agricultural fields if adequate residual vegetation is present at the beginning of the nesting season. Flood irrigation of rice fields provides feeding and roosting sites for shorebirds, wading birds, waterfowl, and raptors. Amphibians such as Pacific treefrogs (*Hyla regilla*) may breed if water is present for a sufficient amount of time; such amphibians would also provide a food source for great blue herons (*Ardea herodias*), egrets (*Egretta* spp.), and long-billed curlews (*Numenius americanus*).

Giant garter snakes (*Thamnophis gigas*) (a species listed as threatened under FESA and CESA) forage in rice fields seasonally when the rice has grown tall enough to provide shelter. When rice fields are drained prior to harvest, giant garter snakes move out of the rice fields and into the canals and ditches to feed on the prey animals that have retreated from the rice fields into the canals and ditches (Hansen and Brode 1992). Agricultural lands in the project area provide limited habitat for terrestrial vertebrates because of the lack of cover and frequent ground disturbance. Consequently, the diversity of native species on agricultural lands is likely much lower than on less-disturbed grasslands to the north and east. Agricultural lands nonetheless support various wildlife species and seasonally attract large numbers of some bird species. Amphibians and reptiles are poorly represented in agricultural lands of the project study area.

Croplands provide foraging habitat for several bird species common to the Central Valley, including Brewer's blackbirds (*Euphagus cyanocephalus*), mourning doves *(Zenaida macroura*), American crows (*Corvus brachyrhynchos*), and European starlings (*Sturnus vulgaris*). Winter migrants that could occur include American pipits (*Anthus rubescens*), white-crowned sparrows (*Zonotrichia leucophrys*), and occasional mountain bluebirds (*Sialia currucoides*). Red-tailed hawks and turkey vultures (*Cathartes aura*) are commonly seen foraging over the study area at various times of the year. Swainson's hawk (*Buteo swainsoni*) (state listed as threatened), northern harrier (species of special concern), and white-tailed kite (*Elanus leucurus*) (fully protected) forage in croplands. Swainson's hawk is known to nest in the project region along the I-5 and Sacramento River corridor (Figure 3.4-2).

Several mammal species likely occur in the agricultural lands, even though the lands are heavily disturbed. House mice (*Mus musculus*), deer mice, California voles, and Botta's pocket gophers (*Thomomys bottae*) likely occur in limited numbers and attract predators such as Pacific gopher snakes (*Pituophis catenifer*) and red-tailed hawks.

All or portions of cultivated rice fields maybe considered "artificially irrigated wetlands" by the USACE and subject to Section 404 of the CWA. As part of the current wetland delineation effort, ICF Jones & Stokes is delineating rice fields using the methods described in the March 13, 2007 regulatory guidance memorandum (CESPK-CO-R [1145]) from the USACE Sacramento District and based on verbal direction from the USACE.

Fremont Cottonwood Riparian Woodland

Fremont cottonwood riparian woodland is the primary riparian community in the project area and occurs along natural and artificial drainage systems. The community is dominated by Fremont's cottonwood (*Populus fremontii*), Goodding's black willow (*Salix gooddingii*), arroyo willow (*Salix lasiolepis*), narrow-leaved willow (*Salix exigua*), valley oak (*Quercus lobata*), California grape (*Vitis californica*), and Himalayan blackberry (*Rubus armeniacus*, formerly *R. discolor*).

Despite widespread disturbances resulting from urbanization, agricultural conversion, and grazing, riparian habitats remain important wildlife resources. Scarce both regionally and statewide, riparian habitats are used by a large variety of wildlife species. This habitat supports abundant aquatic and terrestrial invertebrates that are prey for amphibians and reptiles such as common garter snakes (*Thamnophis sirtalis*), western skinks (*Eumeces sklitonianus*), and ringneck snakes (*Diadophis punctatus*), and for insectivorous birds such as warblers, northern flickers (*Colpates auratus*), downy woodpeckers (*Picoides pubescens*), and flycatchers. Small mammals found in riparian habitats include shrews, voles, bats, and mice. Raptors that prey on these small mammals and nest in large riparian trees include great-horned owls, red-tailed hawks, and American kestrels. Cavity-dependant species such as woodpeckers, bats, squirrels, and raccoons (*Procyon lotor*) require mature stands of trees. Striped skunks (*Mephitis mephitis*), red foxes (*Vulpes vulpes*), gray foxes (*Urocyon cinereoargentatus*), and badgers forage in riparian habitats and use them for cover and travel.

Valley elderberry longhorn beetle (VELB) (*Desmocerus californicus dimorphus*) (federally listed as threatened) and Swainson's hawk are both known to occur in riparian habitat along the Sacramento River, east of the project area. Patches of Himalayan blackberry along drainages in the project area provide suitable nesting habitat for colonies of tricolored blackbird (*Agelaius tricolor*) (species of special concern) (DeHaven et al. 1975).

Freshwater Marsh

Like riparian communities, freshwater marsh wetlands are primarily associated with drainages that cross through the project area. Bulrush-cattail wetland is the dominant type of freshwater marsh habitat that occurs in the study area. The acreage of freshwater marsh wetlands is included in the acreage for drainages because these wetlands occur below the ordinary high water mark of these features. Although some rice fields contain freshwater marsh wetlands along their edges they were not mapped separate from rice fields.

This type of wetland is generally dominated by perennial emergent wetland species (species that grow in wetland conditions more than 99% of the time), which often form a closed canopy and grow in areas that are permanently or seasonally flooded by slow-moving or stagnant fresh water. Freshwater marsh wetlands derive water from association with perennial or near-perennial surface water sources, such as overland flow from rivers or other surface water sources; ponded seasonal precipitation; and willow groundwater tables. These wetlands may be entirely vegetated or partially vegetated with an open water component, or may be dry in summer.

In the study area, freshwater marsh wetlands are dominated by bulrush (*Scirpus acutus* and other spp.) and broad-leaved cattail (*Typha latifolia*). In some drainages, curly dock (*Rumex crispus*), Baltic rush (*Juncus balticus*), smartweed, western vervain (*Verbena lasiostachys*), Bermuda grass (*Cynodon dactylon*), Johnson grass (*Sorghum halepense*), barnyard grass (*Echinochloa crus-galli*), and irrigated pasture grasses also occur as subdominants. Some emergent wetlands in the project area support willows in or adjacent to their boundaries**.**

Freshwater marsh wetlands are among the most productive wildlife habitats in California, providing food, cover, and water for more than 160 species of birds and numerous mammals, reptiles, and amphibians occupying the open water and adjacent grassland habitats (Mayer and Laudenslayer 1988). Vegetation growing along the edges of water bodies also provides nesting habitat for several bird species (e.g., waterfowl, red-winged blackbird [*Agelaius phoenicius*], American bittern [*Botaurus lentiginosus*], marsh wren [*Cistothorus palustris*], song sparrow [*Melospiza melodia*]).

Giant garter snakes forage in freshwater marsh wetlands. Tricolored blackbirds may nest in seasonal wetlands with stands of cattail or bulrush that are large enough to support a nesting colony (typically more than 50 pairs). Preferred foraging habitats include rice, alfalfa, irrigated pasture and annual grasslands (Beedy and Hamilton 1999).

Seasonal Wetland

Non-native annual grasslands in the western portion of the project area (west of the Glenn-Colusa Canal and south of the Delevan Compressor Station access road) are known to support seasonal wetlands (see Sheet 10 in Exhibit 1). These wetlands have been characterized as seasonal wetlands rather than vernal pools because they are not closed basin systems and are not dominated by typically vernal pool plant species (as described below). Seasonal wetlands were also mapped in the roadside swales along the I-5 corridor (see Sheet 8 in Exhibit 1) and some agricultural ditches (see table in Appendix E for drainages that contain seasonal wetland vegetation).

The seasonal wetlands east of the Glenn-Colusa Canal were delineated by URS Corporation as part of the PG&E Colusa Generating Station Project and verified by the USACE on August 10, 2007. The area north of the Delevan Compressor Station access road contains mima-mound topography and supports a variety of seasonal wetland types (including vernal pools and seasonal swales). As described previously, the proposed metering station site and PG&E interconnection pipeline were surveyed by ICF Jones & Stokes for the proposed project and Essex Environmental and URS Corporation for the other projects in the area and do not support seasonal wetlands.

Seasonal wetlands in the project area are routinely disked for fire control and as of June 29, 2009 supported very little vegetation (as shown in the photographs below). The dominant species observed during the June 29, 2009 wetland delineation were Italian wildrye (*Lolium multiflorum*) and Medeterranian barley *(Hordeum marinum* ssp. *gussoneanum)*.

Seasonal wetlands in grassland areas provide foraging and breeding habitat for a variety of wildlife species. The pools in the project study area are shallow and may or may not hold water long enough (at least one month) for successful breeding by Pacific tree frog, and western spadefoot toad. Insect larvae and invertebrate species that commonly occur in seasonal wetland systems, such as predacious diving beetles (Coleoptera: Dytiscidae), water scavenger beetles (Coleoptera: Hydrophilidae), back swimmers (Coleoptera: Notonectidae), and seed shrimp (Arthropoda: Ostracoda) provide a valuable food source for amphibians as well the many birds that overwinter in or migrate through the region. Birds such as killdeer (*Charadrius vociferus*), greater yellow-legs (*Tringa melanoleuca*), and mallards (*Anas platyrhynchos*) use seasonal wetlands for nesting and foraging in both winter and spring. As discussed below, seasonal wetlands (that pond for at least 10 days) can provide habitat for federally-listed invertebrate species. Central Valley will be avoiding direct and indirect impacts on seasonal wetlands by located project components (including the metering station, gas pipeline, access roads, and staging areas) at least 250 feet from the edge of the wetlands.

Drainage

For the purpose of this PEA, the term *drainage* includes natural and artificially created features with a well-defined bed and bank and flowing water at some time of the year. In the project study area, these drainages include natural creek systems, irrigation ditches, and canals. Unless they are actively maintained, these drainages typically support freshwater marsh wetlands. Natural drainages (e.g., Hunter Creek) also support riparian woodland vegetation (described above). Drainages that occur in and adjacent to the project area are shown in Exhibit 1 and listed in Appendix E. Drainages with wetland vegetation below the ordinary high water mark (OHWM) are referred to as “wetland drainages” and are typically dominated by freshwater marsh vegetation and seasonal wetland vegetation. Drainages that lack wetland vegetation below the OHWM are referred to as “non-wetland drainages”. Wetland drainages would generally be considered jurisdictional wetlands while non-wetland drainages would be considered other waters (as indicated in Appendix E).

The wildlife value of the drainages that occur in the project study area ranges from high to low. Most of the drainages have high to moderate wildlife value because streamside vegetation provides cover and foraging habitat. Amphibians, including Pacific tree frog and the non-native bullfrog, were observed in drainages during field surveys, and striped skunk, raccoon, and coyote may use drainages for foraging. Giant garter snakes occur in irrigation ditches and canals and adjacent uplands. Northwestern pond turtle (*Actinemys marmorata*) may use areas where there are pools with some vegetative cover such as willows or emergent vegetation and exposed branches or rocks to use as basking sites.

Irrigation and roadside ditches that are actively maintained by the landowner and have low wildlife value because they are narrow; lack vegetative cover; and are adjacent to development, paved roads, and agricultural roads. Additionally, feral and domestic cats, automobile traffic, and agricultural practices reduce wildlife use in these areas.

The potential for drainages in the project area to support high quality habitat for fish is relatively low. Most of the drainages have relatively poor water quality because of the heavy pesticide and herbicide use in the area. The Colusa Drain is a major source of chemical, physical, and thermal pollution from agricultural runoff that affects resident fish in the canal and both resident and migratory fish in downstream receiving waters (Yolo Bypass and Sacramento River).

In addition, as described below under “Special-Status Fish”, NMFS determined (as part of PG&E Colusa Generating Station Project) that listed salmonids and designated critical habitat was not present in the project area. NMFS also determined that the project would not affect any Essential Fish Habitat.

Horticultural Plantings

Horticultural plantings occur along the edges of roads, fences, and developed areas. Eucalyptus trees are the primary horticultural species that occurs in these areas. These trees do provide potential roosting and nesting opportunities for various birds species.

Special-Status Species

Special-Status Plants

A review of existing information resulted in the identification of 22 special-status plants as having potential to occur in the project region (Table 3.4-1). Three of these species were identified during the prefield survey to have moderate to high potential to occur in the project area on the basis of existing information and the presence of suitable habitat conditions in the area. Sanford’s arrowhead (*Sagittaria sanfordii*), round-leaved filaree (*California macrophylla*), and rose-mallow (California hibiscus) (*Hibiscus lasiocarpus*) were identified as having the potential to occur in the project area because suitable habitat conditions are present and there are known occurrences documented in the region (California Native Plant Society 2008, California Natural Diversity Database 2009). The remaining special-status plant species have a relatively low potential to occur in the project area either because specific habitat and/or microhabitat requirements are not present, or there are no nearby occurrences and the habitat is marginally suitable.

Botanical surveys conducted in 2001, 2006, and 2007 for the PG&E Colusa Generating Station Project did not locate any special-status plants in this area (west of the Glenn-Colusa Canal) (URS Corporation 2007a). In addition, no special-status plants have been recorded in the region (Figure 3.4-1). Therefore, this PEA analysis assumes that no special-status plants occur in this area and no additional surveys are required.

Because access to most of the project area has been limited by flooded field conditions and other landowner restrictions, suitable habitat areas were not evaluated to a level that would sufficiently conclude whether special-status plants occur along the pipeline portion of the alignment (east of the Glenn-Colusa Canal). When botanical surveys were conducted in 2001 to support the Wild Goose Storage Expansion Project SEIR, no special-status plants appear to have been located in the proposed project area (California Public Utilities Commission 2002).

Special-Status Wildlife

A review of existing information resulted in the identification of 18 special-status wildlife species with potential to occur in the project region (Table 3.4-2). Following the reconnaissance field surveys, it was determined that the project study area contains suitable habitat for several of these species. Additional surveys in 2009 were conducted to document habitats and confirm the level of potential for these special-status wildlife species to occur in the project area. A brief discussion of the species that have the highest potential to occur in the project area is provided below. CNDDB (2009) recorded occurrence of special-status wildlife species are shown in Figure 3.4-2.

Valley Elderberry Longhorn Beetle

VELB is federally listed as a threatened species (FR 45:52803). One elderberry shrubs was located in the biological study area along the gas pipeline corridor, east of I-5 (Sheet 8 in Exhibit 1). A second shrub was located outside of the study area during the field surveys (Sheet 2 in Exhibit 1). VELB is closely associated with blue elderberry, an obligate host for beetle larvae. Based on the presence of suitable habitat and known occurrences along the Sacramento River, it was determined that VELB has a high potential to occur in the project area.

Vernal Pool Fairy Shrimp/Vernal Pool Tadpole Shrimp

Two federally-listed invertebrates have the potential to occur in the western portion of the project area (west of the Glenn-Colusa Canal): vernal pool fairy shrimp and vernal pool tadpole shrimp. These species were identified by URS Corporation as having a relatively low potential to occur in the area as part of the PG&E Colusa Generating Station (URS Corporation 2007a). This determination was based on the lack of recorded occurrences in the area and relatively unsuitable habitat conditions. For this reason, these two species are discussed in this PEA and identified as having a low to moderate potential to occur in the area west of the Glenn-Colusa Canal. In addition, the seasonal wetlands that occur west of the Glenn-Colusa Canal have been disked and may no longer support adequate hydrologic conditions for these species.

Vernal pool fairy shrimp is listed as threatened under FESA (59 FR 48136). Vernal pool fairy shrimp occurs in the Central Valley from Tehama County to Madera County and in the eastern margin of the central and south Coast Ranges from San Benito County to Ventura County. A disjunct population is also located in Riverside County (Eng et al. 1990). Most known locations are in the Sacramento and San Joaquin Valleys and along the eastern margin of the central Coast Ranges (Eng et al. 1990).

Vernal pool tadpole shrimp is listed as endangered under FESA (59 FR 48136). Vernal pool tadpole shrimp occurs in the California Central Valley from Shasta County in the north to Merced County in the south, and a disjunct population occurs in western Alameda County (Rogers 2001).

Vernal pool fairy shrimp and vernal pool tadpole shrimp are restricted to seasonal wetland habitats (e.g., vernal pools and wet swales) in California that provide the necessary seasonal environmental conditions. These species produce cysts (eggs) that lie dormant in the soil over summer and hatch when pools fill during the winter rainy season. To complete their life cycle, vernal pool fairy shrimp and vernal pool tadpole shrimp require an annual cycle of inundation during cold and wet winter months, when the water temperature is cool and oxygen concentration is high, contrasted by dry soil conditions during the summer months (Eriksen and Belk 1999, Helm 2000).

Vernal pool fairy shrimp and vernal pool tadpole shrimp are not known to occur in shallow seasonal wetlands that lack a defined basin and do not provide a water column of sufficient depth (>3cm) and duration (3–4 weeks) because such conditions are necessary for reproduction. Similarly, these species do not occur in wetlands that remain wet or damp throughout most of the year (such as seasonal marsh and perennial wetlands) or permanent bodies of water (such as riverine and marine habitats) because these conditions do not allow egg cysts to properly dry and cure (59 FR 48136–48153).

As described above under “Methods”, ICF Jones & Stokes conducted a field survey on January 12, 2009 to confirm the location of the previously delineated seasonal wetlands and their proximity to the proposed metering station, gas pipeline, and access road to these facilities. As shown in the pictures above, the fields that contain these previously mapped wetlands have been disked and most of the seasonal wetlands were not evident during the summer 2009 field surveys.

Giant Garter Snake

The giant garter snake is a federally and state-listed threatened species (58 FR 54053–54065, October 20, 1993. The species inhabits marshes; sloughs; ponds; small lakes; and low-gradient waterways such as small streams, irrigation and drainage canals, and rice fields. Giant garter snakes feed on small fish, tadpoles, and frogs (Fitch 1940; Hansen 1988). The giant garter snake requires the habitat components listed below.

- Adequate water during the active season (early spring through mid-fall) to provide food and cover.
- Emergent wetland vegetation such as cattails (*Typha* spp.) and bulrushes (*Scirpus* spp.) to provide escape cover and foraging habitat.
- Grassy banks for basking.
- Higher elevation uplands for cover and refuge from winter floods during the dormant season (i.e., November to mid-March) (Hansen and Brode 1980; Hansen 1988; 58 FR 54053–54065, October 20, 1993).

Giant garter snakes are absent from large rivers and other water bodies that support introduced populations of large, predatory fish; wetlands with sand, gravel, and rock substrates; and natural and artificial waterways where weeds are controlled routinely, either mechanically or chemically, and where bank soils are compacted regularly (Hansen and Brode 1980; Rossman and Stewart 1987; Hansen 1988). Giant garter snakes are usually also absent from riparian woodlands because the woodlands have excessive shade and lack basking areas and prey populations (Hansen and Brode 1980).

The wetland habitats where giant garter snakes are known to occur contain permanent or seasonal water, mud bottoms, and vegetated dirt banks (Fitch 1940; Hansen and Brode 1980). In portions of the species' range where rice is grown, this species has adapted well to the vegetated artificial waterways used to flood rice fields (Hansen and Brode 1980). Prior to wetland reclamation, occupied habitats probably consisted of freshwater marshes and low-gradient streams. In the project area, potential habitat occurs within the rice fields and drainages that occur within the proposed gas pipeline corridor. USFWS also considers adjacent uplands within 200 feet from the edge of suitable aquatic habitat as habitat for giant garter snake (U.S. Fish and Wildlife Service 1997). Rice fields and drainages provide aquatic habitat while the associated uplands provide suitable areas for basking and cover during the active season and cover for hibernation during the winter. USFWS has indicated that rice fields are important for giant garter snake because they provide a reliable prey base at the appropriate time of year when snakes are pregnant or giving birth. Prey items are generally smaller in rice fields, making them attractive to young snakes, according to Jana Milliken, Chief, Sacramento Valley Branch, U.S. Fish and Wildlife Services, in e-mail on September 4, 2008.

Based on the presence of known occurrences of giant garter snake immediately along and near the project corridor, it was determined that there is a high potential for this species to occur in the pipeline corridor, compressor station site, and remote well pad site.

Swainson's Hawk

Swainson's hawk is state listed as threatened by DFG, is a federal species of concern, and is protected under the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code Section 3503.5. The MBTA and Section 3503.5 prohibit the "take" of migratory birds, nests, and young. In the Central Valley, this hawk typically nests in oak or cottonwood trees in or near riparian habitats; in oak groves; in roadside trees; and in lone trees. Swainson's hawks prefer nesting sites that provide sweeping views of nearby foraging grounds consisting of grasslands, irrigated pasture, alfalfa, hay, and row and grain crops. Swainson's hawks are migratory, wintering from Mexico to Argentina and breeding in California and elsewhere in the western United States. The raptor generally arrives in the Central Valley in mid-March and begins courtship and nest construction immediately upon arrival at the breeding sites. The young fledge in early July, and most Swainson's hawks leave their breeding territories by late August or early September.

Swainson's hawks are known to nest and forage in the project area. As shown in Figure 3.4-2, there are several documented nest sites along I-5 and the Sacramento River. Row crops provide suitable foraging habitat in the project study area. Rice and fallow fields are not considered suitable foraging habitat. Based on the presence of known nest sites, there is a high potential for these hawks to nest and forage in the project area.

Tricolored Blackbird

Tricolored blackbird is a federal species of concern and is protected under the federal Migratory Bird Treaty Act (16 U.S.C. 703B711); it is also a state species of special concern. Tricolored blackbird colonies have been documented in the project region (Figure 3.4-2). There is a high potential for this species to nest in blackberry thickets along drainages that are crossed by the proposed 14.9-mile gas pipeline alignment.

Western Burrowing Owl

The western burrowing owl (burrowing owl) is a state species of special concern. Western burrowing owl is found throughout much of California in annual and perennial grassland, desert, and arid scrubland (California Department of Fish and Game 1995). It can also be found in vacant lots in residential areas, along railroad ballast, along dirt roads, and on canal levees. The critical requirement for western burrowing owl habitat is the presence of burrows. The species uses burrows excavated by California ground squirrels and badgers, as well as artificial burrows such as cement culverts, debris piles, or openings under roads (California Department of Fish and Game 1995). Its breeding season extends from March through August, peaking in April and May (Zeiner et al. 1990).

According to the CNDDB (2009), burrowing owls occur in the annual grasslands in the western end of the project (near the proposed metering station and PG&E interconnection) (Figure 3.4-2). Surveys conducted in 2001 by Essex Environmental to support the Wild Goose Gas Storage Expansion Project did not locate any burrowing owls in the area (California Public Utilities Commission 2002). However, because there are occurrences previously recorded near the proposed metering station site and suitable nesting habitat (annual grasslands) is present, the potential for burrowing owls to occur within the project area is considered high.

Western Pond Turtle

The western pond turtle (pond turtle) is a state species of special concern. Pond turtles inhabit aquatic habitats such as ponds, marshes, or streams with rocky or muddy bottoms and vegetative cover. They will occasionally leave the water to bask, and females leave the water from May through July to lay eggs as far as 0.25 mile from water.

Perennial irrigation ditches and drainages in the project area provide potential breeding and movement corridors for pond turtles. Surveys conducted in 2001 by Essex Environmental to support the Wild Goose Expansion Project located western pond turtles in several aquatic sites throughout their survey area (California Public Utilities Commission 2002). There is a high potential for pond turtles to occur in the project area based on the presence of suitable habitat conditions and previously identified pond turtles.

Other Special-Status and Non-Special-Status Migratory Birds and Raptors

Several non-special-status migratory birds (including waterfowl) and raptors could nest in and adjacent to the study area, based on the presence of suitable nesting habitat (wetlands and annual grasslands). The breeding season for most birds is generally from February 16 to August 15. The occupied nests and eggs of these birds are protected by federal and state laws, including the MBTA and California Fish and Game Code Sections 3503 and 3503.5. DFG is responsible for overseeing compliance with the codes and makes recommendations on nesting bird and raptor protection.

Several special-status migratory birds and raptors have either been documented in the project region or habitat the potential to occur in the region (Table 3.4-2). These species include northern harrier, white-tailed kite, white-faced ibis (*Plegadis chihi*), and loggerhead shrike (*Lanius ludovicianus*). As discussed above, Swainson's hawk, tricolored blackbird, and burrowing owl have been documented in the project area.

Other non-special-status birds that were observed during the reconnaissance field surveys include red-tailed hawk, American kestrel, killdeer, western meadowlark (*Sturnella neglecta*), northern mockingbird (*Mimus polyglottos*), red-winged blackbird, western kingbird (*Tyrannus verticalis*), and mourning dove. These generally common species are locally and regionally abundant.

The project region also provides habitat for resident and wintering waterfowl (including mallard, northern pintail [*Anas acuta*], cinnamon teal [*Anas cyanoptera*], ruddy duck [*Oxyura jamaicensis*], American wigeon [*Anas americana*], and northern shoveler [*Anas clypeata*]). These species are most abundant during winter (October through January) and are actively hunted by the numerous duck clubs located in the project region.

Special-Status Fish

As described previously, the proposed gas pipeline alignment crosses several natural drainages and artificially-created canals and irrigation ditches. Many of these drainages are tributaries to the Sacramento River. However, these drainages are not known to provide habitat for migrating and spawning anadromous fish species (National Marine Fisheries Service 2008).

In 2007, National Marine Fisheries Service (NMFS) concluded that PG&E's Colusa Generating Station project was not likely to adversely affect listed fish species under their jurisdiction, including Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*), Central Valley steelhead (*Oncorhynchus mykiss*), and the Southern Distinct Population Segment of the North American green sturgeon. NMFS determined that listed salmonids and designated critical habitat was not present in the project area (NMFS letter to USACE dated August 2, 2007). NMFS also determined that the project would not affect any Essential Fish Habitat. For these reasons, impacts to special-status fish are not addressed in this PEA.

Regulatory Setting

This section describes the federal, state, and local plans, policies, and laws relevant to biological resources in the project region.

Federal Regulations

The FESA, CWA, and Executive Orders (EOs) 13112 and 13186 are applicable to the proposed project and are described below.

Endangered Species Act

The FESA protects fish and wildlife species and their habitats that have been identified by USFWS or NMFS as threatened or endangered. *Endangered* refers to species, subspecies, or distinct population segments that are in danger of extinction through all or a significant portion of their range, and *threatened* refers to those that are likely to become endangered in the near future. The FESA is administered by USFWS and NMFS. In general, NMFS is responsible for protection of FESA-listed marine species and anadromous fishes, while other listed species are under USFWS jurisdiction. Provisions of FESA Sections 7 and 9 are relevant to this project and summarized below.

Section 7: Authorization Process for Federal Actions

The FESA Section 7 provides a means for authorizing take of threatened and endangered species by federal agencies. Under Section 7, the federal agency that is conducting, funding, or permitting an action (i.e., the lead federal agency) must consult with USFWS or NMFS as appropriate to ensure that the proposed action will not jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat. If a proposed project may affect a listed species or designated critical habitat, the lead agency is required to prepare a Biological Assessment that evaluates the nature and severity of the expected effect. In response, USFWS or NMFS will issue a Biological Opinion with a determination that the proposed action either:

- may jeopardize the continued existence of one or more listed species (jeopardy finding), or result in the destruction or adverse modification of critical habitat (adverse modification finding); or

- will not jeopardize the continued existence of any listed species (no jeopardy finding) or result in adverse modification of critical habitat (no adverse modification finding).

The Biological Opinion may stipulate discretionary reasonable and prudent conservation measures. If the project would not jeopardize a listed species, USFWS or NMFS will issue an incidental take statement to authorize the proposed activity.

To comply with Section 7 (16 United States Code [USC] 1536), Central Valley will request that USACE initiate consultation with USFWS for potential impacts on vernal pool fairy shrimp, vernal pool tadpole shrimp, giant garter snake, and VELB. A Biological Assessment will be prepared for the project that assessing potential impacts on these species.

Section 9: Prohibitions

The FESA Section 9 prohibits the take of any fish or wildlife species listed under FESA as endangered. Take of threatened species also is prohibited under Section 9 unless otherwise authorized by federal regulations.[1] *Take*, as defined by FESA, means “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” *Harm* is defined as “any act that kills or injures the species, including significant habitat modification.” In addition, Section 9 prohibits removing, digging up, cutting, and maliciously damaging or destroying federally listed plants on sites under federal jurisdiction.

Clean Water Act

CWA was enacted as an amendment to the federal Water Pollution Control Act of 1972, which outlined the basic structure for regulating discharges of pollutants to waters of the United States. CWA serves as the primary federal law protecting the quality of the nation’s surface waters, including lakes, rivers, and coastal wetlands. CWA empowers EPA to set national water quality standards and effluent limitations, and includes programs addressing both point-source and non-point-source pollution. Point-source pollution originates or enters surface waters at a single, discrete location, such as an outfall structure or an excavation or construction site. Non-point-source pollution originates over a broader area and includes urban contaminants in stormwater runoff and sediment loading from upstream areas. CWA operates on the principle that all discharges into the nation’s waters are unlawful unless they are specifically authorized by a permit; permit review is CWA’s primary regulatory tool. The following sections provide additional details on specific sections of CWA (Sections 401, 402, and 404).

[1] In some cases, exceptions may be made for threatened species under ESA Section 4[d]. In such cases, USFWS or NMFS issues a “4[d] rule” that describes protections for the threatened species and specifies the circumstances under which take is allowed.

Section 401: Water Quality Certification

Under CWA Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects with a federal component that may affect state water quality, including projects that require federal agency approval, such as issuance of a Section 404 permit, must also comply with Section 401. Central Valley will apply for water quality certification from the Central Valley Regional Water Quality Control Board (RWQCB).

Section 402: Permits for Stormwater Discharge

CWA Section 402 regulates construction-related stormwater discharges to surface waters through the National Pollutant Discharge Elimination System (NPDES) program, administered by the U.S. Environmental Protection Agency (EPA). In California, the State Water Resources Control Board (State Water Board) is authorized by EPA to oversee the NPDES program through RWQCB (see “Porter-Cologne Water Quality Control Act” below). The project corridor and vicinity are under the jurisdiction of the Central Valley RWQCB.

NPDES permits are required for projects that disturb more than 1 acre of land. The NPDES permitting process requires the applicant to file a public notice of intent (NOI) to discharge stormwater and to prepare and implement a storm water pollution prevention plan (SWPPP). The SWPPP includes a site map, description of proposed construction activities, and best management practices (BMPs) that will be implemented to prevent soil erosion and discharge of other construction-related pollutants (e.g., petroleum products, solvents, paints, and cement) that could contaminate nearby water resources. Permittees are required to conduct annual monitoring and reporting to ensure that BMPs are correctly implemented and effective in controlling the discharge of stormwater-related pollutants. Because the proposed project will result in more than 1 acre of disturbed lands, Central Valley will prepare a SWPP and apply for an NPDES permit.

Section 404: Permits for Fill Placement in Waters and Wetlands

CWA Section 404 regulates the discharge of dredged and fill materials into waters of the United States. *Waters of the United States* refers to oceans, bays, rivers, streams, lakes, ponds, and wetlands, including any of the following:

- areas within the ordinary high-water mark (OHWM) of a stream, including non-perennial streams with a defined bed and bank and any stream channel that conveys natural runoff, even if it has been realigned; and
- seasonal and perennial wetlands, including coastal wetlands.

On January 9, 2001, the U.S. Supreme Court made a decision in *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers* (121 S. Ct. 675 [2001]), generally referred to as *SWANCC,* that affected USACE jurisdiction in isolated waters. Based on SWANCC, USACE no longer has jurisdiction or regulates isolated wetlands (i.e., wetlands with no hydrologic connection to waters of the United States).

Applicants must obtain a permit from USACE for all discharges of dredged or fill material into waters of the United States, including adjacent wetlands, before proceeding with a proposed activity. USACE may issue either an individual permit evaluated on a case-by-case basis or a general permit evaluated at a program level for a series of related activities. General permits are preauthorized and are issued to cover multiple instances of similar activities expected to cause only minimal adverse environmental effects. Nationwide permits (NWPs) are a type of general permit issued to cover particular fill activities. Each NWP specifies particular conditions that must be met for the NWP to apply to a particular project, including acreage limits on the extent of fill. The proposed project is expected to qualify for authorization under NWP 12 (utility lines). Potential waters of the United States in the study area would be under the jurisdiction of USACE Sacramento District. Central Valley will apply for the appropriate permit from USACE in compliance with Section 404.

Executive Order 13186: Migratory Bird Treaty Act

EO 13186 (signed January 10, 2001) directs each federal agency taking actions that could adversely affect migratory bird populations to work with USFWS to develop a memorandum of understanding (MOU) that will promote the conservation of migratory bird populations. Protocols developed under the MOU will include the agency responsibilities listed below.

- Avoid and minimize, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions.
- Restore and enhance habitat of migratory birds, as practicable.
- Prevent or abate the pollution or detrimental alteration of the environment for the benefit of migratory birds, as practicable.

The EO is designed to assist federal agencies in their efforts to comply with the MBTA (50 Code of Federal Regulations [CFR] 10 and 21) and does not constitute any legal authorization to take migratory birds. *Take* is defined under the MBTA as “the action of or attempt to pursue, hunt, shoot, capture, collect, or kill” (50 CFR 10.12) and includes intentional take (i.e., take that is the purpose of the activity in question) and unintentional take (i.e., take that results from, but is not the purpose of, the activity in question).

State Regulations

The CESA, Porter-Cologne Water Quality Control Act (Porter-Cologne Act), and California Fish and Game Code (CFGC) are applicable to the proposed project and described below.

California Endangered Species Act

California implemented CESA in 1984. The act prohibits the take of endangered and threatened species; however, habitat destruction is not included in the state's definition of take. Under CESA, *take* is defined as an activity that would directly or indirectly kill an individual of a species, but the definition does not include harm or harass. CESA Section 2090 requires state agencies to comply with endangered species protection and recovery and to promote conservation of these species. DFG administers the act and authorizes take through Section 2081 agreements, except for species designated as fully protected. Regarding rare plant species, CESA defers to the California Native Plant Protection Act (CNPPA), which prohibits importing rare and endangered plants into California, taking rare and endangered plants, and selling rare and endangered plants. State-listed plants are protected mainly in cases where state agencies are involved in projects under CEQA. In these cases, plants listed as rare under CNPPA are not protected under CESA but can be protected under CEQA.

Swainson's hawk and giant garter snake are the only state-listed species that are known to occur in the project area. Measures will be implemented to avoid and minimize effects on these species. DFG will be consulted to determine if take authorizations under CESA are required (particularly for giant garter snake).

Porter-Cologne Water Quality Control Act

California Water Code Section 13260 requires "any person discharging waste, or proposing to discharge waste, in any region that could affect the waters of the state to file a report of discharge (an application for waste discharge requirements)." Under the Porter-Cologne Act definition, waters of the state are "any surface water or groundwater, including saline waters, within the boundaries of the state." The SWANCC ruling, described above, has no bearing on the Porter-Cologne Act definition. Although all waters of the United States that are within the borders of California are also waters of the state, the reverse is not true. Therefore, California retains authority to regulate discharges of waste into any waters of the state, regardless of whether USACE has concurrent jurisdiction under CWA Section 404. If USACE determines that a wetland is not subject to regulation under Section 404, CWA Section 401 water quality certification is not required. However, RWQCB may impose waste discharge requirements (WDRs) if fill material is placed into waters of the state. As stated previously, Central Valley will apply for water quality certification from the Central Valley RWQCB.

California Fish and Game Code

Several sections of the CFGC apply to the proposed project and are described below: Sections 1602, 3503, 3503.5, 3511, and 3513.

Section 1602: Streambed Alteration Agreements

Under CFGC Section 1602, public agencies are required to notify DFG before undertaking any project that would divert, obstruct, or change the natural flow, bed, channel, or bank of any river, stream, or lake. Preliminary notification and project review generally occur during the environmental process. When an existing fish or wildlife resource may be substantially adversely affected, DFG is required to propose reasonable project changes to protect the resources. These modifications are formalized in a streambed alteration agreement (SAA) that becomes part of the plans, specifications, and bid documents for the project. Central Valley will apply for an SAA for trenching through drainages and will coordinate with DFG to determine the need for a SAA for boring under drainages and associated riparian habitat.

Sections 3503 and 3503.5: Birds and Raptors

CFGC Section 3503 prohibits destruction of bird nests. Section 3503.5 prohibits killing of raptor species and destruction of raptor nests. Trees and shrubs may be present in and adjacent to the study area and could provide potential nesting habitat for birds and raptors. Central Valley will avoid violation of CFGC Sections 3503 and 3503.5 by implementing applicant-proposed measures identified below for birds and raptors.

Section 3511: Fully Protected Birds

CFGC provides protection from take for a variety of species, referred to as *fully protected species*. CFGC Section 3511 lists fully protected birds and prohibits take of these species. The code defines *take* as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." Except for take related to scientific research, all take of fully protected species is prohibited. One fully protected species, the white-tailed kite (*Elanus leucurus*) is common in the Central Valley (Dunk 1995), and has the potential to occur in the study area. Central Valley will avoid violation of CFGC Section 3511 by implementing applicant-proposed measures identified below for birds and raptors.

Section 3513: Migratory Birds

CFGC Section 3513 prohibits the take or possession of any migratory non-game bird as designated in the MBTA or any part of such migratory non-game bird, except as provided by rules and regulations adopted by the Secretary of the

Interior under provisions of the MBTA. Central Valley will avoid violation of CFGC Section 3513 by implementing applicant-proposed measures for migratory birds.

Local Regulations

The Colusa County General Plan (Colusa County 1989) contains policies in the Resource Conservation (CO) and Open Space and Recreation (OS) Elements that apply to biological resources. The following policies are relevant to the proposed project.

Conservation (Wildlife and Habitat Policies)

- **CO-20.** Protection of Resource Conservation Areas may at times conflict with agricultural and recreation management practices on adjoining lands. Such conflicts should be resolved on a case by case basis in a manner which recognizes the public interests in both habitat resource protection and the sound management of agricultural and recreational resources.
- **CO-21.** Land uses within Resource Conservation Areas will be regulated only to the degree necessary to achieve protection of the resource. Very low density single family residences, low intensity recreation uses, and agricultural uses may be permitted to the extent that critical habitats are not disrupted.

Open Space and Recreation (Natural Resource Preservation Policies)

- **OS-4.** The native perennial grasslands in Colusa County (located 6 miles west of Williams near Salt Creek) should be preserved as open space.
- **OS-5.** The Mendocino Natural Forest Plan for Colusa County should be supported.
- **OS-6.** The National Wildlife Refuges in Colusa County should remain in their present use. Efforts to improve the conditions of the refuges for wildlife should be supported.

Impact Analysis

This section describes the proposed project's impacts on biological resources. First, it describes the methods used to determine the proposed project's impacts and lists the thresholds used to conclude whether an impact would be significant. Second, it discusses the individual construction (temporary, short-term) impacts. Third, it discusses operational (permanent, long-term) impacts associated with each component of the proposed project and the project as a whole. Applicant-proposed measures to avoid, minimize, or compensate for potentially significant impacts are described for each impact, as necessary.

Significance Thresholds and Methodology

Methods

This impact analysis is based on project information provided in Chapter 2, information gathered during reconnaissance field surveys, and experience monitoring construction activities on natural gas storage projects. Compensatory mitigation for impacts on federally listed species may also be identified as conditions of project permits (e.g., the Biological Opinion from USFWS) and will be implemented as part of the project.

Impact Assumptions

Construction and future operation-related activities associated with the proposed project could result in temporary or permanent impacts on biological resources. In assessing the magnitude of possible effects, the following assumptions were made regarding project-related impacts on biological resources.

- The extent of biological communities that would be removed during construction activities was estimated using the most current project information provided by the Central Valley and its engineers.
- Construction of the proposed project would result in the disturbance of common natural communities (e.g., non-native grassland and agricultural fields). The loss or disturbance of these communities is not considered significant from a botanical perspective; therefore, botanical-related impacts on these communities are not discussed in this section.
- It is currently not known if vernal pool fairy shrimp or vernal pool fairy shrimp are present in the project area because protocol-level surveys for these species have not been conducted for this project or the previous Wild Goose and PG&E projects in the area and areas that were previously identified as suitable habitat have been disked. These issues will be addressed during future coordination with the USFWS. For the purpose of this impact analysis, it is assumed that aquatic habitat for federally-listed invertebrates occurs in the project study area but is greater than 250 feet from the proposed project facilities that are located in the area that supports the seasonal wetland habitat (metering station, gas pipeline, and access road to these facilities). Impacts on federally-listed invertebrates are addressed in this analysis because there is a potential for inadvertent impacts on potential seasonal wetland habitat. APMs are described below to ensure this habitat is avoided and protected during construction in the grasslands west of the Glenn-Colusa Canal.
- No special-status plants have been located during previously surveys and none were located during the recent 2008 and 2009 surveys. The only suitable habitat for special-status plants is associated with the perennial drainages and associated freshwater marsh habitat that cross through the pipeline alignment. The two species that have the highest potential to occur along these drainages but were not previously observed during field surveys

are Sanford's arrowhead (*Sagittaria sanfordii*) and rose-mallow (California hibiscus) (*Hibiscus lasiocarpus*). Drainages that provide suitable habitat for these species tend to be larger features and will be bored as part of the project. The project will not have a significant impact on special-status plants because none have been document in the area and all suitable habitat areas (including wetland drainages) will be avoided as part of the proposed project. For these reasons, impacts on special-status plants are not addressed further in this section.

- No suitable habitat for special-status fish species (including Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, and green sturgeon) or designated critical habitat occurs in the project area. Therefore, potential impacts on these species and critical habitat are not discussed in this impact analysis.
- The proposed project will not conflict with the provisions of an adopted habitat conservation plan (HCP), natural communities conservation plan (NCCP), or other approved local, regional, or state habitat conservation plan because these types of plans do not exist for the project area.
- The proposed project will not conflict with Colusa County conservation and open space policies (described above under "Regulatory Setting").

Impact Mechanisms

Biological resources could be directly or indirectly affected during construction activities associated with the proposed project. Impacts on biological resources fall into the three categories: temporary, short-term, and long-term.

- A *temporary* impact would occur only during construction or subsequent restoration.
- A *short-term* impact would last from the time construction ceases to 3 years after construction or subsequent restoration.
- A *long-term* impact would last longer than 3 years after construction or subsequent restoration, and typically would be associated with future maintenance activities. In some cases, a long-term impact could be considered a permanent impact.

Some activities that could cause impacts on biological resources are listed below.

- Trenching activities during pipeline installation.
- Clearing of vegetation and grading to support construction of the compressor station, metering station, remote well pad site, and observation wells.
- Temporary stockpiling and side-casting of soil, construction materials, or other construction wastes.
- Soil compaction, dust, and water runoff from the construction site.
- Increased short-term construction-related noise and vibrations from equipment.

- Degradation of water quality in adjacent wetlands and waterways resulting from construction runoff containing petroleum products.
- Ground vibrations resulting from boring under drainages.

These impact mechanisms were used to assess project-related impacts on biological resources in the project area.

Criteria for Determining Significance

According to the CEQA Guidelines, a project would have a significant impact on biological resources if it would:

- have a substantial adverse effect, either directly or through habitat modification, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by DFG or USFWS;
- have a substantial adverse effect on federally protected wetlands, as defined by CWA Section 404 (including marsh, vernal pool, and coastal wetlands) through direct removal, filling, hydrological interruption, or other means;
- interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan.

Impacts

Table 3.4.4 provides an estimate of the total acreages of communities in the biological study area and potential temporary and permanent impacts on those communities anticipated from the proposed project.

Table 3.4-4. Summary of Acreage Impacts on Biological Communities in the Study Area

	Summary of Acreages		
Biological Community Type	Total Acreage in Biological Study Area	Acreage of Temporary Impact	Acreage of Permanent Impact
Non-native annual grassland	68.93	13.71[1]	0.97[2]
Agricultural land	1400.00	170.00[3]	14.15[4]
Fremont cottonwood riparian woodland	7.79	0.00	0.00
Freshwater marsh (outside of wetland drainages)	6.01	0.00	0.00
Seasonal wetland	0.21	0.00	0.00
Drainage (wetland and non-wetland)	42.81	0.07	0.00
Horticultural plantings	5.20	0.00	0.00

Notes:

[1] Acreage is associated with the temporary work space for the metering station (0.2 acre), 10-acre staging area, and gas pipeline segment west of the Glenn-Colusa Canal.

[2] Acreage includes the permanent metering station (0.8 acre) and associated 300-foot-long new access road to the facility.

[3] Agricultural land temporary impact acreage includes rice, row crops, orchards, and currently fallow fields. This temporary impact is associated with the gas pipeline and dual gas gathering line system.

[4] Acreage includes 14 acres of rice land at the compressor station and remote well pad and 0.2 acre of other crops at the observation well pads and new access roads to S-2, SL-1, and Z-1.

Impact 3.4-1: Potential inadvertent loss or disturbance of woody riparian communities during construction of the gas pipeline

Construction of the gas pipeline could result in potential loss or disturbance of woody riparian vegetation along drainages that cross through the project corridor. Currently, Central Valley is proposing to avoid drainages that support woody riparian vegetation by boring underneath the drainage and associated riparian corridor (as described in Chapter 2 and shown in Exhibit 1). However, if during the final engineering phase, Central Valley and their engineers determine that some of these bores are not feasible, woody riparian vegetation may be removed or disturbed during construction of the pipeline.

Riparian communities were once common, but have steadily declined as a result of development and agricultural land conversion practices throughout the state. The disturbance or potential removal of woody riparian vegetation would be considered a significant impact because riparian communities are considered sensitive by DFG and have declined compared to their historic extent. As part of the spring 2009 botanical field surveys (applicant-proposed measure BIO-7), woody riparian communities will be mapped and characterized. Implementation of applicant-proposed measures BIO-1 through BIO-5 would reduce this impact to a less-than-significant level.

Impact 3.4-2: Potential effects on wetlands and other waters during construction of the compressor station, remote well pad, and gas pipeline

Construction of the gas pipeline is expected to result in temporary impacts on 0.07 acre of wetlands and other waters. As described previously, it is currently unknown whether all or portions of the rice fields will be considered agricultural wetlands. This final determination will be made as part of the wetland delineation and through coordination with the USACE. For this reason, the acreage of fill material that may be permanently or temporarily deposited into agricultural wetlands (rice fields) is not presented below. These acreages will be calculated after the wetland delineation has been verified and the Section 404 application drafted.

Table 3.4-5 provides a summary of the temporary effects on wetlands and other waters based on the current engineering design.

Table 3.4-5. Summary of Impacts on Waters of the United States

Community	Type of Waters	Total Acreage of Fill	Temporary/Permanent Fill
Non-Wetland Drainage	Other Waters	0.03	Temporary
Wetland Drainage (includes drainages with freshwater marsh and seasonal wetland vegetation below the OHWM)	Wetland	0.04	Temporary
Freshwater marsh (not associated with wetland drainages)	Wetland	None	None
Seasonal wetland	Wetland	None	None

The primary potential impacts to waters of the United States would be associated with the gas pipeline component. The pipeline would result in temporary impacts on non-wetland drainages and wetland drainages that support freshwater marsh and seasonal wetlands below their ordinary high water mark. No permanent impacts on waters of the United States are anticipated as part of the pipeline component because the pipeline will be buried and the construction corridor will be restored to preconstruction condition.

The impact associated with trenching through waters of the United States (drainages, emergent wetlands, and potentially some rice fields that contain historic wetland systems) is considered temporary for the reasons listed below.

- Construction activities would be relatively short in duration.
- Construction activities would not substantially alter surface or subsurface wetland hydrologic functions.
- Topsoil would be replaced immediately after construction to allow wetlands to re-establish after construction activities are complete.

- Natural landscape or agricultural field contours will be restored to preproject conditions.

The acreage of fill material that will be temporarily deposited into potential waters of the United States will be confirmed as part of the Section 404 permitting phase. After potential waters of the United States have been delineated and the wetland report verified by USACE, the quantity and type of fill material that will be temporarily discharged into waters of the United States will be confirmed at that time. This information will be documented in the Section 404 permit package to the USACE and CPUC.

In addition to implementing the applicant-proposed measures described in Section 3.8, Hydrology and Water Quality, Central Valley will also implement measures BIO-1, BIO-2, BIO-3, and BIO-6 to ensure impacts on waters of the United States are temporary and less than significant. Central Valley will also be required by USFWS to mitigate for temporary effects on aquatic habitat for giant garter snake which would include waters of the United States. This impact and associated applicant-proposed measures are discussed below under “Impact 3.4-9: Potential Temporary Effects on Giant Garter Snake during Construction of the Gas Pipeline.”

Impact 3.4-3: Potential disturbance of western burrowing owl foraging and nesting habitat during construction of the metering station, PG&E interconnection, and gas pipeline

Construction of the metering station, PG&E interconnection pipeline, and a small section of the gas pipeline would result in impacts to non-native annual grassland. Western burrowing owls have been previously recorded in this area (California Natural Diversity Database 2009; Figure 3.4-2). The grasslands at and adjacent to the proposed metering station and PG&E interconnect sites are surrounded by existing facilities and are currently (as of December 2008) being disturbed by construction activities associated with the PG&E Colusa Generating Station. Because of the high level of noise, dust, and other disturbances occurring in the area, the area may not be currently occupied by burrowing owls. If no burrowing owls are present at the time of construction activities associated with the proposed project, the proposed project would not result in the removal of an occupied breeding or wintering burrow site and loss of adults, young, or eggs.

Central Valley will conduct biological surveys prior to construction to confirm that active western burrowing owl burrows are not present within 250 feet of the construction zone (including any staging areas and new access roads). If potential burrows or signs of burrowing owls are detected during these spring surveys, Central Valley will implement applicant-proposed measures BIO-1 and BIO-7 to ensure that the proposed project does not result in a substantial adverse effect on western burrowing owls and does not violate the MBTA and California Fish and Game Code Section 3503.5.

Impact 3.4-4: Potential loss or disturbance of nesting habitat for special-status and non-special-status raptors and migratory birds during construction of all project components

Construction activities associated with the project components could result in the removal or disturbance of trees and shrubs that provide potential nesting habitat for special-status birds and raptors. Trees and shrubs in the project area can also provide nesting habitat for a variety of migratory birds and raptors, including American goldfinch, violet-green swallow, acorn woodpecker, Nuttall's woodpecker, American kestrel, red-shouldered hawk, red-tailed hawk, and great-horned owl.

Causing the abandonment or removing active nests (with eggs or young) of white-tailed kite, northern harrier, loggerhead shrike, and many other non-special-status migratory birds and raptors violates the California Fish and Game Code and the MBTA.

Construction activities during the breeding season (generally between February 15 and August 15) could disturb or remove occupied nests of white-tailed kite, northern harrier, loggerhead shrike, and other non-special-status migratory birds and raptors. This disturbance could cause nest abandonment and subsequent loss of eggs or developing young at active nests in or near the project area. This impact would be considered significant because the project could result in a substantial adverse effect (through loss of eggs or young) on species (migratory birds and raptors) protected by the MBTA and California Fish and Game Code Sections 3503 and 3503.5. However, Central Valley will implement applicant-proposed measures BIO-1, and BIO-8 to reduce this impact to a less-than-significant level.

Impact 3.4-5: Potential disturbance of habitat for valley elderberry longhorn beetle during construction of the gas pipeline

The gas pipeline will be designed to avoid elderberry shrubs (VELB habitat) and therefore no shrubs would be removed as part of the proposed project. However, possible indirect effects on VELB habitat that occurs within 100 feet of gas pipeline construction activities could include dust accumulation on elderberry shrubs from pipeline ground-disturbing activities, changes in hydrology around elderberry shrubs, and removal of associated woodland species that could result in the subsequent death of the elderberry shrubs and loss of VELB habitat. Indirect effects have the potential to degrade VELB habitat and could result in the subsequent loss of habitat for a federally listed species. Potential direct and indirect effects on VELB habitat will be addressed in the Biological Assessment that is being prepared for the proposed project. To ensure that the proposed project does not result in a substantial reduction in local population size, lowered reproductive success, or habitat fragmentation, Central Valley will implement applicant-proposed measures BIO-1, BIO-2, BIO-3, and BIO-9.

Impact 3.4-6: Potential disturbance of Swainson's hawk nests during construction of all project components

Construction of the proposed project could result in the disturbance of known nest sites and suitable nesting habitat (riparian forest) for Swainson's hawk. As described previously, Swainson's hawks are known to nest near I-5 and the Sacramento River (Figure 3.4-2). Noise associated with construction activities could result in the disturbance of nesting Swainson's hawk if these activities occur during the breeding season (generally between February 15 and August 15) and nests are present within or adjacent to the construction area. These disturbances could cause nest abandonment and death of young or loss of reproductive potential at active nests located in or near the project area. The proposed project could result in a substantial adverse effect (through loss of eggs or young) on a species listed as threatened under CESA.

To ensure that the proposed project does not result in a substantial reduction in local population size, lowered reproductive success, or habitat fragmentation, Central Valley will implement applicant-proposed measures BIO-1, BIO-2, BIO-3, and BIO-10. This impact would be less than significant and no additional mitigation is necessary.

Impact 3.4-7: Potential disturbance of western pond turtle during construction of the gas pipeline

Western pond turtles could be crushed and killed during pipeline construction activities near drainages that provide suitable habitat for this species. To ensure that the proposed project does not result in a substantial reduction in local population size, lowered reproductive success, or habitat fragmentation, Central Valley will implement applicant-proposed measures BIO-1, BIO-3, BIO-6, and BIO-11. This impact would be less than significant and no additional mitigation is necessary.

Impact 3.4-8: Potential permanent and temporary effects on giant garter snake habitat during construction of the compressor station, remote well pad, and gas pipeline

The proposed project crosses through a region that is known to support giant garter snakes. In particular, the gas pipeline crosses through several rice fields and drainages that provide suitable aquatic habitat for this species. Upland habitats (e.g., banks of drainages and grasslands within 200 feet from drainages, including canals and agricultural ditches) provide suitable upland refuges and hibernacula for giant garter snake. The extent of this habitat is not currently known because no recent protocol-level surveys have been conducted for the proposed project. In addition, the Wild Goose Gas Storage Expansion and PG&E Colusa Generating Station Projects assumed that giant garter snake was present and did not conduct protocol-level surveys to support the projects' Biological Opinions.

Construction of the gas pipeline will result in temporary impacts on giant garter snake aquatic and upland habitat. No permanent loss of habitat is anticipated for the gas pipeline and gathering line system. Construction of the compressor station and remote well pad will result in permanent loss of 14 acres of aquatic habitat. Acreages for temporary and permanent impacts on giant garter snake habitat will be calculated as part of the Biological Assessment that is being prepared for the proposed project. These acreages will be provided to the CPUC once they are available.

Construction activities also have the potential to cause direct mortality, substantially reduce local population size, or lower reproductive success of the species. Boring activities could create vibrations that disturb snakes, which hear primarily by detecting vibrations on the ground. The distance that giant garter snakes can detect vibrations is unknown, as is the magnitude of vibrations that might result in disturbance to foraging, hibernating, or breeding activities. As discussed previously, Central Valley will be preparing a Biological Assessment that addresses direct, indirect, and cumulative effects on this federally-listed species. The Biological Assessment will be submitted to USACE (federal lead agency) to support consultation with USFWS under Section 7 of the Federal FESA. To minimize the potential for take and substantial effects on giant garter snake, Central Valley will implement the conditions of the future Biological Opinion and applicant-proposed measures BIO-1, BIO-2, BIO-3, BIO-6, BIO-12, and BIO-13.

Impact 3.4-9: Potential disturbance of seasonal wetland habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp during construction of the metering station and gas pipeline

Currently, the proposed metering station site, gas pipeline alignment, and access road to these facilities avoids direct effects on vernal pool fairy shrimp and vernal pool tadpole shrimp habitat. However, construction activities in the annual grasslands west of the Glenn-Colusa Canal could result in unanticipated disturbances on seasonal wetland habitat from vehicle or equipment traffic.

Potential unanticipated impacts on these species and associated habitat would be considered significant because construction-related activities could result in a substantial adverse effect on habitat for a federally listed species. Implementation of applicant-proposed measures BIO-1, BIO-2, BIO-3, BIO-6, and BIO-14 would reduce this impact to a less-than-significant level.

Impact 3.4-10: Potential disturbance or loss of common wildlife species habitat during construction of all project components

Construction activities throughout the project area could temporarily disturb habitat for many common wildlife species. Many species would move out of the construction area and into nearby areas as they currently move to avoid ongoing agricultural activities (such as plowing, disking, and other ground-disturbing practices). This impact is considered less than significant because the amount of habitat that would be disturbed is small relative to the amount of habitat available to these common species in the project region. In addition, the implementation of the applicant-proposed measures described in this section and in other related resource sections of this PEA would provide some level of protection to common wildlife species in the project area. No mitigation is necessary.

Impact 3.4-11: Potential interference with the movement of fish or wildlife species or their movement corridors during construction of all project components

As noted above, the project site is adjacent to large tracts of agricultural lands and the wildlife refuge and crosses numerous paved roads. Wildlife corridors in the project site consist of creeks, drainages, ditches, and riparian habitat where present. None of these habitat types will be affected during construction. Many species would move out of the construction area and into nearby areas as they currently move to avoid ongoing agricultural activities (such as plowing, disking, and other ground-disturbing practices). Because construction is short-term and will move quickly along a narrow corridor, species movements will not be disrupted for any length of time and there will be no barriers to wildlife movement.

The impact on wildlife connectivity and migration corridors is considered less than significant because the there will be no loss of connectivity and species will be able to move freely during construction. No mitigation is necessary.

Applicant-Proposed Measures

In addition to the applicant-proposed measures described in Section 3.8, Hydrology and Water Quality, and Section 3.7, Hazards and Hazardous Wastes, Central Valley will implement the following measures to ensure that the proposed project does not result in significant and avoidable impacts on sensitive biological resources.

BIO-1: Develop and implement a worker environmental awareness program

Before any work occurs in the project area, including grading, Central Valley will conduct mandatory contractor/worker environmental awareness training for construction, monitoring, supervisory, and engineering/inspection personnel. The awareness training will be provided to all construction personnel to discuss sensitive environmental resources known or having the potential occur in the project region; discuss best management plans; and permit conditions. If new construction personnel are added to the project, Central Valley will ensure that the personnel receive the mandatory training before starting work.

BIO-2: Obtain and comply with state, federal, and local permits

Before any construction activities are initiated and engineering plans and specifications have been finalized, Central Valley will obtain the permits listed below.

- CWA Section 404 nationwide permit from the USACE.
- CWA Section 401 water quality certification from the Central Valley Water Board (all Section 404 permits require a Section 401 water quality certification from RWQCB).
- CWA Section 402/NPDES permit from the State Water Board (requiring preparation of a SWPPP).
- Section 1602 Streambed Alteration Agreement and 2081 Agreement from DFG.
- Biological Opinion from USFWS.

Central Valley is responsible for obtaining all required permits and authorizations from local, state, and federal agencies. If a conflict arises between the provisions of any of the permits, Central Valley will comply with the provision that offers the greatest protection to water quality, species of special concern, and/or critical habitat. Copies of the permits will be provided to the contractor with the construction specifications.

BIO-3: Install temporary construction barrier fencing to protect sensitive biological resources adjacent to the construction zone

The construction specifications will require that a qualified biologist identify sensitive biological habitat onsite and identify areas to avoid during construction. Sensitive communities in the area that would generally be required for construction, including staging and access, will be fenced off to avoid disturbance in these areas. The contractor will install construction barrier fencing to identify environmentally sensitive areas. Sensitive resources that occur in and adjacent to the construction area include woody riparian vegetation, wetlands (including suitable habitat for federally-listed invertebrates), giant garter snake aquatic and upland habitat, western pond turtle aquatic habitat, elderberry shrubs that provide potential habitat for VELB, and trees that support nests of sensitive bird species.

Before construction, the contractor will work with the project engineer and a resource specialist to identify the locations that require barrier fencing, and will place stakes around the sensitive resource sites to indicate these locations. In some areas, staking and flagging may be appropriate and will be determined by the environmental compliance monitor. The protected area will be designated an environmentally sensitive area and clearly identified on the construction specifications. The fencing will be installed before construction activities are initiated and will be maintained throughout the construction period.

BIO-4: Minimize potential for the long-term loss of woody riparian vegetation

To the extent possible, Central Valley will direct the contractor to minimize the potential for the long-term loss of woody riparian vegetation by trimming vegetation rather than removing entire shrubs or trees. Using hand tools (e.g., clippers, chain saw), shrubs and trees may be trimmed to the extent necessary to gain access to the work zone. Cutting will be limited to the minimum area necessary and will only be done in areas that do not provide habitat for sensitive species. All cleared material/vegetation will be removed out of the riparian zone.

BIO-5: Compensate for the loss of woody riparian vegetation at a ratio of 2:1

Central Valley will compensate for the removal or loss of woody riparian vegetation (trees and shrubs) a minimum ratio of 2:1 (2 acres for every 1 acre removed). Central Valley will purchase mitigation bank credits at a locally approved bank or contribute funds to the National Fish and Wildlife Foundation in-lieu fee program. Central Valley will provide written evidence to CPUC and other appropriate resource agencies (e.g., DFG) that compensation has been established through the purchase of mitigation credits. The amount to be paid will be the fee that is in effect at the time the fee is paid.

BIO-6: Avoid and minimize disturbance of waters of the United States, including wetlands

To the extent possible, Central Valley will avoid and minimize impacts on waters of the United States, including wetlands by implementing the following measures. These measures will be incorporated into contract specifications and implemented by the construction contractor.

- The project will be designed, to the extent possible, to avoid direct and indirect impacts on waters of the United States, including wetlands.
- Construction activities will be avoided in saturated or ponded natural wetlands and drainages during the wet season (spring and winter) to the maximum extent possible. Where such activities are unavoidable, protective practices such as use of padding or vehicles with balloon tires will be employed.
- Exposed drainage banks and levees above drainages will be stabilized immediately upon completion of construction activities. Other waters of the United States will be restored in a manner that encourages vegetation to re-establish to its preproject condition and reduces the effects of erosion on the drainage system.
- Any trees, shrubs, debris, or soils that are inadvertently deposited below the OHWM of streams will be removed in a manner that minimizes disturbance of the drainage bed and bank.
- To the extent possible, in-stream construction within the OHWM of natural drainages crossed by a pipeline alignment will be restricted to the low-flow period (generally April through October).
- All activities will be completed promptly to minimize their duration and resultant impacts.

BIO-7: Conduct preconstruction surveys for active burrowing owl burrows and implement the California Department of Fish and Game guidelines for burrowing owl mitigation, if necessary

If wildlife surveys indicate that the annual grasslands west of the Glenn-Colusa Canal support potential burrows, Central Valley will retain a qualified biologist to conduct preconstruction surveys for active burrows according to DFG guidelines. DFG (1994) recommends that preconstruction surveys be conducted at all construction sites (except paved areas) and within a 250-foot-wide buffer zone around the construction site to locate active burrowing owl burrows.

If no burrowing owls are detected, then no further actions will be taken. If active burrowing owls are detected, the following measures will be implemented by Central Valley.

- When destruction of occupied burrows is unavoidable outside the nesting season (September 1–January 31), unsuitable burrows will be enhanced (enlarged or cleared of debris) or new burrows created (installing artificial burrows) at a ratio of 2:1 on protected lands approved by DFG. Newly created burrows will follow guidelines established by DFG.
- If owls must be moved away from the project construction area, passive relocation techniques (e.g., installing one-way doors at burrow entrances) will be used instead of trapping. At least 1 week will be necessary to accomplish passive relocation and allow owls to acclimate to alternate burrows.
- If active burrowing owl burrows are found and the owls must be relocated, Central Valley will offset the loss of foraging and burrow habitat in the project construction area by acquiring and permanently protecting foraging habitat (the acreage would be determined through consultation with DFG).
- If avoidance is the preferred method of dealing with potential impacts, no ground disturbing construction activities will occur within 160 feet of occupied burrows during the nonbreeding season (September 1–January 31) or within 250 feet during the breeding season (extends from March through August, peaking in April and May).

BIO-8: Avoid disturbance of tree-, shrub-, or ground-nesting white-tailed kite, northern harrier, loggerhead shrike, and non-special-status migratory birds and raptors

Central Valley will implement one of the following measures, depending on the specific construction timeframe, to avoid disturbance of tree-, shrub- or ground-nesting birds such as white-tailed kites, northern harriers, loggerhead shrikes, and white-faced ibis, and non-special-status migratory birds and raptors.

- For project components that are scheduled for construction during the breeding season for these species (generally between February 15 and August 15), a qualified wildlife biologist will be retained to conduct the following focused nesting surveys within the appropriate habitat.

  - Tree- and shrub-nesting surveys will be conducted in riparian and oak woodland habitats within or adjacent to the construction area to look for white-tailed kite, loggerhead shrike, and other non-special-status migratory birds and raptors.

  - Ground-nesting surveys will be conducted in annual grasslands and agricultural lands within and adjacent to the construction area to look for northern harrier and other non-special-status migratory birds.

    The surveys should be conducted within 2 weeks before initiation of construction activities and at any time between February 15 and August 15. If no active nests are detected, then no additional measures are required.

    If surveys indicate that migratory bird or raptor nests are found in any areas that would be directly affected by construction activities (e.g., the noise associated with construction would substantially exceed ambient noise levels associated with highway/road or agricultural noise), then a no-disturbance buffer will be established around the site to avoid disturbance or destruction of the nest site until after the breeding season or after a wildlife biologist determines that the young have fledged (usually late June to mid-July). The extent of these buffers will be determined by a wildlife biologist, and will depend on the level of noise or construction disturbance, line of sight between the nest and the disturbance, ambient levels of agricultural and highway/road noise and other disturbances, and other topographical or artificial barriers. These factors should be analyzed to make an appropriate decision on buffer distances.

- Construction activities that are scheduled to begin before the breeding season (i.e., begin between August 16 and February 15) (pre-existing construction) can proceed. Optimally, all necessary vegetation removal should be conducted before the breeding season (generally between February 15 and August 15) so that nesting birds or raptors would not occur in the construction area during construction activities. If any birds or raptors nest in the project vicinity under conditions existing before construction, then it is assumed that they are habituated (or will habituate) to the construction activities. Under this scenario, the preconstruction survey described previously should still be conducted on or after February 16 to identify any active nests in the vicinity, and active sites should be monitored by a wildlife biologist periodically until after the breeding season or after the young have fledged (usually late June to mid-July). If active nests are identified on or immediately adjacent to the project site, then all nonessential construction activities (e.g., equipment storage and meetings) should be avoided in the immediate vicinity of the nest site, but the remainder of construction activities may proceed.

All preconstruction surveys will be documented in a memo to the CPUC to support authorization of the notice to proceed for specific project components.

BIO-9: Establish a minimum 20-foot-wide buffer around all elderberry shrubs prior to construction in the area around the shrub

Before any ground-disturbing activity, Central Valley will ensure that a minimum 4-foot-tall temporary, plastic mesh–type construction fence is installed at least 20 feet from the driplines of elderberry shrubs that are within 100 feet of the construction area. The fencing will be installed in a way that prevents equipment from enlarging the work area beyond the delineated work area. The fencing will be checked and maintained weekly until all construction is completed.

No construction activity, including grading, will be allowed until this condition is satisfied. No grading, clearing, storage of equipment or machinery, or other disturbance or activity may occur until the CPUC environmental compliance monitor has inspected and approved all temporary construction fencing. The fencing and a note reflecting this condition will be shown on the construction plans.

BIO-10: Conduct preconstruction surveys for Swainson's hawk nests and implement appropriate restrictions

To ensure that possible impacts on nesting Swainson's hawks or their foraging habitat are less than significant, and that unauthorized take of Swainson's hawk does not occur, Central Valley will implement the following measures:

(a) Preconstruction surveys for nesting Swainson's hawks will be conducted in the project area. These surveys will occur during the breeding season before project activities begin.

(b) If a Swainson's hawk nest occurs in or adjacent to the project area and could be adversely affected by the increase in ambient noise levels associated with construction, Central Valley will follow DFG's recommendations for mitigating impacts to Swainson's hawks (California Department of Fish and Game 1994).

BIO-11: Conduct a preconstruction survey for western pond turtles and implement measures to avoid impacts

To avoid construction-related impacts on western pond turtles, Central Valley will retain a wildlife biologist to conduct a preconstruction survey for western pond turtles no more than 48 hours before the start of construction activities associated with the 14.7-mile gas pipeline component. The wildlife biologist will look for adult pond turtles. If a western pond turtle is located in the construction area, the biologist will move the turtle to a suitable aquatic site outside the construction area.

BIO-12: Implement avoidance and minimization measures during construction activities in giant garter snake habitat
Because of the nature and scale of anticipated adverse effects on giant garter snakes and their habitat, mitigation and compensation measures presented in this measure were derived primarily from the Service's Standard Avoidance and Minimization Measures during Construction Activities in Giant Garter Snake Habitat. Mitigation measures also are based on the guidance provided in the *Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California* (U.S. Fish and Wildlife Service 1997.)

Mitigation measures to avoid and minimize effects on the giant garter snake are as follows:

- At such time when construction plans are finalized, a biologist will conduct a preconstruction survey for giant garter snake and its habitat at each site where construction activities will occur. This survey will identify and document the specific locations of suitable habitat within, or adjacent to, proposed construction areas. The biologist will be responsible for submitting survey maps and immediately reporting the presence of the species, if found, to the USFWS in order to determine appropriate actions.

If giant garter snake habitat is identified during the preconstruction survey identified above, Central Valley will:

- Avoid construction activities within 200 feet from the banks of giant garter snake aquatic habitat and confine movement of heavy equipment to existing roadways to minimize habitat disturbance to the maximum extent feasible.
- Time construction activities within habitat so that they occur between May 1 and October 1. This is the active period for giant garter snakes and direct mortality is lessened, because snakes are expected to actively move and avoid danger.
- Inform construction personnel to recognize giant garter snakes and their habitat. Construction personnel should receive worker environmental awareness training prior to undertaking work at construction sites.
- Survey the project area for giant garter snakes 24 hours prior to initiating construction activities. After construction has been initiated, a biologist will be available thereafter. If a snake is encountered during construction, the biologist will have the authority to stop all construction activity until appropriate corrective measures

can be completed or it has been determined that the snake will not be harmed. A survey of the project area should be repeated if a lapse in construction activity of 2 weeks or greater has occurred. Sightings and acknowledgement of incidental take will be reported to the USFWS immediately.

- Confine clearing to the minimum area necessary to facilitate construction activities. Flag and designate avoided giant garter snake habitat within or adjacent to the project area as an environmentally sensitive area. This area should be avoided by all construction personnel.
- Ensure any dewatered habitat remains dry for at least 15 consecutive days after April 15 and prior to excavating or filling the dewatered habitat.
- Remove temporary fill and construction debris and, wherever feasible, restore disturbed areas to preproject conditions after construction activities. Restoration work may include such activities such as replanting species removed from banks or replanting emergent vegetation in the active channel.

BIO-13: Compensate for the temporary disturbance of giant garter snake habitat

Central Valley will compensate for temporary disturbance of giant garter snake habitat. This mitigation will be determined through consultation with USFWS and USACE and provided in the Biological Opinion. Based on a review of the Biological Opinions that were issued for the Wild Goose Gas Storage Expansion and PG&E Colusa Generating Station Projects, the USFWS will likely require a 1:1 ratio for temporary impacts to giant garter snake habitat. This mitigation ratio is consistent with the USFWS *Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted projects with Relatively Small Effects on Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California* (U.S. Fish and Wildlife Service 1997).

The Biological Opinion will be provided to the CPUC to support their issuance of a notice to proceed for project components that support suitable giant garter snake upland and aquatic habitat.

BIO-14: Implement avoidance and minimization measures during construction activities near vernal pool fairy shrimp and vernal pool tadpole shrimp habitat

Central Valley will avoid potential direct and indirect disturbance of vernal pool fairy shrimp and vernal pool tadpole shrimp habitat by implementing the following measures:

- The onsite biological monitor will be present during ground disturbance activities occurring west of the Glenn-Colusa Canal to ensure that habitat is avoided, will have the authority to stop all construction activities that may result in the destruction of habitat.

- Central Valley will prohibit all activities within 250 feet of suitable seasonal wetland habitat (unless there is a physical barrier such as a road or berm that eliminates a hydrologic connection and potential for indirect impacts to habitat during the winter months). This would include alteration of topography, dumping, burning, burying of garbage or fill materials, construction of access roads, placement of storm water drains, and use of pesticides or other toxic chemicals.

Section 3.5

Cultural and Paleontological Resources

This section discusses cultural (archaeological and historic) and paleontological resources present or with the potential to be present in the project area. This section also provides an impact analysis and identifies measures that would reduce potential impacts on important cultural and paleontological resources.

Environmental Setting

Cultural Resources

Methods

The methods used to identify potential cultural resources in the project area involved conducting a prefield research, conducting Native American consultation, and reviewing previously prepared documents from adjacent projects.

Prefield Research

A qualified archaeologist conducted a cultural resources records search of the proposed project area. The records search was conducted at the Northeast Information Center of the California Historical Resources Information System, located at California State University, Chico. The records search was conducted for the project area and a 0.25-mile radius around it. No previously recorded cultural resources were reported within the project area; however, portions of the Glenn-Colusa Canal, which the project crosses, have been previously recorded (CA-Gle-606H).

Although the records search indicated that the majority of the proposed project area has not been previously investigated for the presence of cultural resources, a previous investigation conducted for the adjacent Wild Goose Storage Expansion Project included an investigation of portions of the proposed project area This investigation resulted in the identification of historic resources but no Native American resources were identified. A cultural resources investigation for the PG&E Colusa Generating Station (URS Corporation 2006) included the portion of the proposed alignment between the PG&E Delevan Compressor Station to just east of

McDermott Road. No archaeological sites were identified during this recent investigation.

Native American Consultation

On June 2, 2008, ICF Jones & Stokes faxed a letter to the California Native American Heritage Commission (NAHC) requesting a search of NAHC's sacred lands database for any potential cultural resources within the proposed project area. ICF Jones & Stokes also requested a list of contact information for local Native American representatives that may have information regarding potential cultural resources within the project area. On June 10, 2008, NAHC faxed a response letter to ICF Jones & Stokes indicating that a sacred lands database search failed to indicate the presence of cultural resources in the area. The NAHC response included a list of contact information for local Native American representatives. On June 16, 2008, ICF Jones & Stokes sent letters with attached project area maps to representatives on the list. The letters included a brief project description, project location details, and a request for information regarding any concerns about potential cultural resources in the project area vicinity. No responses have been received to date.

Cultural Resources Setting

Prehistoric Setting

Central Valley Archaeology

The history of human occupation and use of the Central Valley is characterized by a number of related trends taking place over the last 10,000 years. Archaeologically visible patterns can be attributed to responses to gradual changes in climate, resource availability, and human population growth. The cultural responses to these changes include specialization, intensification, sedentism, and the development of regional economic networks.

This section provides an overview of the changing adaptive strategies used by the inhabitants of the Central Valley and the archaeological manifestations of these changes. Although this area of the Central Valley was known to have reached high levels of population density, the distribution of people over the landscape was variable and closely tied to food and water availability. Except for the major east–west rivers and their stream networks, much of the project area was relatively void of large population aggregates. This is particularly true of the last several thousand years, when population levels in the Central Valley peaked. This characterization does not suggest that many locations in the project area were not used, but rather that the activities that took place in these areas are not readily visible in the archaeological record.

The archaeological record of the Central Valley has been approached in two fundamentally different ways. The first approach is chronological. Developed initially from relative sequences in stratified occupation and burial sites, a three-stage chronology was proposed in the late 1930s (Lillard et al. 1939). Called simply the Early, Middle, and Late Periods, these chronologies were defined by shifting patterns in site assemblages and mortuary morphology. Although interpretations varied, explanations for change were usually linked to the movements of people. This chronological framework was later refined and eventually became the Central California Taxonomic System (CCTS) which, to be consistent with the Midwest Taxonomic System, substituted the term *horizon* for *period* (Beardsley 1954a, 1954b).

The second approach grew out of the archaeological patterns developed from the CCTS. As absolute dates became available for sites with early, middle, and late assemblages, it was discovered that sites with different assemblages actually were contemporaneous. This was particularly true for sites from the Early and Middle Horizons. This discovery, along with a change in archaeological paradigms to a more economic and functional orientation in the 1960s, led to a reorganization of the CCTS. The new scheme used the same archaeological manifestations to differentiate sites as did the old CCTS, but ordered sites into functional groups rather than temporal ones.

This second, more functional approach was advanced by Fredrickson (1973), who used the term *pattern* to describe an "adaptive mode extending across one or more regions, characterized by particular technological skills and devices, and particular economic modes." Three patterns were introduced: Windmiller, Berkeley, and Augustine. Patterns, while generally corresponding to the Early, Middle, and Late Horizons within the Central Valley, were conceptually different and free of spatial and temporal constraints. By changing the paradigm from a cultural-historical orientation to a more processual-adaptive one and introducing the concept of pattern, Fredrickson addressed problems with the chronological and regional sequences that had been nagging archaeologists for several decades.

One problem with both approaches is that they have been based on an archaeological record derived primarily from village sites. This poses less of a problem under a chronological framework, but presents a more substantial problem when an economic perspective is taken. Our current understanding of the prehistoric valley settlement and subsistence systems is heavily biased toward large habitation sites adjacent to permanent water sources. These sites, by their very nature, can provide only limited information on the total economic system. Much more archaeological work is needed at ephemeral and peripheral sites located away from the larger habitation sites.

Cultural Sequence in the Project Area

This summary of the archaeology of the Central Valley follows a temporal outline using the Early, Middle, and Late Horizons, but it does so within a processual perspective incorporating the Windmiller, Berkeley, and Augustine patterns. The Central Valley sequence is seen as a continuous and gradual cultural response to both ecological and social constraints.

Pleistocene/Holocene Transition: 12,000–6000 B.C.

Archaeological evidence for human use of the Central Valley during the late Pleistocene and early Holocene is scarce. At the end of the Pleistocene, circa 10,000–8000 B.C., parts of the Sierra Nevada adjacent to the Central Valley were covered with large glaciers, and the valley provided a major transit route for animals and people. This transportation corridor, perhaps rivaled only by maritime coastal travel, was undoubtedly used heavily by early Californians.

Although rare, the archaeological remains of these activities have been identified in the Central Valley (Johnson 1967; Peak & Associates 1981; Treganza and Heizer 1953). Johnson (1967) presents evidence for some use of the Mokelumne River area, under what is now Camanche Reservoir, during the late Pleistocene. A number of lithic cores and a flake were found at three different locations. All lithic specimens were associated with Pleistocene gravels. These archaeological remains have been grouped into what has been called the Farmington Complex, characterized by core tools and large, reworked percussion flakes (Treganza and Heizer 1953). Farther north, at Rancho Murieta, lithic artifacts spanning the reduction sequence, as well as unworked raw material, were recovered from gravel deposits attributed to the late Pleistocene (Peak & Associates 1981).

Some archaeological evidence of human use of the Central Valley during the Pleistocene does exist. The paucity of evidence from this time period is likely a product of the archaeological record itself rather than the lack of use of the area. Most Pleistocene-Holocene era sites are deeply buried in the gravels and silts that have accumulated in the Central Valley from erosion, river flooding, and silt deposition over the last 5,000 years, or have eroded away.

The economy of the Central Valley residents during the late Pleistocene is thought to be based on the hunting of large Pleistocene mammals. Although no direct evidence of this exists in the Central Valley, the similarity of the artifact assemblages with those of other locations in western North America, where the association can be demonstrated, supports this argument. Much of the Pleistocene megafauna became extinct at the Pleistocene-Holocene transition. These extinctions were caused by warming temperatures, rising sea levels, and changing precipitation patterns. The Central Valley gradually became both warmer and dryer. Pine forests were replaced by vegetation similar to that found today. The rising sea level filled San Francisco Bay and created the Sacramento/San Joaquin River Delta marshes. To survive without large game, people had to change their food procurement strategies to make use of a more diverse range of smaller plants and animals.

Early Horizon: 6000–2000 B.C.

Using a wider range of smaller resources meant that people had to have access to larger areas of land to hunt and to collect the food and other resources they needed. Small groups of people probably moved through the valley, the foothills, and the Sierra Nevada to take advantage of seasonally available resources and resources limited to particular ecozones. The ability to move from resource to resource was key to the survival of populations using this adaptive strategy.

Reliance on a diverse number of smaller plants and animals had several consequences. First, people had to move around from one area to another to take advantage of the seasonal availability of particular resources. Second, large areas of land were needed to ensure that enough resources were available during all times of the year. Third, more specialized tools were necessary to procure and process the wider range of plants and animals that were being used.

A generalized subsistence strategy worked well for the inhabitants of the Central Valley for many millennia. During the Early Horizon, beginning at approximately 4000 B.C., change in the subsistence strategy began to take place. This change to a more specialized subsistence strategy can be at least partially explained by the increasing numbers of people living in the Central Valley. As the population slowly increased, it became more and more difficult for people to obtain seasonally available resources across large areas of land. Increasing populations are suggested by a much more abundant archaeological record and dietary stress indicated by dental pathologies (Morrato 1978). When the population's ability to maintain sustenance was constrained, they were forced to find ways to increase the amount of food that could be procured from smaller portions of land.

The beginnings of this intensification can be seen in what Fredrickson (1973) has identified as the Windmiller Pattern, based on the assemblage at the Windmiller site (CA-SAC-107). Artifacts and faunal remains at Windmiller sites indicate that a diverse range of resources were exploited, including seeds, a variety of small game, and fish. The material culture assemblage includes trident fish spears; at least two types of fishhooks; quartz crystals and numerous charm stone styles; and a baked clay assemblage that included net sinkers, pecan-shaped fish line sinkers, and cooking balls. Ground stone items found included mortars and pestles. The bone tool industry appears minimal but includes awls, needles, and flakers. People with a Windmiller adaptation buried their dead in formal cemeteries, both within and separate from their villages, in a ritual context that included the use of red ochre, often rich grave offerings, and ventral extension with a predominantly western orientation (although other burial positions, such as dorsal extension and flexed, and cremations are also known) (Moratto 1984). While the Windmiller Pattern is identified with the Sacramento/San Joaquin River Delta, work at Camanche Reservoir has identified sites with Windmiller assemblages (Johnson 1967), indicating that people exhibiting these adaptations also used other Central Valley settings.

Middle Horizon: 2000 B.C.–A.D. 500

It is during the Middle Horizon that resource specialization is readily visible in the archaeological record. At least one factor that necessitated the need for specialization was the gradual increase in population in the Central Valley that was mentioned in the prior section. The Central Valley inhabitants responded to this population pressure by focusing on two things. First, they used the marshlands of the Delta area where the Sacramento and San Joaquin rivers meet. The Delta at this time was much more extensive than it is today and was rich in food resources. Second, they increased the use of acorns as a food source. Acorns had been used before this time, but they became a much more predominant resource with specialized procurement and processing technologies. People in this period were more sedentary than they had been in the past, and village sites are found throughout the valley along rivers and near other areas with permanent sources of water. An economic shift from a foraging to a collecting strategy probably occurred during this time.

The adaptive pattern that is found most frequently during this period is called the Berkeley Pattern and is based on the assemblage of CA-Ala-307 (Fredrickson 1973). Sites displaying Windmiller Pattern assemblages, however, are also found in the Middle Horizon. The Windmiller Pattern sites in this period seem to occur with more frequency in or near the Delta, while Berkeley Pattern sites tend to be more prevalent farther north. The Berkeley Pattern differs primarily in its greater emphasis on the exploitation of acorns as a staple. This distinction is reflected in the more numerous and varied mortars and pestles. This complex is also noted for its especially well-developed bone industry and such technological innovations as ribbon flaking of chipped stone artifacts. During this era, flexed burials replaced extended burials, and the use of grave goods generally declined (Moratto 1984).

A restricted land base, coupled with a more specialized resource base, meant that people had to develop economic relationships with other groups of people living in areas with access to different specialized resources. Although resources and commodities were being exchanged throughout the region prior to this period, it is in this period that more extensive and more frequently used economic networks developed. Transported resources likely included foods (trans-Sierran acorn movement is known from later periods [d'Azevedo 1985]) and commodities more visible in the archaeological record such as shell and lithic materials.

Late Horizon: A.D. 500–1769

The trends toward specialization, exchange, and spatial circumscription that characterized prior periods continued in the Late Horizon. Population continued to increase and group territories continued to become smaller and more defined. The Delta region of the Central Valley reached population density figures higher than almost any other area of North America (Chartkoff and Chartkoff 1984). Patterns in the activities, social relationships, belief systems, and material culture continued to develop during this period and took forms similar to those described by the first Europeans that entered the area.

The predominant generalized subsistence pattern during this period is called the Augustine Pattern (Fredrickson 1973). Archaeological sites representing the Augustine Pattern show a high degree of technological specialization. Artifacts in this period include artifacts of composite materials, developed reductive technologies such as stone and shell work, and highly specialized adaptive technologies including basketwork and ceramic production. Other notable elements of the material culture assemblage include flanged tubular smoking pipes; harpoons; ceramic figurines and vessels (Cosumnes Brownware); clam shell disk beads; and small projectile point types such as the Gunther Barbed series. These small projectile points may indicate the use of the bow and arrow. Complex social and economic institutions are also represented by differential access to wealth as indicated by the amount and diversity of mortuary goods found in particular burials, the implementation of a shell money system, and the maintenance of extensive exchange networks.

Ethnographic Setting

The project area is in the apparent historic territory of the Patwin (Johnson 1978:350; Kroeber 1925:Plate 34). *Patwin* is a collective Euroamerican referent for the speakers of one of the three languages in the Wintuan group, a part of the Penutian language family. One translation for the word is *people*. Several politically autonomous tribelets in the southwestern part of the Sacramento River Valley are known to have used the word in reference to their respective individual groups (Powers 1877). The approximate maximum extent of Patwin territory in the late eighteenth and early nineteenth centuries was from the town of Princeton in Colusa County south to Suisun Bay, and from the Sacramento River west across the eastern slope of the Coast Ranges (Johnson 1978).

The evidence for the chronology of the initial establishment and subsequent development of Patwin territory is equivocal. Glottochronological estimates for the internal divergence of Wintuan languages suggests a California entry for Wintuan speakers at least 2,500 years ago (Levy 1979:22), although present archaeological data do not seem to support this timeframe (Moratto 1984:557). It appears more probable that the Wintuan entry into California occurred approximately between A.D. 1 and A.D. 500 (Moratto 1984:562). Glottochronological and other linguistic evidence suggests that the Patwin were in the lower Sacramento River Valley by approximately A.D. 700 (Bennyhoff 1977; Whistler 1977 and 1980) and that they began to move onto the eastern slope of the Coast Ranges after approximately A.D. 1000 (Moratto 1984:571).

The character of the culture that developed in the Patwin region is known from ethnographic and historic sources that date from the late eighteenth to the early twentieth centuries. The majority of these sources date to the latter end of this range, because the intense proselytization of the Patwin by the Missions San Francisco de Asís, San Jose de Guadalupe, and San Francisco Solano de Sonoma in the late eighteenth and early nineteenth centuries in combination with the malarial epidemic of 1833 and the smallpox epidemic of 1837 led to an apparent rapid decline in Patwin population and the abandonment, particularly in the south, of significant portions of former Patwin territory (Johnson 1978:351–352). Most of the actual ethnographic data from native Patwin informants dates to the late nineteenth and early twentieth centuries and actually postdates the cultural upheaval of the earlier period. It is unclear how well the available data represent Patwin culture prior to European contact.

The tribelet was the broadest apparent unit of political organization among the Patwin. Kroeber (1932:258–259) developed the term to describe what appears to have been the prevailing form of Native American political organization in central California from approximately the late eighteenth through the late nineteenth centuries. A tribelet is small in size, on the order of 100–300 people, with a discrete territory. The territory typically includes a permanent principal settlement or village and a number of subordinate villages that may or may not have been permanently occupied. Principal Patwin villages with dance houses appear to have been the residences of tribelet head chiefs (Kroeber 1932:259). Each village in a Patwin tribelet also had a chief (Johnson 1978:354). The position appears to have been hereditary, but, in the absence of an heir, village elders could choose a chief. The chief was the primary trustee of the village's natural resources. The chief appears to have been responsible for the reification of the village's ownership of particular resources and for decisions about resource utilization. Despite the apparent weight of a village chief's authority, the foundation for that authority was always the consensus of the households in the village.

The Patwin economy was principally based on the utilization of natural resources from the riverine corridor, the wetlands, and the grasslands of the lower Sacramento River Valley, and from the open woodlands on the eastern foothills of the Coast Ranges (Johnson 1978; Kroeber 1925, 1932). The family was the basic subsistence unit within the tribelet that engaged in the exploitation of this resource mosaic (Johnson 1978:354). Tribelets with territory primarily on the floor of the Sacramento River Valley were more reliant on riverine and wetland resources. Fish, shellfish, and waterfowl were important sources of protein in the diet of these groups (Johnson 1978:355; Kroeber 1932:277–280). Salmon, sturgeon, perch, chub, sucker, pike, trout, and steelhead were variously caught with nets, weirs, lines and fishhooks, and harpoons. Mussels were taken from the gravels along the Sacramento River stream channel. Geese, ducks, and mudhens were taken with the use of decoys and various types of nets. Tribelets with territory on the western margin of the Sacramento River Valley were less reliant on riverine and wetland animal resources and more reliant on terrestrial game (Kroeber 1932:294–295). Deer, tule elk, antelope, bear, mountain lion, fox, and wolf were variously driven, caught with nets, or shot.

The majority of the plant resources that were important factors in the Patwin diet came from the grasslands of the lower Sacramento River Valley and the woodlands of the Coast Range foothills (Johnson 1978:355; Kroeber 1932:275–276 and 295–296). Acorns were a staple amongst all the Patwin tribelets. Two types of valley oak acorns and a variety of hill and mountain oak were the primary sources of this foodstuff. As in many other native California cultures, the acorns were pulverized into meal and leached with water in a sand basin. The processed meal was then used to make a gruel or bread. A number of seed plants were important secondary food sources. These plants include sunflower, wild oat, alfilaria, clover, and bunchgrass (Johnson 1978:355). The seeds from these plants were typically parched or dried, and then ground into meal for consumption. Manzanita and juniper berries were also typically dried and ground. Blackberries, elderberries, and wild grapes could be eaten raw, dried and ground into meal, or boiled. On the western margin of the Patwin culture area, sugar pine and foothill pine nuts were roasted and eaten whole (Kroeber 1932:296).

Historic Setting

This section, summarizing the history of the project area, was extracted from the *Wild Goose Storage, Inc. Expansion Project Draft SEIR* (California Public Utilities Commission 2002). The information on historic resources is herein incorporated by reference.

Hispanic Period

Exploration and sporadic settlement of the northern Sacramento Valley region began late in the Spanish-Mexican colonial era. The Spanish did not enter the area until 1808, and it was not mapped in any detail until 1843. From the late 1820s through the mid-1840s, Canadian and American fur trappers are known to have passed through the area. After an initial period of exploration, the Spanish concentrated on the founding of presidios, missions, and secular towns with the land held by the Spanish Crown (1769–1821). In contrast, the later Mexican policy stressed individual ownership of the land in the form of land grants.

Six ranchos were established for raising cattle in 1844–47 at the end of the Mexican period. These vast land grants, ranging in size from 17,000 to 26,000 acres, were located for the most part along the Sacramento and Feather rivers to the east and north of the project study area.

The Larkins Children Rancho was located on the west side of the Sacramento River from about present-day Codora (west and slightly south of Butte City) south to Compton Landing. This 44,364-acre rancho was finally confirmed to Francis Larkin et al. Following the Mexican War of 1846–48, California was ceded to the United States (McGie 1970; Talbitzer 1987).

Gold Rush

The first substantial settlement in the region occurred during the Gold Rush, beginning in 1848 and extending to the mid-1850s (California Public Utilities Commission 2002). Mining camps sprang up along the Feather River and its tributaries, giving rise to permanent towns such as Oroville and Chico. By 1860, hydraulic mining companies dominated gold mining along the Feather River. These large-scale operations required elaborate systems of dams, reservoirs, ditches, and pipelines to deliver water to high-pressure hoses that washed away bluffs and hillsides to reach gold-bearing strata. Debris and slickens from the mines washed downstream, causing floods and inundating farmland with sand and gravel. Litigation by agricultural interests led to an 1884 court order halting most hydraulic mining in the region (Wells and Chambers 1882; Gilbert 1917; Talbitzer 1987; Kelley 1989).

Colusa County

Colusa County, originally known as Colusi, was created but not separately organized in 1850. Between 1851 and 1855, public land in the County was surveyed and subdivided into townships and sections and gradually came under private ownership (United States Surveyor General's Office 1856a,b; United States General Land Office 1856-1881; Coy 1923; Robinson 1948).

Railroad

The project study area remained sparsely settled through the 1860s (California Public Utilities Commission 2002). The first permanent towns in the area, Gridley and Biggs, were established around stations on the line of the California and Oregon Railroad in 1870. The railroad, which eventually consolidated with the Central/Southern Pacific system, had a primary role in the development of the region by transporting agricultural products and delivering materials and supplies needed for growth (McGie 1970; Robinson 1948).

Irrigation and Agriculture

Irrigation and drainage systems had a fundamental role in the development of the region by transforming farming practices (California Public Utilities Commission 2002). The year-round availability of water meant that large holdings could be subdivided into smaller parcels for resettlement and recultivation, a process that began at the turn of the century and accelerated in the 1910s and 1920s.

The general land survey was completed just as the project study area was beginning to make the transition from a mining-oriented economy to one based on agriculture and lumber (California Public Utilities Commission 2002). Early settlers in the study area established farms and ranches for cultivating grain (primarily wheat and barley) and raising livestock (primarily cattle and sheep). Dry farming of grain and the ranging of livestock remained predominant in the region through the first decade of the twentieth century.

By World War I, the agricultural economy had expanded and diversified beyond grain and livestock to include a variety of irrigation-based crops (California Public Utilities Commission 2002). The most important of these new crops was rice. California's rice industry originated in southwest Butte County in the early years of the century. A wartime boom in the rice market fueled a rapid expansion of rice farming in the Sacramento Valley. The intensive development of irrigation and drainage systems during this period was closely linked to rice farming (Mansfield 1918; California Blue Book 1932; Talbitzer 1987; Johnson, Haslam, and Dawson 1993; Bradford 1996 pers. comm.). The rice market collapsed after the war, but then it slowly stabilized.

Because of the enormous amounts of water used in flood irrigation, rice farming had a significant impact on the region's wetlands by releasing water from the rice fields during the dry summer season.

Since the 1920s, the project study area has been characterized by a continuity of uses that include large-scale reclamation systems, hunting, wildlife and habitat management, and rice farming. The major new development during this period involved the production of natural gas.

Architectural Survey

On June 25, 2009, an ICF Jones & Stokes architectural historian conducted an inventory of all buildings and structures 45 years or older within the proposed study area. Access to the existing wells was not available at the time of this field survey. However, these existing wells will be evaluated once property access has been secured and will be documented as part of the cultural resources inventory report to determine their eligibility.

Known Cultural Resources and Sensitivity Assessment

Known Cultural Resources

Based on the results of the cultural resources records search, review of a previous cultural resources investigation directly adjacent to the proposed project (Wild Goose Storage Expansion Project), review of aerial photographs, and field survey, the following cultural resources are known to be present in the proposed project area.

- The Glenn-Colusa Canal (CA-Gle-605H) (UTM: 10s 564660 mE/ 4356975 mN)
- Old Highway 99 (UTM: 10s 569593 mE/ 4357379 mN)
- Union Pacific Railroad grade (formerly Southern Pacific Railroad) (UTM: 10s 569628 mE/ 4357378 mN)
- Colusa Trough Segment (UTM: 10s 579033 mE/ 4356670 mN
- Southam Well #4
- Canal Segment 1 (UTM: 10s 583011 mE/ 4359097 mN)
- Canal Segment 2 (UTM: 10s 580315 mE/ 4356701 mN)
- Canal Segment 3 (UTM: 10s 574462 mE/ 4356616 mN)

Sensitivity Assessment

Based on the topography in the project area, the results of previous investigations, and the level of disturbance from agricultural activities, the project area has a generally low sensitivity for the presence of potentially significant prehistoric archaeological remains. Although there is a low likelihood that surface indications of prehistoric archaeological remains are present, it is possible that buried archaeological remains that have been obscured as a result of agricultural activities and natural deposition could be present. Previous investigations adjacent to and including a majority of the proposed project alignment have failed to identify significant archaeological remains. Flooding, vegetation, deposition, and previous disturbance all reduce the likelihood of the identification of archaeological remains on the ground surface. Archaeological monitoring conducted during construction of the Wild Goose Storage, Inc. Gas Storage Facilities Expansion Project (Basin Research Associates 2003) resulted in the identification of only two isolated artifacts including one prehistoric and one historic artifact. Neither artifact was considered to be a significant historical resource.

The project area has a moderate to high sensitivity for the presence of historic period sites such as water conveyance features (canals), transportation features (roads and railroads), and farming structures and associated historic period remains.

Paleontological Resources

Methods

Paleontological resources represent a limited, nonrenewable, and potentially sensitive scientific and educational resource. For the purposes of this section, paleontological resources are defined as fossilized remains of vertebrate and invertebrate organisms, fossil tracks and trackways, and plant fossils. A scientifically significant paleontological resource is regarded as an identified site or geologic deposit that contains individual fossils that are unique or unusual, are diagnostically or stratigraphically important, or add to the existing body of knowledge (i.e., stratigraphic, taxonomic, or regional) of a specific area.

Fossils are important scientific and educational resources because of their utility for the purposes listed below.

- Documenting the presence and evolutionary history of particular groups of now-extinct organisms.
- Reconstructing the environments in which these organisms lived.
- Determining the relative ages of the strata in which they occur and the geologic events that resulted in the deposition of the sediments that formed these strata.

The key sources of data and information used in the preparation of this section were published geologic literature and maps and other environmental impact documents for projects that are underlain by the same geologic formations as the project area.

Paleontological Setting

As described in Section 3.6, Geology, Soils, and Seismicity, the project area is located in the Great Valley Geomorphic Province of California. In the vicinity of the project area, the valley is filled with approximately 30,000 feet of marine and non-marine rocks and sedimentary deposits.

The project area passes through four geological formations/units.

- **Basin deposits** (late Pleistocene and Holocene). Occurs in the central and western parts of the alignment. Generally consists of fine-textured, unconsolidated alluvium.
- **Riverbank Formation, lower member** (early Pleistocene). Occurs in the vicinity of Delevan. Consists of old gravelly, sandy, and silty alluvium on low terraces. Typically contains soils with a subsurface hardpan layer.
- **Modesto Formation, lower member** (mid-Pleistocene). Occurs in the eastern part of the alignment, including the compressor station site. Consists of weakly indurated gravels, sands, silts, and clays on low terraces that border existing streams (Helley and Harwood 1985).

- **Bedrock, metamorphic, intrusive, and sedimentary rocks (**Tertiary**)**. Occurs in the extreme western part of the project area, just east of the proposed metering station site. Consists of rocks indicated in the name of the unit, but in the project area presumed to be specifically sedimentary rocks.

Based on review of existing information, the Modesto and Riverbank Formations have the potential to contain sensitive vertebrate fossil. Mammoths, bison, camels, and horses have been recovered from the Riverbank Formation elsewhere in California. Recently, during excavation of a natural gas pipeline trench, a partial mammoth (ribs, two teeth, a tusk, and a portion of a shoulder blade) were uncovered in the Riverbank Formation south of Elk Grove in the Sacramento Valley. In addition, a late Pleistocene vertebrate fauna was collected from the Riverbank Formation during excavation of a site near ARCO Arena in Sacramento County. The fossils include Harlan's ground sloth (*Paramylodon harlani*), bison (*Bison antiquus*), coyote (*Canis latrans*), horse (*Equus* sp.), camel (*Camelops hesternus*), squirrel (*Sciurus* sp.), an antelope or deer, and a mammoth (*Mammuthus* sp.). Plant fossils of an unidentified leaf and a hollyleaf cherry seed were also collected from the site (Three Rivers Levee Improvement Authority 2006).

Fossil specimens from the Modesto Formation have been reported near the Formation's type locality in the city of Modesto. Other locations are also known throughout the Central Valley. Among these are several sites near Davis and Woodland, which have yielded Rancholabrean-age rodents, snakes, horses, antelope, Harlan's ground sloth, mammoth, and saber-toothed tiger from sediments associated with both the Modesto and Riverbank Formations (EDAW 2006).

Regulatory Setting

Federal Regulations

The proposed project may require a permit from the U.S. Army Corps of Engineers (USACE). If a permit under the Clean Water Act is required, USACE is also required to comply with Section 106 of the National Historic Preservation Act (NHPA) of 1966 as amended, and its implementing regulations (36 CFR Part 800).

Section 106 of the NHPA requires that, before beginning any undertaking, a federal agency must take into account the effects of the undertaking on historic properties and afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on these actions. The Section 106 process has four basic steps.

- Identify and evaluate historic properties.
- Assess effects of the project on historic properties.
- Resolve any adverse effects of the project on historic properties in consultation with the State Historic Preservation Officer (SHPO), resulting in a Memorandum of Agreement (MOA) that spells out specific measures to avoid or mitigate impacts on the historic property.

- Proceed in accordance with the MOA.

Specific regulations regarding compliance with Section 106 state that, although the tasks necessary to comply with Section 106 may be delegated to others, the federal agency (in this case, USACE) is ultimately responsible for ensuring that the Section 106 process is completed according to statute.

Paleontological resources are nonrenewable scientific resources that are protected by several federal statutes including NEPA and the federal Antiquities Act of 1906.

State Regulations

The cultural and paleontological resources investigation was conducted in compliance with CEQA as it pertains to the requirements for identification and treatment of historic and prehistoric cultural resources and paleonotological resources.

As the designated lead agency under CEQA for approval of this action, CPUC is responsible for complying with CEQA's requirements regarding the identification and treatment of historic and prehistoric cultural resources. The State CEQA Guidelines (Pub. Res. Code Section 5097) also specify the procedure to be followed in the event of the unexpected discovery of human remains on nonfederal land. The disposition of Native American burials falls under the jurisdiction of the NAHC.

CEQA requires public agencies that finance or approve public or private projects to assess the effects of the project on cultural resources (i.e., buildings, sites, structures, or objects that may have historical, architectural, archaeological, cultural, or scientific importance). CEQA states that if a project would result in significant effects on important cultural resources, alternative plans or mitigation measures must be considered; however, only important cultural resources need to be addressed. Therefore, before mitigation measures can be developed, the importance of cultural resources must be determined.

Local Regulations

The Colusa County General Plan (Colusa County 1989) contains policies in the Resource Conservation (CO) element that apply to cultural resources. The following policies are relevant to the proposed project.

- **CO-22.** The preservation and re-use of historical sites and structures in the county should be encouraged.
- **CO-23.** The county should apply for landmark status or national register listing for any historical sites which may be eligible.
- **CO-24.** The county shall encourage and cooperate with cities, special districts, state and federal agencies, and private landowner in acknowledging and

preserving the county's cultural heritage, historical and archaeological structures, sites and landmarks.

- **CO-25.** An archaeological survey should be required prior to approval of any project which would require excavation in an area known to contain archaeological resources.

Impact Analysis

Significance Criteria

The State CEQA Guidelines define a significant historical resource as "a resource listed or eligible for listing in the California Register of Historical Resources" (Pub. Res. Code Section 5024.1). A historical resource may be eligible for inclusion in the California Register of Historical Resources (CRHR) if it meets any of the conditions listed below.

- 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 the state's 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.
- Has yielded, or may be likely to yield, information important in prehistory or history.

Further, CEQA emphasizes that evaluations take into consideration the historic integrity of a resource, combining its location, design, setting, materials, workmanship, feeling, and association.

Properties that are listed in or eligible for listing in the National Register of Historic Places (NRHP) are considered eligible for listing in the CRHR and thus are significant historical resources for the purpose of CEQA (Pub. Res. Code Section 5024.1[d][1]).

An impact on cultural and paleontological resources is considered significant if it would result in any of the following outcomes.

- Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5.
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 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.

CEQA does not define “unique paleontological resource or site,” but the SVP (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995) has suggested that *significant or unique paleontological resources* be defined as those that fulfill one or more of the following criteria.

- Provides important information shedding light on evolutionary trends and/or helping to relate living organisms to extinct organisms.
- Provides important information regarding the development of biological communities.
- Demonstrates unusual circumstances in the history of life.
- Represents a rare taxon or a rare or unique occurrence, or is in short supply and in danger of being destroyed or depleted.
- Has a special and particular quality, such as being the oldest of its type or the best available example of its type.
- Provides important information used to correlate strata for which it may be difficult to obtain other types of age dates.

Professional standards for assessment and mitigation of adverse impacts on paleontological resources have been established by the Society of Vertebrate Paleontology (SVP), an international scientific organization of professional vertebrate paleontologists (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995).

Impacts

Impact 3.5-1: Potential disturbance to known cultural resources during project construction

Known cultural resources in the project area, including the Glenn-Colusa Canal (CA-Gle-605H), Old Highway 99, Union Pacific Railroad grade (formerly Southern Pacific Railroad), the Colusa Trough, and three (3) canal segments are considered potentially significant cultural resources. Damage to or destruction of these resources would be a significant impact. However, because the project construction techniques include boring underneath all of these resources, there would be no impact. No mitigation is necessary because these features will be avoided as part of the proposed project.

Impact 3.5-2: Potential disturbance to previously unidentified cultural resources during project construction

The proposed project area has not been subjected to an onsite archaeological pedestrian survey due to restricted access and flooded rice fields. Although the proposed project area appears to have low sensitivity for the presence of potentially significant archaeological remains, it is possible that archaeological remains are present. There is also some potential that buried cultural resources could be inadvertently unearthed during ground-disturbing activities associated with project construction. To avoid these potentially significant impacts, Central Valley will implement applicant-proposed measures CR-1 and CR-2 as part of the proposed project. No additional mitigation is necessary.

Impact 3.5-3: Inadvertent discovery of Native American human remains

According to the California Health and Safety Code, six or more human burials at one location constitute a cemetery (Section 8100), and disturbance of Native American cemeteries is a felony (Section 7052). Section 7050.5 requires that construction or excavation be stopped in the vicinity of discovered human remains until the coroner can determine whether the remains are those of a Native American. If the remains are determined to be Native American, the coroner must contact the NAHC.

No human remains are known to be located in the project corridor. However, there is always the possibility that unmarked burials may be unearthed during construction. To avoid this potentially significant impact, Central Valley will implement applicant-proposed measure CR-3 as part of the proposed project. No additional mitigation is necessary.

Impact 3.5-4: Potential disturbance of buried paleontological resources from project construction

Construction of the gas pipeline, remote well pad, and compressor station could disturb or destroy previously unidentified vertebrate or plant fossils or other buried paleontological resources of scientific importance within the Riverbank and Modesto Formations. As described above, these two formations occur around Delevan, the compressor station site, and the eastern end of the pipeline corridor and could contain significant or unique paleontological resources. To avoid potential impacts on buried or previously unidentified paleontological resources, Central Valley will implement applicant-proposed measure CR-4. No additional mitigation is necessary.

Applicant-Proposed Measures

CR-1: Conduct additional field investigations and implement measures if sensitive cultural resources are found

Prior to construction, Central Valley will retain the services of a professional archaeologist to conduct onsite pedestrian inspections of those portions of the project area that are not flooded and that are considered by the archaeologist to have the potential to have archaeological deposits, and which have not already been subjected to archaeological inspection. Any identified cultural resources will be recorded on standard Department of Parks and Recreation site record forms. The archaeologist will consult with Central Valley to determine methods of avoiding impacts (such as boring under the resource or routing around the resource) on any potentially significant cultural resources that are identified as a result of these additional investigations. If any potentially significant cultural resources cannot be avoided, then additional documentation and data recovery efforts will be implemented by a qualified archaeologist in consultation with CPUC, USACE, and the State Historic Preservation Officer. Additional documentation will include preparation of formal NRHP and CRHR evaluations of recorded resources.

CR-2: Conduct archaeological monitoring and stop work if buried resources are discovered inadvertently

Central Valley and its construction contractor will take the steps specified below during project construction. A qualified archaeological monitor will inspect all ground-disturbing activities associated with pipeline construction preparation. Construction preparation will include removal of topsoil in agricultural areas, formation of berms to restrict flooding, and grading of staging areas. If buried cultural resources, such as chipped or ground stone, historic debris, building foundations, or human bone, are discovered inadvertently during ground-disturbing activities, work will stop in area of the find until a qualified archaeologist can assess the significance of the find and, if necessary, develop appropriate treatment measures in consultation with CPUC, the State Historic Preservation Officer, and other appropriate agencies. In the event that human remains are encountered, Mitigation Measure CR-3 will be implemented.

CR-3: Implement measures to comply with state laws relating to Native American remains

If human remains of Native American origin are discovered during project construction, it will be necessary to comply with state laws relating to the disposition of Native American burials, which fall under the jurisdiction of the NAHC (Public Resources Code, Section 5097). If any human remains are discovered or recognized 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 human remains, until:

- The Colusa County Coroner has been informed and has determined that no investigation of the cause of death is required and
- If the remains are of Native American origin,
  - The descendents of the deceased Native Americans have made a recommendation 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 a provided in Public Resources Code, Section 5097.98; or
  - NAHC is unable to identify a descendant or the descendant fails to make a recommendation within 24 hours after being notified by the NAHC.

CR-4: Implement measures to avoid effects on paleontological resources during construction

Central Valley will implement the following measures to avoid potential impacts on buried or previously unidentified paleontological resources.

Conduct paleontological resource training. As part of the preconstruction environmental training program, construction workers will be provided an overview of the paleontological resources that could occur in the project area. The training will be conducted to help construction workers to (1) identify potential paleontological resources encountered during excavation, and (2) review procedures in the event that a potential fossil is found. Specifically, the training may include a discussion of the following.

- Fossil identification (the paleontologist may present example fossils to the workers).
- The prohibition of collecting or intentionally disturbing fossils.
- Stopping all excavation and ground-disturbing work within 100 feet of the find.
- Procedures for notifying supervisors and site monitoring staff.
- A discussion of the paleontologist's authority to redirect or stop certain work operations.
- An overview of the actions that the paleontologist may take to identify the sensitivity of a fossil and to recover and curate a fossil.

Stop work if paleontological resources are discovered during construction. If a vertebrate fossil is discovered during construction, the contractor will stop work immediately in the area of the find until a qualified professional vertebrate paleontologist can assess the nature and importance of the find and recommend a course of action in consultation with CPUC and other appropriate agencies. If the fossil is determined to be of scientific importance, the course of action will involve preparation, recovery, and museum curation of the fossil. The course of action may also include preparation of a report for publication describing the find. Central Valley will be responsible for ensuring that the recommendations of the paleontologist regarding treatment and reporting are implemented.

Section 3.6
Geology, Soils, and Seismicity

This section describes the geologic character of the landscape and the applicable regulations pertaining to geologic hazards in the proposed project area. This section also discusses potential impacts pertaining to geology, soils, and seismicity associated with the proposed project. Applicant-proposed measures to mitigate any potentially significant impacts are described at the end of the section.

Environmental Setting

Regional Geology and Structure

The project alignment is located in the western portion of the Sacramento Valley. The Sacramento Valley represents the northward extension of California's Great Valley geomorphic province, which is characterized by thousands of feet of marine and non-marine sedimentary rocks of Cretaceous age (144 million to 66 million years), Tertiary age (66 million years to 1.6 million years), and Quaternary age (0 to 1.6 million years). These deposits fill a large, northwest-trending basin more than 400 miles in length and 50 miles wide. The Cretaceous rocks are predominantly well-consolidated marine sandstones and shales. The Tertiary rocks consist of interbedded marine and non-marine sandstones and shales; non-marine conglomerates; and a few volcanic flows, tuff layers, and diatomaceous rocks. The Quaternary-age sediments typically consist of alluvial and lacustrine sediments that are semiconsolidated to unconsolidated.

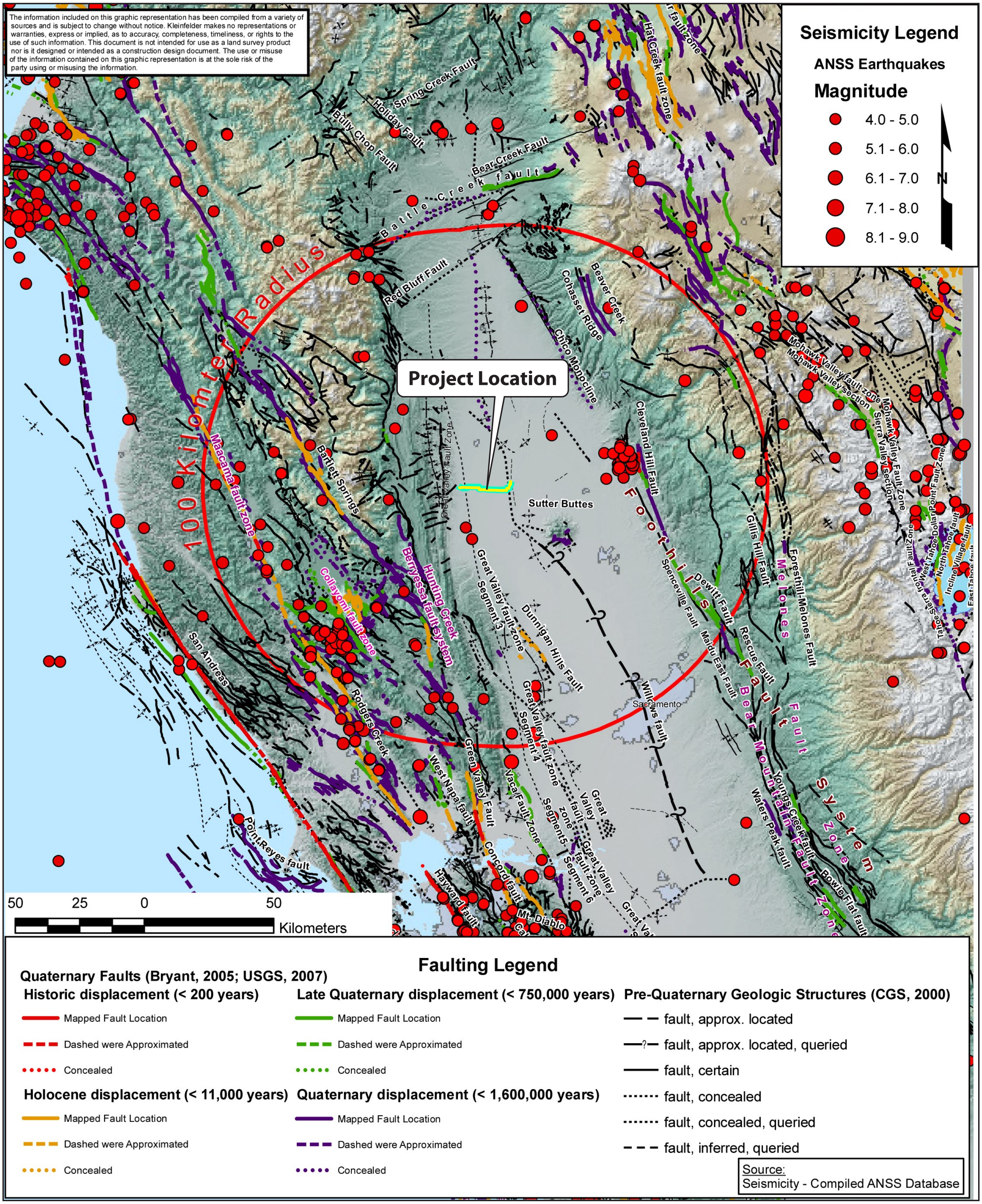
Regional Faulting and Structure

The Great Valley province is bounded to the west by the Coast Ranges–Great Valley thrust fault system. This system is a series of blind thrust faults (i.e., low-angle faults that do not extend to the ground surface) beneath the western margin of the valley. Rocks of the Coast Ranges are being thrust up over the basement rock and Great Valley sediments along these blind faults (Wakabayashi and Smith 1994). Tertiary- and Quaternary-age east–west compression across the Sacramento Valley has formed regional structural features consisting of generally north- to northwest-trending reverse broad folds and underlying blind reverse faults. A few normal faults representing north–south extension exist at the northern and southern ends of the valley. Structural relationships between these folds, faults, and Tertiary sediments have resulted in numerous natural gas reservoirs throughout the Sacramento Valley.

Most of the Sacramento Valley area is characterized by very limited seismic activity attributable to the relative absences of active faults (i.e., Holocene-age displacement) when compared with other portions of California. According to the California Geological Survey active and sufficiently active faults must be considered as potential sources of fault rupture and are placed within Alquist-Priolo Earthquake Fault Zones (APEFZ) (California Geological Survey 2001, Bryant, 2007). Active and sufficiently active faults are defined by the CGS as having evidence of Holocene displacement within the last approximately 11,000 years. No APEFZ faults cross the project area. According to the CGS, the only historic earthquake to have generated surface fault rupture in the Sacramento Valley region occurred on the Cleveland Hill fault, located approximately 30 miles northwest of the western end of the project alignment (a short fault segment considered to be part of the Foothills fault system) (California Geological Survey 2001, Bryant, 2007). In 1975, ground rupture was observed and mapped at the ground surface following this magnitude (M) 5.7 Oroville earthquake, primarily along the northern extent of this fault. This rupture was studied by the CGS and placed within an APEFZ; it is still considered capable of ground-surface rupture. A summary of the significant faults in the project region, with associated fault properties, is presented below in Table 3.6-1. These faults, along with the maximum magnitude for the individual faults, are also shown in Figure 3.6-1, "Faults and Historical Seismicity."

Table 3.6-1. Significant Faults and Associated Properties

Fault Name	Fault Length (km)	Closest Distance (km)[a]	Characteristic Earthquake Magnitude[b]	Slip Rate (mm/yr)	Recurrence Interval (yr)
Great Valley 3	55	30	6.9	1.5	1019
Great Valley 4	42	78	6.6	1.5	472
Great Valley 5	28	118	6.5	1.5	500
Hunting Creek–Berryessa	60	57	7.1	6.0	775
Great Valley 2	22	17	6.4	0.1	6803
Bartlett Springs	174	53	7.6	6.0	599
Battle Creek	29	115	6.5	0.5	1316
Maacama-Garberville	221	92	7.5	9	–
San Andreas	412	132	7.8	–	1229
West Napa	30	107	6.5	1	709
Collayomi	29	75	6.5	0.6	1230
Concord	17	108	6.2	4	690
Hayward-Rodgers Creek	150	104	7.2	9	3472
Great Valley 1	44	16	6.7	0.1	9615



Graphics ... 01099.07 (7-13-09) tm

ICF Jones & Stokes
an ICF International Company

Figure 3.6-1
Faults and Historical Seismicity

Fault Name	Fault Length (km)	Closest Distance (km)[a]	Characteristic Earthquake Magnitude[b]	Slip Rate (mm/yr)	Recurrence Interval (yr)

Notes:
[a] Closest distance between mapped fault and any portion of the study area.
[b] Moment magnitude: An estimate of an earthquake's magnitude based on the seismic moment.

The nearest Holocene active fault is the Bartlett Springs fault located about 26 miles west of the west end of the pipeline alignment. The Bartlett Springs fault system is a major northwest-trending zone composed of discontinuous, steeply dipping dextral strike-slip faults associated with the San Andreas Fault system. Swan and Taylor (1986) reported that the most recent fault rupture event occurred 300–1,000 years ago. An M7.6 earthquake has been assigned to this fault (United States Geological Survey 2008).

Within the valley, several concealed faults have been mapped, and some are considered potentially active by the CGS. Potentially active faults are defined as showing evidence of displacement that is older than 11,000 years and younger than 1.7 million years. It should be noted that the "potentially" active fault definition is no longer used as criteria for zoning active faults by CGS. However, potentially active faults still may be capable of generating a seismic event that could affect the project. An example of a potentially active fault near the proposed project is the Dunnigan Hills fault, located about 36 miles south to southeast of the project area. The Dunnigan Hills fault is considered part of the Great Valley fault system (Wakabayashi and Smith 1994) and is mapped by Jennings (1994) as an active Holocene fault because of an M5.5 event that occurred near the fault. Although some geologists and seismologist speculate that this M5.5 event may represent activity along the fault, studies performed by the CGS to consider zoning as an APEFZ concluded that there was not sufficient evidence to consider this fault active and did not recommend it be zoned.

Small, unnamed faults on the southern side of the Sutter Buttes, approximately 6 miles southeast of the project area, are identified by Jennings (1994) as being Quaternary evidence of displacement within the last 1.6 million years.

Project Area Geology

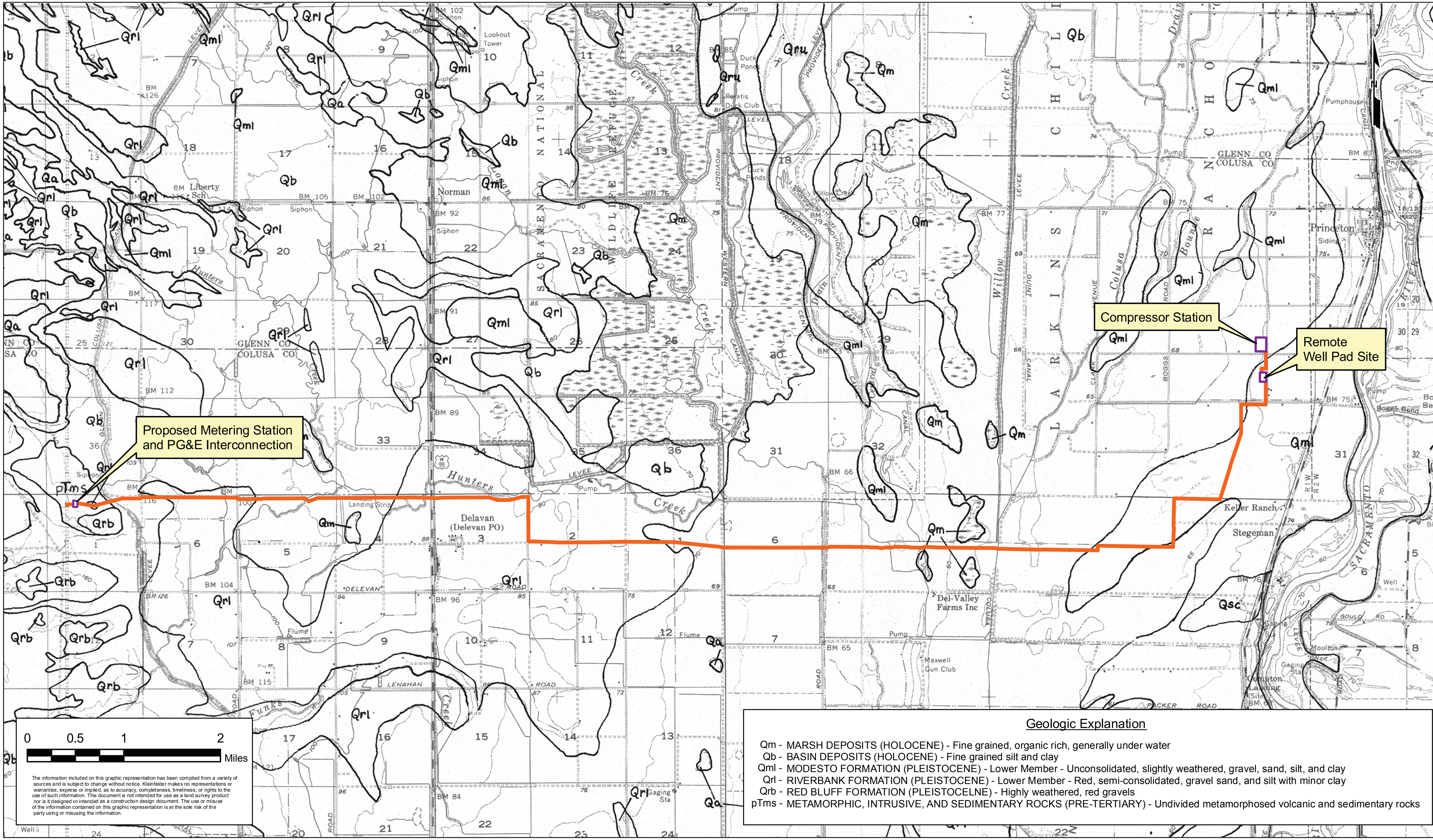
The project surface geology has been mapped by a number of geologists on a regional scale, including published maps by Jennings (1960 and 1977) and Helley (1985). Jennings' two published maps include the Geologic Map of California (1977) at a scale of 1:2,000,000 and the Ukiah Sheet (1960), at a scale of 1:250,000. Both of these maps are compilations that reflect mapping by previous authors and thus show geologic interpretation similar to Helley's. Helley's mapping focused on surface Quaternary geologic units based on geomorphology and was performed at a scale of 1:62,500. This map is presented in Figure 3.6-2 and shows that the project alignment is underlain by the following four primary geologic units.

- **Basin deposits** (map symbol Qb)—Basin deposits occur in the central and western parts of the alignment and generally consist of Holocene fine-grained, unconsolidated alluvium. Basin deposits are generally 3 to 6 feet thick near the valley perimeter and can be as thick as 180 feet in the valley center.
- **Modesto Formation, lower member** (map symbol Qml)—This occurs in the eastern part of the alignment, including the compressor station site, and consists of Late Pleistocene, unconsolidated gravel, sand, silt, and clay. The thickness of this member is poorly defined in the project area. However, in other parts of the Sacramento Valley, the lower member of the Modesto Formation has been described as having a maximum thickness of 60 feet (Busacca 1989).
- **Riverbank Formation, lower member** (map symbol Qrl)—This occurs in the vicinity of Delevan and consists of Middle to Late Pleistocene, semiconsolidated gravel, sand, and silt alluvium. It typically contains soils with a subsurface hardpan layer. Like the lower member of the Modesto Formation, the thickness of the Riverbank Formation is poorly defined in the project area. However, Busacca (1989) indicates that in other parts of the Sacramento River, the lower member of the Riverbank Formation has been described as having a maximum thickness of 30 feet.
- **Bedrock, metamorphic, intrusive, and sedimentary rocks** (map symbol pTms)—These occur at the surface in the extreme western part of the project area, just east of the proposed metering station site. Rocks mapped at depth in the area of the proposed pipeline consist of pre-Tertiary, unmetamorphosed sedimentary rocks of the Great Valley sequence. These rocks generally include strongly cemented sandstone and shale. More detailed descriptions of these rock and their formation names are presented in the “Stratigraphy of the Gas Field” section below.

Helley’s (1985) geologic units can be correlated to units on the Jennings (1960) Ukiah Sheet as shown below in Table 3.6-2. However, it should be noted that Jennings (1960) does not show Pleistocene age deposits underlying the east and central portions of the project area, as mapped by Helley. Jennings instead shows the eastern edge of the project area underlain by stream channel deposits (map symbol Qsc) and the entire central portion of the project underlain by basin deposits (Qb). These differences in mapped geologic units likely reflect the difference in scale between the two maps, with more detailed geologic interpretation shown on the smaller-scale geologic map (Helley 1985).

Table 3.6-2. Geologic Formation Correlations between Helley (1985) and Jennings (1960)

Helley (1985)		Jennings (1960)	
Map Unit	Map Symbol	Map Unit	Map Symbol
Basin deposits	Qb	Basin deposits	Qb
Modesto Formation (lower member)	Qml	Pleistocene non-marine terrace deposits	Qt



Graphics … 01099.07 (7-14-09) tm

ICF Jones & Stokes
an ICF International Company

Figure 3.6-2
Geologic Units in the Project Area

Helley (1985)		Jennings (1960)	
Riverbank Formation (lower member)	Qrl	Pleistocene non-marine	Qc
Metamorphic, Intrusive, and Sedimentary Rocks	pTms	Upper Pliocene non-marine	Puc
		Upper Cretaceous marine	Ku

Thesken (1993) provides a description of the geology in the area of the Princeton Gas Field, at the east end of the project, with an emphasis on describing the formations and structure related to the gas reservoir. As a result, he groups the Recent to Pliocene deposits as alluvium and begins to focus on formation details beginning with the Eocene Upper Princeton Valley Fill, at a depth of about 1,800 feet. A more detailed description of the geology is provided below.

Stratigraphy of the Gas Field

This description of the stratigraphy and structural geology of the Princeton Gas Field is primarily adapted from R. S. Thesken's *Bounde Creek and Princeton Gas Fields* (1993). A stratigraphic column is shown in Figure 2-1, in Chapter 2.

The oldest and deepest stratigraphic unit in the Princeton Gas Field is the Forbes Formation (Late Cretaceous), consisting mostly of shale, with lenticular sandstone interbeds. Although these Forbes Formation sandstones produce gas throughout the central and northern Sacramento Valley, they have not been productive in the Princeton Gas Field.

The roughly 2,000-foot-thick Kione Formation (Late Cretaceous) conformably overlies the Forbes Formation. The lower portion resembles the Forbes Formation; the upper portion, named the Wild Goose Sand, is a 200- to 500-foot massive (i.e., unbedded) sandstone section with a small amount of shale interbedding. This stratum is the only productive zone in the Princeton Gas Field. The target storage reservoir lies within the Kione Formation, about 2,000 to 2,300 feet deep, and consists of five discrete sand layers separated by relatively impermeable shale interbeds. The Massive Sand, the lowest of the sandstone layers, is 200 to 350 feet thick and is continuous across the field. The upper four sand layers are much thinner. Each layer ranges in thickness from 5 to 20 feet (Figure 2-2).

The Princeton Valley Fill system lies above the Kione Formation and is about 200 to 500 feet thick. This system of valley fill units represents a northeast–southwest trending canyon that was eroded and filled between the late Paleocene and early Eocene. This canyon was developed during an uplift period likely caused by Paleogene subduction and possible lateral faulting to the west (Harwood 1987). Subsequent filling of the canyon with transgressive marine sequences occurred during periods of tectonic subsidence. These marine sediments formed shale deposits that constitute the restrictive layer that upwardly confines the productive zone of the Kione Formation. The productive limit of the structure is controlled by structural closure and stratigraphic trapping, the latter by truncation of the Wild Goose Sand against the Lower Princeton Submarine Valley Fill.

The Princeton Valley Fill is overlain by Eocene marine and non-marine sediments (Thesken 1993, 2000; Harwood 1987). Neither of these authors provides formation names or property details for these Eocene deposits. Helley's (1985) mapping of Quaternary geology in the Sacramento Valley identifies an Eocene "Sedimentary Rock in Sutter Buttes Area" unit. This unit is described as consisting of the "Capay Shales," "Ione Sands," and "Butte Gravels." The Capay Shales are noted above as capping the productive zone of the Kione Formation but may extend into these unnamed Eocene deposits. Review of electric logs for Southam Well #1, #2, and #3 indicate the material extending from the productive zone to depths of about 500 feet below the ground surface (bgs) generally consists of shale with small interbeds of limestone and sandstone.

The Eocene marine and non-marine deposits are unconformably overlain by the Pliocene Tuscan and Tehama Formations. The Tuscan Formation consist of interbedded lahars, volcanic conglomerates and sandstones, and siltstones. The Tuscan Formation is found exposed along the east side of the valley in the foothill region, and beyond this project's boundary, it also extends westward below the Sacramento River and can be found at a depth of approximately 800 to 1,000 feet and is 200 to 400 feet thick in the central portion of the valley. The Tuscan Formation is believed to pinch out at east of the I-5 alignment and likely has small interfingers with the Tehama Formation in the project area. The Tuscan Formation is not found west of the Willows-Corning Fault.

The Pliocene Tehama Formation (Tte) is exposed on the west side of the valley in the foothills. Moving eastward, the Tehama Formation is as thick as approximately 1,000 feet, although some data suggest it can be as thick as 2,000 feet (California Department of Water Resources 2003) west of the Black Butte Fault and Willows-Corning Fault. The Black Butte Fault and Willows-Corning Fault truncate the valley formations and aquifer systems in the western portion of the valley. The Tehama Formation extends east past the Willows-Corning Fault, but its thickness is significantly reduced as it overlies the western extent of the Tuscan Formation. Groundwater production in the Tehama Formation is typically less than that of the Tuscan Formation and is characterized as poor to moderate.

The surface projection of the original productive limits of the Princeton Gas Field is delineated by numerous dry holes surrounding the field. It is these features that render the Princeton Gas Field a suitable location and a natural container for the storage of natural gas, as proposed for the project.

Project Faulting and Structure

The nearest mapped fault to the project alignment is the Willows fault. This fault is mapped by Harwood (1987) as crossing the east end of the pipeline, where the pipeline alignment turns north toward the compressor station and well pad locations. The fault also is mapped near the western edge of the Princeton Gas Field. The Willows fault was originally mapped by Harwood (1987) and subsequently by others as a steeply dipping reverse fault, based on the following subsurface data and geomorphology:

- linear boundaries of the Late Pleistocene Modesto Formation in the Orland Buttes area (Harwood 1987);
- linear step in groundwater elevations (California Department of Water Resources 2001);
- Tertiary and Cretaceous sediments offset based upon well log data (Harwood 1987; California Department of Water Resources 2001); and
- alignment of the Corning, Greenwood, and similar dome features (Harwood 1987 and Unruh et.al. 1997).

Harwood's (1987) cross sections drawn across the Willows fault show offset between 200 feet and 1,000 feet, based on well log data located about 6 miles north and 28 miles southeast of the project alignment, respectively. Redwine (1972, in Harwood 1987) indicates that the Princeton submarine canyon, which contains deposits that form the restrictive layer confining the Princeton Gas Field, was localized by movement along the Willows fault.

The Corning fault is mapped as a branch of the Willows fault, extending north from its intersection with the Willows fault (near the town of Willows) to the town of Red Bluff. The Corning fault is of interest because it can be linked to Late Pleistocene and Holocene-age activity and may connect with the Willows fault. Studies performed to date by Harwood (1987), California Department of Water Resources (2001), and Unruh et.al. (1997) have identified Late Pleistocene or younger ground deformation and seismic activity as being limited to the area generally north of the intersection between these two faults (and thus north of the project site). Furthermore, although these studies interpret these two faults as the same deep-seated structural geologic boundary, it is unclear whether the faults are physically connected or separated by a ductile shear zone. These studies also found no evidence of surface rupture for either the Corning or Willows faults.

Folding has occurred at depth in the project area, and has resulted in two anticlinal highs in the Princeton Gas Field area. This folding is likely due to Cenozoic east-west compressive stress that was accommodated by the Willows fault. Harwood (1987) indicates that available data in the project area dates this deformation as Late Pliocene and older, based on deformation observed in the Tehama Formation. Further discussion of this deformation is provided below relative to dating seismicity in the project area.

Historic Seismicity

A review of Petersen et al. (1999) finds that only two M6–7 and six M5–5.9 earthquakes have been recorded within about a 62-mile radius of the project alignment. Locations and magnitudes of these seismic events are presented below.

- 1881: An earthquake of estimated magnitude M5.6 occurred east of Red Bluff, about 40 miles north of the project alignment. This earthquake may be associated with the blind thrust fault beneath the Chico Monocline, the northernmost extension of the Foothills fault system.
- 1892 and 1893: Three earthquakes of estimated magnitudes M6.8, M6.4, and M5.6 occurred in the Vacaville–Winters area, about 56 to 62 miles south of the project alignment. These earthquakes have been attributed to Segment 6 of the Great Valley fault system (Wakabayashi and Smith 1994).
- 1909: An earthquake estimated to be of M5.9 occurred within the Sierra Nevada near the town of Strawberry Valley, about 43 miles northeast of the eastern end of the alignment.
- 1928: An earthquake of estimated magnitude M5.5 occurred in the Newville area, about 40 miles northwest of the pipeline alignment.
- 1975: The Oroville earthquake of M5.9 (Cleveland Hill) is discussed above.
- 1985: Four minor quakes on an unknown fault in the Coast Range foothills, the largest registering M3.7.

Kleinfelder (2001) indicated that M6.6–6.7 was appropriate for the Willows fault in the area of the Wild Goose pipeline alignment. However, data indicates seismic activity and ground deformation significantly decreases as the distance increases southward from the Corning–Willows fault intersection. Jennings (1994) and Saucedo (1992) show the Willows fault as pre-Quaternary age. Current studies by the California Department of Water Resources (DWR) (California Department of Water Resources 2001) based on deep gas well logs indicate about 300 to 500 feet of offset has occurred at the base of the Late Pliocene–age Tehama Formation. Studies also indicates that deformation of the Pleistocene-age Riverbank Formation or younger units was not evaluated because the deep gas wells were not logged in the upper 300 to 650 feet. Harwood (1987) shows similar offset of the Tehama Formation using well log data from approximately 6 miles north of the project alignment. Unruh et.al. (1987) analyzed the morphology of the Late Pleistocene-age abandoned Gapit fluvial channel to assess activity of the Willows fault. This channel is crossed by the mapped trace of the Willows fault east of the town of Artois (approximately 18 miles north of the project's well pad and compressor station site). This study found no deformation of the Gapit channel, concluding that the fault was not "active" by CGS definition. The Advanced National Seismic System (ANSS) (2008) historic microseismicity data (<M 4.0) indicate that seismic events may be occurring at depth along the north end of the Willows fault alignment, near the Corning fault intersection. However, these data also clearly indicate that seismic activity becomes increasingly infrequent with continued distance south of this

fault intersection. Microseismicity data in the immediate vicinity of the Willows fault and project alignment intersection is sparse. Furthermore, subsequent evaluation of the above surface features mapped by Harwood (1987) suggests that surface faulting has not occurred along the Willows fault. Although Harwood (1987) showed the Willows fault extending to the surface, he has since indicated that the lineaments used to map the surface expression of the Willows fault are attributable to sedimentary processes rather than surface faulting as originally thought (Harwood pers. comm.). Based on a combination of the most recent displacement identified as Pliocene, the lack of evidence indicating Late Pleistocene or younger deformation has occurred, and inadequate microseismicity, it can be concluded that the segment of the Willows fault crossing the project alignment is not seismically active.

Soils

The soils in the project vicinity are shown in Figure 3.6-3. Nearly the entire project area is characterized by basin, basin rim, floodplain, and alluvial fan landforms. At the extreme western end of the project area, near the proposed metering station, are upland soils that formed from material weathered from sedimentary rocks. The alluvial soils are generally medium- to fine-textured and poorly drained, with an erosion hazard of slight to none. Some of the basin soils have excess alkali or drainage problems, or both, caused by the presence of subsurface restrictive layers, such as cemented hardpan (Reed 2006; Natural Resource Conservation District 2008). A summary of the soil properties underlying the proposed project area are provided below.

Table 3.6-3. Summary of Soil Properties in Proposed Project Area

Soil Number	Soil Name	Slopes	Flooding Frequency	pH	Corrosivity (Steel)	Corrosivity (Concrete)	Shrink-Swell Potential	PI	LL
104	Willows silty clay	0 to 1% slopes	Frequently flooded	6.1–9.0	High	High	High	25–40	50–70
105	Willows silty clay	0 to 1% slopes	Occasionally flooded	6.1–9.0	High	High	High	25–40	50–70
106	Willows silty clay	0 to 1% slopes	No data	6.1–9.0	High	High	High	25–40	50–70
108	Scribner silt loam	0 to 1% slopes	No data	5.6–7.8	Moderate	Low	Low	10–25	30–45
113	Westfan loam, sodic	0 to 2% slopes	No data	6.6–8.8	High	Moderate	Low	5–25	25–50
124	Moonbend silt loam	0 to 2% slopes	Occasionally flooded	6.6–8.4	Moderate	Low	Moderate	10–20	30–45
125	Moonbend silt loam	0 to 2% slopes	No data	6.6–8.4	Moderate	Low	Moderate	10–20	30–45

Soil Number	Soil Name	Slopes	Flooding Frequency	pH	Corrosivity (Steel)	Corrosivity (Concrete)	Shrink-Swell Potential	PI	LL
128	Mallard loam	0 to 1% slopes	No data	6.1–8.4	Moderate	Low	Moderate	10–30	30–60
130	Corbiere silt loam	0 to 1% slopes	No data	6.6–9.0	High	Low	High	10–40	30–60
133	Corbiere silt loam	0 to 2% slopes	Occasionally flooded	6.6–9.0	High	Low	High	10–40	30–60
144	Hillgate clay loam	0 to 2% slopes	No data	5.6–8.4	Low	Moderate	High	10–40	30–60
145	Hillgate loam	0 to 2% slopes	No data	5.1–8.4	High	Moderate	Moderate	15–50	30–60
155	Alcapay clay	0 to 1% slopes	No data	6.0–9.5	High	Low	High	30–45	50–65
171	Vina loam	0 to 2% slopes	No data	6.1–7.3	Moderate	Low	Low	5–15	25–35
205	Capay clay	0 to 3% slopes	No data	5.6–9.0	High	Moderate	Very high	30–45	50–65
206	Capay clay	5 to 9% slopes	No data	5.6–9.0	High	Moderate	Very high	30–45	50–65
210	Corval loam	0 to 3% slopes	No data	6.1–7.3	Low	Low	Moderate	10–20	30–45
220	Altamont silty clay	5 to 9% slopes	No data	6.1–8.4	High	Low	High	20–40	40–65
652	Water	No data	No data	No data	No data	No data	No data	No data	No data

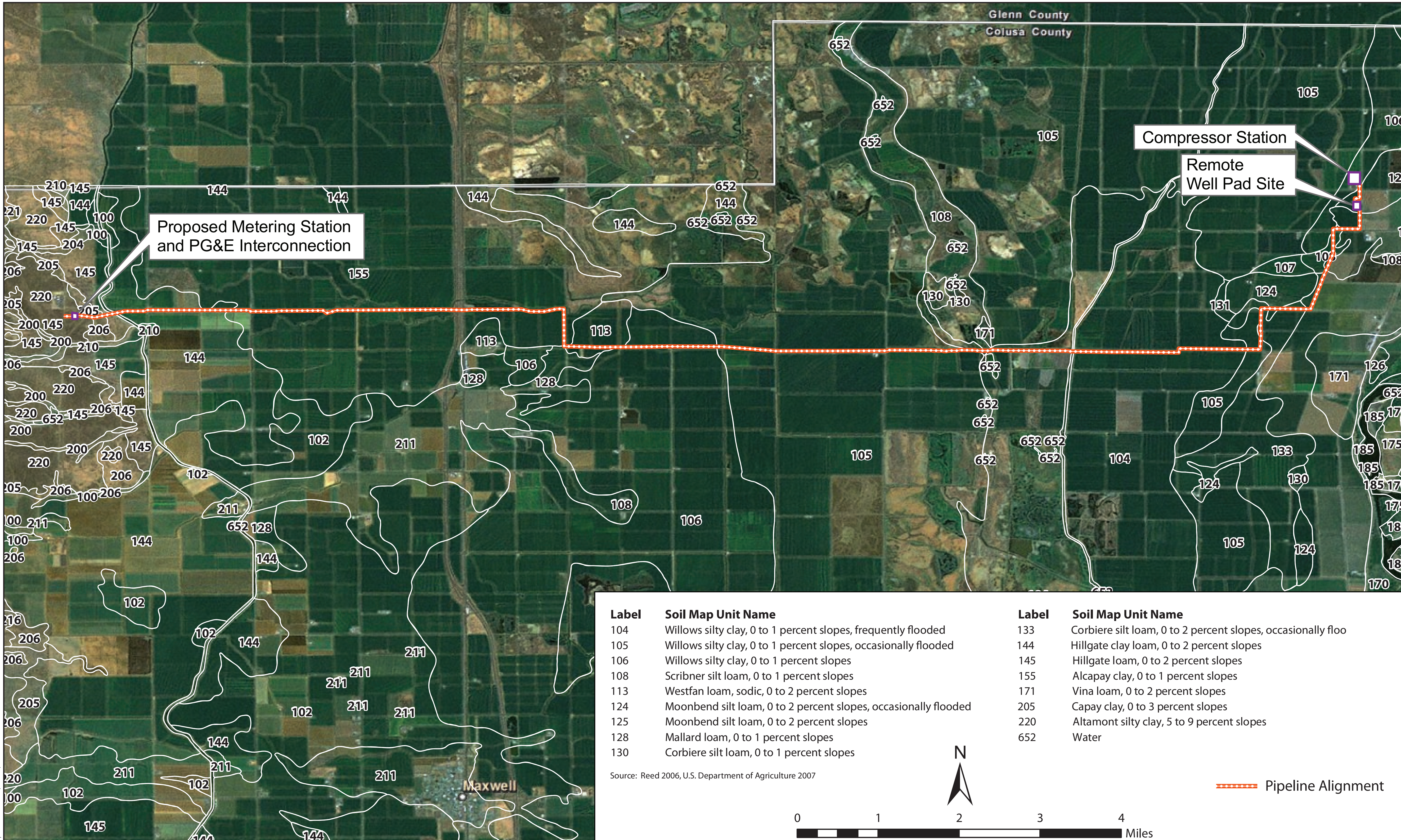
Notes:
PI = Plasticity Index
LL = Liquid Limit

Potential Geologic and Soil Hazards

This section summarizes the types of geologic and soil hazards that may be encountered during or after project construction. Each hazard addresses generalized hazards identified in the CEQA checklist.

Surface Ground Rupture

The Willows fault is the only known fault to cross the proposed pipeline alignment. As discussed in the "Project Faulting and Structure" section above, this fault has been mapped as concealed beneath Quaternary alluvial deposits



Graphics ... 01099.07 (7-14-09)

ICF Jones & Stokes
an ICF International Company

Figure 3.6-3
Soil Map Units in the Project Vicinity

(i.e., blind faulting). No evidence of surface fault rupture of Late Quaternary deposits has been documented, and CGS does not consider this fault to present a hazard of surface fault rupture (Hart and Bryant 1997). Furthermore, Unruh et.al. (1997) indicates that Late Quaternary ground surface deformation, relative to a northern extension of the Willows fault (Corning fault), also concealed by similar Quaternary alluvium, is limited to broad-scale gentle upwarping on the order of hundredths of a millimeter per year with no evidence of surface fracturing having occurred. Relative to the segment of the Willows fault that crosses the pipeline alignment, evidence of modern upwarping of the Late Quaternary alluvium is lacking. As such, there is a low potential for surface fault rupture.

Ground Shaking

Although the site is located in an area that is relatively inactive compared with other regions in California, earthquakes of M5.0 to M6.8 have occurred historically within the region. Future earthquakes of similar magnitude should be anticipated during the design life of the project, which will produce strong ground shaking within the project area.

Preliminary seismic design parameters based upon the 2007 California Building Code were developed from the USGS Java Ground Motion Parameter Calculator (2008). This calculator calculates hazard curves, uniform hazard response spectra, and design parameters for a given site. Inputting the latitude and longitude of the west and east ends of the project alignment into the Java calculator provides the design spectral accelerations SD_S and SD_1 0.659 and 0.382 at the west end of the project and 0.561 and 0.332 at the east end of the project, respectively. Site-modified spectral accelerations SMS and SM1 are 0.989 and 0.574 at the west end of the project and 0.842 and 0.497 at the east end, respectively. The peak ground acceleration (PGA) for the design earthquake (DE) can be estimated by calculating SDS/2.5. Based on this equation, the calculated PGA values for the DE at the west and east ends of the project are 0.26 gravity (g) and 0.22g respectively. The PGA for the maximum considered earthquake (MCE) can be estimated by calculating SMS/2.5. Based on this equation, the calculated PGA values for the MCE at the west and east ends of the project are 0.40g and 0.34g, respectively. The pipeline and facility structures will need to incorporate these 2007 California Building Code parameters into their design.

Liquefaction and Lateral Spreading

Soil liquefaction is a condition where saturated, granular soils undergo a substantial loss of strength and deformation due to pore pressure increase resulting from cyclic stress application induced by earthquakes. In the process, the soil acquires mobility sufficient to permit both horizontal and vertical movements if the soil mass is not confined. Factors known to influence liquefaction include soil type and age, grain size, relative density, confining pressure, depth to groundwater, and the intensity and duration of ground shaking.

Soils most susceptible to liquefaction are saturated (at depths shallower than 50 feet bgs), loose, clean, uniformly graded, and fine-grained sand and some silt deposits of Holocene age. If liquefaction occurs, foundations resting on or within the liquefiable layer may undergo settlements. This will result in a reduction of foundation stiffness and capacity.

The site is mapped by Helley (1985) as being underlain by Holocene-age basin deposits, Quaternary-age Riverbank and Modesto Formations, and bedrock of the Great Valley Sequence. Groundwater data (California Department of Water Resources 2008) from wells in the project vicinity indicate that groundwater levels near the Sacramento River can reach to near the ground surface during the wet season. Wells located farther west from the Sacramento River indicate that groundwater levels are commonly 50 feet bgs or shallower. Peak groundwater levels appear to be attributable to both irrigation practices and wet season peaks.

Strong ground shaking (SD_S and SD_1 values ranging between 0.603 and 0.324 at the west end of the project and 0.518 and 0.280 in the area of the compressor) can be anticipated along the alignment during the design life of the pipeline and structures, as discussed in the previous section. This strong ground shaking in combination with the high groundwater levels discussed above could cause loose soils beneath the project to liquefy. However, as discussed above under "Project Area Geology", much of the site is underlain by Pleistocene-age soils and bedrock, which are not anticipated to liquefy, even under saturated conditions. The younger Holocene-age basin deposits (silts) and any coarse-grained channel deposits too small to be mapped at the scale of Helley (1985) could potentially liquefy. Therefore, these deposits will need to be identified and evaluated relative to liquefaction potential during the geotechnical analysis that will be conducted for the proposed project.

Slope-Related Hazards

Because the topography in most of the project area (excluding the western end near the proposed metering station site) is nearly level, the likelihood of slope-related hazards such as landslides, slumps, and severe erosion is low. The *Colusa County General Plan* identifies the project area as having a low landslide potential (Colusa County 1989).

As described above, nearly all the soils in the project area have an erosion hazard that is slight to none. Accelerated erosion as a result of project construction activities is a concern only in the more steeply sloping areas—specifically at the extreme western end of the project area near the metering station and along drainage ways that cross the gas pipeline corridor.

Subsidence

Subsidence is defined as the settling of the ground surface. In the Central Valley, the primary cause of land subsidence has been the compaction of sediments within aquifers following severe, long-term withdrawal of groundwater in excess of recharge. In the project area, potential causes of subsidence include groundwater extraction and gas extraction from the recharged gas reservoir.

Most of the project area (excluding the metering station) occurs in an area of known subsidence (Colusa County 1989).The specific cause of this subsidence has not been identified, but groundwater withdrawal is suspected. The USGS (1989) prepared a map showing areas of ground subsidence in the Central Valley greater than 1 foot. This map indicates that ground subsidence greater than 1 foot has not been recorded in Colusa County. The DWR (2009) has installed two stations in Colusa County to monitor subsidence. These stations have been recording for 2 years, and data can be viewed at www.nd.water.ca.gov/Data/Extensometers/Data/index.cfm. Review of this data shows elastic (not long-term) subsidence on the order of less than 0.25 inch. This elastic condition may be due to aquifer and soil responses to seasonal fluctuations. Based on the above data, subsidence has not been recorded within the project area. However, depending on groundwater extraction practices, subsidence could occur.

Another potential cause of heave/subsidence is the possible influence of pressurizing/depressurizing the gas field and the displacement of groundwater caused by the introduction of gas into the field. The anticipated injection pressures are not expected to generate stresses greater than the strengths of the storage formation or the overlying strata, which would result in deformation of these overlying materials. Subsidence following extraction of gas from the reservoir is also not likely. In the case of the Massive Sand (the thickest of the five layers within the target storage reservoir), groundwater would be expected to fill the voids previously occupied by the gas, minimizing changes in pore pressure and any significant deformation/densification of the reservoir materials. The Upper Sands have been in a depleted state (i.e., at their lowest and current pressure of approximately 350 pounds per square inch [psi]) since the field ceased production in 1991. It is anticipated that the Upper Sands will be operated at a higher minimum stabilized reservoir pressure of 500 psi or greater. Furthermore, the California Division of Oil, Gas, and Geothermal Resources (DOGGR) indicates there are no known events or records of subsidence in the Princeton area (e-mail from Tim Kustic, District Deputy, to Ray Schnegelsberg [Central Valley] on June 26, 2009). Based on this information, it stands to reason that conditions that could lead to subsidence will not be present during and after the gas injection and extraction process.

Soil Expansion Potential

The basin soils—the most common type of soils in the project area—have moderate to very high expansion potential in response to changes in seasonal moisture content. Soil volume changes can be a few percent to more than 50%. These soils also may be susceptible to consolidation, chemical reactivity to untreated concrete and steel, and settlement. Consolidation (and long-term settlement) is most prominent in clay-rich and silt-rich soils.

According to the *Colusa County General Plan*, the soil expansive potential in the project area ranges from low to high (Colusa County 1989). Figure 3.6-4 shows the project alignment relative to soils mapped based on their shrink-swell potential (Natural Resource Conservation Service 2007). This map indicates the compressor station and eastern end of the gas pipeline occur in an area that has a low to moderate probability for expansive soils to occur. Most of the gas pipeline alignment is in an area that has a high probability for expansive soils. The metering station and western end of the gas pipeline are partially in an area identified as having a very high potential for expansive soils.

Tsunami and Seiche

Tsunamis are oceanic waves that are generated by earthquakes, submarine volcanic eruptions, or large submarine landslides. The waves are generally formed in groups that may have very long wavelengths (several to more than 100 miles), but only a few feet high. As a tsunami enters shallow water near coastlines, the wave velocity diminishes, and the wave height increases. If the trough of the wave reaches land first, the arrival of a tsunami is preceded by recession of coastal waters; if the crest of the wave reached land first, there would be a rise in water level. The large waves that follow can crest at heights of more than 50 feet and strike with devastating force. However, because the study area is more than 80 miles from the nearest coastline, the potential for this condition is considered low to nil.

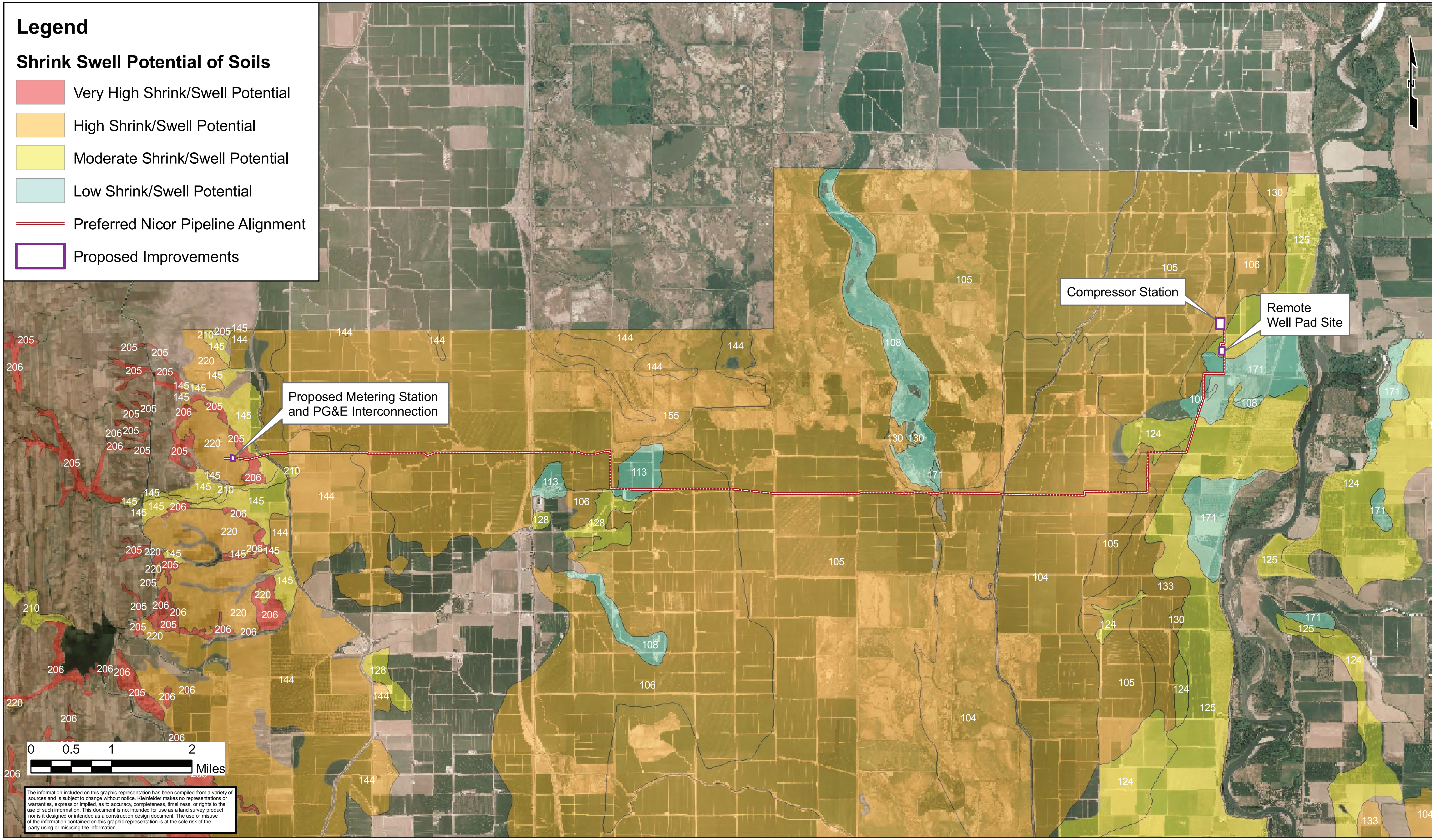
A seiche is a standing wave condition whereby large bodies of water subjected to seismic accelerations can generate significant waves that overtop the basin boundaries. The nearest body of water to the site is the Sacramento River, located about 1 mile east–southeast of the site. The size of the river and its distance from the site does not create a seiche hazard for the project.

Regulatory Setting

State Regulations

California Department of Industrial Relations, Occupational Safety and Health Regulations

Worker safety on construction projects, in particular where grading, trenching, and earthmoving are involved, is the responsibility of the California Department of Industrial Relations, Occupational Safety and Health Regulations (Cal/OSHA). Cal/OSHA establishes and enforces regulations for excavation and trenching permits (Title 8, Division 1, Chapter 3.2, Subchapter 2, Article 2 ["Permits—Excavations, Trenches, Construction and Demolition and the Underground Use of Diesel Engines in Work in Mines and Tunnels"]) and for worker safety (Chapter 4, Subchapter 4, Article 6 ["Excavations"]).



Graphics ... 01099.07 (7-13-09) tm

ICF Jones & Stokes
an ICF International Company

Figure 3.6-4
Shrink-Swell Potential for Soils in the Project Area

California Department of Conservation, Division of Oil, Gas, and Geothermal Resources

DOGGR regulates drilling, production, injection, and gas storage operations in accordance with California Code of Regulations (CCR) Title 14, Chapter 4, Subchapter 1, “Onshore Well Requirements,” Section 1724.7, “Project Data Requirements.” Approval must be obtained from DOGGR before any subsurface injection or disposal project can begin. The operator must provide data that are pertinent and necessary for the proper evaluation of the proposed project. The data required include those listed below.

- An engineering study that includes the reservoir characteristics for each injection zone; reservoir fluid data; well casing diagrams; and a well drilling, plugging, and abandonment plan.
- A geologic study that includes a structural contour map; a map of each injection zone; a geologic cross section; characteristics of the caprock; gas reserves of the storage zones before the start of injection; and a representative electric log identifying all geologic units, formations, freshwater aquifers, and oil or gas zones.
- An injection plan that includes a map of the facilities; maximum surface injection pressure; daily rate of injection per well; monitoring system or method to be used to ensure that no damage is occurring and that injection fluid is confined to the intended zone or zones of injection; method of injection; proposed cathodic protection measures for plant, lines, and wells; proposed surface and subsurface safety devices, tests, and precautions taken to ensure safety of the project; treatment of water injected; and source and analysis of injection fluid. Reservoir characteristics that must be defined include porosity; permeability; average thickness; areal extent; fracture gradient; original and present temperature and pressure; and original and residual oil, gas, and water saturations.

California Geological Survey: Alquist-Priolo Earthquake Fault Zoning Act

In the 1960s and 1970s the State of California recognized the hazards of constructing structures for human occupation across traces of active faults. As a result, the Alquist-Priolo Earthquake Fault Zoning Act (1972) was enacted. The act directs the state geologist to delineate special study zones along active faults in the state. According to the act, an active fault is one that has ruptured in the last 11,000 years. Structures for human occupancy cannot be placed over the trace of the fault and must be set back from the fault (generally 50 feet).

California Seismic Hazards Mapping Act of 1990

The Seismic Hazards Mapping Act is designed to protect the public from the effects of strong ground shaking, liquefaction, landslides, other ground failures, or other hazards caused by earthquakes. The act requires site-specific geotechnical investigations to identify the hazard and the formulation of mitigation measures before the permitting of most developments designed for human occupancy.

Special Publication 117, *Guidelines for Evaluating and Mitigating Seismic Hazards in California* (California Geological Survey 2008), constitutes the guidelines for evaluating seismic hazards other than surface fault rupture and for recommending mitigation measures as required by Public Resources Code (PRC) Section 2695(a).

California Building Code 2007

The 2007 California Building Code (CBC) is based on the 2006 International Building Code Uniform Building Code, but contains more extensive structural seismic provisions. The CBC was adopted by the California Building Standards Commission and became effective January 1, 2008. It is contained in Title 24 of the CCR, “California Building Standards Code.”

Seismic sources and the procedures used to calculate seismic forces on structures are defined in Section 1613 of the CBC. The code requires that all structures and permanently attached nonstructural components be designed and built to resist the effects of earthquakes. The code also includes grading and other geotechnical issues, and specifications for buildings and non-building structures.

Local Regulations

Colusa County General Plan

The Colusa County General Plan contains geology-related objectives in the Land Use Element. The objectives listed below are relevant to relative to geology issues.

- To permit rural development contingent upon a range of natural factors, including environmental impact, safety hazards, and the availability of water. [Land Use.]
- To encourage water use methods which minimize subsidence. [Resource Conservation.]
- To minimize the threats to life and property from seismic and geologic hazards [Public Health and Safety.]

Specific applicable safety policies under the Geologic Hazard Protection section of the Safety Element are listed below.

- **SAFE-6.** No development shall take place on or immediately adjacent to an existing landslide unless a geotechnical investigation has been performed.

This investigation shall define slide activity and slide limits, and contain specific recommendations regarding avoidance, removal, or repair. The County Planning Department should maintain a map showing the general location of existing landslides for reference by development sponsors. The determination of the location of a landslide relative to a proposed development and the preparation of any geotechnical report shall be the responsibility of the development sponsor.

- **SAFE-7.** A geotechnical investigation should be performed for any development proposal in an area of known subsidence in order to determine whether engineering modifications should be made to the design to eliminate or mitigate the adverse impacts. The county may also require a geotechnical investigation for any development proposed on highly expansive soils.
- **SAFE-23.** The County Planning Department and the Office of Emergency Services should maintain hazard maps to aid in the review of development proposals and in the development of emergency response plans. Such maps shall illustrate potential flooding, dam inundation, landslides, subsidence, and wildfire threats.
- **SAFE-26.** Development proposals in potential hazard areas should be referred to appropriate agencies for review and recommendation.

Impact Analysis

Thresholds of Significance

The following criteria for determining the significance of impacts pertaining to geology, seismicity, and soils were based on Appendix G of the State CEQA Guidelines. An impact pertaining to geology, seismicity, and soils would be considered significant if it would result in any of the outcomes listed below.

- It would expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the state geologist for the area or based on other substantial evidence of a known fault (refer to California Geological Survey Special Publication 42);
  - strong seismic ground shaking;
  - strong seismic-related ground failure, including liquefaction; or
  - landslides.
- It would result in substantial soil erosion or the loss of topsoil.
- It would 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 offsite landslide, lateral spreading, subsidence, liquefaction, or collapse.

- It would be located on expansive soil, creating substantial risks to life or property.
- It would have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems in areas where sewers are not available for the disposal of wastewater.

In addition, any conflict with the policies and objectives of the *Colusa County General Plan* listed above would constitute a significant impact.

Impacts

To support this impact analysis, data and analyses by Kleinfelder and others as presented in the above findings were reviewed. Findings and conclusions from the Kleinfelder 2001 and 2002 studies for the Wild Goose Storage Expansion Project SEIR (California Public Utilities Commission 2002) also were reviewed and reevaluated as part of this impact analysis.

Impact 3.6-1: 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

Faults that are significant to the project setting were discussed previously under "Project Faulting and Structures". Special Publication 42 (California Geological Survey 2007) provides guidelines for definition and evaluation of faults capable of potential ground rupture. These guidelines generally identify faults that have ruptured the ground surface within the past 11,000 years (i.e., Holocene Epoch) to be capable of rupturing the ground surface in the future. The nearest known Holocene faults are the Bartlett Springs and Cleveland Hill faults located 26 miles west and 30 miles east of the project, respectively. The Willows fault is the only mapped fault crossing the project alignment. However, based on review of available geomorphic, geologic, and seismic data, as discussed in the above sections, the potential for reactivation of this fault is not considered a potential impact. No mitigation is necessary.

Impact 3.6-2: Potential to expose people or structures to potential substantial adverse effects from strong seismic ground shaking

As discussed previously under "Historic Seismicity", eight M5.5 to M6.8 earthquakes have occurred historically within an approximately 62-mile (100-kilometer) radius of the project area. Future earthquakes of this magnitude and distance should be anticipated during the design life of the project and will likely create strong ground shaking in the project area. Based on the USGS Java Ground Motion Parameter Calculator (2008), the PGAs calculated for the DE are 0.26g and 0.22g for the west and east ends of the alignment, respectively. The PGAs calculated for the MCE at the west and east ends of the alignment are 0.4 and 0.34, respectively. Based on this data, the pipeline and project facilities could be adversely affected as a result of this ground shaking if not adequately designed. Central Valley will implement applicant-proposed measures GEO-1, GEO-2, GEO-3, and GEO-4, which includes performing site-specific studies, modifying project design, and incorporating all necessary building codes as required to reduce the potential impacts caused by strong seismic ground shaking. No additional mitigation is necessary.

Impact 3.6-3: Potential to expose people or structures to potential substantial adverse effects from seismic-related ground failure, including liquefaction

The site is underlain by Cretaceous-age sedimentary rock (at the west end of the alignment), mid- to late Pleistocene-age alluvium, and Holocene age basin deposits (clays and silts). Based on the Southern California Earthquake Center (1999) *Guidelines for Analyzing and Mitigating Liquefaction Hazards in California*, the groundwater levels and anticipated seismic ground motions within the project area meet the criteria for inducing liquefaction in loose soil conditions. Loose soil conditions may exist in the basin deposits and in small channel deposits that cross the pipeline alignment but are too small to be mapped at the Helley (1985) map scale of 1:62,500. Ground deformation due to liquefaction could adversely affect the pipeline and project facilities if not sufficiently designed.

The majority of the project alignment is located on relatively flat ground with little relief. However, the alignment does cross several creeks, drainages, and canals. The steep relief of these features may make them susceptible to lateral spread resulting from seismic ground shaking. Should lateral spread occur in these areas, it could adversely affect the pipeline if not properly positioned (buried) or supported across these crossings.

Central Valley will implement applicant-proposed measure GEO-4, which includes performing additional studies and modifying project design as required to reduce the potential impacts caused by liquefaction, dynamic compaction and lateral spreading. No additional mitigation is necessary.

Impact 3.6-4: Potential to expose people or structures to potential substantial adverse effects from landslides

Except where the pipeline crosses channels, drainages, and canals, the potential for landslides and slumps to occur is considered low. However, natural levees along waterways (e.g., Colusa Drainage Canal levee) and creek channel embankments have a higher potential for local slope instability, particularly if they are disturbed by construction. The *Colusa County General Plan* identifies the project area as having a low landslide potential (Colusa County 1989).

As described above, nearly all the soils in the project area have an erosion hazard that is slight to none. Accelerated erosion as a result of project construction activities is a concern only in the more steeply sloping areas, specifically at the extreme western end of the project area near the metering station and along drainage ways that cross the gas pipeline corridor.

Central Valley will implement applicant-proposed measure GEO-5, which includes performing additional studies and modifying project design as required to reduce the potential impacts caused by landslides or slumping at canal or drainage crossing points. No additional mitigation is necessary.

Impact 3.6-5: Potential for substantial soil erosion or the loss of topsoil

Project construction has the potential to cause accelerated soil erosion, especially at slopes bordering stream crossings and at cut slopes along any part of the pipeline alignment proposed for trenching. Disturbance of the slopes may also promote surface water infiltration that can lead to superficial or rotational slope failures in sloping areas. However, the erosion hazard of the soils in most of the project area is slight.

Trenching work for pipeline installation could also cause the loss of topsoil unless measures are undertaken to salvage and reapply it. In particular, topsoil could be buried as trench backfill if it is not segregated from subsoil layers. As described in Chapter 2, “Project Description,” Central Valley proposes to conduct trench soil excavation such that the upper 12 inches of native topsoil is removed from the trench and stockpiled separately from deeper soil layers. The stockpiled topsoil will be replaced at the top of the trench backfill after pipeline installation. By implementing this measure, Central Valley will ensure that the loss of topsoil is minimal and that any potential impacts will be less than significant.

To reduce the potential for soil erosion or loss of topsoil, Central Valley will implement applicant-proposed measure HYDRO-1, described in Section 3.8, “Hydrology and Water Quality.” No additional mitigation is necessary.

Impact 3.6-6: Potential for the project to be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project

The project area is underlain by four geologic formations/units: Holocene-age basin deposits; the Late Pleistocene–age Modesto Formation; mid- to Late Pleistocene-age Riverbank Formation; and Cretaceous-age bedrock. These units have varying degrees of stability relative to the proposed project activities.

Based on the age, properties, and position of these geologic units relative to the rather flat topography within the project area, soils and rocks of these formations are generally stable and are not expected to become unstable as a result of the project. Exceptions to this condition may exist at channel and canal crossings, where undercutting, either through natural causes or construction, could weaken the soils or rock. Available data for the nearby Wild Goose Storage Expansion Project suggests that proposed surface facilities could be safely built if the latest provisions of the 2007 CBC and other requirements of the Colusa County Planning and Building Department relevant to the proposed project are satisfied (GEO-3). Central Valley will implement geotechnical borings as described in applicant-proposed measure GEO-4. Accordingly, there is limited potential for the project to be constructed on a geologic unit or soil that is unstable or that would become unstable as a result of the project. With the implementation of these measures, this potential impact is considered less than significant. No additional mitigation is necessary.

Impact 3.6-7: Potential for expansive soil effects

Soil units mapped by the Natural Resources Conservation Service (NRCS) (2007) beneath the proposed pipeline alignment and facilities have a moderate to very high expansive potential. Expansive soils are characterized by their ability to undergo significant volume change (shrink or swell) due to variations in moisture content. Changes in soil moisture content can result from rainfall, crop or landscape irrigation, utility leakage, roof drainage, perched groundwater, drought, or other factors, and may cause unacceptable settlement or heave of structures, pipelines, concrete slabs supported on grade, or pavements supported over these materials. Depending on the extent and location below finished subgrade, these soils could have a detrimental effect on the proposed construction.

As part of applicant-proposed measure GEO-4, geotechnical soil borings would be performed and analyzed to determine the applicable structural design and construction requirements prescribed in the 2007 CBC to compensate for expansive soil conditions. Any fill and foundation areas found to have expansive soils would be engineered (over-excavated and backfilled with non-expansive fill material) in compliance with Colusa County building requirements to mitigate the effects of expansive soil. By implementing the building code requirements (GEO-3), potential effects of expansive soils would be accounted for in project design and construction, and no significant impacts are anticipated. No additional mitigation is necessary.

Impact 3.6-8: Potential for on-site or off-site subsidence

The eastern portion of Colusa County has been identified as containing areas of the greatest concern for subsidence. Although the specific causes of subsidence within these areas have not been identified, groundwater withdrawal is suspected to be the cause of local subsidence. There are no readily available studies on ground subsidence in the project area indicating that subsidence has not been an issue in the project area. In addition, studies suggest that ground subsidence greater than 1 foot due to groundwater extraction has not been identified in the project area. Based on this data subsidence, is not expected to be significant in the project area. This potential impact is considered less than significant, and no mitigation is necessary.

Applicant-Proposed Measures

GEO-1: Develop site-specific seismic stress guidelines into facility design

Central Valley will retain a qualified professional geologist or geotechnical engineer to perform a site-specific seismic analysis for the project. The analysis will develop estimated peak ground accelerations and response spectra for the pipeline crossing site. The analysis will use geologic and seismic parameters, including distances to faults, major historical earthquakes, regional seismicity, and subsurface conditions.

GEO-2: Assess pipeline response to seismic ground accelerations and ground deformation resulting from seismic events

Central Valley will retain an expert in steel pipeline response to earthquakes who will use the results from the ground acceleration and liquefaction study (GEO-1) to assess the gas pipeline response to seismic, ground shaking, liquefaction, dynamic compaction, lateral spreading, and strains due to seismic wave propagation. The results and any recommendations contained in this analysis will be used in the design of the pipeline.

GEO-3: Construct project in accordance with state and county building and construction codes related to earthquake safety and structural stability

Central Valley will ensure that the project is constructed in accordance with all applicable state and county building and construction codes and ordinances related to earthquake safety and structural stability during ground shaking for above-ground structures. In addition, Central Valley will install safety vibration sensors in all relevant equipment to shut down operations should an earthquake occur that is of a magnitude that could jeopardize the integrity of the facilities. To support the project design, geotechnical soil borings will be performed to the extent necessary to determine the seismic structural design and construction requirements prescribed in the 2007 CBC.

GEO-4: Conduct geotechnical studies and implement specific measures in potential liquefaction-prone and expansive soil areas

Central Valley will conduct site-specific geotechnical studies and implement special construction in liquefaction-prone and expansive soil areas. Where appropriate, the measures listed below will be incorporated into the final facilities design.

- Excavation and removal or recompaction of liquefiable soils.
- In-situ ground densification.
- Ground modification and improvement.
- Deep foundations.

- Reinforced shallow foundations.
- Reinforced structures to resist deformation during liquefaction.

GEO-5: Assess pipeline response to surface deformation due to landslides or slumping at channel and canal pipeline crossings

Central Valley will ensure that the project is constructed in accordance with all applicable state and county building and construction codes and ordinances related to creek, drainage, and canal crossings. A qualified geologist and geotechnical engineer will be retained to evaluate the stability of the slopes or the pipeline design depth relative to existing slopes, or both, within these water drainages and canals.

Section 3.7
Hazards and Hazardous Materials

This section describes the existing setting and regulatory environment for public health and safety issues related to hazardous materials handling and storage, and evaluates the proposed project's potential effects associated with possible rupture or explosion of the natural gas pipeline and facilities. Because natural gas is explosive under certain conditions, system safety is an important factor in the review of any facility that handles or stores natural gas. The section also provides a brief overview of the safety features of the proposed project and relevant state and federal safety requirements.

Additional information related to hazards and public safety is provided in additional sections of this PEA. Section 3.6, Geology, Soils, and Seismicity, discusses the potential for the project to expose people or 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; seismic-related ground failure, including liquefaction; or landslides. Section 3.8, Hydrology and Water Quality, addresses hazards associated with flooding. Section 3.15, Transportation and Traffic, discusses potential disruption of emergency vehicle access during construction of the project. Section 3.13, Public Services, discusses public safety concerns related to potential increased demand for emergency response services, including law enforcement and fire protection.

Environmental Setting

Sensitive Receptors in the Project Vicinity

Sensitive receptors comprise residences, businesses, schools, and hospitals (Figure 3.7-1). Scattered residences, agricultural operations, and duck clubs are located along the project alignment. There are no schools or hospitals near the project area. The nearest school (Princeton Jr./Sr. High School) is approximately 1.25 miles from the project area.

Hazards

In its overview of hazards, the Safety Element of the Colusa General Plan addresses flooding, dam inundation, landslides, subsidence, and wildfire. As discussed above, all these hazards with the exception of wildfires, are addressed in other sections of this PEA.

Wildfires are a potential hazard to development in the foothill and mountain areas of the county. The California Department of Forestry and Fire Protection determine the severity of wildfire problems by evaluating three factors: vegetation, climate, and slope. Most of the project area is not highly susceptible to fire hazard, particularly within rice fields. The nonnative annual grasslands around the proposed metering station have a higher potential for fire.

Hazardous Materials and Hazardous Waste

A *hazardous material* is defined by the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) as a material that poses a significant present or potential hazard to human health and safety or the environment, if released, because of its quantity, concentration, or physical or chemical characteristics (26 California Code of Regulations [CCR] 25501). For the purposes of this analysis, *hazardous materials* include the raw materials and products, and *hazardous waste* constitutes waste generated by facilities and businesses or waste material remaining onsite as a result of past activities.

A majority of the hazardous substances used in the county are associated with agricultural operations and production. Pesticides, including insecticides and herbicides, are widely used through both aerial and ground application. I-5 and SR 20 are major routes for the transportation of hazardous materials brought into or through the county (Colusa County 1989).

Project Construction and Operation

Because heavy equipment is used during construction, hazardous materials would be in use along the construction corridor; these materials would be stored at the staging areas or within designated work areas. Fuels, lubricants, and solvents would be required daily or on a job-specific basis in the work area. As part of PG&E's operation of the metering station, PG&E will add mercaptan (odorant) to gas leaving the storage facility and entering the pipeline.

In addition to these materials, project operations would entail permanent storage of a variety of hazardous fluids onsite at the compressor station (Table 3.7-1).

Table 3.7-1. Hazardous Compressor Station Fluids and Estimated Quantities

Material	Estimated Quantity on Site (gallons)
Clean Tri-ethylene glycol	2,500
Used Tri-ethylene glycol	2,500
Compressor lube oil	1,000
Engine lube oil	1,000

ICF Jones & Stokes
an ICF International Company

Figure 3.7-1
Sensitive Receptor near the Project Components

Material	Estimated Quantity on Site (gallons)
Used lube oil	800
Engine Coolant	1,500
Methanol (at well pad)	1,000

Phase I Environmental Site Assessment Findings

A Phase I Environmental Site Assessment (ESA) was conducted for the proposed project area to identify the presence of recognized environmental conditions (RECs) that may have resulted from past or present operations (Wallace-Kuhl & Associates [WKA] 2008). The ESA is provided with this PEA and presents the findings summarized below.

- Based on the available information and documentation review, there is no evidence of historical or existing RECs in the project area. However, WKA was not able to conduct a complete and thorough site reconnaissance due to site access constraints.
- No neighboring agency–listed facilities were identified within the designed American Society of Testing and Materials (ASTM) search for the area.
- Based on the completion of the potential vapor intrusion conditions (pVIC) screening matrix, WKA concluded it is presumed *unlikely* that a pVIC currently exists beneath the site.

The ESA sets forth the following recommendations.

- Interview site owners concerning the historical uses of the site, including hazardous materials storage and pesticide use, in order to make a more conclusive determination regarding RECs in the project area.
- If areas of concern (significant soil staining, petroleum hydrocarbon odors) are encountered during construction, additional assessment may be warranted at that time.
- If soils from the site are to be exported to another location during construction, it may be prudent to sample and analyze the exported material to determine appropriate disposal methods.
- If existing onsite structures are to be demolished during construction, WKA recommends that, prior to demolition, a qualified contractor survey the structures for asbestos-containing building materials and lead-based paint. [Note: Central Valley is not proposing to demolish any structures and will route the pipeline to avoid aboveground structures.]

Central Valley Gas Project Safety Features

The facility operation plans will include measures to protect employees, the public, and the environment by including modern gas control systems that enhance operational efficiencies and provide for greater safety. Primary control room equipment will include personal computers and programmable logic controllers, which would provide automation of control and monitoring functions. Specific safety features of the project are listed below.

- Gas, fire, and vibration detection systems will monitor equipment inside the compressor building and will be able to alarm or if needed, safely shut down equipment automatically if abnormal operating conditions are detected. An automatic call-out system will be used to contact personnel in emergencies. The gas detection system will alarm if the atmosphere in the building reaches 20% of the lower explosive limit (LEL). The system will shut down all compressors, actuate valves to a closed position and vent all gas piping within the building at 40% LEL.
- The fire detection system will shut down all compressors and block and vent all gas piping within the building.
- Vibration sensors will be installed on each gas compressor/engine and will automatically shut down the unit if the vibration exceeds a preset level.
- Fire prevention and response in the compressor station will include smoking area restrictions, work area restrictions, and firefighting equipment and fire detection equipment in the compressor building. Dry chemical fire extinguishers will be placed at appropriate locations at the meter station and compressor facility. No water or foam system is proposed at either location. In the event of a fire, the most effective means of control is to block in and vent the gas from the facility or affected area.
- Flow, temperature, and pressure will be monitored at the compressor station, well pad sites, and the PG&E Line 400/401 interconnection. The facility piping system will be equipped with overpressure protection (relief valves).
- Mainline valves and valves that control the flow of gas into and out of the compressor station and the meter station will have actuators installed, allowing them to be remotely operated from the control room, locally at the valve, or automatically in the event of an emergency shut down (ESD). During an ESD these valves block off the plant from the main 24-inch pipeline, wells, and gathering pipeline, and the entire plant is vented. Also, in the event of an immediate loss of pipeline pressure, on the 24-inch mainline, the valves will actuate to the closed position to block off the affected area. The valves will be inspected annually as required by U.S. Department of Transportation (USDOT) and maintained as needed.
- Gas flows and pressures will be measured at each of the storage wells and signaled back to the control room to allow proper monitoring of the characteristics and performance of the gas storage reservoir. This information will provide instantaneous inventory data to enable proper reservoir management and underground placement of the gas.
- The compressor and separator facilities will be connected to a cathodic protection system. Pipelines will be cathodically protected against corrosion.
- At the PG&E meter station, a gas chromatograph will monitor gas composition, ensuring that the gas delivered meets PG&E’s quality

specification. Off-spec gas could cause safety issues for PG&E's downstream customers.

- As required by regulations of USDOT's Office of Pipeline Safety (OPS), aboveground markers will be placed along the pipeline corridor. These markers will be placed within the line of sight along the pipeline corridor and will identify the type of utility and a point of contact in case of emergency.

Findings of Safety Record Study

Sacramento Natural Gas Storage LLC (SNGS) retained International Gas Consulting (IGC) to prepare a safety record study for their proposed natural gas storage project in Sacramento, California. IGC prepared *Safety Record Study of Underground Gas Storage in Depleted Reservoirs: A Safe Industry in the Past, Present, and Future* (International Gas Consulting 2007) to assist SNGS in demonstrating the safety record for underground natural gas storage facilities in the United States. The results of this study are directly applicable to Central Valley's proposed project, are hereby incorporated by reference, and are accordingly excerpt below.

- Underground natural gas storage facilities are designed and constructed to meet stringent industry and regulatory specifications and codes. As a result, these facilities have one of the best safety records of all industries, including employee safety and general public safety.
- There have been relatively few problems associated with underground storage of natural gas in depleted gas reservoirs (including aquifer drives) during the 90+ years of history of gas storage.
- During the last 30 years (1976–2006), five minor storage failures or accidents have been reported in the public record. None of these incidents were reported to have resulted in personal injuries or loss of life.
- The operating record for 301 facilities revealed a frequency of occurrence of safety incidents of one incident in every 1,806 years.
- There have also been occasional problems with storage gas migrating beyond the intended reservoir due to a lack of structural integrity of the geologic reservoir or due to a man-made conduit (e.g., poor cementation in the storage well casing strings). If this type of breach occurs, problems can occur (e.g., contamination of freshwater zones or loss of gas to a "thief zone" with adjacent producing wells. However, when gas migration occurs it typically remains subsurface and poses no danger to the public and structures on the surface above the migrating gas.
- To minimize the potential for safety and environmental problems, facility design should focus on implementing specific measures related to reservoir integrity; casing integrity; wellhead design and maintenance; surface facility operation and maintenance practices; and pipeline maintenance and monitoring/testing plans.

The report states that "The design, construction, operation, and maintenance of storage facilities are focused on safely preventing gas loss incidents. Integrity management programs maintain the safety of the public. Ongoing monitoring and evaluation of surface and subsurface facilities and conditions lead to the timely detection of potential problems and the mitigation of possible negative consequences." The study goes on to state that "storage provides a safe means of helping assure supplies to satisfy the nation's demand for natural gas." As stated previously, these conclusions and statements also apply to the proposed project.

Emergency Response Services and Times

The Colusa County Sheriff's Department serves as the county emergency services center and dispatches all emergency services to the local jurisdictions. In the event of an emergency that exceeds the county's emergency response capabilities, the sheriff's department would use mutual aid response agencies (such as the City of Willows in Glenn County for additional fire, ambulance, and CHP support). This was confirmed by Janice Bell, OES Technician, Colusa County Office of Emergency Services, Colusa County Sheriff's Office, in telephone conversations on October 16, 2008 and May 15, 2009. She provided the following estimated response times for fire, law enforcement, and ambulance services in the project area.

Fire Response. Eight rural districts, two city fire departments, the California Department of Forestry and Fire Protection, and the U.S. Forest Service provide fire protection services in Colusa County. Volunteer fire fighters staff the majority of districts. The western end of the project area is in the Maxwell Rural Fire District. The Maxwell Fire Department, approximately 13 miles from the metering station site, is the closest station to the western end of the project area. The eastern end of the project area would be serviced by the Princeton Rural Fire District. Either of these fire departments would service the central portion of the project area. In an emergency, the first response would be from Princeton Fire Department with secondary response provided by Maxwell Fire Department (both comprised of volunteers). The estimated response times to the project area are as follows:

- East and West areas: 8-10 minutes
- Central area: 12-15 minutes

Law Enforcement Response. The unincorporated areas of Colusa County receive general safety and law enforcement services from the Colusa County Sheriff's Department, located in Colusa. The Department also serves as the County Emergency Services Center. Colusa County Sheriff's Department patrols the northwest part of the Colusa County 24 hours a day. The department would dispatch CHP from the regional office in Williams (south of the project area), as needed. The expected response times to a situation in the project area would depend on the location of the assigned deputy at the time of the call. The response time throughout the project area could be within a few minutes (if there is a deputy in the immediate area) to 20 minutes.

Ambulance Response. Ambulances are dispatched from the Colusa County Sheriff's Department. There is one ambulance in Colusa (primary) and one in Williams (secondary). The estimated response times for the project area are as follows:

- East and Central area: 12-15 minutes
- West Area: 15-17 minutes (this area is not as easily accessible as the rest of the proposed alignment)

Pipeline Incident Response. The range of response times for Central Valley personnel will vary between a few minutes and perhaps up to a maximum of one hour after the detection of an emergency condition, the latter in the case of an operator callout during unattended operation. The automatic line break detection will actuate the pipeline block valves to a closed position in a matter of minutes when the pressure falls below the minimum set pressure. Upon detection of a line break condition, the station control system will shut down all systems and isolate the 24-inch pipeline to limit the uncontrolled release of gas into the atmosphere or a fire. The highest ranking Central Valley employee on site will immediately commence the call-out procedure including calling the local fire and police departments. Medical responders will be called in if there are injuries. Senior company officials will be notified depending upon the seriousness of the emergency.

If a 24-inch pipeline block valve fails to operate correctly, the station's automatic ESD system can be tripped manually by a Central Valley operator. In addition to isolating the 24-inch pipeline, the station ESD system will isolate additional piping in the compressor station and will isolate the gathering line system to the remote well pad site.

In addition to Central Valley facilities, the PG&E meter site will have a pipeline block valve that monitors for low-pressure conditions. This valve will close automatically if a line break condition occurs. In the case of a pipeline rupture or an ESD event, Central Valley operators will notify PG&E, so that PG&E is aware of the incident and can close pipeline block valves on their system, as needed.

In the event of a gas cloud formation near a public roadway or in the event an evacuation becomes necessary, emergency response measures will be developed with the assistance and approval of the state, county and local authorities and first responders. These measures will form part of the Central Valley Construction and Operations Safety and Emergency Response Plan (HAZ-2) which will be developed and approved by the CPUC before construction.

Compressor Station Incident Response. The range of response times for Central Valley personnel will vary between a few minutes and perhaps up to a maximum of one hour after the detection of an emergency condition, the latter in the case of an operator callout during unattended operation. In the event of a fire or explosion the compressor station will be automatically vented under an ESD condition triggered by fire and heat detection devices inside the compressor building. Any explosions or fire external to the compressor building will be dealt with by the operator who will then manually trip the ESD system, if needed. The threat of a sustained and major fire or explosion is substantially reduced with the plant vented of natural gas. The highest ranking Central Valley employee on site will immediately commence the call-out procedure including calling the local fire and police departments. Medical responders will be called in if there are injuries. Senior company officials will be notified depending upon the seriousness of the emergency. Coincident to call-out, Central Valley personnel trained in natural gas fire fighting would be on the scene to help contain any fires and assist local fire fighters.

In the event of an unplanned ESD, the operator will investigate the reason immediately. The root cause and location of the alarm will be thoroughly assessed and the upset condition identified and corrected. After it is determined to be safe to do so, the system will be reset for normal operation.

As with the pipeline incident response, emergency response measures for the compressor station will be developed with the assistance and approval of the state, county and local authorities and first responders. These measures will form part of the Central Valley Construction and Operations Safety and Emergency Response Plan (HAZ-2) which will be approved by the CPUC before construction.

Regulatory Setting

Federal, state, and local regulations and policies relevant to the proposed project are summarized below.

Federal Regulations—Pipeline Safety

U.S. Department of Transportation

Office of Pipeline Safety—49 CFR Part 192

Federal regulations and standards for natural gas pipelines are the responsibility of OPS. Federal safety standards for transportation of natural gas by pipeline are set forth in 49 CFR Part 192. One of the key pipeline design factors is the class location. The class location unit is defined by the number of dwelling units, high-occupancy buildings, or public gathering areas within 220 yards of the centerline per mile of pipeline. Based on this definition, natural gas pipelines are classified as shown below.

- A Class 1 location has 10 or fewer dwelling units per mile.
- A Class 2 location has more than 10 but fewer than 46 dwelling units per mile.

- A Class 3 location has 46 or more dwelling units per mile, or is located within 100 yards of either a building (such as a school, restaurant, or other business) or a small, well-defined outside area (such as a playground, recreation area, or other place of public assembly) that is occupied by 20 or more persons on at least 5 days a week for 10 weeks in any 12-month period.
- A Class 4 location is in any class location unit where buildings with four or more stories above ground are prevalent.

A design factor as determined by the class location is used during pipeline engineering to provide a factor of safety. Areas with higher population density require higher safety factors in pipeline design, testing, and operation. Pipe wall thickness and pipeline design pressures, hydrostatic test pressures, Maximum Allowable Operating Pressure (MAOP), inspection and testing of welds, and frequency of pipeline patrols and leak surveys must all conform to higher standards in more populated areas.

Pipelines constructed on land in Class 1 locations must be installed with a minimum cover depth of 30 inches in normal soil and 18 inches in consolidated rock. All pipelines installed in navigable rivers, streams, and harbors must have a minimum cover of 48 inches in soil and 24 inches in consolidated rock.

Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock.

Class locations also specify the maximum distance to a sectionalizing block valve for onshore line segments. Part 192 regulations require at least one sectionalizing block location every 20 miles in Class 1 locations, every 15 miles in Class 2 locations, every 8 miles in Class 3 locations, and every 5 miles in Class 4 locations.

The preferred 14.7-mile gas pipeline alignment runs through a USDOT Class 1 location, except for the I-5, public road, and railway crossings (which will be bored as part of the project).

Pipeline and Hazardous Materials Safety Administration Safety Regulations

USDOT regulates pipeline safety pursuant to Title 49 USC Chapter 601. The USDOT Pipeline and Hazardous Materials Safety Administration (PHMSA) develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. OPS administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline.

Many of the regulations are written as performance standards, which set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve these standards. Section 5(a) of the Natural Gas Pipeline Safety Act (NGPSA) (49 USC 60105[a]) provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing the federal standards. Section 5(b) of the NGPSA (49 USC 60105[b]) permits a state agency that does not qualify under Section 5(a) to perform certain inspection and monitoring functions. A state also may act as USDOT's agent to inspect interstate facilities within its boundaries; however, USDOT is responsible for enforcement action. The majority of the states have either Section 5(a) certifications or Section 5(b) agreements, while nine states act as interstate agents. California has a Section 5(a) certification.

USDOT pipeline standards are published in 49 CFR Parts 190–199. Part 192 specifically addresses natural gas pipeline safety issues, but does not address pipeline siting and routing. Siting and routing are primarily matters of private negotiation between pipeline companies and landowners and may be subject to review and approval (including appropriate environmental review) by other agencies with jurisdiction over a project.

The pipeline and aboveground facilities associated with the proposed project must be designed, constructed, operated, and maintained in accordance with USDOT Minimum Federal Safety Standards in 49 CFR Part 192. These regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. Part 192 specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

Part 192 includes the requirement to establish a written plan governing operation and maintenance activities. Under Part 192.615, each pipeline operator must establish an emergency plan that includes procedures to minimize the hazards in a natural gas or hazardous materials pipeline emergency. Key elements of the plan include procedures to address the needs listed below.

- Receiving, identifying, and classifying notices of events that require immediate response by the [pipeline] operator.
- Establishing and maintaining communications with local fire, police, and public officials, as well as coordinating emergency response.
- Making personnel, equipment, tools, and materials available at the scene of an emergency.
- Protecting people first and then property, and making them safe from actual or potential hazards.
- Implementing emergency shutdown of the system and safely restoring service.

Part 192 requires each operator to establish and maintain a liaison with the appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas and hazardous materials pipeline emergency, and to coordinate mutual assistance.

Office of Pipeline Safety—High Consequence Areas

OPS has published a series of rules that (1) define high consequence areas (HCAs) where a gas pipeline accident could do considerable harm to people and property, and (2) require an integrity management program to minimize the potential for an accident. USDOT (68 FR 69778, 69 FR 18228, 69 FR 29903) defines HCAs as they relate to the different hazard classification zones (discussed above), potential impact circles, or areas containing an *identified site* as defined in 49 CFR Part 192.903 of USDOT regulations.[1]

The HCAs may be defined by one of two alternative methods. Method 1 defines HCAs on the basis of the hazard classifications discussed above; the criteria are listed below.

- Current Class 3 and 4 locations.
- Any area in Class 1 or 2 locations where the potential impact radius[2] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle[3].
- Any area in Class 1 or 2 locations where the potential impact circle includes an identified site.

Method 2 defines HCAs on the basis of any potential impact circle that contains either of the following features.

- Twenty or more buildings intended for human occupancy.
- An identified site.

Once a pipeline operator has determined whether and where there are HCAs on its pipeline, it must apply its integrity management program to those segments of the pipeline within HCAs. The USDOT regulations specify the requirements for integrity management plans at Part 192.911. Where an HCA is present along a segment of a pipeline, the pipeline integrity management rule requires inspection of the entire pipeline every 7 years to determine the condition of the pipeline in that HCA.

Central Valley has not identified any HCAs present, or potentially present in the future, in the project area.

---

[1] An *identified site* is an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.
[2] The potential impact radius for natural gas is calculated as the product of 0.69 and the square root of the maximum allowable operating pressure of the pipeline in pounds per square inch multiplied by the pipeline diameter in inches.
[3] The potential impact circle is a circle of radius equal to the potential impact radius.

Federal Pipeline Safety Improvement Act

In 2002 Congress passed the Pipeline Safety Improvement Act (PSIA) of 2002 (HR 3609) to strengthen the nation's pipeline safety laws. Under the PSIA, gas transmission operators are required to develop and follow a written integrity management program containing all the elements described in Part 192.911 of the USDOT regulations and to address the risks on all transmission pipeline segments that include an HCA. Specifically, the law establishes an integrity management program that applies to all HCAs.

Natural Gas Pipeline Safety Act

OPS administers the NGPSA (49 USC Chapter 601) national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. USDOT's PHMSA ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local levels.

Federal Regulations—Hazardous Materials and Wastes

U.S. Environmental Protection Agency

EPA is the principal federal regulatory agency responsible for the safe use and handling of hazardous materials and hazardous waste. Two key federal regulations pertaining to hazardous materials and hazardous wastes are described below. Other applicable federal regulations are contained primarily in Titles 29, 40, and 49 of the Code of Federal Regulations.

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) enables EPA to administer a regulatory program that extends from the manufacture of hazardous materials to their disposal, thus regulating the generation, transportation, treatment, storage, and disposal of hazardous waste at all facilities and sites in the nation.

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act, also known as Superfund, was passed to facilitate cleanup of the nation's toxic waste sites. In 1986, Superfund was amended by the Superfund Amendment and

Reauthorization Act Title III (SARA), also known as the Emergency Planning and Community Right-to-Know Act (EPCRA). SARA Title III and the Clean Air Act of 1990 establish a nationwide emergency planning and response program and impose reporting requirements for businesses that store, handle, or produce significant quantities of extremely hazardous materials. The Clean Air Act (as implemented in 40 CFR Part 68.100 et seq.) requires the states to implement a comprehensive system to inform local agencies and the public when a significant quantity of such materials is stored or handled at a facility. Additionally, SARA identifies requirements for planning, reporting, and notification concerning hazardous materials.

State Regulations—Pipeline Safety

Natural Gas Pipeline Safety Act, Section 5(a)

Section 5(a) of the NGPSA provides for a state agency to assume all aspects of the safety program for intrastate pipeline facilities by adopting and enforcing the federal standards, while Section 5(b) permits a state agency that does not qualify under Section 5(a) to perform certain inspection and monitoring functions by agreement. The majority of states have either Section 5(a) certifications or Section 5 (b) agreements, while nine states act as interstate agents. California has a Section 5(a) certification.

General Order 112-E

General Order 112-E, developed by the CPUC, establishes minimum requirements for the design, construction, and quality of materials, locations, testing, operations, and maintenance of facilities used in the gathering, transmission, and distribution of gas. General Order 112-E provides requirements for reporting, construction and safety standards, liquefied natural gas facilities, gas holders, and petroleum gas vessel stations.

State Regulations—Hazardous Materials and Wastes

California regulations concerning hazardous materials and wastes are equal to or more stringent than federal regulations. EPA has granted the State of California primary oversight responsibility to administer and enforce hazardous materials and waste management programs. State regulations require planning and management to ensure that hazardous materials and wastes are handled, stored, and disposed of properly in order to reduce risks to human health and the environment. Several key laws pertaining to hazardous materials and wastes are discussed below.

Hazardous Materials Release Response Plans and Inventory Act of 1985

The Hazardous Materials Release Response Plans and Inventory Act, also known as the Business Plan Act, requires businesses using hazardous materials to prepare a plan that describes their facilities, inventories, emergency response plans, and training programs. Hazardous materials are defined as raw or unused materials that are part of a process or manufacturing step. They are not considered to be hazardous waste. Health concerns pertaining to the release of hazardous materials, however, are similar to those relating to hazardous waste.

California Code of Regulations Title 22, Chapter 11

Title 22 of the California Code of Regulations, Division 4.5, Chapter 11 contains regulations for the identification and classification of hazardous wastes. The Code defines a waste as hazardous if it has any of the following characteristics: ignitability, corrosivity, reactivity, and toxicity. Article 3 provides detailed definitions of each characteristic. Article 4 and 5 provide lists of RCRA hazardous wastes, non-RCRA hazardous wastes, hazardous wastes from specific sources, extremely hazardous wastes, hazardous wastes of concern, and special wastes.

Hazardous Waste Control Act

The Hazardous Waste Control Act created the state hazardous waste management program, which is similar to—but more stringent than—the federal Resource Conservation and Recovery Act program. The act is implemented by regulations contained in Title 26 of the California Code of Regulations, which describes the requirements pertaining to the following aspects of proper management of hazardous waste.

- Identification and classification.
- Generation and transportation.
- Design and permitting of recycling, treatment, storage, and disposal facilities.
- Treatment standards.
- Operation of facilities and staff training.
- Closure of facilities and liability requirements.

These regulations list more than 800 materials that may be hazardous and establish criteria for identifying, packaging, and disposing of such waste. Under the Hazardous Waste Control Act and Title 26, the generator of hazardous waste 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 the DTSC.

Emergency Services Act

Under the Emergency Services Act, the state 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. The office coordinates the responses of other agencies, including EPA, the California Highway Patrol, regional water quality control boards, air quality management districts, and county disaster response offices.

California Department of Conservation, Division of Oil, Gas and Geothermal Resources

DOGGR is the state agency that regulates the oil, gas, and geothermal industry in California. DOGGR has various policies and standards to protect the environment, including water resources, from energy operations. These include well design standards, well casing and cementing requirements, well plugging and abandonment requirements, injection controls, and general construction practices. Detailed information on DOGGR is provided in Section 3.10, Mineral and Energy Resources.

California Occupational Health and Safety Administration

Occupational safety standards exist in federal and state laws to minimize worker safety risks from both physical and chemical hazards in the workplace. The California Occupational Health and Safety Administration (Cal/OSHA) is responsible for developing and enforcing workplace safety standards and ensuring worker safety in the handling and use of hazardous materials.

Cal/OSHA obligates many businesses to prepare Injury and Illness Prevention Plans and Chemical Hygiene Plans. The Hazards Communication Standard requires that workers be informed of the hazards associated with the materials they handle. Manufacturers are required to label containers, provide Material Safety Data Sheets in the workplace, and provide worker training.

Other State Regulations

Various other state regulations have been enacted that affect hazardous waste management; those relevant to the proposed project are listed below.

- Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) requires labeling of substances known or suspected by the state to cause cancer.

- California Government Code Section 65962.5 requires the Office of Permit Assistance to compile a list of possibly contaminated sites in the state.
- The California Public Resources Code includes fire safety regulations that restrict the use of equipment that may produce a spark, flame, or fire; require the use of spark arrestors on construction equipment that has an internal combustion engine; specify the requirements for the safe use of gasoline-powered tools in fire hazard areas; and specify fire suppression equipment that must be provided onsite for various types of work in fire-prone areas.

Local Regulations

Colusa County Office of Emergency Services

Storage, handling, and disposal of hazardous materials are regulated by the County Department of Agriculture and the County Office of Emergency Services. As described above, businesses are required to report the types and amounts of hazardous materials they use to the County Office of Emergency Services. Businesses also must provide emergency response plans for a release or a threatened release of hazardous materials with the County Department of Environmental Health. This was confirmed by Janice Bell, OES Technician, Colusa County Office of Emergency Services, Colusa County Sheriff's Office, in e-mail correspondence on September 8, 2008 and telephone conversation on September 9, 2008.

Colusa County General Plan

The Colusa County General Plan contains the following policies and goals related to hazardous wastes that are applicable to the proposed project.

- Colusa County should promote and encourage practices and technologies which reduce the use of hazardous substances and the generation of hazardous wastes, recover and recycle wastes for reuse, and treat those wastes not amenable to reduction or recycling so that the environment and community health are not harmed by their disposal.
- **SAFE-13.** Further study of the environmental impact of injection wells should be encouraged.
- **SAFE-23.** The County Planning Department and the Office of Emergency Services should maintain hazard maps to aid in the review of development proposals and in the development of emergency response plans. Such maps shall illustrate potential flooding, dam inundation, landslides, subsidence, and wildfire threats.

Impact Analysis

Information regarding the use, storage, and disposal of hazardous materials and hazardous waste was obtained from Central Valley and from historical safety records. Because hazardous materials and hazardous wastes are strictly regulated, this analysis assumes that the proposed project would comply with all pertinent regulations regarding the presence, use, and storage of hazardous materials and hazardous wastes onsite and their transportation offsite. Noncompliance with these regulations would constitute a violation of law and would be subject to penalty.

Significance Criteria

Criteria for determining the significance of health and public safety impacts were based on the environmental checklist form in Appendix G of the CEQA State Guidelines and on professional judgment. Based on the checklist questions, a project may have a significant effect on the environment if it would result in any of the following conditions.

- 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 involve handling hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.
- Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment.
- Be located within an airport land use plan area or, where such a plan has not been adopted, be within 2 miles of a public airport or public use airport, and result in a safety hazard for people residing or working in the project area.
- Be located within the vicinity of a private airstrip and 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.

Impacts

Based on available information and relevance to this project, the proposed project would not result in the following impacts; accordingly, they are not discussed further in this section.

- The proposed project does not have the potential to emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school because no existing or proposed schools are in or near the project area. The closest school (Princeton Jr./Sr. High School) is located in Princeton, more than 1 mile north of the project area. Therefore, in the unlikely event of release of hazardous emissions or materials from the project site, there would be no impacts on existing or proposed schools within one-quarter mile of the project.
- The proposed project is not located within an airport land use plan or within 2 miles of a public airport or public use airport and therefore would not result in a safety hazard for people residing or working in the project area.
- The project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. The project is located in a rural agricultural area with scattered residences. Based on the location of the proposed project and the fact that it would not affect any major access routes (i.e., I-5), the proposed project would not impair or interfere with the county's emergency response plan or emergency evacuation plan (Janice Bell, pers. comm.).
- The project would not expose people or structures to a significant risk of loss, injury, or death involving flooding, as a result of the failure of a levee or dam, because the project would not affect the Sacramento River levee, Colusa Trough levee, or any existing dams (see Section 3.08, Hydrology and Water Quality).
- There are no residential or commercial developments currently proposed for the project area. Based on recent communication with Colusa County Planning Department, no residential subdivisions are pending and there are no commercial developments currently underway or pending approval (Kent Johanns, Senior Planner, Colusa County Planning and Building Department, telephone conversation on October 16, 2008.)

Impact 3.7-1: Potential to create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials

The proposed project would routinely use various materials during construction and operation phases that could be hazardous to workers, nearby residents, and the general public if not transported, handled, and disposed of safely. These potentially hazardous materials are listed below.

- Fuels, lubricants, and solvents used for reciprocating engines, including the compressors and construction equipment.

- Methanol used to avoid potential hydrate formation at the injection / withdrawal wells.
- 50/50 blend of Tetrahydrothiophene and Tertiary Butyl Mercaptan used by PG&E as an odorant in natural gas.

Central Valley estimates that compressor station operations would generate a variety of liquid waste, including but not limited to used lubricants, glycols, solvents and paints. Small quantities of oily rags, oil filters, and tri-ethylene glycol filters would also be generated. In accordance with current federal, state, and local regulations, these hazardous wastes would be stored onsite for a maximum of 90 days before they would be picked up by a licensed hazardous waste hauler for transport to a licensed hazardous waste storage facility. Solid wastes would be temporarily stored at the compressor site in enclosed, secured areas.

Hazardous liquids and liquid wastes would be held secure in storage tanks at the compressor site. There is a very small potential for the accidental release of liquid hazardous wastes temporarily stored onsite, but the chance of such a release reaching the public is low because the volumes of materials used or stored at the compressor site would be enclosed within double-walled tanks or within single-walled tanks with spill containment areas designed to contain up to 110 percent of the stored volumes.

Central Valley has committed to implementing applicant-proposed measures HAZ-1 and HAZ-2 as part of the proposed project. Implementation of these applicant-proposed measures would reduce the potential exposure of the public to hazardous materials used on-site for routine construction and operation activities. Therefore, the project would not create a significant hazard to the public or the environment as the result of transport, use or disposal of hazardous materials.

Impact 3.7-2: Potential to create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment

Three categories of impacts associated with the potential of the project to create a significant hazard to the public or environment are described separately below.

Natural Gas Releases from Surface Facilities

As described above, underground natural gas storage facilities are designed and constructed to meet stringent industry and regulatory specifications and codes. The Federal Energy Regulatory Commission stated the following in a 2002 ruling (99 FERC 61, 385 (2002). Docket CP01-427-001, Dominion Transmission, Inc.):

> Field operators have achieved broad success through a system of sound engineering practices using appropriate monitoring and testing of storage field performance through the entire active operating life of each storage field. The early detection of problems such practices allow has proven effective in assuring the initiation of remedies to minimize adverse effects to the environment and the preservation of the stored natural gas.

As described above under *Central Valley Gas Project Safety Features*, Central Valley will design and maintain all project components to meet the required regulatory specifications and codes.

Releases of natural gas from surface facilities will occur as planned events during routine maintenance and could potentially occur as unplanned events such as a fire at the compressor station or a failure of a pressure containing component.

Natural gas will occasionally be released to the atmosphere during routine maintenance of compressor units. Because only small amounts of natural gas will be vented at a time and because natural gas is lighter than air it will readily dissipate into the atmosphere and, therefore, these releases are not considered significant. In the event of an abnormal operating condition or a fire at the compressor station, an ESD sequence would automatically block the station gas piping system from the main pipeline and the wells, the entire plant would be vented, and an emergency call-out response would be initiated. The gas will be vented through blow down stacks away from possible ignition sources and dissipate into the atmosphere. The ESD releases would not be considered significant because emergency events requiring complete plant blow down are expected to be rare. Closures installed on the ESD vents would ensure that no gas is vented to the atmosphere during planned annual system testing, as required by USDOT.

A failure or rupture of a pipeline can occur if there is a material defect in the pipe or in weld quality, corrosion that causes localized defects or losses in wall thickness, seismic induced stresses that weaken or shear the pipe and accidental contact of the pipe during third party excavation activities. Seismic design of the pipeline is covered in Section 3.6, Geology, Soils and Seismicity of the PEA. With respect to material quality, Central Valley will be engaging inspectors at both the pipe manufacturing facility and in the field during construction to ensure that materials and workmanship conform to all industry standards. Failure due to corrosion is considered remote as the pipeline will be designed with modern cathodic protection facilities that will be monitored by operating personnel on a regular basis. By employing these measures, the impacts of unintentional gas releases due to poor material or workmanship quality is considered less than significant.

Another factor that could lead to a failure or rupture of the pipeline is by accidental contact by third parties during excavation activities. Central Valley will provide a depth of cover of five feet so as not to conflict with agricultural activities, including laser leveling in rice fields to improve irrigation. Depth of cover may be increased in sections to accommodate certain landowner's needs or land uses. In the event of failure or rupture of the main pipeline due to third party contact or other reasons, the pipeline would be automatically blocked off from the PG&E meter station and the compressor station by the ESD system to arrest the source of gas entering the pipeline from PG&E or the compressor station and wells. The gas that remains in the pipeline will be allowed to vent to atmosphere until empty. Under ESD situations, Central Valley will respond immediately in accordance with the Construction and Operation Safety and Emergency Response Plan (applicant-proposed measure HAZ-2). In order to minimize response times to the west end of the project, Central Valley proposes to coordinate its emergency response plan with PG&E personnel at Delevan.

Natural Gas Releases from Subsurface Components

The loss of gas from the underground reservoir can occur by a leak of the geological structure or via casing or cement leaks in the gas storage wells and plugged and abandoned (P&A) wells.

There is a remote possibility the gas can migrate beyond its intended boundary. Although this would have commercial consequences for Central Valley the gas would typically stay in the subsurface and poses no danger to the public as concluded in the *Safety Record Study of Underground Gas Storage in Depleted Reservoirs: A Safe Industry in the Past, Present, and Future* (International Gas Consulting 2007). Central Valley will minimize the risk of subsurface gas migration by monitoring the gas movement in the reservoir through observation wells. If gas is found to be migrating away from its intended boundary, operational changes will be implemented to address the problem. The loss of gas from the geologic structure is possible if the cap rock were to fracture during operations. The probability of occurrence is very remote since Central Valley will operate the field to a pressure that will not compromise the integrity of the cap rock by determining the strength and threshold pressure of the cap rock prior to commencing operations.

The most probable source of gas releases from the subsurface is through leaking casings or cement columns in the wells. The new wells (9 gas injection/withdrawal and up to 2 saltwater disposal wells) will be drilled in strict accordance with DOGGR regulations and will use new casing and modern cementing techniques and materials. Because of the rigorous casing and cementing design and modern techniques and cement materials used, the risk and impact of unintentional gas releases through new wells is considered less than significant.

The structural integrity of older wells drilled approximately 40-50 years ago is of greater concern and may be a source of subsurface natural gas releases due to the potential deterioration of the older casing and cementing materials over time and the older completion practices used. Central Valley proposes to use five older wells and convert them to observation wells; three of which are open today (S-3, S-4 and SL-1) and two are currently P&A wells (S-2 and Z-1). These wells will be re-entered to undergo casing and wellhead inspections and if necessary, remedial work to upgrade the well for gas storage use. This work may involve relining the well with new casing, installing new wellheads and remedial cement work. By employing these measures, the integrity of the older wells will be comparable to new wells and the risk of unintentional gas releases is considered less than significant.

One well in the field that was plugged and abandoned in 1974 will remain plugged during storage operations (S-1). This well has been properly plugged and abandoned in accordance with DOGGR regulations - cement plugs are set at predetermined intervals, old casing is cut and recovered, top of casing is cut four to six feet below grade, a metal plate is welded on top and the well is buried with no visible markers. As part of its routine operations Central Valley will keep a record of the location of the plugged and abandoned well site and conduct regular inspections to ensure that there are no gas leaks occurring at these sites. If a leak is discovered emanating from the P&A well, the well will be re-entered and remedial work will be completed to arrest the leak. By employing these measures, risk of unintentional gas releases at the P&A well sites is considered less than significant.

Potential Exposure to Hazardous Materials

There is a potential for construction workers to be exposed to contaminants in the soil. However, Central Valley will minimize this potential risk in a number of ways. Project facilities will be sited to avoid the areas that have visible hazardous materials, should they be present. If potential problem sites cannot be avoided, a Phase II site assessment will be conducted of the sites within construction zones to further determine the significance of the risk. If a significant risk is present, the site can be remediated or construction techniques would be adopted that are fully protective of the workers. These contingency measures would be identified in the Construction and Operation Safety and Emergency Response Plan (applicant-proposed measure HAZ-2), which would be approved by the CPUC prior to construction.

Because Central Valley will design and construct project components in accordance with applicable laws and because they will implement applicant-proposed measures HAZ-1 and HAZ-2 as part of the proposed project, the potential to create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment is relatively low. Therefore, this impact is considered less than significant and no additional mitigation is necessary.

Impact 3.7-3: Potential for the project to be located on a site that is included an a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5

The project would not be located on a site that is included on a list of hazardous materials sites. The Phase I ESA that was prepared for the proposed project (Wallace-Kuhl & Associates 2008) revealed no evidence of hazardous materials sites within the project area. In addition, Central Valley will ensure that any previously unidentified REC sites that are encountered during engineering design or construction would be avoided. This impact is considered less than significant and no mitigation is necessary.

Impact 3.7-4: Potential for the project to result in a safety hazard for people residing or working in the project area near a private airstrip

The gas pipeline would cross under a private airstrip located in rice lands east of Delevan Road and Four Mile Road (Figure 3.7-1). This airstrip is a runway for crop dusters and has relatively low air traffic volume. One residence is located immediately south of the airstrip (Figure 3.7-1). Construction of the pipeline in this area would not result in a safety hazard for people residing or working in the area; the gas pipeline would be bored under this airstrip (an approximately 150-foot-long bore) to avoid the runway. In addition, Central Valley will coordinate with the users/owners to ensure that the work does not conflict with aircraft traffic or ongoing agricultural production (including spraying of crops), and that construction does not present a hazard to the users of this airstrip. This impact is less than significant and no mitigation is necessary.

Impact 3.7-5: Potential to expose people or structures to a significant risk of loss, injury, or death involving wildland fires

The Safety Element of the Colusa County General Plan (Colusa County 1989) classifies most of the project area as a low fire hazard severity zone. The nonnative annual grasslands in the western end of the project area (near the proposed metering station site) are classified as a high fire hazard area. The potential for grass fires in this area is relatively high due to the dry grassland environment and winds. During the construction phase, heavy equipment and passenger vehicles driving on vegetated areas before clearing and grading with heated mufflers could increase the danger of fire in the area around the proposed metering station.

As described in Section 3.13, Public Services, the project would be serviced by the Maxwell Fire Department and the Princeton Rural Fire District. The Maxwell Fire Department is the closest station to the western end of the project area, approximately 13 miles from the metering station site. The eastern end of the project area would be serviced by the Princeton Rural Fire District. Either of these fire departments would service the central portion of the project area.

The increased potential risk of wildland fire in the project area (primarily around the western end of the project area) would be reduced by implementing the fire management measures described in applicant-proposed measure HAZ-2. With implementation of this measure, the potential for impacts on public safety from wildland fires in the project area would be less than significant. No additional mitigation is necessary.

Applicant-Proposed Measures

HAZ-1: Implement equipment maintenance and refueling restrictions

The construction equipment used for the proposed project will require periodic maintenance and refueling. To reduce the potential for contamination by spills, no refueling, storage, servicing, or maintenance of equipment will be allowed within 100 feet of sensitive environmental resources. No refueling or servicing will be allowed without the placement of absorbent material or drip pans underneath the vehicle to contain spilled fuel. Any fluids drained from the machinery during servicing will be collected in leak-proof containers and taken to an appropriate disposal or recycling facility. If such activities result in spilling or accumulation of a product on the soil, the contaminated soil will be assessed and disposed of properly. Under no circumstances will contaminated soils be added to a spoils pile.

Mobile refueling trucks likely will be used for onsite refueling of construction equipment. The refueling trucks will be independently licensed and regulated to haul and dispense fuels to ensure that the appropriate spill prevention techniques are implemented.

All maintenance materials (oils, grease, lubricants, antifreeze, and similar materials) will be stored at offsite staging areas. If these materials are required during field operations, they will be placed in a designated area away from site activities and sensitive resources.

During construction, vehicles and equipment not in use will be parked or stored at least 100 feet from water bodies, wetlands, known archaeological sites, and other sensitive resource areas. These areas will be identified on the construction drawings, as appropriate. All wash-down activities will be conducted at least 100 feet from sensitive environmental resources.

HAZ-2: Prepare and implement a construction and operation safety and emergency response plan

Central Valley will prepare a comprehensive Construction and Operation Safety and Emergency Response Plan that includes hazardous substance control, worker health and safety, incident response, and fire prevention and management. Each of these plan elements is briefly described below. The plan will be prepared prior to construction and submitted to the CPUC for review and approval.

Release of Hazardous Substances and Emergency Response Element

This element of the plan will include measures that will be implemented if an accidental release occurs or if any subsurface hazardous materials are encountered during construction and during future operation of the facility. The provisions outlined in this plan will include telephone numbers of county and state agencies and primary, secondary, and final clean-up procedures.

The plan will include the following measures to address hazardous materials generated from construction-related activities.

- Diesel fuel and petroleum-based lubricants will be stored only at designated staging areas.
- All hazardous material spills or threatened releases—including petroleum products such as gasoline, diesel, and hydraulic fluid, regardless of the quantity spilled—must be reported immediately if the spill has entered or threatens to enter a water of the state, has caused injury to a person, or threatens injury to public health.

Sudden Uncontrolled Release of Natural Gas and Emergency Response Element

This element of the plan will include measures that will be implemented if there was a failure or rupture of a pipeline or compressor station component during future operation of the facilities. The provisions outlined in this plan will include a callout procedure with telephone numbers of local fire and police responders, county and state agencies. The plan will address public safety measures, emergency evacuation routes and traffic control. Coordination and training with other parties like PG&E and the local fire and police departments will also be part of this plan.

Worker Health and Safety Element

This element of the plan will include provisions that establish worker training. This portion of the plan will also establish security measures to prevent unauthorized entry to cleanup sites and to reduce hazards outside the investigation/cleanup area. It will also address gas leaks, methods of evacuation, and general protection measures.

Fire Prevention and Management Element

To minimize the potential fire risks during summer construction activities, this element of the plan will identify fire management measures that will be implemented during construction and operation. The plan will include the notification procedures and emergency fire precautions listed below.

- All internal combustion engines, stationary and mobile, will meet applicable regulatory standards.
- Light trucks and cars with factory-installed (type) mufflers, in good condition, may be used on roads where the roadway is cleared of all vegetation.
- "No Smoking" signs and fire rules will be posted at the contractor field offices and areas visible to employees during the fire season.
- Equipment parking areas and small stationary engine sites will be cleared of all extraneous flammable materials.
- Fire extinguishers will be installed at the compressor station and metering station.
- Employee training in use of extinguishers and communication with the local fire departments will be provided to all personnel.

Section 3.8
Hydrology and Water Quality

This section describes the surface water and groundwater resources in the project area, existing water regulatory programs, and water quality conditions. It also discusses potential impacts of the proposed project on hydrology and water quality.

Environmental Setting

Climate

The proposed project is located in an area of California that is characterized by hot, dry summers and mild winters. The climate is conducive to agricultural development, and Colusa County is considered a leading agricultural crop production area.

Average temperatures recorded from 1948 to 2007 for the city of Colusa, approximately 7 miles southeast of the project site, indicate a mean low temperature of 37ºF in January and a mean high temperature of 95ºF in July (Western Regional Climate Center 2008).

Average annual rainfall for Colusa County is estimated at 16 inches (Colusa County 2003). Most rainfall occurs during the winter and early spring (i.e., November–March). Average annual precipitation for the city of Colusa is 16.35 inches (mean precipitation as recorded from 1948 to 2007).

Surface Water

The project area is within the Colusa Basin Watershed, which encompasses the eastern slopes of the inner Coast Ranges, the trough of the Colusa Basin, and the Sacramento River (Colusa County 1989). The surface water system in this area consists of natural and artificially created irrigation and drainage systems (these drainage systems are shown in Exhibit 1 and are listed in Table E-1 in Appendix E). The Sacramento River, near the eastern end of the project area, is the most prominent natural water feature in the project region. It is the largest waterway in Colusa County, ultimately draining the entire Sacramento Valley and flowing south–

southwest toward San Francisco Bay. The river would not be directly or indirectly affected by the project.

The Sacramento River is the source of irrigation water for much of the agricultural land in the project area. Shasta and Keswick Dams, north of Redding, are used to control river flows. Water releases vary depending on flood control needs, power generation demands, and minimum flows necessary to maintain water quality in the Sacramento–San Joaquin River Delta (Delta). Other beneficial uses for the Sacramento River (designated in the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins* [Basin Plan]) include domestic and municipal supply, recreation, and fish habitat (Central Valley Regional Water Quality Control Board 1998).

The Glenn-Colusa Canal, a large canal that provides the majority of irrigation water for the county, crosses the project area near its western end. The Glenn-Colusa Irrigation District manages the canal. Surface water systems between the Sacramento River (beyond the eastern end of the project corridor) and the Glenn-Colusa Canal include the Colusa Trough (also known as the 2047 Canal, a continuation of the Colusa Drainage Canal), Hunters Creek, Logan Creek, and various large and small agricultural irrigation ditches and canals (shown in Exhibit 1). In the project area, water drains from these creeks and canals to the east and south and collects in the Colusa Drainage Canal. The Colusa Drainage Canal conveys surface water south toward the Sacramento River.

The Colusa Trough (also shown as the Colusa Drainage Canal in the *Colusa County General Plan*) crosses the gas pipeline corridor in the eastern section of the pipeline alignment. This drainage is a south-draining linear depression that drains Willow Creek and the Colusa Drainage Canal. It collects runoff from storms and field drainage from the north and is maintained by Reclamation District 2047, located in Colusa. The Colusa Trough includes channelized drainages used for agricultural production and managed wetlands that provide wildlife habitat and waterfowl hunting opportunities.

Hunters Creek runs through the central section of the gas pipeline alignment. This creek is an intermittent waterway that transfers runoff from surrounding agricultural fields and areas in the lower foothills of the Coast Ranges. The creek headwaters are located west of the Sacramento NWR. The creek drains eastward into the Colusa Trough area (as shown in Figure 1-2 in Chapter 1).

Logan Creek crosses the gas pipeline route once, just east of Four Mile Road. The perennial waterway is directly connected to the Sacramento NWR. It drains east and connects to the Colusa Trough, just south of the pipeline corridor.

The gas pipeline corridor crosses many agricultural irrigation ditches and drainage canals. These ditches and canals provide both irrigation and drainage functions.

In the project area, freshwater wetlands and marshes are primarily found along the waterways and agricultural canals that cross the pipeline corridor. A large wetland complex is present north of the pipeline alignment and west of the Colusa Trough.

All the major drainages, wetlands, and waterways would be bored (auger bore or HDD) and directly avoided as part of the proposed project. A list of the crossing methods that may be used for each surface water feature is provided in Appendix E.

Groundwater

The project area is in the Sacramento Basin, an extensive groundwater body that is unconfined and free flowing. Groundwater flows from the north to the southeast to the Sacramento River (Colusa County 1989). Water is generally shallow in the areas between the Sacramento River and the low hills and alluvial fans due to surface infiltration of precipitation and irrigation water, subsurface lateral flow of water in shallow porous layers, and the presence of clay-rich or hard layers restricting downward flow of water to deeper aquifers (California Public Utilities Commission 2002).

Regional Groundwater Setting

The Sacramento Valley is composed of saline and freshwater aquifer systems (Fulton et al. n.d.). The saline aquifer system is typically located deep within the Sacramento River Hydrologic Region, Sacramento Valley Groundwater Basin, and Colusa Subbasin. The saline aquifer lies within marine formations such as the Jurassic–Cretaceous Great Valley Sequence and the Eocene Lower Princeton Valley Fill. The groundwater from these formations is highly saline (total dissolved solids [TDS] >10,000 parts per million [ppm]) and considered unsuitable for domestic, agricultural, or municipal uses.

Transitional aquifer systems (intermediate in depth) lie within such formations as the Neroly Formation, Ione Formation, and Upper Princeton Valley Fill. They contain a mix of saline and fresh water.

The freshwater aquifer system is only found in the upper formations of the groundwater basin. The system overlies the marine formations and provides major sources of fresh groundwater. The depth to the freshwater aquifer system ranges between 1,500 and 3,000 feet. The formations are made up of non-marine sediments and include:

- alluvial (includes Holocene and Pleistocene deposits described below),
- Upper Tuscan Formation (Unit C),
- Lower Tuscan Formation (Units A and B), and
- Tehama Formation.

The Quaternary-age alluvial aquifer is the uppermost aquifer between near ground surface and is over 200 feet thick. Typically, domestic or residential wells penetrate the alluvial aquifer. The alluvial aquifer system includes Holocene alluvium (Qa) and basin (Qb) deposits, Pleistocene Modesto Formation (Qm), and Pleistocene Riverbank Formation (Qr). Both the Modesto and Riverbank Formations can yield high production rates for fresh water. Basin deposits are made up of mainly clays with low permeability and yield little water.

The Tertiary Upper Tuscan Formation lies below the Alluvial system. The groundwater yield within the Upper Tuscan Formation in the east is considered low; however, the formation transitions into a more permeable strata westward and can yield pumping rates up to 6,000 gallons per minute (gpm).

The Tertiary Lower Tuscan Formation is located below the Upper Tuscan Formation and can be found at a depth of approximately 1,000 feet in the central portion of the valley. The Lower Tuscan Formation can yield between 2,000 and 3,000 gpm.

The Tertiary Tehama Formation (Tte) is exposed on the west side of the valley in the foothills. Moving eastward, the Tehama Formation is approximately 1,000 feet, thick, although the DWR (2003) suggests it may be as thick as 2,000 feet west of the Black Butte Fault and Willows-Corning Fault. The Black Butte Fault and Willows-Corning Fault truncate the valley formations and aquifer systems in the western portion of the valley. Groundwater production in the Tehama Formation is typically less than that of the Tuscan Formation and is characterized as poor to moderate.

Groundwater data from wells in the project vicinity indicate groundwater levels near the Sacramento River can reach to near the ground surface during the wet season (California Department of Water Resources 2008). Wells located farther west from the Sacramento River indicate groundwater levels are commonly 50 feet bgs or shallower. Peak groundwater levels appear to be attributable to both irrigation practices and wet season peaks.

Based on the information reviewed for this assessment and noted above, the freshwater aquifer system appears to range in thickness from a few feet up to over 2,000 feet. The freshwater aquifer system thickness is dependent on location within the valley relative to the valley axis and foothill proximity.

The base of freshwater is cited as being 1,800 feet within the Princeton Gas Field according to the *California Oil and Gas Fields, Northern California,* Volume 3 (California Department of Oil, Gas, and Geothermal Resources 1983). This occurrence lies within the Upper Cretaceous Ione Formation, which underlies the Tuscan Formation in the central portion and east side of the valley.

Groundwater Basins

The project area lies within the Sacramento River Hydrologic Region (California Department of Water Resources 2003). The Sacramento River Hydrologic Region extends from north of Red Bluff in the north, the Delta in the south, the Coast Ranges in the west, and the Sierra Nevada in the east.

Within the Sacramento River Hydrologic Region, there are seven groundwater basins. The distinct groundwater basins are:

- Sacramento Valley Groundwater Basin, No 5-021;
- Stonyford Town Area Groundwater Basin, No. 5-63;
- Bear Valley Groundwater Basin 5-64;
- Little Indian Valley Groundwater Basin, No. 5-65;
- Funks Creek Groundwater Basin, No. 5-90;
- Antelope Creek Groundwater Basin, No. 5-91; and
- Blanchard Valley Groundwater Basin, No. 5-92.

The project site lies within the Sacramento Valley Groundwater Basin. Within the Sacramento Valley Groundwater Basin, there are two subbasins. They are:

- Colusa Subbbasin, No. 5-021.52; and
- West Butte Subbasin, No. 5-21.58.

The major distinction between the Colusa and West Butte Subbasins is that they are separated by the Sacramento River as a boundary on the east and west, respectively. Because the project does not extend east beyond the Sacramento River, only the Colusa Subbasin will be discussed here further.

Colusa Subbasin, Groundwater Basin No. 5-021.52

The Colusa Subbasin encompasses approximately 1,434 square miles (918,380 acres) and extends into portions of Colusa, Glenn, Tehama, and Yolo Counties. The Colusa Subbasin is bounded on the east by the Sacramento River, on the west by the Coast Ranges, on the south by Cache Creek (Yolo County), and on north by Stony Creek (Tehama County).

The Colusa Subbasin is composed of continental deposits of late Tertiary to Quaternary age. The water-bearing formations within the Colusa Subbasin include:

- Holocene Stream Channel Deposits,
- Holocene Basin Deposits,
- Pleistocene Modesto and Riverbank Formations,
- Pliocene Tehama Formation,
- Pliocene Tuscan Formation, and
- Subareas of the Colusa Subbasin (Stony Creek Fan, Willow to Williams Plain, Arbuckle to Dunnigan Plains, and Cache Creek Floodplain).

The following sections discuss the individual deposits and formations.

Holocene Stream Channel Deposits

The Holocene stream channel deposits consist of unconsolidated gravel, sand, silt, and clay originating from erosion, reworking, and deposition of the Tehama Formation and Quaternary stream terrace deposits. The Holocene stream channel deposits represent the upper part of the unconfined zone of the aquifer system. They are moderately to highly permeable, and the thickness and areal extent of the deposits limit water production.

Holocene Basin Deposits

The Holocene basin deposits originated from flood waters that rose above the natural levees of rivers and streams, which spread across low-lying areas. The deposits consist of silts and clays and may include stream channel deposits along the Sacramento River. The basin deposits generally have low-yielding wells and low water quality. The basin deposits can be considered part of the unconfined aquifer system.

Pleistocene Modesto and Riverbank Formations

Terrace deposits in the project area are made up of the Modesto and Riverbank Formations. They consist of moderately to highly permeable gravels, sands, and silts. The Riverbank Formation has pebble and small cobble interlensed with clay, sand, and silt. Although the Modesto and Riverbank Formations can be unconfined relative to the exposure near the valley's edges, they also are commonly categorized as semi-confined when overlain by significant layers of the basin deposits as seen near the central portion of the valley.

Pliocene Tuscan Formation

The Tuscan Formation occurs mainly in the northern portion of the Colusa Subbasin and may extend east of I-5. It is found at a depth of approximately 400 feet and is composed of interbedded lahars, volcanic conglomerates and sandstones, and siltstones. Low permeable layers within the upper units form thick confining layers for groundwater contained in the more permeable sediments of intermediate units.

Pliocene Tehama Formation

The Tehama Formation is the thickest water-bearing formation within the Colusa Subbasin and reaches thickness up to 2,000 feet. The Tehama formation can be found at depths ranging from a few feet to several hundred feet. It consists of moderately compacted clay, silt, silty sand with lenses of sand, gravel, and cemented conglomerate. The Tehama Formation is characterized as providing poor to moderate production.

Groundwater Monitoring

Colusa County is currently preparing a groundwater management plan (GMP) (Colusa County 2008). GMPs are generally prepared to ensure proper management of the resource and to develop actions and policies to ensure that groundwater quantity and quality are maintained at historical levels. Historical groundwater data for Colusa County wells show normal seasonal trends with peak elevations in spring after significant recharge during winter, slow declines over summer during peak water consumption by rice growers and other farmers in the Colusa Basin, and changes in area groundwater levels (California Department of Water Resources 1993, 1994; Colusa County 2008). The conclusions presented below are based on a review of data from monitoring wells located near the project.

- Some of the recorded groundwater level declines are associated with the 1976–1977 and 1987–1992 drought periods. All groundwater levels recovered from the 1976–1977 drought to pre-drought levels during the wet period in the early 1980s. Most of the groundwater levels recovered from the 1987–1992 drought period during the wet 1992–1993 winter and spring.
- Wells located east of the Glenn-Colusa Canal exhibited almost no seasonal water level fluctuations, most likely as a result of localized recharge from intensive rice production in summer and recharge of the groundwater basin by the Sacramento River. Groundwater in this area appears to be near the surface; deep percolation from surface water irrigation may help keep the groundwater basin full in this area.

According to the Colusa County GMP, data are inadequate or not available to determine the surface water/groundwater interaction between the Sacramento River and local aquifer(s). In order to make an evaluation of this sort, the groundwater monitoring wells are required to be in relatively close proximity of the river, and a river gauging station needs to be in the same location as a well. Although there appear to be adequate river gauging stations along the Sacramento River (e.g., Butte City and Colusa), there are no groundwater monitoring stations in close proximity to those river stations. The monitoring wells that are currently in place are located too far from the river to be of any use to evaluate the interaction.

The groundwater flow in the area of the project site appears to flow toward the east from the Coast Ranges near the site's western boundary (which coincides with the groundwater basin's western extent), and south/southeast near the site's eastern boundary (Colusa County 2008; California Department of Water Resources 2008)[1]. Based on groundwater elevation data, groundwater typically flows coincidentally with the topography toward the axial trough of the Sacramento Valley (near the Sacramento River), which drains the valley from the north, west, and east to the Sacramento/San Joaquin Delta in the south and ultimately the San Francisco Bay.

Groundwater recharge in Colusa County is derived from local creeks, the Glenn-Colusa Canal, and the Sacramento River (when the surface water level is higher than the adjacent groundwater level). Some groundwater recharge also is received from precipitation, applied water, and subsurface inflow from the north and east.

Within Colusa County there are more than 25 water purveyors, consisting of water districts, irrigation districts, reclamation districts, mutual water companies, public utilities districts, and incorporated cities (Colusa County 2008). They include:

- agricultural purveyors, such as
  - Colusa County Water District,
  - Colusa Drain Users Association,
  - Colusa Irrigation Company,

1 Groundwater measurements are based on groundwater level measurements taken from wells constructed within the middle portion of the aquifer system (100 to 400 feet deep). This portion of the aquifer supplies approximately 70% of all domestic, agricultural, and municipal wells.

    - Cortina Water District,
    - Davis Water District,
    - Glenn-Colusa Irrigation District,
    - Glenn Valley Water District,
    - Holthouse Water District,
    - LeGrande Water District,
    - Maxwell Irrigation District,
    - Myers marsh Mutual Water Company,
    - Provident Irrigation District,
    - Reclamation District 108 (RD108),
    - Reclamation District 479 (RD 479),
    - Reclamation District 1004 (RD 1004),
    - Reclamation District 2047 (RD 2047),
    - Roberts Ditch Irrigation Co. Inc.,
    - Sartain Mutual Water Company,
    - Westside Water District,
    - Willow Creek Mutual Water Company, and
    - 4M Water District;
- urban water purveyors, such as:
    - the City of Williams,
    - the City of Colusa, and
    - Arbuckle Public Utility District;
- flood management agencies, such as
    - Colusa Basin Drainage District, and
- land use and resource agencies, such as
    - Colusa County, and
    - Colusa County Resource Conservation District.

The project area crosses four water purveyors. They include, from west to east:

- Holthouse Water District,
- Glenn-Colusa Irrigation District,
- Colusa Drain Water Users Association, and
- Princeton-Codora-Glenn Irrigation District.

It is unclear whether the project alignment crosses the RD 1004 area. In the Colusa County GMP, RD 1004 is not shown west of the Sacramento River; however, in the *Sacramento Valley Integrated Regional Water Management Plan*, RD 1004 is shown on both the east and west sides of the Sacramento River (CH2M Hill and GEI Consultants 2006). This assessment assumes the project alignment is not on RD 1004 property.

For the four purveyors listed above, approximately 83.5% of the total water used water used comes from surface water supplies, and 16.5% comes from groundwater. This statistic does not account for non-organized areas or private domestic use, which typically uses 100% groundwater for the total demand of potable supply.

No municipal water users were identified in the data reviewed for areas of the project alignment.

Water Quality

Several studies have been conducted in Colusa County to determine the effects of agriculture herbicides and pesticides on water supplies upstream and downstream of the county. In the project area, irrigation runoff from rice fields affects the water quality of natural streams (e.g., Hunters Creek) and artificial conveyances (e.g., the Colusa Drainage Canal). Herbicides and pesticides that are commonly used by rice growers for weed abatement adversely affect public health and aquatic life. Groundwater quality in the Colusa Basin is dictated heavily by rice production and rice herbicides.

The Colusa Drainage Canal was designed and constructed by the federal government to provide drainage service to federal water contractors when Shasta Dam was built as part of the Central Valley Project. Consequently, water quality conditions in the Colusa Drainage Canal can vary during the season and as a result of crop rotations by local farmers and the chemicals they use. In general, water in the canal has high turbidity and suspended solids, as well as trace amounts of numerous agricultural chemicals. However, water quality in the canal has improved over time following the implementation of tougher rules on rice herbicide applications and the initiation of water management by the Central Valley Regional Water Quality Control Board (Central Valley Water Board). Previously, agriculture in the Central Valley was not subject to regulation by the Central Valley Water Board with use of a conditional waiver. In recent years, the waiver program has been challenged in court. Since 2005, the Central Valley Water Board has been developing a long-term regulatory program (the Irrigated Lands Regulatory Program) through a number of resolutions focused on reducing water pollution from intensive agricultural operations such as those that occur in Colusa County.

Flood Hazard Zones

The Federal Emergency Management Agency (FEMA) designates the 100-year flood zone under the National Flood Insurance Program. Based on a review of 2003 FEMA flood zone maps for the project region, it appears that the project area falls within Zone A (100-year flood zone) and Zone X (outside 100-year and 500-year flood zone) (FEMA Flood Zone Maps, available online at http://map1.msc.fema.gov. A 100-year flood zone is defined as an area in which a flood has a probability of occurring once in 100 years (a 1% chance every year). A 500-year flood zone poses less of a risk and has the probability of flooding once in 500 years (a 0.2% chance every year). According to the Colusa County General Plan, the Colusa Drainage Canal is one of the most severe hazard areas on the valley floor.

The designed FEMA flood zones for the project area are shown in Figure 3.8-1.

Regulatory Setting

Federal Regulations

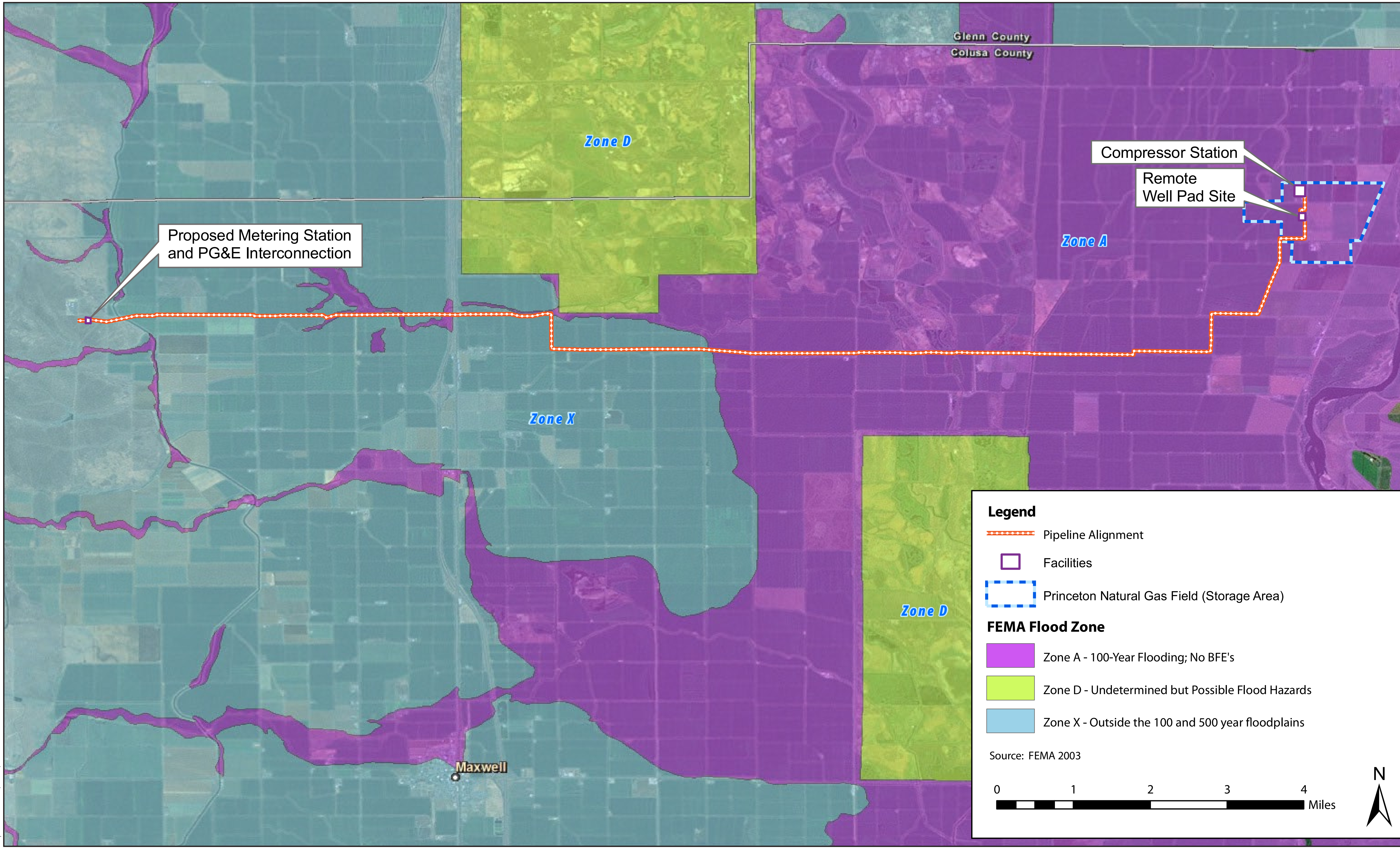
Clean Water Act (Sections 401 and 404)

The CWA was implemented to "restore and maintain the chemical, physical, and biological integrity of the nation's waters," including streams and wetlands (33 CFR 1251; 33 CFR 328.3). Section 404 of the CWA governs the placement of dredged and fill material in waters of the United States, including wetlands; such activities and the relevant permits are regulated by the USACE. Under the CWA, the RWQCBs must issue Section 401 water quality certification for the project to be permitted under Section 404. Water quality certification requires evaluation of water quality considerations associated with placement of dredged or fill materials into waters of the United States.

National Pollutant Discharge Elimination System

Created under the CWA, the NPDES permit program applies to stormwater and point source discharges. The EPA has delegated regulatory authority for the NPDES program to the nine RWQCBs. The Central Valley Water Board has jurisdiction over the project area. A provision of the NPDES permit requires that a SWPPP be developed and that it be implemented concurrently with construction. As described in Chapter 2, "Project Description," a SWPPP would be prepared as part of the proposed project.

Under the NPDES program, the Central Valley Water Board has adopted a General Order for Dewatering and Other Low Threat Discharges to Surface Waters (General Low Threat Discharge Permit). This permit applies to various categories of



Graphics … 01099.07 (7-15-09)

ICF Jones & Stokes
an ICF International Company

Figure 3.8-1
FEMA Flood Zones in the Project Vicinity

dewatering activities. To obtain coverage, the applicant must submit an NOI and a pollution prevention and monitoring program (PPMP). The PPMP must include a description of the discharge location, discharge characteristics, primary pollutants, receiving water, treatment systems, spill prevention plans, and other measures necessary to comply with discharge limits. A representative sampling and analysis program must be prepared and implemented by the applicant as part of the PPMP, along with record keeping and quarterly reporting requirements during dewatering activities. For dewatering activities that are not covered by the general permit, an individual NPDES permit and WDRs must be obtained from the Central Valley Water Board.

Executive Order 11988—Floodplain Management

Executive Order 11988 requires federal agencies to recognize the values of floodplains and to consider the public benefits from restoring and preserving floodplains. Under this order, the USACE is required to take action and provide leadership to:

- avoid development in the base floodplain;
- reduce the risk and hazard associated with floods;
- minimize the impact of floods on human health, welfare, and safety; and
- restore and preserve the beneficial and natural values of the base floodplain.

State Regulations

Porter-Cologne Water Quality Control Act

The Porter-Cologne Act created the State Water Board and the nine RWQCBs and authorized each agency to create a basin plan establishing beneficial uses of area waters and water quality criteria to protect those uses. The act also established a waste discharge permit system that requires waste dischargers to obtain a permit prior to discharges into state waters. Discharges to surface waters are also covered by the NPDES permit program of the CWA. The CWA requires the RWQCBs to adopt basin plans for the protection of water quality. The Central Valley Water Board produced the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins* (Basin Plan). The Basin Plan establishes beneficial uses of the major surface waters in the plan area. Beneficial uses include municipal use, coldwater and warmwater fisheries, contact and noncontact recreation, stock supply, agricultural supply, and industrial. Water quality criteria to protect beneficial uses identified in the Basin Plan are established by the EPA, the DFG, and the Central Valley Water Board.

State Water Resources Control Board Order 99-08-DWQ—NPDES Permit Discharge of Stormwater Runoff Associated with Construction Activity

This stormwater permit is necessary for any project that disturbs more than 1 acre of soil. It requires the filing of an NOI for coverage under the general permit, as well as preparation and implementation of a SWPPP. The permit requires the implementation of BMPs to ensure protection of state waters from soil erosion that may be discharged from construction sites. The permit requires both visual monitoring and water sampling. Central Valley or its construction contractor will be required to prepare a SWPPP for this project because of its size.

Central Valley Water Board Order 5-00-175—Waste Discharge Requirements and General Order for Dewatering and Other Low Threat Discharges to Surface Waters

Order No. 5-00-175 is a general permit intended to protect water quality in the state from various common practices, such as well development, construction dewatering, pump testing, pipeline pressure testing, and other activities that could cause impacts if not regulated. This permit also requires the filing of an NOI; a permit fee; and monitoring of water quality for total suspended solids, total settleable solids, pH, and biological oxygen demand. The permit has numerous terms and conditions to which the applicant must adhere to maintain legal coverage. Central Valley will be required to obtain this permit for trench dewatering and other water management actions for pipeline and compressor station construction. This general permit is currently being revised and circulated for public review and comment by the State Water Board.

Central Valley Regional Water Quality Control Board, Resolution R5-2003-0008—Waiver of Reports of Waste Discharge in the Central Valley

Resolution R5-2003-0008 waives the requirement from obtaining WDRs for various activities that are considered a low threat to waters of the state. Central Valley may claim coverage under this waiver for the discharge of water associated with pressure testing of the pipeline.

California Safe Drinking Water and Toxics Enforcement Act (Proposition 65)

The California Safe Drinking Water and Toxics Enforcement Act, as administered by the RWQCBs, prohibits actions that contaminate drinking water with chemicals known to cause cancer or that possess reproductive toxicity.

California Department of Conservation Division of Oil, Gas and Geothermal Resources

DOC's DOGGR is the state agency that regulates the oil, gas, and geothermal industry in California. DOGGR has various policies and standards to protect the environment, including water resources, from energy operations. The policies and standards include well design standards, well casing and cementing requirements, well plugging and abandonment requirements, injection controls, and general construction practices Additional detailed information on DOGGR is provided in section 3.6, "Geology, Soils, and Seismicity."

EPA Underground Injection Control Program—Well Injection Permit

The Underground Injection Control Program regulates construction, operation, permitting, and closure of injection wells that place fluids underground for storage or disposal. There are five classes of wells and well designs. Class II wells inject fluids associated with oil and natural gas production. Most of the injected fluid is salt water (brine), which is brought to the surface in the process of producing (extracting) oil and gas. In addition, brine and other fluids are injected to enhance oil and gas production. The approximately 144,000 Class II wells in operation in the United States inject more than 2 billion gallons of brine every day. Most Class II injection wells are in Texas, California, Oklahoma, and Kansas. In California, all Class II injection wells are regulated by the DOGGR Underground Injection Control Program, which is monitored and audited by the U.S. EPA. The main features of the program include permitting, inspection, enforcement, mechanical integrity testing, plugging and abandonment oversight, data management, and public outreach.

Local Regulations

Colusa County Floodplain Development Policies, Procedures, and Standards

Colusa County established floodplain development policies, procedures, and standards (Colusa County 1999) to provide standards for placement of structures in the county that would fall within FEMA-defined areas of special flood hazard zones ("A" zones). Flood zone development permits are required for new buildings or additions constructed within all "A" zones. Prior to their construction, structures to be located in one of these "A" zones need to be placed in a manner that minimizes the risk of flooding.

Colusa County General Plan

The Colusa County General Plan contains the following policies relevant to the proposed project and project alternatives to preserve or protect hydrologic resources.

- **CO-1.** The conservation of the county's natural resources shall be promoted and projects, which would waste resources or unnecessarily degrade them, shall be discouraged.
- **CO-13.** Waste disposal sites and other sources of hazardous or polluting materials should be discouraged in close proximity to streams, creeks, reservoirs, or the Sacramento River groundwater basin.
- **CO-14.** Sedimentation and erosion shall be minimized through control of grading, quarrying, logging, vegetation removal, placement of roads and bridges, use of off-road vehicles, and agricultural practices.
- **CO-17.** Water-conserving agricultural practices and reuse of water should be promoted.
- **CO-18.** Native or non–water demanding landscaping should be encouraged in new subdivisions.
- **CO-26.** The California Environmental Quality Act (CEQA) shall be strictly enforced.
- **FL-3.** Wherever possible, flood control projects should avoid extensive alteration of natural creeks and destruction of riparian vegetation.
- **FL-4.** New development should be required to mitigate its drainage impact through any of a series of measures that should be explored in a countywide drainage and flood control plan.
- **FL-6.** Future development in the county should be located in a way that precludes the need for costly flood control structures and drainage improvements. Development in the 100-year floodplain should be discouraged; no critical or high occupancy structures such as schools and hospitals shall be permitted in the floodplain.
- **FL-7.** Comprehensive drainage solutions to community flooding should be supported. Environmental evaluation of development should always consider cumulative drainage impact.
- **FL-8.** The County should support efforts to acquire state and federal funds for the reconstruction of levees and other flood control structures.
- **SAFE-1.** Floodplains should generally be maintained as open space. In these areas, their use for agriculture, recreation, preservation of vegetation and wildlife habitat, and scenery should be encouraged.
- **SAFE-2.** There will be no development in the 100-year floodplain.
- **SAFE-5.** Flood control policies in the Community Services Element should be supported to reduce the hazards associated with flooding.

- **WA-4.** New industries, which consume significant amounts of water, should be encouraged to recycle the water and ensure its percolation back into the groundwater strata.
- **WA-6.** Where no surface water source is available, the availability of groundwater sufficient to meet project needs should be one of the primary considerations used to determine the suitability of a site for development.

Impact Analysis

Significance Criteria

Criteria for determining the significance of hydrology and water quality impacts were based on Appendix G of the State CEQA Guidelines. In accordance with the CEQA checklist questions, a project may have a significant effect on the environment if it would result in any of the outcomes listed below.

- Violate any water quality standards or waste discharge requirements.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge, resulting in a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of preexisting nearby wells would drop to a level that 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 that would result in substantial erosion or siltation onsite or offsite.
- 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 that would result in flooding onsite or offsite.
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
- Otherwise substantially degrade water quality.
- 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 that would impede or redirect floodflows.
- 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.
- Contribute to inundation by seiche, tsunami, or mudflow.

Impacts

Project implementation could potentially result in impacts on hydrology and water quality, including soil erosion during construction, short-term effects on surface water and groundwater during pipeline construction, and long-term operational impacts such as degradation of local water quality from compressor station operations and accidental releases from project facilities. Project construction—in particular, activities associated with pipeline construction—could affect local groundwater supply, groundwater quality, and surface water quality. Because of these concerns, Central Valley developed several applicant-proposed measures during the project planning phase as part of the project. These measures were developed to address standard water quality issues (e.g., erosion, stormwater runoff, and spills) considered in this assessment. This section provides additional details on the potential for project impacts on hydrology and water quality.

Based on available information, the proposed project would not result in the impacts listed below; accordingly, they are not discussed further.

- The project would not involve the placement of 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 because the project would not include any residential housing.
- The project would not 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, because the project would not affect the Sacramento River levee, the Colusa Trough levee, or any existing dams. Colusa Trough and associated levees would be bored and avoided as part of the project design.
- Because of the location of the proposed project and site conditions, the project would not contribute to inundation by seiche, tsunami, or mudflow.

Impact 3.8-1: Potential for general construction effects on water quality in local waterways

Construction activities such as grading, trenching, and dewatering procedures can affect surface water and groundwater. These activities could result in soil erosion and sedimentation of local and downstream waterways, including Hunters Creek, Logan Creek, Colusa Trough, and their tributary drainages. The severity of construction-related water quality impacts depends on the soil erosion potential; construction practices; the frequency, magnitude, and duration of precipitation events; and the proximity of the activity to local waterways. Construction activities also could expose disturbed and loosened soils susceptible to erosion from rainfall, water, and wind erosion. Construction activities remove the protective cover of vegetation and lessen soil resistance to erosion associated with rainfall impact.

Although sediment from soil erosion is the pollutant most frequently associated with construction activity, gasoline, oils, grease, solvents, lubricants, and other petroleum-based products are commonly used in construction activities and can be toxic to aquatic life if accidentally spilled. In addition, the proximity of construction activities to watercourses increases the potential for a spilled toxic substance to enter the water. Accidental spillage of bentonite could also adversely affect water quality.

Implementation of applicant-proposed measures in Section 3.4, "Biological Resources," and 3.7, "Hazards and Hazardous Materials," and HAZ-1 and HAZ-2 (described below and provided in Section 3.7) will reduce potentially significant impacts on the water quality of local waterways to a less-than-significant level. No additional mitigation is necessary.

Impact 3.8-2: Potential for short-term degradation of shallow groundwater during construction from pipeline trenching and boring

As described in Chapter 2, pipeline construction would require dewatering because of shallow groundwater conditions along much of the pipeline route. Local perched groundwater is found in most of the project area at depths as shallow as 4–11 feet (California Public Utilities Commission 2002). The groundwater pumped from the pipeline trench and bore holes could be discharged into agricultural ditches and drainage canals, possibly increasing surface water quality and turbidity. The trench would be dewatered prior to installation of the gas pipeline. The trench water would be filtered through hay bales before being discharged into local rice fields through agreements with landowners.

Central Valley would apply for and obtain NPDES Permit 05-175 from the Central Valley Water Board for construction dewatering of the pipeline trench. The general permit specifies discharge monitoring requirements to ensure that beneficial uses are protected during dewatering activities. The general permit imposes limits of no more than 250,000 gallons per day, or operations cannot extend beyond a 3-month period. If the proposed dewatering operations exceed the volume or time thresholds, Central Valley will need to inform the Central Valley Water Board and may need to obtain WDRs.

To reduce the potential for degradation of groundwater, Central Valley will implement applicant-proposed measures HYDRO-1 and HYDRO-2, provided lower in this section. Implementation of these measures and compliance with conditions of state and federal permits will reduce potentially significant impacts on groundwater to a less-than-significant level; no additional mitigation is necessary.

Impact 3.8-3: Potential water quality impacts on local waterways from inadvertent release of directional drilling mud

As described in Chapter 2, pipeline sections that are installed across natural waterways or large drainage canals (Hunters Creek, Logan Creek, and Colusa Trough) will be horizontally directionally drilled. Drilling mud (bentonite, a clay-based material) used during the HDD process could enter surface waters if drilling fluids reached the surface (or overlying watercourse) during boring. Migration through existing natural fractures, induced fractures, or porous and permeable zones (gravels and cobbles) could allow caustic drilling fluids to reach the creek bed and seep into local surface waters. If drilling fluids unintentionally reach a surface water body (commonly called a "frac-out" in the drilling industry), they could degrade water quality and affect aquatic life.

Bentonite used during drilling operations is a highly alkaline material that can cause substantial increases in the pH and dissolved metals of a receiving water if there is insufficient dilution. Large increases in Ph and dissolved metals can be fatal for numerous aquatic species, can cause exceedances of water quality criteria, and can cause acute reactions and fatality to aquatic organisms found in local waterways (e.g., fish, bullfrogs, snakes) under low-flow conditions. This is considered a potentially significant impact. As described in Chapter 2, Central Valley's engineering consultant would prepare an HDD plan that contains detailed drawings and a frac-out contingency plan. The plan will focus on minimizing the potential for a frac-out; providing for timely detection of frac-outs by a detailed mud volume and creek monitoring plan (primarily pH and conductivity); and ensuring an organized, timely, and "minimum-impact" response in the event of a frac-out and release of drilling mud (bentonite) in a waterway. Contingency plans may include ceasing drilling, temporarily impounding water, and pumping the contaminated water onto the ground or to a local rice field. As part of the contingency plan, the contractor would provide continuous visual observations of natural waterways during HDD operations. If visual observations indicated possible frac-out conditions, measures would be implemented to avoid and minimize the release of bentonite into the waterway.

Implementation of an HDD plan and associated contingency measures would avoid potentially significant impacts on water quality. No additional mitigation is necessary.

Impact 3.8-4: Potential degradation of surface waters during hydrostatic testing of the pipeline

As described in Chapter 2, approximately 1.7 million gallons of water would be used for hydrostatic testing of the completed pipelines. The primary purpose of testing is to ensure that the constructed pipeline is free of any leaks when subjected to a pressure beyond its maximum operating pressure. Because no chemicals or other potential pollutants are used during this one-time test, no substantial changes in water quality are expected. The test water would be obtained from existing public or private water supplies. Although the specific source has not yet been identified, it is anticipated that the majority of the water needed for hydrostatic testing would be purchased from a local landowner or a small local water system. The test water would either be discharged under Central Valley Water Board Resolution R5-2003-0008, "Waiver of WDRs," onto existing dry farmland through agreement with a local landowner, or it would be discharged into small settling ponds or existing drainage ditches in agricultural areas. Hydrostatic testing would be conducted by Central Valley in accordance with the requirements of USDOT pipeline safety regulations and applicable permits.

Central Valley would be required to comply with Central Valley Water Board Order 5-00-175 to protect the environment from water quality degradation related to hydrostatic testing. Discharge of hydrostatic test water into the existing surface waters is regulated by the Central Valley Water Board in accordance with the requirements of the NDPES permit and WDRs issued by the Central Valley Water Board. As part of applicant-proposed measure HYDRO-2, Central Valley will sample and test waters to confirm compliance with these requirements. The potential for degradation of local surface waters during pipeline testing is accordingly considered less than significant, and no mitigation is necessary.

Impact 3.8-5: Potential short-term depletion of groundwater supply during construction

Perched groundwater that is separated from the main (deeper) groundwater aquifer by an unsaturated zone could be affected by pipeline trenching or pipeline boring activities. The water can rest upon a layer of sufficiently low permeability that prevents rapid downward water movement. Such conditions can vary from location to location throughout the project area, with some perched zones being semi-confined between two low-permeability layers. This condition can occur when water contacted in a boring at depth rises into the boring within a relatively short period as it equalizes to the driving forces caused by higher surrounding elevations (called "head" or potentiometric pressure). Construction-related dewatering activities also could lower groundwater levels temporarily.

However, the pipeline trench would be dewatered in short segments, and the extent of dewatering would be small. Therefore, impacts on perched water tables are expected to be short-term and minimal and are not expected to appreciably affect local water supply wells. This impact is considered less than significant.

Impact 3.8-6: Potential impacts on groundwater supplies during gas well operations

During operation of the natural gas storage facility, there is a potential for produced saltwater to enter the freshwater aquifer and affect local water quality. As described in Chapter 2, "Project Description," saltwater would be produced during gas withdrawal. Central Valley is proposing to drill one or two saltwater disposal wells on the 4-acre remote well pad site to dispose of saltwater that is produced during gas storage withdrawals. This saltwater would be injected into the water-bearing Upper Kione Formation that lies structurally lower than the target storage zone, several hundred feet bgs. This is a common operational practice at many gas fields and has been handled successfully at other gas fields in the state. DOGGR and the EPA have established design standards for saltwater injection wells to ensure that local water supplies are not affected by the injection of saltwater associated with oil/gas production fields and gas storage operations.

DOGGR regulates the drilling of wells and issues permits for injection (as does Colusa County). Under DOGGR regulations, precautions are taken to prevent produced saltwater from migrating into freshwater aquifers. Central Valley would obtain EPA Class II injection well permits from DOGGR to drill and operate the saltwater disposal wells.

Potential impacts on groundwater supplies during project operation are considered less than significant because potential impacts would be avoided through well design, the EPA/DOGGR approval process, and the required monitoring to ensure that gas operations would not violate water quality standards. No mitigation is necessary.

Impact 3.8-7: Potential for degradation of groundwater and surface water during facility operation

Compressor station operations could lead to a degradation of shallow groundwater and surface waters if on-site hazardous materials contaminate surface water and groundwater because proper precautions are not taken by the applicant. Several hazardous materials would be used and stored at the compressor station site. Accidental spills or leakage of these materials could impair water quality and cause exceedance of numerical water quality criteria. This is considered a potentially significant impact.

To reduce the potential for degradation of groundwater and surface water during operation of the compressor station facility, Central Valley will implement applicant-proposed measures HAZ-1, HAZ-2, and HYDRO-1. In addition, the compressor station is considered an industrial facility and would need to obtain long-term coverage for stormwater quality management under the State Water Board General Industrial Stormwater Permit (Board Order 97-03-WQ) to ensure the protection of nearby surface waters from activities at the facility. The permit requires preparation of a SWPPP and focuses on good housekeeping and BMPs to ensure that compressor station operations do not contribute significantly to water quality problems. Implementation of these measures and the terms and conditions of state and federal permits would reduce potentially significant impacts on groundwater and surface water to a less-than-significant level. No additional mitigation is necessary.

Impact 3.8-8: Placement of structures within a flood hazard area

The aboveground project components (compressor station, remote well pad, and metering station) are located within a 100-year flood zone (compressor station and remote well pad) and outside a 100-year and 500-year flood hazard zone (metering station) (Figure 3.8-1). Inundation of the compressor station and remote well pad has the potential to occur once in 100 years (a 1% chance every year). The potential for these aboveground structures and other facilities in the area (gas injection/withdrawal wells, observation wells, and saltwater disposal wells) to be rendered inaccessible by a severe flood event is highly unlikely. Moreover, the minor amounts of impervious surfaces associated with these project facilities would generate nominal volumes of stormwater runoff. Consequently, the placement of these aboveground structures within a flood hazard area is considered less than significant.

As shown in Figure 3.8-1, the buried gas pipeline would be placed in areas mapped as Zone A and Zone X flood zones. However, the pipeline would be buried approximately 5–7 feet below ground level and would not impede or redirect flood flows. Flood damage to the project facilities would be considered an adverse impact if damaged wells or associated equipment could not be accessed for repairs. No mitigation is necessary.

Applicant-Proposed Measures

Applicant-proposed measures HAZ-1 (Implement equipment maintenance and refueling restrictions) and HAZ-2 (Prepare and implement a construction and operation safety and emergency response plan**)** are described in Section 3.7, Hazards and Hazardous Materials.

HYDRO-1: Prepare and implement a storm water pollution prevention plan

The reclamation effort will involve restoration of temporarily disturbed areas (where necessary) and installation of erosion control measures to comply with County grading permits and the NPDES permit from the State Water Board. Central Valley will prepare a SWPPP that describes when, where, and how such site reclamation will occur. Site-specific erosion control measures (nonvegetative or mechanical techniques) will be determined on a site-specific basis as part of this SWPPP.

As part of the SWPPP, erosion and sediment control measures will be implemented to reduce the amount of soil that is displaced or transported from a land area and to control the discharge of soil particles that are displaced or transported. The standard control measures and practices listed below will be implemented during and after construction to reduce accelerated soil erosion and sedimentation impacts to a less-than-significant level.

- Remove only the vegetation that it is absolutely necessary to remove.
- Avoid off-road vehicle use outside the work zone.
- Avoid excessive trips along the ROW or access roads.
- Instruct all personnel on stormwater pollution prevention concepts to ensure that all are conscious of how their actions affect the potential for erosion and sedimentation.
- Perform initial cleanup.
- Compact subsurface backfill material.
- Apply an appropriate seed mix, where determined necessary, in nonagricultural areas and through coordination with the landowner.

Construction inspectors will be onsite during all construction activities and will reinforce the importance of confining all vehicular traffic to the existing ROW and access roads.

HYDRO-2: Prepare and implement a dewatering and discharge plan

Prior to construction of the gas pipeline, Central Valley will prepare a dewatering and discharge plan that describes the methods of dewatering and filtering the trench and hydrostatic test water; general locations where groundwater and hydrostatic test water will be discharged; and monitoring methods to ensure that surface waterways are not affected by the discharged water. A copy of this plan will be submitted to the CPUC for review and approval prior to its implementation.

Section 3.9
Land Use and Planning

This section discusses the existing and proposed land uses in the project area, relevant and applicable land use plans and policies in Colusa County, and compatibility of the proposed project with these land uses and land use plans and policies.

Environmental Setting

As discussed in Chapter 2, approximately 246.5 acres of land will be used to construct the proposed project. The project components of most concern for impacts on land use are the 10-acre compressor station and 4-acre remote well pad site on the eastern end of the project area, the approximate 1-acre metering station on the western end of the project area, and the 14.7-mile gas pipeline that would connect these sites. The compressor station and remote well pad sites are located in a rice field, and the metering station site is in nonnative annual grasslands adjacent to the Wild Goose Meter Station and PG&E interconnection pipeline.

The 14.7-mile pipeline corridor crosses through agricultural lands of the Colusa Basin—predominantly rice fields with widely scattered rural residences and agricultural facilities. The pipeline system, which would be placed underground, would have a permanent easement encompassing approximately 54.2 acres. Temporary construction easements for the pipeline system would be 130.2 acres.

Regional Setting

The project area is located in a portion of Colusa County that consists primarily of agricultural lands. Row crops and orchards are present along the east and west sides of the Sacramento River. As shown in the project alignment maps in Exhibit 1, the area west of the river is dominated by rice fields. Row crops and orchards (primarily walnut) are found at the western end of the project corridor (west of McDermott Road).

In 2006, the total amount of prime farmland in Colusa County was 200,182 acres (California Department of Conservation 2008). This total constitutes about

41.3% of the 485,392 acres of land in agricultural production in Colusa County in 2005 and 27.1% of the total land area (737,450 acres) (California Department of Finance 2007). In 2006, the total value of agricultural crops in Colusa County was about $422.7 million, putting Colusa County in 20th place among California counties. The highest value crops in 2006 were rice ($164.6 million), almonds ($111.7 million), processing tomatoes ($42.4 million), walnuts ($12.7 million), and cattle/calves ($12.2 million) (California Farm Bureau Federation 2008).

Existing Conditions

Current Land Uses

The project alignment maps in Exhibit 1 show existing land use in the project area: agricultural operations, residences, and USFWS refuge lands. Current agricultural uses, residential uses, and commercial uses in the project area are discussed below. Recreation areas and uses, conservation areas, wildlife refuges, and hunting areas are described in Section 3.14, Recreation.

Agricultural Uses

Large farms dominate most of the project area. The land in the project area is primarily flat and used for rice production, walnut orchards, and row crops (wheat, tomatoes, and sunflowers). As discussed, rice is the dominant crop in the project area, although nut orchards and row crops are found around the compressor station and remote well pad sites and east of the Glenn-Colusa Canal. The annual grasslands west of the Glenn-Colusa Canal at the western end of the project area are used for cattle grazing. Table 3.2-1 in Section 3.2, Agricultural Resources, indicates parcels in the project area that are covered by Williams Act contracts.

Residential and Business Uses

Most of the residences in the project area are scattered single-family homes associated with farming operations (see Figure 3.7-1 in Section 3.7, Hazards and Hazardous Materials). Fewer than 10 residences and agricultural operations (structures, barns, and other equipment storage areas) are within 300 feet of the project alignment. Most of the residences are located in the eastern portion of the project area, around the proposed compressor station, remote well pad, and observation wells.

Land Use Designations and Zoning

Most of the land in the project area is designated Agriculture (A-G) in the general plan. Land in the A-G designation is typically used for orchard and crop production. Secondary uses in these areas include oil and natural gas drilling, non-intensive recreation, agricultural industry, and agricultural support uses, as long as these uses do not interfere with the viability of agriculture or create environmental hazards.

Some lands in the project area are zoned Exclusive Agriculture (E-A) (Karen Anania, County of Colusa Planning and Building Department, telephone conversation on July 7, 2008). According to the county’s zoning ordinance (No. 534), the principal permitted uses in E-A areas are all general agriculture uses. Uses permitted with a use permit include exploratory drilling and production of fossil fuels and geothermal power.

Two other zoning districts are present in the project area: Rural Service Center (RSC) and Designated Floodway (DF). The north-south strip along I-5 near the Delevan Road interchange is zoned RSC. This area comprises small, predominantly residential settlements. Commercial and residential uses are permissible in this area, as long as the uses conform to the zoning requirements for such uses. The agricultural areas along the Sacramento River and the Colusa Drainage Canal have a zoning overlay classification of DF, as designated by the State Reclamation Board.

According to the Colusa Planning Department there are currently no approved or proposed (future) commercial or residential projects planned for the project area (telephone discussion with Mr. Kent Johanns, senior planner on October 16, 2008). As discussed, the area is predominantly agricultural; this use will continue for at least several years. A different or more intense development pattern in the project area would require amendment of the county general plan and zoning ordinance, which would require additional, independent environmental analysis.

Affected Landowners

As required by the CPUC, a list of the names and mailing addresses of all land owners within 300 feet of the proposed project is provided in Appendix A of this PEA. This appendix also contains a figure showing the location of the landowners and Williamson Act contract lands.

Regulatory Setting

Federal Regulations

U.S. Fish and Wildlife Service—Draft Comprehensive Conservation Plan for the Sacramento, Delevan, Colusa, and Sutter National Wildlife Refuges

The U.S. Fish and Wildlife Service (USFWS) and Sacramento National Wildlife Refuge Complex produced a draft comprehensive conservation plan (CCP) for the Sacramento, Delevan, Colusa, and Sutter National Wildlife Refuges in July 2008. This draft plan, developed in compliance with the National Wildlife Refuge System Improvement Act of 1997, is designed to guide management of the refuges over the next 15 years, replacing the individual management plans that are currently in place. The specific purposes of the CCP are to:

- provide a clear statement of direction for the future management of the refuges;
- provide long-term continuity in refuge management;
- communicate the service's management priorities for the refuges to their partners, neighbors, visitors, and the general public;
- provide an opportunity for the public to help shape the future management of the refuges;
- ensure that management programs on the refuges are consistent with the mandates of the refuge system and the purposes for which the refuges were established;
- ensure that the management of the refuges is consistent with federal, state, and local plans; and
- provide a basis for budget requests to support the refuges' needs for staffing, operations, maintenance, and capital improvements.

State Regulations

Williamson Act

The California Land Conservation Act of 1965 (Williamson Act) enables counties and cities to designate agricultural preserves (Williamson Act lands) and offer preferential taxation to agricultural landowners based on the income-producing value of their property in agricultural use, rather than on its assessed market value. In return for the preferential tax rate, the landowner is required to sign a contract with the county or city agreeing not to develop the land for a minimum 10-year period. Contracts are automatically renewed annually unless a party to the contract files for nonrenewal or petitions for cancellation.

Lands under Williamson Act contracts must comply with regulations pertaining to parcel size, allowable development, and compatible uses. Section 9-1810.3 of the Colusa County Williamson Act ordinance, “Terms of Contract,” outlines allowable uses, including petroleum and natural gas extraction and utilities services, for properties under contract.

Local Regulations

Colusa County General Plan

The Colusa County General Plan (Colusa County1989) sets forth goals, objectives, and policies to guide the long-range development of Colusa County. The following goals and objectives are relevant to the proposed project.

- **Land Use Goal:** Maintain the efficient and harmonious use of land in the county, promoting a well-organized and orderly development pattern, avoiding random, haphazard growth, protecting public health and safety, and accommodating the orderly growth of population and employment.
- **Land Use Objective “i”:** To preserve opportunities for rural and semi-rural living through zoning and planning policies.
- **Land Use Objective “j”:** To permit rural development contingent upon a range of natural factors, including environmental impact, safety hazards, and the availability of water.
- **Land Use Objective “n”:** To promote development which is consistent in character and appearance with existing development in the county and limit development where it would be inconsistent with surrounding uses or detract from the area’s character.
- **Land Use Objective “o”:** To ensure that development in rural areas is harmonious in scale and orientation with the natural physical setting.
- **Community Character Objective “e”:** To conserve the county’s uncrowded, uncongested environment.
- **Resource Conservation Goal:** Encourage a balanced mix of conservation, utilization, and development of Colusa County’s natural resources.
- **Resource Conservation Objective “d”:** To recognize that agricultural land is the county’s greatest natural asset and to take appropriate measures to safeguard Class I and II soils in the future.

Additionally, the following policies from the Land Use Element of the Colusa County General Plan are relevant to the proposed project:

- **LU-4.** Agriculture and resources management should be the primary land uses outside of the designated communities. Freestanding subdivisions isolated from existing communities and lacking urban services should be prohibited.
- **LU-9.** The proposed development pattern should protect the integrity of agriculture and shall not in any way create a hardship for the county's farmers. Lands presently in agricultural uses that do not adjoin existing communities should be protected through the county's land use regulations. In addition, the CEQA initial study checklist should consider the potential impact of proposed development on existing and adjoining agricultural operations and water supply.
- **LU-20.** Lands designated for General or Upland Agriculture should continue to be used for agriculture for at least the duration of the planning period (1987–2010). Such period may be extended by future revisions of the plan.
- **LU-25.** Exploration and extraction of oil, gas, and other mineral resources should be conducted in such a way that conflicts with agricultural uses are minimized and permanent interference with agricultural operations is avoided, and in a way that is consistent with the land use compatibility requirements of the Williamson Act, for those lands that are now under contract.
- **LU-28.** Preservation of agricultural land under the Williamson Act should be an option available to all those who qualify.
- **LU-44.** The County Chamber of Commerce, Farm Bureau, Board of Supervisors and Economic Development Commission should work together to determine the types of business and industry appropriate to enhance the county's economy, and endeavor to bring such industries into the county. First priority should be given to businesses that are compatible with Colusa County agriculture and enhance the quality of life in Colusa County.

Colusa County Zoning Ordinance

The specific zoning classifications applicable to the project are discussed above. The Colusa County Zoning Ordinance provides a general allowance for pipelines and associated facilities in all zoning districts, following Colusa County Planning Commission review and approval of site, route, and facility plans as part of a land use permit.

Impact Analysis

This impact analysis addresses construction-related impacts, impacts resulting from operation and maintenance, and impacts associated with potential incompatibility of the proposed project with applicable plans and policies.

Construction impacts, which would be temporary, constitute changes that would occur during construction of the project facilities. Operation and maintenance impacts involve long-term operation of the project facilities and any changes resulting from construction that cannot be guaranteed to be returned back to the original state. Impacts associated with incompatibility with applicable plans and policies were identified through examination of the plans and policies of those agencies with jurisdiction over the area encompassing the proposed project.

Significance Criteria

According to Appendix G of the State CEQA Guidelines, a project would result in a significant land use impact if it would result in any of the following outcomes.

- 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.
- Conflict with any applicable habitat conservation plan or natural community conservation plan.

Impacts

Impact 3.9-1: Potential for physical division of an established community

The proposed project occurs in a largely rural agricultural area that supports existing industrial, electric generation and natural gas pipeline and storage facilities (e.g., the PG&E Delevan Compressor Station, Wild Goose Meter Station, PG&E Colusa Generating Station) and scattered farming residences with ancillary structures. The proposed project is approximately 1.25 miles south of the town of Princeton, but does not pass through any populated or established communities. A key criterion in selecting the route of the pipeline was to minimize its proximity to residential areas. In addition, as described in other sections of this PEA, Central Valley will implement measures to limit noise, visual, and air quality impacts on neighboring parcels.

Because construction activities would be of short duration and most of the facilities would be underground, the proposed project would not physically divide a community or substantially restrict future agricultural operations. Consequently, this impact is considered less than significant, and no mitigation is necessary.

Impact 3.9-2: Potential inconsistency with plans and policies

The proposed project would not conflict with Colusa County General Plan policies to preserve the integrity of agricultural uses and conserve the county's undeveloped rural environment. In general, pipeline facilities are considered compatible uses on lands under Williamson Act contracts. Operation of the project facilities is not expected to foster development within the project area or accelerate nonrenewal or termination of existing Williamson Act contracts. Construction of the proposed facilities could result in temporary conflicts with agricultural operations, but none of these conflicts will require termination or nonrenewal of the contracts. Consequently, this impact is considered less than significant, and no mitigation is necessary.

Impact 3.9-3: Potential conflict with habitat conservation plan or natural community conservation plan

None of the features of the proposed project is located on lands covered by a habitat conservation plan or natural community conservation plan. However, the Sacramento and Delevan NWRs and other management areas are located in the project vicinity. The Sacramento and Delevan NWRs, which are covered under the draft CCP discussed under "Regulatory Setting," are located north and south of the proposed pipeline alignment, respectively. None of the project features are located within the boundaries of an NWR, and it is not anticipated that the project would conflict with future management of the refuges under the CCP. Therefore, there would be no impact, and no mitigation is necessary.

Conflicts with recreational uses of these refuges are discussed in Section 3.14, Recreation. As discussed in Impact 3.14-1, construction of the proposed project could conflict with recreational uses such as hunting and birding. However, Central Valley will implement applicant-proposed measure REC-1 to ensure that disturbance of recreation activities associated with the NWR lands, duck clubs, and private landowners are minimized to the extent possible, thereby reducing this impact to a less-than-significant level.

Applicant-Proposed Measures

As stated, no potentially significant impacts related to land use have been identified. Moreover, Central Valley will implement noise, visual, recreation, agricultural, and air quality measures as part of the proposed project to avoid and minimize potential land use impacts. No additional mitigation related to land use is necessary.

Section 3.10
Mineral and Energy Resources

This section describes the mineral, natural gas, and sand and gravel resources known to occur in the project region and project area. It also contains an analysis of the potential effects of the proposed project on mineral and energy resources in the vicinity.

Environmental Setting

The information pertaining to the environmental setting was extracted from the *Wild Goose Storage, Inc. Expansion Project Supplemental EIR* (California Public Utilities Commission 2002) and the Colusa County General Plan (Colusa County1989). Where appropriate, the environmental setting information is summarized and herein incorporated by reference.

Regional Setting

Mineral Resources

In the Sacramento Valley, the primary mineral resources of economic value include petroleum reserves (oil and gas); precious metals (gold, silver, and platinum); construction aggregate (sand and gravel); clay; gypsum; and other deposits. The Colusa General Plan states that the western portion of Colusa County has a long history of mineral activity. Historical mineral resources throughout the county include sandstone, produced in the vicinity of Sites; mineral water, from the springs of the western portion of the county; and sand and gravel, located in the valley portion of the county. Salt, mineral paint, brick, chromite, copper, limestone, and sulphur have been produced in small quantities; the presence of gypsum, pyrite, and manganese has been recorded (Colusa County 1989).

Although mining had occurred in Colusa County since the mid-1800s, most mining activity, other than sand and gravel extraction, ceased by 1943. The Wilbur Springs Mining District encompasses portions of western Colusa County and eastern Lake County. Significant mines in the district include the Manzanita Mine, Elgin Mine, Rathburn Group, and Wide Awake Mine (Colusa County 1989).

Natural Gas Resources

Numerous gas fields are located throughout the Sacramento Valley. Oil and gas exploration in the Sacramento Valley began in the mid-1800s. The occurrences of natural gas fields in the project region are shown in Figure 3.10-1. Most fields in the Sacramento Valley produce “dry” gas, with minimal heavier gas components or petroleum liquids. Methane (from about 80% to more than 95%) is the primary component of natural gas in the Sacramento Valley, along with minor amounts of other gases (ethane, propane, nitrogen, carbon dioxide, oxygen). Sacramento Valley natural gas fields are found primarily in Cretaceous and Tertiary age sedimentary deposits. Hydrocarbons are contained within structural traps where channel sands cross over geologic structural highs (domes and anticlines). Sea levels fluctuated during deposition, creating an alternating sequence of marine and non-marine sands and shales forming the reservoirs and cap rock present today (California Public Utilities Commission 2002).

Natural gas fields are located throughout the eastern portion of Colusa County, concentrated mainly along the Sacramento River. When the General Plan was written (Colusa County 1989), Colusa County was the second largest natural gas producer in the state.

Sand and Gravel Resources

In the project region, the Sacramento River and its tributaries represent potentially commercial economic sand and gravel resources. The former California Division of Mines and Geology (formerly CDMG, now the California Geological Survey [CGS]) is the agency responsible for designating potential sand and gravel resource areas. Under the 1975 State Mining and Reclamation Act (SMARA), areas of economic interests are designated. In the immediate project vicinity, no specific sand and gravel resources are currently designated under SMARA and no active surface mineral resources would be crossed or affected by the proposed project.

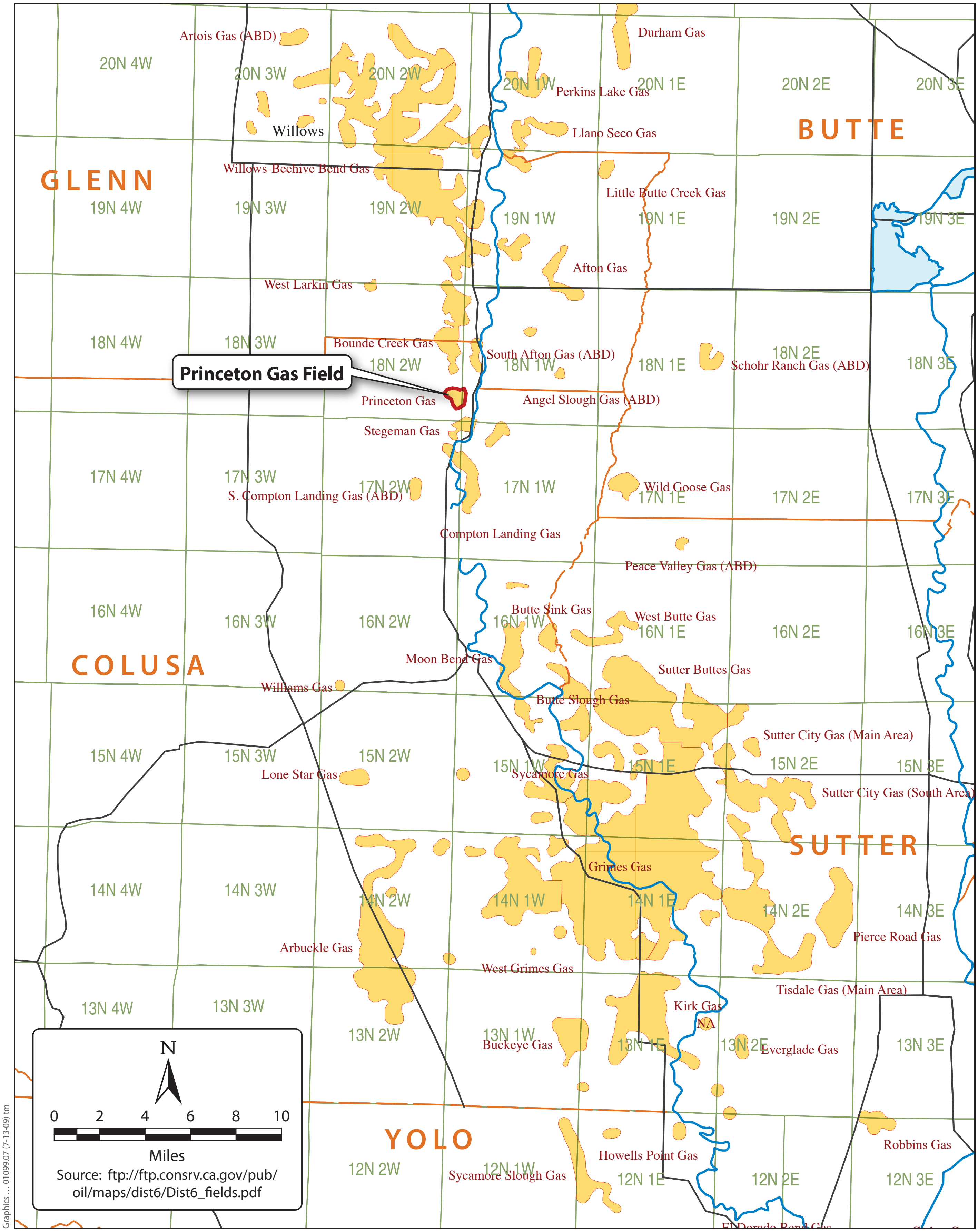
Local Setting

Mineral Resources

In 2004, agriculture and mining accounted for the largest portion (23%) of employment in Colusa County. In 2004, agriculture and mining made up almost 32% of total earnings in Colusa County, compared to 2% in California (Colusa County Economic Development Corporation 2008).

Natural Gas Resources

According to the Conservation Element of the Colusa General Plan, natural gas fields are found throughout the eastern portion of the county. Gas drilling has played



ICF Jones & Stokes
an ICF International Company

Figure 3.10-1
Natural Gas Fields in the Project Area

an increasingly important role in the county's economy. The county plays an important role in natural gas production, ranking third in the state in volume, after Kern and Solano Counties.

Sand and Gravel Resources

Sand and gravel are mined from alluvial deposits, specifically active river channels and channel floodplains. At the present time, there are no known mining operations in the project area.

Regulatory Setting

No federal goals, objectives, or policies relate to the potential effects of the project on mineral and energy resources.

State Regulations

California Surface Mining and Reclamation Act

The California Surface Mining and Reclamation Act (SMARA), as amended to date, is the primary state law concerning conservation and development of mineral resources. SMARA was enacted in 1975 to limit new development in areas with significant mineral deposits. SMARA is found in the California Public Resources Code (PRC), Division 2, Chapter 9, Section 2710 et seq.

Depending on the region, natural resources can include geologic deposits of valuable minerals used in manufacturing processes and in the production of construction materials. SMARA calls for the State Geologist to classify the lands in California on the basis of mineral resource availability. Furthermore, SMARA states that the extraction of minerals is essential to the continued economic well-being of the state and to the needs of society, and that reclamation of mined lands is necessary to prevent or minimize adverse effects on the environment and to protect the public health and safety (PRC Section 2711).

In addition to SMARA, the California Health and Safety Code requires the covering, filling, or fencing of abandoned shafts, pits, and excavations (California Health and Safety Code, Sections 24400–03). Mining may also be regulated by local government, which has the authority to prohibit mining pursuant to its general plan and local zoning laws.

California Department of Conservation, Division of Oil, Gas, and Geothermal Resources

As described in Section 3.6 Geology, Soils, and Seismicity, DOGGR regulates drilling, production, injection, and gas storage operations in accordance with CCR Title 14, Chapter 4, Subchapter 1, Onshore Well Requirements, Section 1724.7, Project Data Requirements. Approval must be obtained from DOGGR before any subsurface injection or disposal project can begin. The operator must provide data that are pertinent and necessary for the proper evaluation of the proposed project. A description of the data required by DOGGR is provided in Section 3.6, Geology, Soils, and Seismicity.

California Department of Industrial Relations, Occupational Safety and Health Regulations

Worker safety on construction projects, in particular where grading, trenching, and earthmoving are involved, is the responsibility of the California Department of Industrial Relations, Occupational Safety and Health Regulations (CAL/OSHA). CAL/OSHA establishes and enforces regulations for excavation and trenching permits (TITLE 8, Division 1, Chapter 3.2, Subchapter 2, Article 2 [Permits—Excavations, Trenches, Construction and Demolition and the Underground Use of Diesel Engines in Work in Mines and Tunnels]), and for worker safety (Chapter 4, Subchapter 4, Article 6 [Excavations]).

Local Regulations

Colusa County has established the following policies for conservation of mineral resources.

- **CO-5.** [Partial] Extraction of gravel and other minerals along rivers should be permitted, subject to CEQA and other applicable laws.
- **CO-6.** Development within and adjacent to Resource Conservation lands shall be regulated so that proposed future land uses will not be incompatible with mineral extraction operations, where existing or future mineral extraction operations are likely. Regulations shall be responsive to the type/intensity of the mining operation and the nature of the adjacent land use. Regulations may include but are not limited to: (1) development siting (setback requirements, clustering); (2) land use buffer requirements; (3) hours of operation for mining activities; and (4) dust and noise controls on mining activities and operation.

No policies have been established specifically for natural gas resources, but the following general policy would apply.

- **CO-1.** The conservation of the county's natural resources shall be promoted and projects which would waste resources or unnecessarily degrade them shall be discouraged.

Impact Analysis

Significance Criteria

Criteria for determining the significance of impacts on energy and mineral resources were based on the environmental checklist form in Appendix G of the State CEQA Guidelines. Based on the checklist questions, a project may have a significant effect on the environment if it would result in the loss of the availability of either of the resources listed below.

- A known mineral resource that would be of value to the region and the residents of the state.
- A locally important mineral resource recovery site delineated in a local general plan, specific plan, or other land use plan.

Section 15064(h) of the State CEQA Guidelines states that a change in the environment is not a significant effect if the change complies with a standard that is a quantitative, qualitative, or performance requirement found in a statute, ordinance, resolution, rule, regulation, order, or other standard of general application. For the purposes of analyzing the energy and mineral resource effects of the proposed project, an impact on mineral and energy resources was considered significant if the proposed project would conflict with the goals and policies of the Colusa County General Plan.

Impacts

Project implementation would not adversely affect any known natural gas or aggregate deposits. No significant aggregate deposits are mapped in the project area. Construction and operation of the project would not interfere with or preclude the operation of active natural gas fields in the region. The proposed project would also not conflict with Colusa County's policies for conservation of mineral resources.

Consequently, the proposed project would not have a significant effect on mineral and energy resources because it would not result in the loss of the availability of the resources specified in the significance criteria above. No mitigation is necessary.

Applicant-Proposed Measures

The proposed project would not result in significant impacts on mineral and energy resources; consequently, no mitigation is necessary.

Section 3.11
Noise

This section addresses noise and vibration impacts associated with construction and operation of the proposed project. This discussion is based primarily on information in the report entitled *Central Valley Gas Storage, LLC—Ambient Sound Survey and Noise Impact Evaluation* (Hoover &Keith 2009).

Terminology

Noise Concepts

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise can be defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient sound level. The decibel (dB) scale is used to quantify the loudness of sound. Because sound pressure can vary enormously within the range of human hearing, a logarithmic loudness scale is used to keep sound intensity numbers at a convenient and manageable level. The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process called “A-weighting,” written “dBA.” In general, human sound perception is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving sound level. Table 3.11-1 summarizes typical A-weighted sound levels.

Table 3.11-1. Typical A-Weighted Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 300 meters (1000 feet)		
	— 100 —	
Gas lawn mower at 1 meter (3 feet)		
	— 90 —	
Diesel truck at 15 meters (50 feet) at 80 kph (50 mph)		Food blender at 1 meter (3 feet)
	— 80 —	Garbage disposal at 1 meter (3 feet)
Noisy urban area, daytime		
Gas lawn mower, 30 meters (100 feet)	— 70 —	Vacuum cleaner at 3 meters (10 feet)
Commercial area		Normal speech at 1 meter (3 feet)
Heavy traffic at 90 meters (300 feet)	— 60 —	
		Large business office
Quiet urban daytime	— 50 —	Dishwasher next room
Quiet urban nighttime	— 40 —	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

Source: Caltrans 1998.

Noise attenuates as a function of the distance from the source. Typically, noise from a point source such as stationary compressor attenuates at a rate of about 6 dB per doubling of distance. Noise from a line source such as traffic on highway attenuates at a rate of about 4.5 dB per doubling of distance. Over large distances (greater than about 1,000 feet) other factors such as wind, temperature inversion conditions, and other atmospheric factors can increase or decrease the rate of attenuation.

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level (L_{eq}), the minimum and maximum sound levels (L_{min} and L_{max}), percentile-exceeded sound levels (L_{xx}), the day-night sound level (L_{dn}), and the community noise equivalent level (CNEL). Below are brief definitions of these measurements and other terminology used in this chapter:

- **Sound.** A vibratory disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.

- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Ambient Noise.** The composite of noise from all sources near and far in a given environment exclusive of particular noise sources to be measured.
- **Decibel (dB).** A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.
- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- **Maximum Sound Level (L_{max}).** The maximum sound level measured during the measurement period.
- **Minimum Sound Level (L_{min}).** The minimum sound level measured during the measurement period.
- **Equivalent Sound Level (L_{eq}).** The equivalent steady state sound level that in a stated period of time would contain the same acoustical energy.
- **Percentile-Exceeded Sound Level (L_{xx}).** The sound level exceeded "x" percent of a specific time period. L10 is the sound level exceeded 10% of the time.
- **Day-Night Level (L_{dn}).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.
- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period with 5 dB added to the A-weighted sound levels occurring during the period from 7:00 p.m. to 10:00 p.m. and 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.
- **Ground-borne Noise.** Audible sound that occurs when ground-borne vibration causes a building element to vibrate and re-radiate sound energy. The audible sound is typically a low-frequency rumble.

L_{dn} and CNEL values differ by less than 1 dB. As a matter of practice, L_{dn} and CNEL values are considered to be equivalent and are treated as such in this assessment.

Vibration Concepts

An activity such as pile driving that imparts energy into the ground creates seismic waves that radiate along the surface of the earth and downward into the earth. These surface waves can be felt as ground vibration. Ground vibration can result in effects ranging from annoyance of people to damage of structures. Varying geology and distance will result in different vibration levels containing different frequencies and displacements. In all cases, vibration amplitudes will decrease with increasing distance.

As seismic waves travel outward from vibration source , they excite the particles of rock and soil through which they pass and cause them to oscillate. The actual distance that these particles move is usually only a few ten-thousandths to a few thousandths of an inch. The rate or velocity (in inches per second) at which these particles move is the commonly accepted descriptor of the vibration amplitude, referred to as the peak particle velocity (ppv).

Human response to vibration is difficult to quantify. Vibration can be felt or heard well below the levels that produce any damage to structures. The duration of the event has an effect on human response, as does frequency. Generally, as the duration and vibration frequency increase, the potential for adverse human response increases.

Table 3.11-2 summarizes the average human response to vibration that may be anticipated when a person is at rest in quiet surroundings. If the person is engaged in any type of physical activity, the level required for the responses indicated are increased considerably.

Table 3.11-2. Human Response to Ground Vibration

Response	Ground Vibration Range ppv (inches per second)
Barely to distinctly perceptible	0.02–0.10
Distinctly perceptible to strongly perceptible	0.10–0.50
Strongly perceptible to mildly unpleasant	0.50–1.00
Mildly unpleasant to distinctly unpleasant	1.00–2.00
Distinctly unpleasant to intolerable	2.00–10.00
Source: Caltrans 2004	

In some situations ground-borne vibration can cause surfaces within a structure to vibrate. The vibrating surfaces can then radiate energy that is perceived as sound. This type of sound is called ground-borne noise. Ground-borne noise is most common in situations where vibration from an underground train causes the noise in a structure located above the track.

Environmental Setting

Land Uses and Receptors Sensitive to Noise in the Project Vicinity

Noise sensitive land uses and receptors are those locations where noise can interfere with primary activities. These uses include places where people reside and sleep such as residences and hospitals. Other noise sensitive uses can include schools, libraries, and parks. The areas surrounding the compressor site and the pipeline alignment are primarily agricultural with a few rural residences. Sensitive receptors in the project area are shown in Figure 3.7-1 in Section 3.7, “Hazards and Hazardous Materials.”

Several residences are located in the immediate vicinity of the compressor and remote well pad sites. Figure 3.11-1 shows the permanent and temporary compressor sites, the remote well pad location, the locations of the four existing wells and the locations of the nearby noise sensitive areas (NSA’s) (i.e. residences.) The distances between primary project-related noise sources and the NSAs are also shown in Figure 3.11-1.

Two rural residences are located along the proposed pipeline alignment. The first is located just east of I-5 about 100 feet from the proposed pipeline centerline. The second residence is westernmost residence identified as NSA #3 in Figure 3.11-1) which is about 1,000 feet from the pipeline centerline.

Existing Noise Conditions

The project area is rural and supports agricultural activities including grazing and farming. The noise environment is defined primarily by noises generated by distant transportation, local traffic, agricultural activities, and natural sources such as wind and wildlife.

Ambient noise measurements were conducted in the project area at three locations on April 27, 2009 by Hoover & Keith. The measurement locations were adjacent to NSA #1, #2, and #3 indicated in Figure 3.11-1. Table 3.11-3 summarizes the measurement results and L_{dn} values calculated from the measurements.

Table 3.11-3. Summary of Measured Ambient Sound Level and the Calculated L_{dn} at the Closest NSAs

Measurement Position	NSAs	Distance/Direction to Compressor Building or Well Pad Site	Measured Morning L_d (dBA)	Measured Afternoon L_d (dBA)	Measured Afternoon L_n (dBA)	Calculated L_{dn} (dBA)
Position 1	House (NSA #1)	1,900 ft. SE of Comp. Bldg.	38.1	47.5	43.1	49.5
Position 2	House (NSA #2)	2,400 ft. NE of Comp. Bldg.	42.3	43.0	39.4	46.5
Position 3	Houses (NSA #3)	1,550 ft. S-SE of Well Pad Site	45.6	48.3	46.0	52.6

The results of the noise monitoring indicate that low ambient noise levels exist in the project area. This is consistent with the rural setting.

Regulatory Setting

No federal noise standards are applicable to the project.

State Regulations

No state noise standards are applicable to the project. However, because the County does not have noise standards for construction noise, guidelines recommended by the California Department of Health (California Department of Health 1977) are applied to this project. These guidelines recommend the following limits for construction operation noise effects on residential uses:

Mobile Equipment–Maximum noise levels for nonscheduled, intermittent, short-term operation (less than 10 days) of mobile equipment:

- Daily, except Sundays and legal holidays (7 a.m. to 7 p.m.): 75 dBA
- Daily, 7 p.m. to 7 a.m. and all day Sunday and legal holidays: 60 dBA

Stationary Equipment–Maximum noise levels for repetitively scheduled or relatively long-term operation (periods of 10 days or more) of stationary equipment:

- Daily, except Sundays and legal holidays (7 a.m. to 7 p.m.): 60 dBA
- Daily, 7 p.m. to 7 a.m. and all day Sunday and legal holidays: 50 dBA

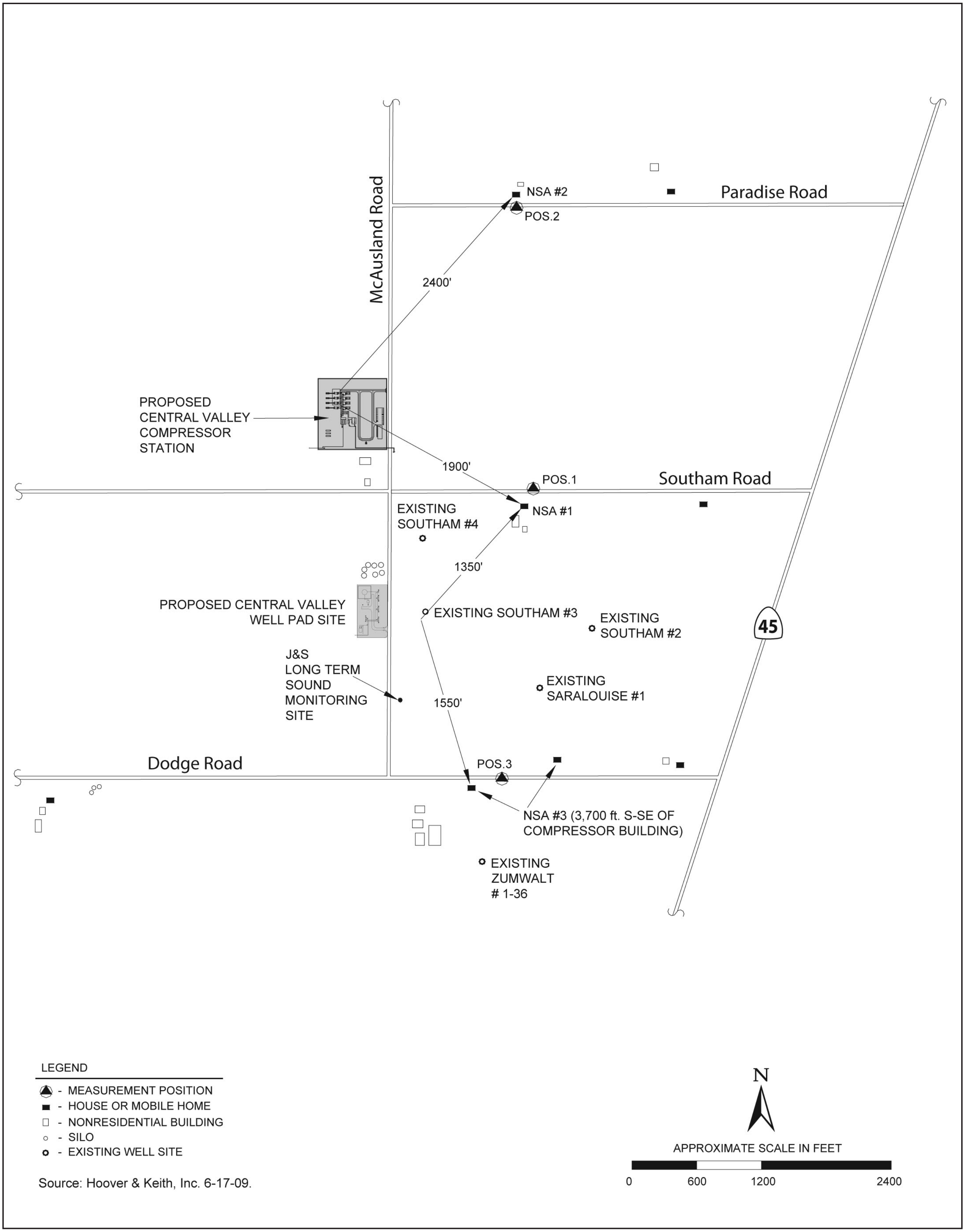
In addition, the County does not have noise standards for vibration. The California Department of Health guidelines recommend that operating or permitting the operation of any device that creates a vibration which is above the vibration perception threshold of an individual at or beyond the property boundary of the source not be allowed.

Local Regulations

Colusa County Noise Element of the General Plan

The Colusa County Noise Element has been incorporated into the Safety Element of the General Plan adopted in 1989. In Colusa County, noise is perceived as a relatively minor problem, and therefore the County has not undertaken a community-wide noise survey or mapping of noise contours. For similar reasons, Colusa County does not have a noise ordinance that regulates noise from construction or stationary sources of noise.

The noise element of the General Plan identifies land use compatibility guidelines for noise and policies for limiting the exposure of people in the County to noise. Figure 3.11-2 summarizes the County's land use compatibility



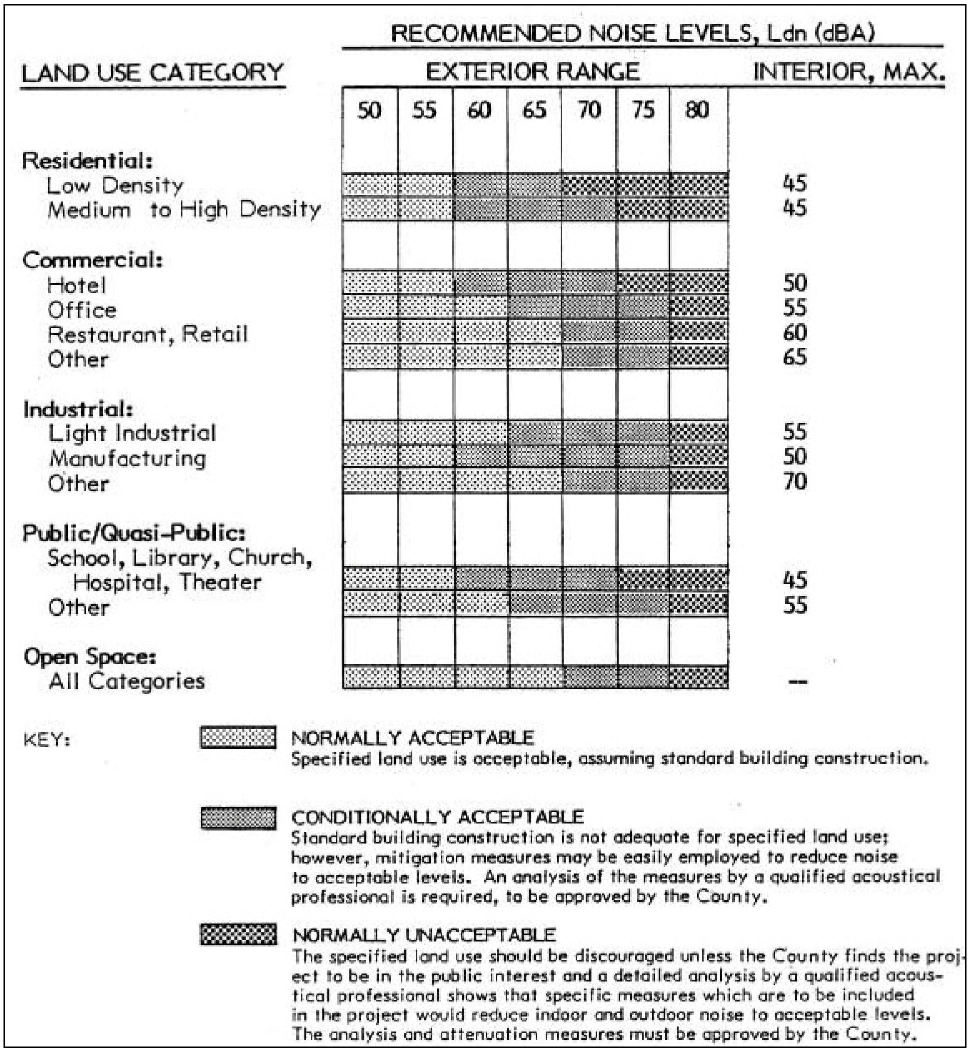
Graphics ... 01099.07 (5-14-09) tm

ICF Jones & Stokes
an ICF International Company

Figure 3.11-1
Land Uses near the Compressor Site and Long-Term Noise Monitoring Position

standards for noise. For rural residential uses, 55 L_{dn} (exterior) and 45 L_{dn} (interior) is identified as being normally acceptable.

Figure 3.11-2. Colusa County Noise/Land Use Compatibility Guidelines



The following noise policies in the noise element are applicable to the project:

SAFE-14. New projects should be conditioned, improved, or denied according to the standards of Figure 3.11-2. When necessary, environmental impact reports should be used to gauge the existing and projected noise environments for proposed projects. All projects in areas above the "conditionally acceptable" noise level should provide the county with proof from a professional acoustical consultant that occupants of the project will be protected from excessive noise.

SAFE-15. New land uses that produce a high levels of noise should not be allowed to encroach upon noise-sensitive uses. Concurrently, new noise-sensitive land uses should be discouraged near uses that produce high levels of noise, including transportation routes.

SAFE-22. Activities which would unnecessarily disturb the peace and quiet of neighborhoods or cause unusual discomfort or annoyance should be prohibited. Regulation of non-vehicular noise (construction, air compressors, manufacturing, loud music) should be discouraged to avoid disturbing uses.

Colusa County Code

Article 8 of Colusa County code contains development standards related to noise. Section 8.0.1 states the following:

> Noise generated by the proposed use as measured at the nearest residential zoned property shall not exceed a day-night of 60 dB, or a median hourly noise level of fifty dBA in daytime (seven a.m. to ten p.m.) and forty-five dBA nighttime (ten p.m. to seven a.m.), whichever is more restrictive.
>
> If the ambient noise level at the receiving residential property exceeds the applicable standard, the standard shall be increased in one decibel increments to include the ambient noise level.

There are no residential zoned properties in the project area. All land is zoned for agricultural use. Accordingly, the noise standards in this code section do not apply to the proposed project. Mr. Kent Johanns, Associate Planner for Colusa County, was contacted to determine the noise standards that should be applied to the proposed project. Mr. Johanns stated that the 55 L_{dn} land use compatibility standard in the general plan noise element should be use to assess noise impacts from the proposed project (telephone conversion with Mr. Kent Johanns, Associate Planner, Colusa County Planning Department on November 11, 2008).

Impact Analysis

Significance Criteria

Criteria for determining the significance of noise impacts were developed based on questions contained in the environmental checklist form in Appendix G of the State CEQA Guidelines. Based on the checklist questions, a project may have a significant effect on the environment if it would result in any of the outcomes listed below.

- Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Exposure of persons to, or generation of, excessive ground-borne vibration or ground-borne noise levels.

- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The specific thresholds listed below are used to determine the significance of construction and operational noise impacts.

Operational Noise

- When continuous noise from operation of the project facilities is predicted to result in an increase in noise that causes the noise level to exceed 55 L_{dn} at the adjacent residences.
- When intermittent noise from operation of the facilities is predicted to exceed 75 dBA-L_{max} 7 a.m. to 7 p.m. or 60 dBA-L_{max} 7 p.m. to 7 a.m. at adjacent residences.

Construction Noise

- When noise from continuous well drilling is predicted to result in an increase in noise that causes the noise level to exceed 55 L_{dn} at adjacent residences.
- When noise from other construction activities (grading, building construction, etc.) is predicted to result in an increase in noise that causes the noise level to exceed 60 dBA-L_{max} daily, 7 p.m. to 7 a.m. and all day Sunday and legal holidays at adjacent residences. (Noise from these activities that occurs between the hours of 7:00 a.m. and 7:00 p.m. is not considered to be significant.)

Ground-borne Noise and Vibration

- Vibration from construction activities or facility operations that causes audible ground-borne noise or perceptible vibration.

Impacts

Impact 3.11-1: Exposure of noise-sensitive land uses to noise from construction activities other than well drilling

Construction activities would result in temporary increases in noise levels in the area of construction activity. Primary noise-generating activities would include excavation, grading, scraping, horizontal boring, and compaction activities. Vehicles traveling to and from construction sites also may affect noise in the area, but to a lesser degree. The magnitude of construction-noise impacts would depend on the type of construction activity, the noise level generated by various pieces of construction equipment, the duration of the activity, the distance between the activity and noise-sensitive receptors, and shielding effects from local barriers and topography. Noise increases from pipeline installation typically would last no more than a few days at any given location. Noise from construction of other facilities could occur over several weeks to several months. Table 3.11-4 shows L_{eq} values for various types of construction equipment that are likely to be used during construction.

A reasonable worst-case assumption is that the three loudest pieces of equipment would operate simultaneously and continuously over at least a 1-hour period. The combined sound level of three of the loudest pieces of equipment listed in Table 3.11-4 (scraper, truck, and bulldozer) is 92 dBA, measured at a distance of 50 feet. Table 3.11-5, which assumes this combined-source noise level, summarizes predicted noise levels at various distances from an active construction site. These predicted construction noise levels include the effects of acoustical absorption by the ground but do not include the effects of shielding from structures or topography.

Table 3.11-4. Noise Emission Levels Typical for Construction Equipment

Equipment	Typical Noise Level (dBA) 50 Feet from Source
Backhoe	80
Bulldozer	85
Grader	85
Loader	85
Roller	75
Scraper	89
Truck	88

Source: Federal Transit Administration 2006.

Table 3.11-5. Estimated Construction Noise in the Vicinity of Active Construction Sites

Distance between Source and Receiver (feet)	Geometric Attenuation (dB)	Ground Effect Attenuation (dB)	Calculated Sound Level (dBA)
50	0	0	92
100	-6	-2	85
250	-14	-4	74
300	-16	-5	72
400	-18	-6	69
500	-20	-6	66
600	-22	-7	64
700	-23	-7	62
800	-24	-7	61
900	-25	-8	60

Distance between Source and Receiver (feet)	Geometric Attenuation (dB)	Ground Effect Attenuation (dB)	Calculated Sound Level (dBA)
1,000	-26	-8	58
1,200	-28	-9	56
1,400	-29	-9	55
1,600	-30	-9	53
1,800	-31	-10	52
2,000	-32	-10	50
2,500	-34	-10	48
3,000	-36	-11	46

Notes:

Calculations are based on Federal Transit Administration 2006.

These calculations do not include the effects, if any, of local shielding from walls, topography, or other barriers that may reduce sound levels further.

The results in Table 3.11-5 indicate that, under the worst-case construction noise assumption, construction operations could result in a noise increase to a level that exceeds the 60 dBA-L_{max} construction noise significance threshold within about 900 feet of an active construction site. Only one residence (the residences located east of I-5 along the pipeline alignment) is anticipated to be located at a distance of less than 900 feet from construction activities. Central Valley will implement applicant-proposed measure NOI-1 (Implement Noise Control Measures) as part of the proposed project to minimize noise-related impacts. This measure includes limiting construction activity within 900 feet of dwelling units to daytime hours of 7 a.m. to 7 p.m. on weekdays, Saturday, and non-holidays. This impact is considered less than significant. No additional mitigation is necessary.

Impact 3.11-2: Exposure of noise-sensitive land uses to noise from well drilling and work over activities

Noise Impact Assessment of Drill Rig for Proposed Storage Wells

Nine new storage wells will be drilled at the Well Pad Site. New well drilling will occur 24 hours a day, 7 days a week and is estimated to take 6-10 days for each well. The estimated sound contribution of the drill rig activities was only performed for NSA #1 and NSA #3 since the sound contribution of the drilling operations at other more distant NSAs typically should be equal to or less than the sound contribution at these NSAs. A description of the acoustical analysis methodology is provided in Hoover & Keith 2009. Subsequent to preparation of Table 3.11-16, the remote well pad site was moved to the west side of McAusland Road. Because this location is farther away from NSA #1 and NSA #3 the predicted noise levels in Table 3.11-16 are higher (and thus more conservative) than would be predicted with the relocated well site.

Table 3.11-6 summarizes the predicted noise levels at NSA #1 and NSA #3 during drill rig operations at the new storage wells assuming standard drill rig equipment is employed and that all noise control treatments specified in Hoover & Keith 2009 are implemented.

Table 3.11-6. Predicted Noise Levels from Operation of Drill Rigs at the Proposed Storage Wells

NSAs	Distance/ Direction to Proposed Storage Wells	Measured Ambient Morning L_d (dBA)	Measured Ambient Afternoon L_d (dBA)	Measured Ambient Nighttime L_{dn} (dBA)	Calculated Ambient L_{dn} (dBA)	Estimated L_{eq} of Storage Well Drill Rig Noise (dBA)	Calculated L_{dn} of Storage Well Drill Noise (dBA)	Measured Ambient L_{dn} + Estimated L_{dn} of Drill Rig Noise (dBA)	Potential Noise Increase (dBA)
NSA #1 (House)	1,350 ft. NE	38.1	47.5	43.1	49.5	45.8	52.2	54.1	4.6
NSA #3 (Houses)	1,550 ft. S-SE	45.6	48.3	46.0	52.6	44.1	50.5	54.7	2.1

The results in Table 3.11-6 indicate that operation of the drill rigs for the proposed storage wells will not result in an increase in noise that causes the noise level at adjacent residences to exceed 55 L_{dn}. This conclusion holds true for the relocated remote well pad site as well. The noise impact from storage well drilling is therefore considered to be less than significant and no mitigation is required.

Noise Impact Assessment Service Rig for Existing Production Wells

Up to six existing wells will be reworked with a service rig. Service rig activities will occur 12 hours/day, 7 days a week, and each existing well is estimated to take approximately 3-5 days to complete. The estimated sound contribution of the service rig activities was only performed for the closest NSAs since the sound contribution of the service rig operations at other more distant NSAs typically should be equal to or less than the sound contribution at these NSAs. A description of the acoustical analysis methodology is provided in Hoover & Keith 2009.

The Table 3.11-7 summarizes the predicted noise levels from service rig operations at the existing well sites assuming standard service rig equipment is employed and that all noise control treatments specified in Hoover & Keith 2009 are implemented.

Table 3.11-7. Predicted Noise Levels from Operation of Service Rig at Existing Well Site

NSAs	Distance/ Direction to Closest Service Rig	Measured Ambient Morning L_d (dBA)	Measured Ambient Afternoon L_d (dBA)	Measured Ambient Nighttime L_{dn} (dBA)	Calculated Ambient L_{dn} (dBA)	Estimated L_{eq} of Service Rig Noise (dBA)	Calculated L_{dn} of Service Rig Noise (dBA)	Measured Ambient L_{dn} + Estimated L_{dn} of Service Rig Noise (dBA)	Potential Noise Increase (dBA)
NSA #3 (Houses)	650 ft. S of Sara Louise #1	45.6	48.3	46.0	52.6	50.7	48.7	54.1	1.5
NSA #3 (Houses)	1,200 ft. S-SW of Southam #2	45.6	48.3	46.0	52.6	43.4	41.4	52.9	0.3
NSA #1 (House)	1,250 ft. NE of Southam #3	38.1	47.5	43.1	49.5	42.9	40.9	50.1	0.6
NSA #1 (House)	925 ft. E-NE of Southam #4	38.1	47.5	43.1	49.5	46.6	44.6	50.7	1.2
NSA #3 (Houses)	650 ft. N of Zum. #1-36	45.6	48.3	46.0	52.6	50.7	48.7	54.1	1.5

The results in Table 3.11-7 indicate that operation of the service rigs at the existing well sites will not result in an increase in noise that causes the noise level at adjacent residences to exceed 55 L_{dn}. The noise impact from service rig operation is therefore considered to be less than significant and no mitigation is necessary.

Impact 3.11-3: Exposure of noise-sensitive land uses to continuous noise from operation of the temporary compressor

A 1,500 HP compressor unit will be temporarily located at the remote well pad site for initial storage field injection while the permanent Station is being constructed. Table 3.11-8 summarizes the predicted noise levels from operation of the temporary compressor unit assuming that all noise control treatments specified in Hoover & Keith 2009 are implemented.

Table 3.11-8. Predicted Noise Levels from Operation of the Temporary Compressor

NSAs	Distance/ Direction to Temporary Compressor	Measured Ambient Morning L_d (dBA)	Measured Ambient Afternoon L_d (dBA)	Measured Ambient Nighttime L_{dn} (dBA)	Calculated Ambient L_{dn} (dBA)	Estimated L_{eq} Temporary Compressor Noise (dBA)	Calculated L_{dn} of Temporary Compressor Noise (dBA)	Measured Ambient L_{dn} + Estimated L_{dn} of Temporary Compressor Noise (dBA)	Potential Noise Increase (dBA)
NSA #1 (House)	1,400 ft. NE	38.1	47.5	43.1	49.5	44.1	50.5	53.1	3.6
NSA #3 (Houses)	1,725 ft. S-SE	45.6	48.3	46.0	52.6	41.8	48.2	53.9	1.4

The results in Table 3.11-8 indicate that noise from operation of the temporary compressor unit will not result in an increase in noise that causes noise at adjacent residences to exceed 55 L_{dn}. This impact is therefore considered to be less than significant and no mitigation is necessary.

Impact 3.11-4: Exposure of noise-sensitive land uses to continuous noise from operation of the permanent compressor facility

Operation of the compressor facility will be the primary source of continuous operational noise associated with operation of the proposed project. Table 3.11-9 summarizes the predicted noise levels from operation of the permanent compressor facility assuming that all noise control treatments specified in Hoover & Keith 2009 are implemented.

Table 3.11-9. Predicted Noise from Operation of the Permanent Compressor Facility

NSAs	Distance/ Direction to Permanent Compressor	Measured Ambient Morning L_d (dBA)	Measured Ambient Afternoon L_d (dBA)	Measured Ambient Nighttime L_{dn} (dBA)	Calculated Ambient L_{dn} (dBA)	Estimated L_{eq} of Permanent Compressor Noise at Full Load (dBA)	Calculated L_{dn} of Permanent Compressor Noise at Full Load (dBA)	Measured Ambient L_{dn} + Estimated L_{dn} of Permanent Compressor Noise (dBA)	Potential Noise Increase (dBA)
NSA #1 (House)	1,900 ft. SE	38.1	47.5	43.1	49.5	41.7	48.1	51.8	2.3
NSA #2 (House)	2,400 ft. NE	42.3	43.0	39.4	46.5	39.2	45.6	49.1	2.6

The results in Table 3.11-9 indicate that noise from operation of the permanent compressor facility will not result in an increase in noise that causes noise at nearby noise at adjacent residences to exceed 55 L_{dn}. This impact is therefore considered to be less than significant and no mitigation is necessary.

Impact 3.11-5: Exposure of noise-sensitive land uses to intermittent noise from operation of the natural gas facility

Venting will be the primary source of intermittent noise associated with operation of the proposed project. There will be three types of vents: pressure relief vents (or valves), compressor unit blow down vents, and plant emergency shutdown vents.

Pressure relief vents or valves are safety devices that will be installed in various locations on the above-ground piping and pressure vessels (e.g., wellhead separators, dehydration towers) within the compressor and metering station in order to protect from an accidental over-pressure situation. When the pressure in the piping system reaches the pre-set release pressure of the relief valve (usually slightly above the maximum operating pressure), a small amount of natural gas is vented to the atmosphere until the pressure returns to normal. An extended overpressure condition is audible by the operators, who can take immediate steps to rectify the situation by isolating the piping as required from the high-pressure gas source.

Two plant emergency shutdown (ESD) vents and six compressor unit vents (blowdown vents) will be installed on the compressor site. ESD vents and compressor unit vents are similar pieces of equipment. Each is designed to quickly reduce or “blow down” the pressure in the piping system within the compressor station or an individual compressor unit to atmospheric pressure. These vents consist of a valve and automatic actuator mounted on the piping with a vertical blow down stack connected to the valve in order to divert flow away from the piping and equipment. These vents can be manually controlled to purge gas piping and compressors for planned maintenance or can be automatically actuated in the event of an abnormal operating condition. Compressor unit blow down vents will be equipped with silencers with the specific purpose of reducing noise. The two ESD vents will not be silenced in order to not restrict the rate at which the gas is vented from the station piping in the unlikely event of an emergency.

Operation of pressure relief vents is not anticipated to result in an adverse noise impact because operation of these vents involves the release of a small amount of natural gas and the over-pressure situation that triggers the release is typically immediately addressed by the system operators. Similarly, the ESD vents are not anticipated to result in an adverse noise impact because they are operated very infrequently in rare emergency conditions.

The operation of compressor blow down vents, however, can result in a high level of noise that would occur more frequently than the ESD vents because the compressor blowdown vents are operated during normal maintenance operations. The sound levels associated with high pressure gas venting are a function of initial blowdown pressure, the diameter and type of blowdown valve, and the diameter and arrangement of the downstream vent piping. As expected, blowdown sound levels are loudest at the beginning of the blowdown event and they decrease as the blowdown pressure decreases. Table 3.11-10 summarizes predicted noise levels from a normal blowdown event (i.e., unit start up and shut down).

Table 3.11-10. Predicted Noise Levels from Normal Blowdown Event

“Normal” Blowdown Sound Source	Closest NSA	Distance/Direction to Proposed Compressor Building	Estimated Initial Sound Level for Blowdown Event (dBA)
Proposed Compressor Units	House (NSA #1)	1,900 ft. SE	44

A normal blowdown event is short duration event of approximately 5 minutes. The results in Table 3.11-10 indicate that noise from normal blowdown events will not result in an increase in noise that causes noise at adjacent residences to exceed 55 L_{dn}. This impact is therefore considered to be less than significant and no mitigation is necessary.

Impact 3.11-6: Exposure of noise-sensitive land uses to ground-borne noise and vibration

It is not anticipated that highly dynamic construction equipment such as pile drivers or impact breakers will be used. Accordingly, construction activity is not anticipated to result in audible ground-borne noise or perceptible vibration.

Large reciprocating compressor units have the potential to impart substantial vibratory energy into the ground. However, this machinery must be operated under strict vibration limits in order to operate property. Because of this and because the nearest residence is located at least 1,900 feet from the compressor site operation of the compressor is not anticipated to result in audible ground-borne noise or perceptible vibration at this residence. This impact is therefore considered to be less than significant and no mitigation is necessary.

Applicant-Proposed Measures

NOI-1: Implement noise control measures

Central Valley will incorporate the following measures into the construction contract specifications to reduce and control noise generated from construction-related activities such that construction noise does not exceed 60 dBA-L_{max} between 7 p.m. and 7 a.m. weekdays and all day on Sundays and legal holidays at adjacent residences.

- Prohibit noise-generating construction activity within 900 feet of occupied dwelling units between the hours of 7 p.m. and 7 a.m. on weekdays and all day on Sundays and legal holidays, unless written approval is obtained from the resident.
- Ensure that all construction equipment has sound-control devices no less effective than those provided on the original equipment. No equipment will have an unmuffled exhaust.
- Implement appropriate additional noise-reducing measures as may be necessary, including but not limited to:
    - Changing the location of stationary construction equipment,
    - Shutting off idling equipment,
    - Providing local enclosures or barriers around noise-generating equipment,
    - Rescheduling construction activity, and
    - Notifying nearby residents in advance of construction work.

Section 3.12
Population and Housing

This section describes the existing population and housing in the project area and applicable regulations related to population and housing. The section also addresses whether impacts on population and housing could result from the proposed project.

Environmental Setting

Population

In comparison to most of California's counties, population in Colusa County is quite sparse. Colusa County's population in 2005 was 21,095; of which 51% was urban and 49% was rural. The population density of the county is 18 persons per square mile (Onboard Informatics 2008). The city of Colusa (county seat) supports the largest concentrated population in the County. The county has historically been one of the slowest growing areas in California. For more than 30 years, growth in Colusa County has been substantially less than growth for the state (Onboard Informatics 2008).

Table 3.12-1 provides information about the Colusa County population.

Population in the immediate project vicinity consists of families in scattered residences associated with farming operations.

Table 3.12-1. Characteristics of Colusa County Population

Characteristic	Year	Value
Population	1990	16,275 persons
	2000	18,804 persons
	2005 (estimated)	21,095 persons
	2015 (projected)	23,565 persons
Population density (persons per square mile)	2000	16.342 persons
Percent population under 18 years old	2000	31.6%
Per capita income	1998	$20,287
	2004	$24,701
Civilian employment	2000	7,280 persons
Average unemployment rate	2000	17.6%
Sources: Knowledgeplex 2008; Colusa County Economic Development Corporation 2008.		

Housing

Housing in rural Colusa County consists primarily of single-family dwellings associated with agricultural activities and multiple-occupancy dwellings associated with hunting clubs. Housing in the cities consists primarily of single-family dwellings. Colusa County has the sixth lowest rental vacancy rate in the state (Knowledgeplex 2008).

Table 3.12-2 provides information about housing in Colusa County.

Housing in the immediate project vicinity consists of scattered single-family residences associated with farming.

Table 3.12-2. Characteristics of Housing in Colusa County

Characteristic	Year	Value
Total housing units	2000	6,774
Median year structure built	2000	1968
Housing units	2005 (est.)	7,251
Housing vacancy rate	2000	10.8%
Percent housing units in single-family detached homes	2000	74.4%
Homeownership rate	2000	63.3%
Average gross rent of renter-occupied units	2000	$511
Source: Knowledgeplex 2008.		

Regulatory Setting

No federal or state goals, objectives, or policies relate to the potential effects of the project on population and housing.

Local Regulations

The Housing Element of the Colusa County General Plan has one goal related to housing.

- Encourage an adequate supply of safe, sanitary, and attractive housing in all communities in Colusa County, affordable to a wide range of income groups.

The Housing Element of the Colusa County General Plan contains the following policy that is applicable to the proposed project.

- **HO-20.** Colusa County should encourage the protection of the existing rental housing supply.

The Land Use Element of the Colusa County Plan has one goal.

- Maintain the efficient and harmonious use of land in the county, promoting a well-organized and orderly development pattern, avoiding random, haphazard growth, protecting public health and safety, and accommodating the orderly growth of population and employment.

The Land Use Element of the Colusa County General Plan contains the following policy to preserve or protect population and housing.

- **LU-31.** Sufficient vacant areas should be designated for residential development to meet the housing demand that can reasonably be expected from new local industry.

Impact Analysis

This impact analysis addresses construction-period impacts, impacts resulting from operation and maintenance, and impacts associated with potential incompatibility of the proposed project with applicable plans and policies. Impacts associated with incompatibility with applicable plans and policies were identified through examination of Colusa General Plan.

Significance Criteria

Criteria for determining the significance of impacts on population and housing were based on the environmental checklist form in Appendix G of the State CEQA

Guidelines. Based on the checklist questions, a project may have a significant effect on population and housing if it would result in any of the following outcomes.

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

The following criterion was also considered in assessing impacts on population and housing.

- Create a demand for temporary housing that could not be met with the existing supply in the project area, resulting in a strain on local resources.
- Conflict with the goals and policies set forth in the Colusa County General Plan.

Impacts

Based on a review of the best available information and relevance to this project, the proposed project would not result in the first three impacts listed above for the reasons provided below; accordingly, they are not discussed further.

- The proposed project would not result in substantial population growth in the area because no new homes or businesses are proposed, and no infrastructure related to population growth is proposed.
- The proposed project would not displace or relocate any existing housing units or current residents during the construction or operational phases of the project because the project (including the gas pipeline) would be in areas that are currently in agricultural production. Permanent land rights would be required in the form of easements for the pipeline route and either long-term leases or fee purchases for the aboveground components. Easement areas established in residential areas would be returned to their previous uses following completion of project construction. Consequently, the proposed project would not result in the displacement of a substantial portion of property away from homeowners.
- The proposed project would not displace people or require replacement housing elsewhere.
- The proposed project would not conflict with the goals and policies set forth in the Housing and Land Use Elements of the Colusa County General Plan.

Impact 3.12-1: Demand for temporary housing

As described in Chapter 2, approximately 370 construction workers would be required during the construction period. Central Valley expects that workers from the local area would be contracted to perform some of the construction work**.** Some specialized non-local workers would be hired during the construction period (an estimate of the number of non-local employees working on the project at any one time is not available). Because these non-local workers would be in the area only during project construction, they would not become permanent residents. Project construction would not directly induce population growth in Colusa County.

Because of the relatively short construction period, most non-local workers can be expected to use hotel/motel accommodations or to park recreational vehicles at local campgrounds or RV parks. No demand for permanent housing would be created. The communities most likely to accommodate non-local workers are Colusa, Willows, Princeton, and Williams. Because of the tendency for construction workers to commute to their jobs, larger communities within a 60-mile radius of the project may also accommodate a number of non-local workers. These would include Marysville, Yuba City, Woodland, and Red Bluff. The distribution of workers among these communities will be based on the choices of the individual workers and therefore cannot be determined with any degree of accuracy.

There are several hotels, motels, RV parks, camping sites, rental properties, and housing opportunities in Colusa County or within a 60-mile commute radius. The temporary increase in demand for temporary housing associated with the project is expected to be accommodated regardless of the phase of the project or the time of year and is expected to provide economic benefits to the community. Accordingly, the impact of the proposed project on temporary housing is less than significant; no mitigation is necessary.

Applicant-Proposed Measures

No applicant-proposed measures have been identified for population and housing because the proposed project would not result in any significant impacts. No mitigation is necessary.

Section 3.13
Public Services

This section describes the existing public services in the project area: law enforcement and fire protection, medical facilities, and schools and parks. The section also identifies potential impacts on public services that would be caused by the proposed project during construction and operation.

Environmental Setting

Law Enforcement

The unincorporated areas of Colusa County receive general safety and law enforcement services from the Colusa County Sheriff's Department, located in Colusa. The Department also serves as the County Emergency Services Center. In July 2008, Colusa County Sheriff patrol personnel comprised 30 sworn officers, three reserves, two in training (at the academy), and possibly two openings. These numbers do not include dispatch, corrections, technicians, or records staff at the Sheriff's Department. Staffing figures were provided by Lt. Shane Maxey, Field Services, in the Colusa County Sheriff's Department, in a telephone conversation on July 9, 2008. It is not anticipated that the project would result in increased demand for sheriff services.

As described in Section 3.07 (Hazards and Hazardous Materials), response time depends on the location of the assigned deputy at the time of the call. Colusa County Sheriff's Department patrols the northwest part of the Colusa County 24 hours a day. The department would dispatch CHP from the regional office in Williams (south of the project area), as needed. The expected response times to a situation in the project area could be within a few minutes (if there is a deputy in the area) to 15 minutes.

Fire Protection

Eight rural districts, two city fire departments, the California Department of Forestry and Fire Protection, and the U.S. Forest Service provide fire protection services in Colusa County. Volunteer fire fighters staff the majority of districts. The western end of the project area is in the Maxwell Rural Fire District. The Maxwell Fire

Department, approximately 13 miles from the metering station site, is the closest station to the western end of the project area. The eastern end of the project area would be serviced by the Princeton Rural Fire District. Either of these fire departments would service the central portion of the project area.

The incidence of fire in the county is relatively low, particularly on the valley floor, where the hazards are also low. The fire protection districts respond to structural and wildland fires and medical emergencies within their boundaries. The districts are occasionally called on to extinguish fires in rice fields when blowing smoke obscures traffic (Colusa County 1989).

As described in Section 3.07 (Hazards and Hazardous Materials), the estimated response time to a facility in the project area is 7 to 12 minutes (for either the Maxwell or Princeton Fire Departments).

Medical Facilities

Major hospitals in Colusa County are located in Colusa (Colusa Community Hospital, also known as Memorial Hospital) and Williams (Valley West Convalescent Hospital). Colusa Regional Medical Center operates a county-wide health system consisting of a 48-bed acute care hospital and skilled nursing facility; a Home Health Agency; and rural health clinics in the communities of Arbuckle, Colusa, Stonyford, and Williams. Valley West Convalescent Hospital is a 128-bed skilled nursing and rehabilitation facility.

Enloe Medical Center has been providing pre-hospital emergency services in the region since 1985 (and has transported sick and injured patients for the past 9 years in Colusa County), when the first Advanced Life Support Unit was staffed with emergency medical technicians and mobile intensive care nurses. The pre-hospital service has evolved over the years to include a fleet of 10 paramedic-staffed ambulances serving three counties and the FlightCare helicopter, which serves a 10-county region. Enloe Emergency Medical Services (EMS) Communications Center coordinates communications and ambulance and helicopter responses to Butte, Glenn, and Colusa Counties.

Enloe has built up a deficit from its ambulance service because of the large region covered, soaring fuel prices, and sparse population in the area. Because of Colusa County's large land area, Enloe keeps one vehicle each in Colusa and Williams to shorten driving time. In the event of an emergency in the project area, response times from Colusa would be approximately 12 minutes, and from Williams no more than 12 minutes (Bell pers. comm.).

Schools and Parks

Colusa Unified School District and Colusa County Office of Education represent the two local school districts in Colusa County. Colusa Unified is responsible for 1,538 students in five schools. Colusa County Office of Education is responsible for 179 students in four schools. (http://california.schooltree.org/Colusa-County-Schools.html.) The school districts require school impact fees for new development.

Neighboring Princeton Joint Unified School District (PJUSD) schools are situated on two separate sites in the unincorporated community. More than 200 students are enrolled in grades K–12. Because most of the students live within the Glenn County boundaries, the Princeton schools are part of the Glenn County Office of Education. (http://www.pjusd.org/index.cfm.)

Regulatory Setting

No federal or state goals, objectives, or policies relate to the potential effects of the project on public services.

Local Regulations

The Colusa County General Plan provides an inventory of the public services provided within Colusa County and guidelines for development of public services in response to new development. The policies of the Community Services Element were developed in coordination with the policies of the Land Use Element. The intent of these policies is to channel development into areas where community services can either accommodate growth or be expanded most efficiently.

The following policies contained in the Colusa County General Plan are applicable to the proposed project.

- **FIRE-2.** Proposed development applications should be referred to the local fire chief for recommendations and comments. Comments should include specific recommendations about equipment, manpower, or facilities that might be required as a result of the development.
- **FIRE-4.** Development which could create a public hazard in the event of fire shall be located away from existing and planned residential areas.
- **FIRE-5.** New development should incorporate design measures which are responsive to the risk of fire hazard in those areas.

Impact Analysis

This impact analysis addresses construction-related impacts, impacts resulting from operation and maintenance, and impacts associated with potential incompatibility of the proposed project with applicable plans and policies. Construction impacts, which would be temporary, constitute changes that would occur during construction of the project facilities. Operation and maintenance impacts involve long-term operation of the project facilities and any changes resulting from construction that cannot be guaranteed to be returned back to the original state. Impacts associated with incompatibility with applicable plans and policies were identified through examination of the Colusa County General Plan.

Significance Criteria

Criteria for determining the significance of impacts on public services were based on the environmental checklist form in Appendix G of the State CEQA Guidelines. Based on the checklist questions, a project may have a significant effect on the environment if it would result in the following outcome.

- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities or a need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services: fire protection, police protection, schools, parks, and other public facilities.

Impacts

Impact 3.13-1: Potential increase in demand for emergency response in the project area

Construction-related activities associated with the proposed project could result in injuries to construction workers and increase the demand for emergency response at project facility sites and along the pipeline construction corridor. Emergency service providers in the area would be able to respond adequately to emergencies associated with construction-related activities because such services are located within an appropriate distance, and an emergency access plan will be in place during construction to ensure emergency vehicle access in and adjacent to the construction work area (see applicant-proposed measure TRA-1 [Prepare and Implement a Construction Traffic Plan] in Section 3.15, Transportation and Traffic). Any increase in demand for emergency response attributable to the risk of fire at the compressor facility would be offset by Central Valley's provision of information, training, and equipment. Consequently, this impact is considered less than significant, and no mitigation is necessary.

Impact 3.13-2: Potential need for response to a catastrophic event

The ability of local fire departments to respond to fires and explosions would be dependent on the scale of such an emergency. It is expected that existing capacity would be adequate to respond to a small fire, explosion, or release of hazardous substances. However, because the project is located in a rural area with limited equipment and personnel, individual local fire departments would not have sufficient equipment and/or personnel to respond to a large or catastrophic event such as a large explosion or fire. Response to a catastrophic event would require a concerted effort by multiple emergency response providers in the area.

To ensure that this type of emergency situation is avoided, Central Valley would maintain appropriate natural gas firefighting equipment at the compressor station and would have trained Central Valley personnel onsite to handle this type of situation. The compressor station building would also have an early warning fire detection system that would invoke immediate action by Central Valley before a fire escalates. Because of the low probability of such an event, as discussed in Section 3.7, Hazards and Hazardous Materials, and the measures that Central Valley will implement as part of the project, the potential impact is considered less than significant, and no mitigation is necessary.

Applicant-Proposed Measures

No significant impacts related to public services have been identified. Therefore, no mitigation is necessary.

Section 3.14

Recreation

This section discusses the existing recreational activities and opportunities in the project area, the relevant and applicable land use plans and policies in Colusa County, and the compatibility of the proposed project with these activities and policies.

Environmental Setting

Regional Setting

Wildlife Refuges and Wilderness Areas

The Sacramento National Wildlife Refuge complex consists of five national wildlife refuges (NWRs) and three wildlife management areas comprising more than 35,000 acres of wetlands and uplands in the Sacramento Valley. In addition, more than 30,000 acres of conservation easements are in the complex. The refuges and easements serve as resting and feeding areas for nearly half the migratory birds on the Pacific Flyway (U.S. Fish and Wildlife Service 2008).

The units on the refuge that are open to public access offer birdwatching, photography, interpretation, and educational opportunities. Portions of the refuges are also open during duck and pheasant seasons.

Several units of the Sacramento NWR complex are near the project area (see Figure 3.14-1). The 4,500-acre Colusa NWR is an important waterfowl wintering area. Other local refuges include the Delevan NWR near the town of Delevan and the Sacramento NWR near the county's northern boundary. These areas provide wildlife viewing opportunities and hunting as part of their primary function of waterfowl and habitat management areas.

The southern boundary of the Sacramento River NWR, at the town of Princeton, is just north of the project area (Figure 1-2). As of 2006, refuge lands comprised approximately 10,000 acres of riparian habitat; wetlands; uplands; and intensively managed walnut, almond, and prune orchards (U.S. Fish and Wildlife Service 2008).

In the northwestern corner of Colusa County near the town of Fouts Springs, the Snow Mountain Wilderness Area is part of the Mendocino National Forest. Snow Mountain is the southernmost peak of the North Coast Ranges. Recreational opportunities here include hiking, backpacking, horseback riding, and wildlife viewing. (Colusa California Online Guide 2008).

Sacramento River

The Sacramento River is less than 1 mile from the eastern end of the project area, near the compressor station and remote well pad sites. Public access to the Sacramento River in Colusa County is limited (Colusa County 1989). The river is generally not visible from SR 45, which parallels the river, because of the levee system that separates the river and highway.

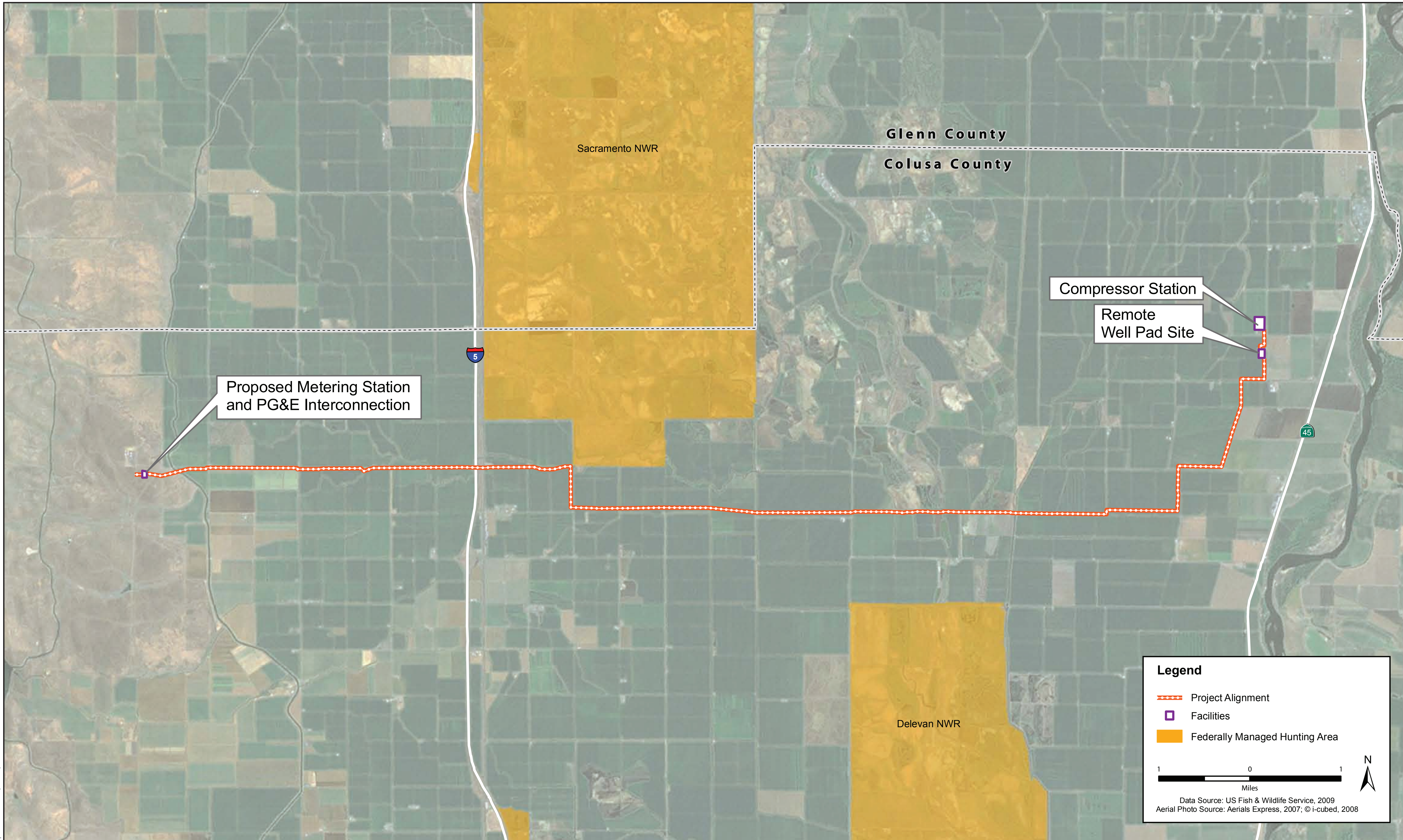
The Sacramento River provides a wide range of recreational opportunities, including fishing, hunting, wildlife viewing, and hiking, in addition to boating and water-related activities. Hundreds of federal, state, local, and private agency sites are located on or along the river between Lake Siskiyou and Suisun Bay. Many sites have public access, while some are conservation lands. Some sites are accessible by public road, and others can be reached only from the river. As noted above, the southern boundary of the Sacramento River NWR is in the project vicinity, and the Sacramento River forms part of the eastern boundary of Colusa County.

Boating is a popular activity on the Sacramento River. The season begins in April and lasts until winter rains. A cleared navigational channel is maintained between the cities of Colusa and Sacramento, allowing boats up to 40 feet long to navigate the river. Traveling along the river with its tree-lined banks, wild grapevines, and overhanging foliage is a picturesque experience. There is presently no organized trail system along the river (Colusa County 1989).

Colusa-Sacramento State Recreation Area

The 67-acre Colusa–Sacramento River State Recreation Area (SRA) is approximately 10 miles south of the project area near the city of Colusa. The SRA provides campsites, picnic areas, and a boat ramp to launch small boats (the only public boat launch and landing facility in the county). Recreational fishing in this portion of the Sacramento River includes king salmon, steelhead, rainbow trout, striped bass, catfish, shad, carp, and sturgeon. (Colusa California Online Guide 2008.)

The project area is located just west of the Colusa Subreach Planning Project Area of the Sacramento River Conservation Area (SRCA). The Colusa Subreach Planning Project Area is located east of SR 45, which borders the eastern end of the project area. The goal of the SRCA is to restore and protect a continuous riparian corridor along 222 miles of the Sacramento River between Keswick Dam in Shasta County and Verona in Sutter County, at the confluence of the Sacramento and



Graphics ... 01099.07 (7-14-09)

ICF Jones & Stokes
an ICF International Company

Figure 3.14-1
Hunting Areas in Project Vicinity

Feather Rivers. The proposed project would not conflict with the goals of the SRCA or the Colusa Subreach Planning Project.

Colusa County Recreation

Colusa County is primarily rural and undeveloped, with an abundance of open space and natural resources, and is a popular area for hunting. More ducks and geese winter in the Sacramento Valley than in any other area of the Pacific Flyway (Colusa County 1989). Ducks arrive in August, and geese arrive in large numbers around Thanksgiving. As indicated above, public hunting is permitted on portions of the NWRs during duck and pheasant seasons. A number of private clubs offer waterfowl hunting in areas in the County. Gaines Ranch Duck Clubs operate over 2,400 acres of prime waterfowl country in Northern California along State Highway 162 between Highway 99 and Interstate 5 (Gaines Ranch 2009). The properties nearest to the Project area are listed below.

- **DPM Ranch**. This property is located east of the Sacramento National Wildlife Refuge near Princeton, north of Norman Road, approximately two miles of the proposed compressor station site. No hunting is permitted north and south of the property. One group of hunters control both blinds on the ranch, one 2-man and one 4-man. The goose and duck shooting is above average and a large population of native pheasants hang out on the levees and ditches that surround the flooded rice fields. Water is provided by the irrigation district and levels are managed to provide the perfect environment for waterfowl.
- **P & P Ranch**. A 450-acre rice farm located in the area of the Sacramento National Wildlife Refuge and has four blinds on the farm.
- **The North Field.** A 500-acre area located north east of SNWR, and contains four, 4-man blinds. In addition to ducks, geese, and pheasant, Colusa County offers opportunities for hunting doves, pig, bear, bobcat, coyote, deer, quail, and turkey. A number of commercial hunting clubs and cooperatives are operated by community organizations throughout the county. These hunting camps are operated on private agricultural land by special use permit. Lambertsville supports a large congregation of mobile homes and trailers used by hunters on a seasonal basis (Colusa County 1989).

Several parcels in the project area contain wetland habitats managed for recreational hunting by private hunting clubs. The management of these lands includes grading and vegetation manipulation to create, maintain, or enhance waterfowl habitat. In addition, controlled flooding of these areas on a seasonal basis contributes to resource and habitat value. A large managed wetland complex lies north of the pipeline alignment in the Colusa Trough, about midway between the Sacramento River and I-5.

Private-governmental cooperative programs provide recreational hunting for waterfowl and upland game birds (pheasant) on some of the private lands in the project vicinity, and a few property owners lease rice fields to hunters during the fallow fall and winter months.

Regulatory Setting

No federal or state goals, objectives, or policies relate to the potential effects of the project on recreation resources.

Local Regulations

The Open Space (OS) Element of the Colusa County General Plan identifies park and recreational areas and establishes policies for outdoor recreation (Colusa County General Plan 1989). The following policies are relevant to the proposed project.

- **OS-3.** Publicly owned lands currently used for recreational purposes or as undeveloped open space should be retained in their present use, unless designated for an alternate use by the Land Use Element.
- **OS-18.** Colusa County should, through its land development regulations, ensure that adequate park space is provided to serve new development.
- **OS-27.** Private landowners should continue to have the right to offer hunters access to their land during the official hunting seasons.

Impact Analysis

Significance Criteria

According to Appendix G of the State CEQA Guidelines, a project would result in a significant impact on recreation if it would result in either of the following outcomes.

- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.
- Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.

Impacts

The proposed project would not result in a significant impact on recreation for the reasons listed below.

- The proposed project would not substantially increase the use of existing neighborhood and regional parks or other recreational facilities. Although some of these areas could be used by non-local workers during the 12-month construction period, the use of these areas would not result in substantial physical deterioration of recreational facilities.

- The proposed project does not include recreational facilities or require the construction or expansion of recreational facilities.
- The proposed project would be consistent with the recreation policies of the Colusa County General Plan because the project would not permanently convert undeveloped open space currently used for recreation. The project would not result in new development; consequently, it would not generate demand for new park facilities.

Impact 3.14-1: Potential disturbance of recreational uses during construction

Fall and winter construction activities have the potential to result in conflicts with hunters and birders that use the Sacramento and Delevan NWR areas, hunting clubs, and private agricultural lands. The sights and sounds of construction may reduce the quality of their recreational experience. Although the potential construction effects would be temporary, they could conflict with Colusa County Policy OS-27, which states that “private landowners should continue to have the right to offer hunters access to their land during the official hunting seasons.” To the extent possible, Central Valley will concentrate pipeline construction activities during the summer months and early fall months to potentially minimize impacts on hunters, birders, and other recreationists that may use the area. In addition, Central Valley will implement applicant-proposed measure REC-1 to ensure that disturbance of recreation activities associated with the NWR lands, duck clubs, and private landowners are minimized to the extent possible. Accordingly, this impact is considered less than significant, and no mitigation is necessary.

Applicant-Proposed Measures

REC-1: Coordinate with adjacent national wildlife refuges and landowners and implement measures to avoid conflicts with seasonal recreation activities

Prior to finalizing the pipeline construction schedule and engineering plans, Central Valley will contact the Sacramento and Delevan NWRs and landowners to discuss the pipeline construction schedule and appropriate measures that could be implemented to reduce the impact on seasonal recreation activities (hunting and bird-watching). Measures that may be implemented to ensure that construction does not conflict with fall/winter hunting season and birding on the adjacent wildlife refuges and private properties are listed below.

- Restrict construction activities to certain locations and times of day (avoiding early mornings and evening in hunting areas).
- Post signs that notify recreationists of construction activities.
- Mail and post fliers that notify the public of construction activities.

Section 3.15
Transportation and Traffic

This section examines the potential effects of the proposed project on local transportation. The analysis focuses on effects during construction, the period when local roadways would be most affected by the project. Potential effects on local roadways during future maintenance and operation of the facility are also addressed.

Environmental Setting

The location of highways and roads that would be used during construction and operation of the proposed project are shown in Figure 2-3 in Chapter 2. Central Valley will also use a variety of unnamed, private agricultural roads to access the project area (primarily the gas pipeline component, as shown in Exhibit 1). Central Valley will negotiate with local landowners to obtain agreements and easements for the use of these roads during construction and operation of the proposed project. Once these private access roads have been identified, their location will be provided to the CPUC for approval.

Regional Circulation

Regional circulation in the project area is provided on Interstate 5 (I-5) and Old Highway 99, which bisect Colusa County north to south. SR 45 (Colusa-Princeton Road) runs north–south adjacent to the eastern project terminus. In the vicinity of the project site, the Average Annual Daily Traffic (AADT) on I-5 is 26,000 vehicles per day; the AADT on SR 45 is 2,300 vehicles per day (Caltrans 2008). Other regional traffic in Colusa County is served by SR 16 and SR 20, which are more than 13 miles south of the project area. I-5 is the state's major north-south highway, and SR 20 is the only major mountain crossing between the Pacific coast and the northern Sacramento Valley.

The intersection of I-5 and SR 20 in Williams, approximately 13 miles south of the project area, is considered the transportation hub of the county. Although state highways comprise less than 10% of the county's total roadway mileage, they carry one-half of the county's traffic (Colusa County 1989).

SR 45 is a proposed scenic route that parallels the Sacramento River (just east of the proposed compressor station and remote well pad sites). I-5 crosses the western portion of the project area. The Union Pacific Railroad tracks run parallel to the east side of Old Highway 99. The Old Highway 99 corridor serves as the frontage road for I-5. The pipeline would be bored under the railroad tracks, Old Highway 99, and I-5. The drilling would be conducted without interrupting vehicle and railroad traffic in this area.

Local Access

Access to the project site by construction workforce and delivery vehicles from San Francisco and Sacramento would be provided on I-5. Primary access to the project area from I-5 would be provided by existing two-lane public roads and private agricultural roads. A summary of the transportation routes that Central Valley expects to use to during construction and operation of the facilities is provided below for the western, eastern, and central segments of the project area.

Access to the western end of the project area (proposed metering station site and gas pipeline) would be provided by I-5 at Delevan Road. Vehicles would exit I-5 at Delevan Road and head west, turning north onto McDermott Road and west onto Dirks Road. The metering station site is located along a private gravel road, just west of the Dirks Road terminus and the Glenn-Colusa Canal. Delevan, McDermott, and Dirks Roads are County-maintained roads.

Central Valley will access the eastern portion of the project area (to the proposed compressor station, remote well pad, observation wells, and gas pipeline) from I-5. Construction and operation vehicles would exit I-5 on Maxwell Road and turn east to SR 45. Vehicles would travel north on SR 45 and then take either Southam or Dodge Roads to McAusland Road to access the compressor station and remote well pad sites.

The central portion of the project area would be accessed using paved, gravel, and dirt private and public roads, including Old Highway 99, Loretz Road, Delevan Road, 2 Mile Road, and 4 Mile Road. As described above, Central Valley and its contractors will coordinate with landowners prior to project initiation to obtain easements and approval to use private agricultural roads for construction and future maintenance access.

Level of Service

Level of service (LOS) is the primary measurement used to determine the operating quality of a roadway. In general, LOS is measured by the ratio of traffic volume to capacity (V/C) or by the average delay experienced by vehicles on the facility (Table 3.15-1). The quality of traffic operation is graded into one of six LOS designations—A, B, C, D, E, or F—with LOS A representing the best range of operating conditions and LOS F representing the worst.

To support preparation of this section, Colusa County Department of Public Works provided historical traffic count reports for routes within the project vicinity.

However, the data for the majority of the routes were dated prior to 2000. Due to limited staff, the County is unable to pick up annual counts due to the size of the County, and there isn't a projected date as to when updated traffic counts will be available (personal communication via email with Jerry Schantz, Information Systems Manager on May 20, 2009).

Although traffic counts or a detailed LOS assessment has not been conducted for the proposed project, the local two-lane public roadways within the project area appear to be operating at LOS A.

Regulatory Setting

No federal goals, objectives, or policies relate to the potential effects of the project on transportation.

State Regulations

The California Department of Transportation (Caltrans) has jurisdiction over state highways and sets maximum load limits for trucks and safety requirements for oversized vehicles that operate on highways. The proposed project area is within Caltrans District 3. Central Valley will obtain an encroachment permit from Caltrans District 3 to cross under I-5.

Local Regulations

Colusa County regulates traffic through the objectives and policies contained in the Colusa County General Plan Transportation Element (Colusa County 1989). The following policies from the Circulation Element of the Colusa County General Plan are applicable to the proposed project.

- **CIRC-39.** Any proposed pipeline or transmission line within the county shall be aligned so that interference with agriculture is minimized.
- **CIRC-49.** Any earthmoving or road reconstruction project should be followed by seeding and vegetation, which restores a natural appearance.
- **CIRC-55.** Permitted roadside commercial uses should have an approved public access plan. The plan should address public safety and ease of access to the site.

Caltrans has determined the minimum acceptable LOS on all state highways in Colusa County. LOS B is considered the lowest acceptable condition on I-5, LOS C is the lowest acceptable condition on SR 20, and LOS D is the lowest acceptable condition on SR 16 and SR 45.

Table 3.15-1. Level of Service Descriptions

			Intersections	
Level of Service	Conditions	Description	Signalized Delay (seconds/vehicle)	Unsignalized[a] Delay (seconds/vehicle)
A	Free flow	Users experience very low delay; progression is favorable and most vehicles do not stop at all	≤10.0	≤10.0
B	Stable operation	Vehicles travel with good progression; some vehicles stop, causing slight delay	10.1 to 20.0	10.1 to 15.0
C	Stable operation	Higher delays result from fair progression; a significant number of vehicles stop, although many continue to pass through the intersection without stopping	20.1 to 35.0	15.1 to 25.0
D	Approaching unstable	Congestion is noticeable; progression is unfavorable, with more vehicles stopping rather than passing through the intersection	35.1 to 55.0	25.1 to 35.0
E	Unstable operation	Traffic volumes are at capacity; users experience poor progression and long delays	55.1 to 80.0	35.1 to 50.0
F	Forced flow	Intersection's capacity is oversaturated, causing poor progression and unusually long delays	>80.0	>50.0

[a] Unsignalized intersections include two-way stop sign–controlled and all-way stop-controlled.

Source: Transportation Research Board 2000.

Impact Analysis

Significance Criteria

Criteria for determining the significance of transportation and traffic impacts were based on the environmental checklist form in Appendix G of the State CEQA Guidelines and professional judgment. Based on the checklist questions, a project may have a significant effect on the environment if it would result in any of the outcomes listed below.

- An increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system.
- The exceedance, either individually or cumulatively, of a level-of-service standard established by Colusa County for any designated roads or highways.
- Inadequate emergency access.

Impacts

Impact 3.15-1: Potential for increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system

As a worst case, during peak periods of construction, up to 370 people could potentially be working in the project area (see Table 2-4 in Chapter 2). This number includes workers associated with all aspects of project construction and assumes all components are constructed at the same time. In addition, construction of the proposed project would entail the delivery of raw materials to multiple sites. As many as 27 daily truck trips during the peak of construction would be required for material delivery and removal from the project area.

Considering employee traffic volumes and delivery and haul truck trips, project construction would entail approximately 120 vehicle trips per day during the peak of construction. If all projected construction traffic were to travel on I-5, it would increase AADT on I-5 by less than 0.5%. If all projected construction traffic were to travel on SR 45, it would increase AADT by approximately 5%. Construction-related traffic would generate a larger increase in traffic volumes on local roadways during peak commute hours (approximately 95 trips per morning and afternoon peak periods), because the existing volumes are so low. However, as discussed above, local roadways in the project area generally operate at LOS A. No degradation of LOS below adopted standards is expected to result from construction-related traffic. Traffic volume increases would be temporary and are not expected to substantially degrade LOS of area roadways. Construction of the proposed project would not exceed, either individually or cumulatively, an LOS standard established by Colusa County for any designated roads or highways.

To ensure that construction does not result in an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system and does not exceed an LOS standard established by the County, Central Valley will implement applicant-proposed measure TRA-1. Consequently, construction-related impacts are considered less than significant, and no mitigation is necessary.

During the operational phase of the proposed facility, a small staff of local employees would operate and maintain the facilities and pipeline, and would be onsite during normal working hours. Traffic associated with the supply of materials and equipment to the compressor station during operation is estimated at two delivery vans or trucks per day. During major maintenance projects requiring outside labor and services, a maximum of 10 vehicle trips may occur daily. These additional trips would result in a negligible effect on the surrounding roadway operations and would not exceed, either individually or cumulatively, the LOS standard established by the County for local roads and highways. Therefore, this impact is considered less than significant, and no mitigation is necessary.

Impact 3.15-2: Temporary disruption of circulation by facility construction

Construction traffic on local roadways during construction of proposed facilities may inconvenience residents and agricultural operations. Because some pipeline construction activities will cross and occur adjacent to public road rights of way (e.g., McAusland Road, Dodge Road, Delevan Road, Old Highway 99, Dirks Road, I-5), Central Valley has committed to implementing construction traffic control measures as part of applicant-proposed measure TRA-1 to ensure that construction traffic and construction activities within and adjacent to road rights-of-way will not disrupt routine agricultural operations and will result in minimal inconvenience to residents. Consequently, this impact is considered less than significant, and no mitigation is necessary.

Impact 3.15-3: Potential for interference with emergency response routes

Construction-related activities within and adjacent to public road rights-of-way and increased truck and vehicle traffic along project access roads could temporarily increase response times for emergency response providers along affected roadways. However, Central Valley will implement construction traffic safety measures as part TRA-1 to ensure that the potential for such disruptions to emergency response routes would be minimal. Consequently, this impact is considered less than significant, and no mitigation is necessary.

Applicant-Proposed Measures

In addition to implementing the following applicant-proposed measure, Central Valley will also enter into a road maintenance agreement with the County to cover any potential construction-related damage to public roads. The construction traffic plan described below will be prepared prior to construction and will be submitted to the County and CPUC for review.

TRA-1: Prepare and implement a construction traffic plan

Central Valley will prepare a construction traffic plan to minimize short-term construction-related impacts on local traffic. These measures will include installation of temporary warning signs at appropriate locations along major road intersections. The signs will be placed at strategic locations near points of access and will be removed after all construction-related activities are completed. The plan will include (but not be limited to) the measures listed below.

- Coordinate with Colusa County on any lane or road closures, if needed to construct improvements.
- Install traffic control devices.
- Provide alternate routes (detours), as necessary, to route local traffic around roadway construction.

- Provide notification of any road closures to residents in the vicinity of construction.
- Provide access to driveways, private roads, and agricultural roads outside the immediate construction zone.
- Consult with emergency service providers and develop an emergency access plan for emergency vehicle access in and adjacent to the construction zone.

Section 3.16
Utilities and Service Systems

This section describes the existing utilities in the project area: water, wastewater, and solid waste; storm drainage systems; and natural gas and electricity services. The section also identifies potential impacts on utilities and service systems that would be caused by the proposed project during construction and operation.

Environmental Setting

Regional Setting

Water and Wastewater

Domestic water systems in Colusa County are supplied with groundwater, while most irrigation systems are supplied with surface water from the Tehama-Colusa or Glenn-Colusa Canals, the Colusa Drain, and the Sacramento River. Community systems in Arbuckle, Colusa, Grimes, Maxwell, Princeton, Stonyford, and Williams tap into the Sacramento River groundwater basin with wells ranging from 100 to 500 feet deep.

Sixty-five percent of the population in Colusa County is served by centralized/ community wastewater disposal systems. The remaining areas that are served primarily by onsite systems are generally rural or agricultural. Onsite systems consist of a septic tank that receives wastewater, allows heavier solids to settle, and releases the remainder to a leach field.

Non-Hazardous and Recyclable Solid Waste

Several active solid waste disposal sites are located in the project region. A small local landfill is located in Stonyford. A 10-acre transfer station is located south of Maxwell; the Maxwell Transfer Station reduces the distance over which waste from the Princeton and Maxwell areas need to be hauled. Private and franchise haulers deposit waste at the Maxwell facility. The waste is transported by truck to Ostrom Road Sanitary Landfill in Sutter County. Table 3.16-1 describes these facilities, including their permitted disposal rates and current remaining capacities.

Table 3.16-1. Solid Waste Disposal Facilities in the Project Region

Facility	Landfill Classification[1]	Permitted Disposal Rate (tons per day)	Remaining Capacity (cubic yards)
Stonyford Disposal Site	III	10.00	55,683
Ostrom Road Sanitary Landfill	II	3,000	41 million
Maxwell Transfer Station	n/a	100.00	n/a
Colusa Industrial Properties	(proposed site)	n/a	n/a

Source: California Integrated Waste Management Board. 2007.

[1] A Class II landfill accepts non-hazardous and designated waste. A Class III landfill is licensed to receive non-hazardous municipal solid waste.

Municipal solid waste collection in the county is conducted by Norcal Waste Systems, a private contractor. The Maxwell Transfer Station does not accept hazardous wastes. The County sponsors collections of household hazardous wastes once or twice a year. This information about County waste collection was provided by Mike Azevedo, Engineer/Technician at the Colusa County Public Works Department in a telephone conversation on July 9, 2008.

Hazardous Waste

As discussed in Section 3.7, Hazards and Hazardous Materials, there is a potential for encountering hazardous waste during construction and operation of the facility. If hazardous waste is encountered during construction or generated during operation of the facility, these materials would be disposed of at an appropriate facility, such as the Ostrom Road Sanitary Landfill in Sutter County.

Stormwater Drainage

A ditch has been built along the Colusa Trough to accommodate flooding in the Colusa Basin. Capacity of this ditch, however, has been exceeded due to increased agricultural irrigation. Flooding is also a problem from the Colusa Drainage Canal and Sacramento River areas. The natural drainage pattern has been altered by road construction and farmers who have straightened channels, leveled fields, and realigned natural streams (California Public Utilities Commission 2002).

Gas and Electricity

PG&E provides electricity and natural gas to the project area.

Local Setting

There are no water facilities, wastewater treatment facilities, or solid waste facilities in the project area.

Water supplies for agricultural purposes are drawn from the Sacramento River or the myriad of canals crossing through the project area. Domestic water in the county is drawn from the Sacramento River groundwater basin.

PG&E operates two 60-kilovolt (kV) electric transmission lines in the project area. One line runs along SR 45 and the other runs parallel to and 0.5 mile east of I-5. PG&E’s 18-inch Line 172 runs generally parallel to and west of SR 45 through the project area.

PG&E’s 12-kV electric distribution line runs along the access road to the Delevan Compressor Station. The Delevan Compressor Station provides compression for PG&E’s 36-inch and 42-inch Line 400/401. As described in Chapter 1, this facility serves as the main natural gas pipeline system for transporting gas from Canada to California markets. Two 230-kV electric transmission tower lines follow a north–south alignment along the east side of the station.

Telephones lines are present at various locations in the project area including along SR 45, Delevan Road, Dodge Road, Old Highway 99, and Dirks Road.

Pacific Bell has installed many of these cables underground along the road shoulder, rather than attaching them to overhead electric power poles.

Regulatory Setting

No federal goals, objectives, or policies relate to the potential effects of the project on utilities or service systems.

State Regulations

The project area is located within the jurisdiction of the State Water Resources Control Board (State Water Board), the California Integrated Waste Management Control Board (CIWMB), and the Central Valley Regional Water Quality Control Board (Central Valley Water Board). The State Water Board and CIWMB formulate policies and regulations pertaining to water discharge and solid waste, respectively, while the Central Valley Water Board conducts permitting and enforcement activities. See Section 3.8, Hydrology and Water Quality, for discussions of State Water Board and Central Valley Water Board jurisdiction over the proposed project.

California Department of Industrial Relations, Occupational Safety and Health Regulations

Worker safety on construction projects, in particular where grading, trenching, and earthmoving are involved, is the responsibility of CAL/OSHA. CAL/OSHA establishes and enforces regulations for excavation and trenching permits (Title 8, Division 1, Chapter 3.2, Subchapter 2, Article 2 [Permits—Excavations, Trenches, Construction and Demolition and the Underground Use of Diesel Engines in Work in Mines and Tunnels]), and for worker safety (Chapter 4, Subchapter 4, Article 6 [Excavations]).

As part of applicant-proposed measure HAZ-2 (Prepare and implement a Construction and Operation Safety and Emergency Response Plan), described in Section 3.07, Hazards and Hazardous Materials, Central Valley will develop a worker health and safety plan. This plan will require Central Valley and the construction contractors to provide preconstruction and ongoing worker safety training.

California Division of Oil, Gas, and Geothermal Resources

DOGGR regulates drilling, production, injection, and gas storage operations in accordance with CCR Title 14, Chapter 4, Subchapter 1, Onshore Well Requirements, Section 1724.7, Project Data Requirements. Approval must be obtained from DOGGR before any subsurface injection or disposal project can begin. A detailed description of DOGGR's requirements is provided in Section 3.6, Geology, Soils, and Seismicity.

Local Regulations

The Colusa County General Plan (Colusa County 1989) contains the wastewater treatment (WWT) and flood control (FL) policies listed below that are relevant to potential impacts of the proposed project on utilities and service systems.

- **WWT-1.** Future development should be located in a way that ensures the economically feasible and environmentally sound provision of wastewater treatment.
- **WWT-3.** Subject to review by the Department of Environmental Health, Colusa County should permit "alternative" on-site treatment systems in rural areas, including mound systems.
- **FL-4.** New development should be required to mitigate its drainage impact through any of a series of measures that should be explored in a countywide drainage and flood control plan.
- **FL-7.** Comprehensive drainage solutions to community flooding should be supported. Piecemeal solutions which divert floodwaters from one parcel to

adjoining parcels shall be avoided. Environmental evaluation of development should always consider cumulative drainage impact.

Impact Analysis

Significance Criteria

Criteria for determining the significance of impacts on utilities were based on the environmental checklist form in Appendix G of the State CEQA Guidelines. Based on the checklist questions, a project may have a significant effect on the environment if it would result in any of the outcomes listed below.

- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board.
- Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.
- Not have sufficient water supplies available to serve the project from existing entitlements and resources, or would need new or expanded entitlements.
- Result in a determination by the wastewater treatment provider that serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the provider's existing commitments.
- Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.
- Be served by a landfill without sufficient permitted capacity to accommodate the project's solid waste disposal needs.
- Conflict with federal, state, and local statutes and regulations related to solid waste.
- Interfere with existing services or utility infrastructure, resulting in the disruption of provider service.

Impacts

The criteria listed below are not applicable to the proposed project for the reasons provided; consequently, they are not discussed further in the impact analysis.

- The proposed project would not exceed wastewater treatment requirements of the Central Valley Water Board. The only wastewater that will be generated as part of the project will be associated with the sanitary disposal system at the compressor station. The small volume of wastewater that is generated by onsite employees will either be disposed of in an onsite septic system or at an appropriate offsite facility. The minimal amount of wastewater water that is generated would not exceed wastewater treatment requirements. Saltwater that is generated during gas withdrawal operations at the remote well pad will be reinjected into new onsite saltwater disposal wells to a depth below freshwater aquifers and will not require treatment.

- The proposed project will not require or result in construction of new water or wastewater treatment facilities or expansion of existing facilities. The proposed project will require one-time use of local water during hydrostatic testing of the pipeline. As described in Chapter 2, Project Description, the water would be treated, if necessary, and discharged into local agricultural fields and ditches.
- Central Valley has determined that sufficient water supplies are available to serve the project from existing entitlements and resources and that no new or expanded entitlements will be needed. As described in Chapter 2, Project Description, the proposed project would require a one-time use of approximately 1.7 million gallons of water to conduct hydrostatic testing of the pipeline. Potential water sources that could be used during construction include local purveyors, local groundwater, and municipal sources that would involve trucking water to the site. During operation of the compressor station facility, adequate water supply will also be available for minor industrial processes and potable water for personnel. This water demand is low relative to other agricultural and commercial uses in the region. Therefore, impacts on local groundwater and municipal water supplies during construction and operation of the project would be minimal.
- The proposed project would not require or result in the construction of new storm water drainage facilities or expansion of existing facilities and therefore would not cause significant environmental effects. It is estimated that less than 2 acres of impervious surface would be created as part of the project; most of this impervious area would be associated with the compressor station. Surface runoff from these areas would be absorbed by the graveled surface of the compressor site and the surrounding agricultural lands.
- The project would not result in a determination by the wastewater treatment provider that serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the provider's existing commitments. As discussed above, wastewater that is generated at the compressor station would be disposed of offsite at an approved facility or onsite in a septic system.
- Central Valley would ensure that the proposed project would not conflict or otherwise be inconsistent with the wastewater disposal and drainage and flood control policies identified in the Colusa County General Plan.

Impact 3.16-1: Minimal increase in demand for landfill space associated with generation of waste during project construction and operation and maintenance

The proposed project would generate solid waste during excavation of the pipeline and grading activities associated with the other project components. This material would include soil, rock, woody vegetation, asphalt, concrete, and other non-hazardous materials. Most of the solid waste that would be generated during construction will come from the pipeline trench. Most of the soil excavated from the pipeline trench would be backfilled after the pipe is installed. The project engineers expect that the soil that is excavated during construction of the metering station, remote well pad, and compressor station would be used on-site and that no excavated material would be hauled off-site.

As discussed in Section 3.7, Hazards and Hazardous Materials, there is a potential for encountering hazardous waste during construction. If hazardous waste is encountered, these materials would be disposed of at an appropriate facility, such as the Ostrom Road Sanitary Landfill in Sutter County.

As part of future routine facility operations and maintenance activities, small amounts of non-hazardous wastes would be generated. It is expected that this small amount of solid waste would also be disposed of at an appropriate waste facility.

Accordingly, the potential for the proposed project to be served by a landfill without sufficient permitted capacity to accommodate the project's solid waste disposal needs is low. In addition, Central Valley will comply with federal, state, and local statutes and regulations related to solid waste. This impact is considered less than significant, and no mitigation is necessary.

Impact 3.16-2: Potential interference with existing utility infrastructure

Construction activities associated with the gas pipeline component of the project could have the potential to temporarily disrupt existing utility services along Dodge Road, Dirk Roads, Old Highway 99, and I-5 (e.g., underground or aboveground utility cables). However, Central Valley does not anticipate the need to realign any utility infrastructure in the project area. During the final design phase of the gas pipeline component, affected service providers would be contacted so that any potential utility conflicts can be identified and relocation efforts can be initiated. The proposed project avoids many potential conflicts by locating the pipeline away from most buried and overhead utilities that generally follow road rights-of-way. Additionally, Central Valley would contact Underground Service Alert before construction begins. Consequently, this impact is considered less than significant, and no mitigation is necessary.

Applicant-Proposed Measures

Construction and operation of the proposed project would not result in significant impacts on local utilities and service systems. Accordingly, Central Valley is not proposing any additional measures related to utilities and services systems.

Section 3.17
Cumulative Analysis and Growth-Inducing Impacts

This section discusses the potential cumulative impacts and growth-inducing impacts related to the proposed project. Cumulative impact analysis under CEQA involves determining whether the project would contribute to a cumulative impact and whether that contribution is a considerable one. "Cumulative impact" refers to two or more individual effects that, when considered together, are significant. Growth-inducing impact analysis involves determining whether the project could foster economic or population growth in the surrounding environment. This would include projects that remove obstacles to growth or that burden existing infrastructure to the extent that it must be expanded and would indirectly foster growth.

Cumulative Analysis

The CPUC's PEA checklist for underground gas storage facilities (California Public Utilities Commission 2008) requests a list of projects (past, present and reasonably foreseeable future projects) within the project area. As described throughout this PEA, there are only two recently constructed projects that occur within the project area – Wild Goose Gas Storage, Inc.'s Wild Goose Storage Expansion Project and PG&E's Colusa Generating Station. The Wild Goose Storage Expansion Project occurs within the project area (see Figures A-1 and A-2 in Appendix A for the location of the gas pipeline and Figure 2-3 for the location of the meter station). This expansion project was constructed in 2003 and is currently providing gas storage and delivery to the PG&E transmission line. The PG&E Colusa Generating Station is located immediately adjacent to the PG&E Delevan Compressor Station (see Figure 2-3) and is currently under construction (as of December 2008). As discussed in Section 3.9 (Land Use), there are currently no known approved or proposed (in the foreseeable future) land use changes or projects within the project area.

The Colusa County APCD has established emissions thresholds that identify both individual project and cumulative impacts. Projects whose emissions fall beneath the thresholds would not contribute to cumulative air quality impacts. To date, no state or local agency has developed GHG emission thresholds. However, CARB in its Climate Change Scoping Plan, has found stated that by 2020, statewide GHG emissions must be reduced by 28.4 percent from business as usual conditions to achieve the 1990 emission levels required by AB-32. This analysis uses a 30 percent reduction to be conservative.

As discussed in Section 3.3, Air Quality, unmitigated average daily emissions of all pollutants except NO_x (an ozone precursor), and PM10 would be less than the air district's significance threshold of 137 ppd. Unmitigated NO_x and PM10 emissions would exceed this threshold. However, with the implementation of Applicant-Proposed Measures AIR-1, AIR-2, and AIR-3, the emissions would be mitigated below a significant cumulative level.

Once in operation, with installation of BACT, facility-wide emissions of ROG, NO_x, and PM10 would be less than the significance thresholds of 137 ppd. These facility-wide emissions also include on-road vehicle trips associated with employees and blow down emissions. Blow down emissions assume two emergency plant blow down events per year, venting a maximum of 1 million standard cubic feet of gas per event, and one maintenance blow down event per month, venting 0.06 million standard cubic feet each (Butte County Air Pollution Control District 2006). No significance thresholds have been established for CO because Colusa County is in attainment for the state and federal CO standards.

The GHG analysis shows that the project would use natural gas, the most CO_2-efficient energy source available, to meet the majority of its energy needs. As compared to business as usual conditions, the project's CO_2 emissions would be reduced by substantially more than the minimum 30 percent significance threshold used for this analysis. Therefore, the project's contribution to cumulative GHG emissions will be less than considerable.

Growth-Inducing Impacts

As illustrated in Table 3.17-1 below, the proposed project will generate a total of 370 jobs during the construction phase. The workforce at any one time during the two years of construction will be less than that amount, depending upon the work at hand.

Table 3.17-1. Anticipated Workforce

Phase	Total Peak Workforce	Estimated Duration	Construction Year
Pipeline construction	230	3–4 months	2011
Compressor station (this includes Line 172, gathering line, and electric distribution line)	75	12-14 months	2010-2011
Metering station and interconnect into PG&E Line 400/401	30	2–3 months	2010
Well pad preparation, drilling and observation well conversions	15	3 months	2010
Site cleanup/restoration	20	2–3 months	2012
Project totals	370		

It is anticipated that a substantial proportion of the temporary construction labor force will be drawn from the surrounding communities in Colusa County, such as Williams, Willows, and Colusa. The remainder will comprise workers with relevant technical expertise from outside the project area. These workers are expected to reside in the local project area only temporarily during the construction period because their primary homes are located elsewhere and they would not relocate on the basis of temporary work. The construction industry differs from most other industry sectors in several ways, including the following.

- Construction employment has no regular place of business. Rather, construction workers commute to job sites that may change several times a year.
- Many construction workers are highly specialized (e.g., crane operators, steel workers, welders) and move from job site to job site, dictated by the demand for their skills.
- The work requirements of most construction projects are also highly specialized, and as a result, workers are employed on a job site only as long as their skills are needed to complete a particular phase of the construction process.

It is therefore unlikely that a significant number of construction workers will permanently relocate their place of residence as a consequence of working on the project. In other similar projects, many workers temporarily relocate to the local project area and reside either in hotels or in their own portable trailer homes (where designated trailer space is available), and then leave the area when the project is completed. Numerous hotels and a smaller number of trailer parks and recreational vehicle parks are present in Colusa County, as well as within commuting distance (60 miles or less) in the larger urban areas of Marysville, Yuba City, Red Bluff, and Woodland. The hotels have sufficient capacity to house construction workers from outside of the area; new trailer or recreational vehicle parks are unlikely to be built to serve the project's workers given the short period that they will be in the area. Therefore, no new or expanded services or infrastructure are necessary to accommodate the temporary construction workforce. Accordingly, project-related construction workers will not induce substantial population growth in Colusa County. Any impacts on population and housing associated with temporary construction workers will be less than significant, and no mitigation is necessary.

The proposed project will generate a small number of permanent full-time positions, primarily at the compression station. Operations and maintenance personnel will be present at the compressor station during normal daytime workday hours. Most of these new employees will be drawn from the surrounding communities.

To the extent that some of these employees relocate from other locations will not constitute a substantial increase in population growth. Any slight increase in the local workforce resulting from the project will result in limited local economic benefits and help reduce local unemployment and vacancy rates, but these benefits will not be sufficient to trigger additional population growth. No new or expanded services or infrastructure are necessary to accommodate the permanent positions required by the proposed project.

Therefore, project-related permanent positions will not induce substantial population growth in the immediate area and region. Any impacts on population and housing associated with permanent workers will be less than significant, and no mitigation is necessary.

Once in operation, the natural gas storage facility will contribute flexibility and operating efficiency to the natural gas supply system by storing a large volume of natural gas for later transmission through existing distribution pipelines. It will not provide new gas supplies to the surrounding area, nor is it an infrastructure project that will provide natural gas to an area that was previously unable to receive natural gas, thereby allowing for more construction in the project area. The project would not result in a significant growth-inducing effect as a result of operations.

Chapter 4
Alternatives

CEQA Requirements

CEQA requires that decision-makers consider a “reasonable range” of alternatives to the proposed project or project location and offer a brief discussion of the rationale for selecting the alternatives to avoid significant environmental impacts. State CEQA Guidelines Section 15126(d) requires that an environmental document include a description of a range of reasonable alternatives to a project that 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.” Alternatives must be considered, even if they might impede to some degree, the attainment of the project objectives or make it more costly. The point of considering alternatives is not to identify a different project to be developed, but to provide a basis for comparison and to foster informed decisions.

CEQA also requires analysis of a no-project alternative. The purpose of evaluating the no-project alternative is to permit a reasoned choice about whether to proceed with the project. This alternative is discussed at the end of this chapter.

Project Objectives

The proposed project is being developed to meet the following basic objectives:

- Increase the total amount of natural gas storage capacity and the reliability of supply in northern California where storage is in high demand.
- Provide statewide benefits by expanding the existing natural gas supply infrastructure in California.
- Add to the vital infrastructure needed to help meet the growing demand for natural gas in residential, commercial, industrial, and power generation markets in the northern region of the state.
- Mitigate potentially costly conditions related to California’s reliance on imported gas.

- Allow purchasers to buy gas when the supply is adequate and the price is low, inject it into the proposed project for storage, and withdraw it and use it when supply is short and prices are higher.
- Develop a storage facility that is in close proximity to PG&E's existing transmission facilities.

A description of the alternatives (including a no-project alternative) that Central Valley considered to support these objectives is provided in this chapter.

Gas Storage Field Alternatives

Central Valley did not extensively evaluate alternate fields for gas storage development. Suitable gas storage fields are unique geologic structures. In concept, other fields would work if they meet or exceed the performance characteristics of the Princeton Gas Field and if they were located in the vicinity of natural gas infrastructure. However, reservoirs that have the necessary qualities to be gas storage reservoirs are not common, as not every depleted gas or oil production field would be suitable. Given that the Princeton Gas Field met the necessary technical and market criteria, Central Valley did not see the need to spend significant resources pursuing gas storage opportunities elsewhere nor is Central Valley aware of other suitable gas storage candidates within the vicinity of the project area.

Facility Site Selection Criteria

As part of the early project scoping phase, Central Valley used a variety of site selection criteria for identifying potential facility sites (Table 4-1). Each of the project component locations, as currently shown in the project alignment maps in Exhibit 1, was determined using these general criteria.

Table 4-1. Facility Site Selection Criteria

Criteria	Description
1. Existing utilization of land	Minimize the number of landowners involved, minimize disruption and displacement to people and structures, consider extent of and type of agriculture (rice field is better than walnut orchards), consider permanent or seasonal crops on site (seasonal is better than permanent).
2. Avoidance of prime farmlands	Locate above-ground facilities (compressor station, meter station, and remote well pad) outside of prime farmlands.
3. Current or planned land uses	Accommodate current or planned land use designation and avoid USFWS refuge lands.
4. Location and proximity to storage field	Locate facilities within or close to the underground storage field and PG&E Line 400/401.

Criteria	Description
5. Proximity to vital infrastructure	Minimize distance to electrical facilities, gas facilities, and water and sewer systems.
6. Topographic features	Avoid, where feasible, flood prone areas.
7. Geologic features	Avoid active fault areas.
8. Hydrological features	Minimize presence of natural stream and wetland systems.
9. Existing environmental conditions	Avoid sites with sensitive biological resources and known archaeological finds.
10. Site access and serviceability	Provide good construction, operation, and emergency access without security issues or restrictive easements.
11. Landowner sentiment	Landowner is amenable to having facilities on his/her property.
12. Agency coordination issues	Avoid conflicts with resource agencies (e.g., USFWS wildlife refuge lands).
13. Location of sensitive receptors	Locate facilities away from residences, hunting clubs, schools, and other public facilities, to the extent possible.

Project Component Alternatives

A list of the major project components and factors considered in choosing the location and potential alternatives for each component is provided in Table 4-2. For most of the project components, feasible alternatives were not identified because of land use restrictions, landowner issues, sensitive resource areas, and the general location and nature of the natural gas storage reservoir. Table 4-2 indicates if Central Valley identified feasible alternatives for each of the components.

Table 4-2. Major Project Components and Feasible Alternatives Identified

Major Projects Component	Feasible Alternatives Identified
10-Acre Compressor Station	Three feasible locations were initially identified within the boundary of the storage area. The final site was selected to avoid prime farmland and to accommodate the landowner.
4-Acre Remote Well Pad	Two locations within the storage area in order to minimize lateral lengths of the directionally-drilled wells and to minimize length of the gathering system piping. The two sites are located on opposite sides of a road and are environmentally similar (both are on prime farmland). The final site was selected based on the landowner willingness to enter into a lease in a timely manner.
Injection/Withdrawal Wells	None. The wells will be placed on the remote well pad site, which minimizes the need for additional land disturbance and development.

Major Projects Component	Feasible Alternatives Identified
Observation Wells	None. Conversion activities require the use of existing wells. This component is limited to where the existing wells are located. There are no other existing wells in the area that would be suitable for conversion to monitoring wells.
Saltwater Wells and Tank	None. Saltwater wells will be placed on the remote well pad site.
Gas Pipeline	Five pipeline routes and various deviations were considered as part of the scoping phase of the project (Figure 2-10). Four of the alternatives (Routes A–D) were eliminated from further evaluation for a variety of environmental, land use, and access reasons.
PG&E Line 172 Connection Line and Rental Compression	One alignment was evaluated. The majority of the approximately 300-foot-long connection pipeline and the rental compression would be located within the 4-acre remote well pad if rental compression is used.
Gathering Line System between Compressor Station and Remote Well Pad	Two routes were initially identified based on the locations of the compressor station and remote well pad. The alternate route runs through the middle of a rice field and was not acceptable to the landowner. The selected route along property lines minimizes disruption of agricultural activities.
Metering Station and PG&E Interconnect	Three locations were considered and evaluated. The location of the metering station site and PG&E interconnection needs to be constructed adjacent to the PG&E Line 400/401. The three alternative sites occur immediately adjacent to the existing Wild Goose meter station. One site was identified north of the station between the existing access road and the station. The two other sites were identified south and immediately adjacent to the Wild Goose meter station. Use of any one of these three sites would result in the same types of environmental impacts. Therefore, environmental constraints were not the determining factors in selecting the preferred metering station site. The preferred metering station site was chosen on the south side of the existing Wild Goose facility because it would not conflict with Wild Goose's meter station operation and maintenance activities.

Electric Drive Compression Alternative

Central Valley reviewed the potential of using natural gas fired compression as well as using electric driven compression. Natural gas fired compression was considered the only option based on proximity to electric transmission lines of sufficient voltage, and reliability concerns of electric supply during emergency periods and the potential for negative impacts on ability to operate.

Central Valley determined that the proposed storage facility would need transmission voltages in excess of 69,000 Volts. Review of transmission lines of these voltages in the area showed that the point of nearest approach is 10 miles, with other lines in the area of 14 miles. No right of way has been obtained. Due to the relative difficulty of installation of power transmission, compared to even natural gas pipelines, timing of a line would lead to project uncertainty. For example, Central Valley is aware of some power lines that can take a decade or more to complete. This timing would be highly unfavorable to the project.

The reliability concern during emergency periods is also a factor that was considered. Central Valley is actively marketing a “firm” storage service. The revenue for a firm service is substantially higher than an interruptible service. Central Valley concern is that during emergency periods declared by California Independent System Operator (ISO), the supply of power could be interrupted, leading to potential curtailment of Central Valley’s storage services. This curtailment could lead to a perception in the market place that Central Valley is not as reliable as its competitors, and reduction in revenue. During the period of 1998 to 2009, the California ISO listed 295 load emergencies of either Stage 1, 2, or 3 Emergencies, where utilities requested conservation or actually curtailed service.

Central Valley believes that the greatest value for the project will be achieved if it can deliver its service during the time of greatest need and to be able to dependably provide service when the market needs it the most.

Gas Pipeline Alternatives and Preferred Route

Central Valley identified five potential pipeline routes during the early scoping phase of this project (Figure 2-10). ICF Jones & Stokes evaluated these pipeline routes as part of an environmental constraints analysis. The purpose of the environmental constraints analysis was to identify potential sensitive resource issues and to assist Central Valley in designing the project to meet the project objectives, minimize potential impacts on landowners and environmental resources, and avoid the Sacramento and Delevan National Wildlife Refuges (Figure 2-10 shows the location of the alternatives in relation to the wildlife refuges).

The preferred project route (as described in Chapter 2) follows the previously constructed Wild Goose Storage Expansion Project pipeline and was determined to be the best pipeline alignment because it meets the objectives of the project and avoids or substantially lessens any of the significant impacts of the project by following an existing pipeline alignment (Figures A-1 and A-2 in Appendix A show the location of the proposed project pipeline and the existing Wild Goose pipeline). In addition to following a previously disturbed right-of-way, the preferred pipeline alignment was chosen for the following reasons.

- It is a direct route between the storage field and PG&E Line 400/401.
- It minimizes potential conflicts with agricultural structures and orchards (especially walnut orchards).
- It minimizes potential for direct and indirect impacts on sensitive biological and cultural resources.
- It avoids federal lands (Delevan and Sacramento Wildlife Refuges).

- It minimizes the number of affected property owners.
- It contains numerous private agricultural access roads and public access roads which will facilitate construction, operation, and emergency access.

No-Project Alternative

CEQA Guidelines Section 15126.6 (e) requires consideration of the environmental consequences of a proposed project. Under the no-project alternative, the proposed project would not be constructed and Central Valley would not meet their project objectives. The existing land uses in the project area would likely remain in their current condition and the present agricultural uses would continue. Therefore, no potentially significant impacts would occur under the no-project alternative.

Chapter 5
References

Executive Summary

California Public Utilities Commission. 2008. *Proponent's Environmental Assessment Checklist for Underground Gas Storage Facilities*. November 2008.

Chapter 1. Purpose and Need

California Energy Commission. 2005. *California Natural Gas Facts and Figures*. Available: http://www.energyalmanac.ca.gov/naturalgas/production_by_source.html>. Page updated: October 3, 2005. Accessed: May 30, 2008.

———. 2007. *Integrated Energy Policy Report. 2007 Summary*.

California Energy Commission and California Public Utilities Commission. 2005. *Energy Action Plan II: Implementation Roadmap for Energy Policies.* September 21.

California Energy Commission and California Public Utilities Commission. 2008. *Energy Action Plan II: Implementation Roadmap for Energy Policies.*

Pacific Gas & Electric Company. 2006. *California Gas Transmission: Interactive System Map*. Available: <http://www.pge.com/pipeline/about/system_maps/statemap.shtml> Accessed: June 6, 2008.

Southern California Gas Company. 2008. *Storage*. Available: <http://www.socalgas.com/business/storage>. Page updated: January 31, 2008. Accessed: June 6, 2008.

Chapter 2. Project Description

California Department of Conservation, Division of Oil, Gas, and Geothermal Resources. 1998. *California Oil and Gas Fields, Volumes I, II and III.* Available on CD at: < http://www.conservation.ca.gov/dog/ pubs_stats/Pages/technical_reports.aspx>.

Hoover & Keith. 2009. Central Valley Gas Storage, LLC – ambient sound survey and noise impact evaluation. Houston, TX. June 17, 2009.

Thesken, R.S. 1993. *Bounde Creek and Princeton Gas Fields.* (Publication No. TR45.) California Department of Conservation, Division of Oil, Gas, and Geothermal Resources.

Chapter 3. Environmental Setting and Impact Assessment

Section 3.0 Introduction

California Public Utilities Commission. 2002. *Wild Goose Storage, Inc. Expansion Project: Draft Supplemental Environmental Impact Report.* March. Prepared by MHA Environmental Consulting, Inc.

Section 3.1 Aesthetics

California Department of Transportation. 2008. *California Scenic Highway Mapping System.* Last updated: December 7, 2007. Available: <http://www.dot.ca.gov/hq/LandArch/scenic_highways>. Accessed: January 2008.

Colusa County. 1989. *Colusa County General Plan*. Final. Adopted January 13, 1989. Published March 1989. Prepared by Sedway Cooke Associates.

Federal Highway Administration. 1983. *Visual Impact Assessment for Highway Projects.* (Contract DOT-FH-11-9694.) Washington, DC.

Section 3.2 Agricultural Resources

California Department of Conservation. 2007a. *Farmland Mapping & Monitoring Program*. Available: <http://www.conservation.ca.gov/dlrp/fmmp/mccu/Pages/map_categories. aspx>. Accessed: August 25, 2008.

———. 2007b. *FMMP—Important Farmland Map Categories*. Available: <http://www.conservation.ca.gov/dlrp/fmmp/Pages/Index.aspx>. Accessed: August 25, 2008.

———. 2008a. *Colusa County Important Farmland, 2006*. Available: <ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2006/col06.pdf>. Accessed: August 25, 2008.

———. 2008b. *Farmland of Local Importance*. Available: <http://www.conservation.ca.gov/dlrp/fmmp/Documents/Local_definitions_00.pdf>. Accessed: August 25, 2008.

California Department of Finance. 2007. *California County Profiles: Colusa County*. Available: <http://www.dof.ca.gov/HTML/FS_DATA/profiles/pf_home.php>. Accessed: August 12, 2008.

California Farm Bureau Federation. 2008a. *County Farm Bureaus: Colusa County*. Available: <http://www.cfbf.com/counties/?id=6>. Accessed: August 12, 2008.

———. 2008b. *California Land Conservation Act*. Available: <http://www.cfbf.com/issues/landuse/willamson_2003.cfm>. Accessed: August 25, 2008.

Colusa California Online Guide. 2008. *Colusa California Online Guide*. Available: <http://colusacaliforniaonline.com>. Accessed: August 12, 2008.

Colusa County. 1989. *Colusa County General Plan*. Final. Adopted January 13, 1989. Published March 1989. Prepared by Sedway Cooke Associates.

Colusa County Economic Development Corporation. 2008. *Business and Industry*. Available: <http://www.colusacountyedc.com/demographics/business-industry.htm>. Accessed: August 12, 2008.

Section 3.3 Air Quality

Bay Area Air Quality Management District. 2007. *Permit Modeling Guidance*. San Francisco, CA. Available: <http://www.baaqmd.gov/pmt/air_toxics/permit_modeling/pmt_modeling_guidance.pdf>.

Butte County Air Pollution Control District. 2002. Authority to Construct Evaluation Application #97-11-02. Wild Goose Gas Storage Project. Chico, CA.

———. 2006. Authority to Construct Evaluation Application #02-04-06. Wild Goose Gas Storage Project. Chico, CA.

Butte County Air Quality Management District. 2008. *CEQA Air Quality Handbook: Guidelines for Assessing Air Quality Impacts for Projects Subject to CEQA Review*. Chico, CA.

California Air Pollution Control Officers Association. 2008. *CEQA and Climate Change, Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act*. January. Available: <http://www.capcoa.org>.

California Air Resources Board. 2007. *Draft California Greenhouse Gas Inventory (millions of metric tons of* CO_2 *equivalent) – By IPCC Category*. Sacramento, CA. Available: <http://www.arb.ca.gov/cc/inventory/data/tables/rpt_Inventory_IPCC_Sum_2007-11-19.pdf>.

———. 2008a. *Ambient Air Quality Standards*. June 26, 2008. Available:<http://www.arb.ca.gov/research/aaqs/aaqs2.pdf>.

———. 2008b. *California and Federal Nonattainment Areas*. Available: <http://www.arb.ca.gov/desig/adm/adm.htm>.

———. 2009. *Aerometric Data Analysis & Management (ADAM) Monitoring data*. Available: <http://www.arb.ca.gov/adam>.

California Climate Action Registry. 2009. General Reporting Protocol, Reporting Entity Wide Greenhouse Gas Emissions. Version 3.1, January 2009. Los Angeles, CA. Available : http://www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf.

California Department of Justice. 2008. *California Environmental Quality Act – Global Warming*. Available: <http://ag.ca.gov/globalwarming/ceqa.php>.

California Energy Commission, 2007. Final Staff Assessment -Colusa Generating Station, Application for Certification (06-AFC-9) Colusa County. CEC 700-2007-003-FSA.

California Environmental Protection Agency. 2003. *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Risk Assessments*. Office of Environmental Health Hazard Assessment. Oakland, CA. Available: <http://oehha.ca.gov/air/hot_spots/HRAguidefinal.html>.

———. 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*. Sacramento, CA. March. Available: <http://www.climatechange.ca.gov/climate_action_team/ reports>.

California Office of Planning and Research. 2008. *Technical Advisory, CEQA and Climate Change: Addressing Climate Change through California Environmental Quality Act (CEQA) Review*. June 19th. Sacramento, CA.

California Public Utilities Commission. 2008. *Interim Guidance for Addressing GHGs in CPUC PEAs*. San Francisco, CA. August and November.

Caterpillar. 2008. *G3612 Gas Petroleum Engine, 3195-3550 bhp Engine Specs*. Available: <http://catoilandgas.cat.com/cda/layout?m=183903&x=7>. Accessed : July 22, 2008.

DCL International. 2008. Quotation for Catalytic Converter on Waukesha F9390 GSI.

Gas Research Institute. 2000. GRI-GlyCalc 4.0 GRI's Glycol Dehydrator Emissions Estimator. Chicago, Ill.

Itron, Inc. 2006. California Commercial End-use Survey. Prepared for: California Energy Commission. March, 2006. CEC-400-2006-005.

U.S. Environmental Protection Agency. 1992. Screening Procedures for Estimating the Air Quality Impact of Stationary Sources. EPA-454-R-92-019.

U.S. Environmental Protection Agency. 1996. AP-42, Chapter 3 Stationary Internal Combustion Sources, Section 3.3 Gasoline and Diesel Internal Combustion Engines.

U.S. Environmental Protection Agency. 1998. AP-42. *Natural Gas Combustion, External Combustion Sources*. Section 1.4. Research Triangle Park, NC.

———. 2000. AP-42. *Natural Gas-Fired Reciprocating Engines, Stationary Internal Combustion Sources*. Section 3.2. Research Triangle Park, NC.

———. 2008. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006*. February. Washington D.C. Available: <http://www.epa.gov/climatechange/emissions/ usinventoryreport.html>.

Waukesha. 2008. *Waukesha VHP P9390G/GSI VHP Series Gas Engine Technical Specifications*. (Bulletin 7012 0102). Available: <http://www.waukeshaengine.com/internet/businessunits/waukesha/pages/documents/publications/specsheets/7012.pdf>.

World Resources Institute. 2008. *Climate Analysis Indicator Tool (CAIT*). Available: <http://cait.wri.org>.

Section 3.4 Biological Resources

California Department of Fish and Game (CDFG). 1994. Five-year status review. Swainson's hawk (*Buteo swainsoni*). Wildlife Management Division, Nongame Bird and Mammal Section Rept. to California Fish and Game Comm. Sacramento, California. 9 pp.

California Department of Fish and Game. 2000. *Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities*. State of California, The Resources Agency. December 9, 1983, revised May 8, 2000.

———. 1995. *Staff Report on Burrowing Owl Mitigation*. State of California Department of Fish and Game, Environmental Services Division (ESD) in cooperation with the Wildlife Management Division. October 1995.

California Native Plant Society. 2001. CNPS botanical survey guidelines. Pages 38-40 in California Native Plant Society's inventory of rare and endangered vascular plants of California (D.P. Tibor, editor). Sixth edition.

California Native Plant Society. 2008. Inventory of Rare and Endangered Plants of California. (v7-08c 07-07-08). Available: <http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi>. Accessed: July 2008.

California Natural Diversity Database. 2009. RareFind 3, Version 3.1 (February 2009 update). Records search of 7.5 minute quadrangle(s) of the project site and surrounding area. Sacramento, California: California Department of Fish and Game.

California Public Utilities Commission. 2002. *Wild Goose Storage, Inc. Expansion Project: Draft Supplemental Environmental Impact Report*. March. Prepared by MHA Environmental Consulting, Inc.

DeHaven, R. W., F. T. Crase, and P. D. Woronecki. 1975a. Breeding status of the tricolored blackbird, 1969–1972. *California Fish and Game* 61:166–180.

Dunk, J. R. 1995. White-tailed kite (Elanus leucurus). In *The Birds of North America*, No. 178 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Eng, L. L, D. Belk, and C. H. Eriksen. 1990. Californian Anostraca: distribution, habitat, and status. *Journal of Crustacean Biology* 10(2):247–277.

Eriksen, C. H., and D. Belk. 1999. *Fairy Shrimps of California's Puddles, Pools, and Playas*. Mad River Press. Eureka, CA.

Feaver, P. E. 1971. Breeding pool selection and larval mortality of three California amphibians: Ambystoma tigrinum californiense Gray, Hyla regilla Baird and Girard and Scaphiopus hammondi hammondi Girard. Master=s thesis, Department of Biology, Fresno State College, Fresno, California. 58 pp.

Essex Environmental. 1997. *Biological Assessment for the Wild Goose Gas Storage Project, Butte County, California.*

Essex Environmental. 2001. *Wetland Delineation Report and Functions and Values Assessment for the Wild Goose Storage Inc. Gas Storage Facilities Expansion*.

Fitch, H.S. 1940. A biogeographical study of the ordinoides Artenkreis of garter snakes (genus Thamnophis). University of California Publications in Zoology 44(1):1-50.

Hansen. 1988. Review of the status of the giant garter snake (Thamnophis couchii gigas) and its supporting habitat during 1986-87. Final report to California Department of Fish and Game, Contract C-2060. 31 pp.

Hansen, G.E. and J.M. Brode. 1980. Status of the giant garter snake Thamnophis couchii gigas(Fitch). California Department of Fish and Game, Inland Fisheries Endangered Species Program Special Publication 80-5, 14 pp.

Hansen, G.E. and J.M. Brode. 1992. Status and future management of the giant garter snake (Thamnophis gigas) within the southern American Basin, Sacramento and Sutter counties, California.

Helm, B. 2000. Biogeography of Eight Large Branchiopods Endemic to California. Pages 124-139 *in*: C.W. Witham, E.T. Bauder, D. Belk, W.R. Ferren Jr., and R. Ornduff (Editors). *Ecology, Conservation, and Management of Vernal Pool Ecosystems – Proceedings from a 1996 Conference*. California Native Plant Society, Sacramento, CA.

Holland, R.F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. State of California, The Resources Agency, Nongame Heritage Program, California Department of Fish and Game, Sacramento, CA.

Jennings, M. R., and M. P. Hayes. 1994. *Amphibian and Reptile Species of Special Concern in California*. Final report. Rancho Cordova, CA: California Department of Fish and Game, Inland Fisheries Division.

Mayer, K. E. and W. F. Laudenslayer, Jr. (eds.). 1988. *A Guide to Wildlife Habitats of California*. Sacramento, CA: California Department of Forestry and Fire Protection.

Loredo, Ivette, Dirk Van Vuren, and Michael L. Morrison. 1996. "Habitat Use and Migration Behavior of the California Tiger Salamander." Journal of Herpetology 30(2): 282-285.

Mayer, K. E. and W. F. Laudenslayer, Jr. (eds.). 1988. A Guide to Wildlife Habitats of California. Sacramento, CA: California Department of Forestry and Fire Protection.

National Marine Fisheries Service. 2008. On-line information on current Central Valley Chinook Salmon Habitat Distribution. Southwest Regional Office of

NOAA. http://swr.nmfs.noaa.gov/hcd/dist2.htm. Accessed December 11, 2008.

Rogers, D.C. 2001. Revision of the neartic *Lepidurus* (Notostraca). *Journal of Crustacean Biology* 21(4): 991–1006.

Rossman, D.A. and G.R. Stewart. 1987. Taxonomic reevaluation of Thamnophis couchii. Occasional Papers of the Museum of Zoology, Louisiana State University, No. 63, 23 pp.

Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee. 1995. Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources: Standard Guidelines. *Society of Vertebrate Paleontology News Bulletin* 163:22–27.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. 2007. Web Soil Survey. Last revised: June 20, 2007. Available: <http://websoilsurvey.nrcs.usda.gov/app>.

Stebbins, R.C. (2003). *Peterson Field Guides: Western Reptiles and Amphibians 3rd Edition,* New York, Houghton Mifflin Company.

Storer, T. I. 1925. A synopsis of the amphibia of California. Univ. Calif. Publ. Zool.27:1-342.

URS Corporation. 2006. *Application for Certification for Colusa Generating Station, Colusa County, California prepared for E&L Westcoast, LLC.* November.

URS Corporation. 2007a. *Revised Biological Assessment (Application for Certification 06-AFC-9) for Colusa Generating Station, Colusa County, California*.

URS Corporation. 2007b. *Draft U.S. Army Corps of Engineers Permit Application for the Colusa Generating Station, Colusa County, California*.

U.S. Fish and Wildlife Service (USFWS) species list for Colusa County. Website - http://www.fws.gov/sacramento/es/spp_lists/species_list.htm

U.S. Fish and Wildlife Service. 1997. *Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California*. (I-1-F-97-149.) Sacramento, CA.

Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White. 1990. Mammals. Volume III in *California's Wildlife*. April. Sacramento, CA: California Department of Fish and Game.

Section 3.5 Cultural and Paleontological Resources

Basin Research Associates, Inc. 2003. Historic Properties Survey Report/Finding of Effect for the Wild Goose Storage Inc. Gas Storage Facilities Expansion Project, Butte and Colusa Counties, California. April.

California Secretary of State. 1932. *California Blue Book.* Sacramento, CA: California State Printing Office.

California Public Utilities Commission. 2002. Wild Goose Storage, Inc. Expansion Project. Draft Supplemental Environmental Impact Report. Prepared by MHA Environmental Consulting, Inc. March.

Coy, Owen C. 1973. *California County Boundaries: A Study of the Division of the State into Counties and the Subsequent Changes in their Boundaries* (Revised edition). California Historical Survey Commission, Berkeley. 1923.

Fredrickson, D. A. 1973. Early Cultures of the North Coast Ranges, California. Ph.D. dissertation. Department of Anthropology, University of California, Davis.

Gilbert, Karl Grove. 1917. *Hydraulic-Mining Debris in the Sierra Nevada*. (United States Geological Survey Professional Paper 105.) Washington, DC: U.S. Government Printing Office.

Helley, E.J. and Harwood, D.S. 1985. *Geologic map of the late Cenozoic Deposits of the Sacramento Valley and Northern Sierran Foothills, California*. United States Geological Survey Map MF-1790, scale 1:62,500.

Johnson, J .J. 1967. *The Archaeology of the Camanche Reservoir Locality, California*. Sacramento Anthropological Society, Paper 6. Sacramento, CA.

Johnson, P. J. 1978. Patwin. California. Pages 350–360 in R. F. Heizer (ed.), *Handbook of North American Indians*, vol. 8, W. C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

Johnson, Stephen, Gerald Haslam, and Robert Dawson. 1993. *The Great Central Valley: California's Heartland*. University of California Press and California Academy of Sciences, Berkeley and San Francisco.

Kelley, Robert. 1989. *Battling the Inland Sea*. Berkeley: University of California Press.

Kroeber, A. L. 1932 The Patwin and their Neighbors. *University of California Publications in American Archaeology and Ethnography* 29(4):253–423.

———. 1925. *Handbook of the Indians of California*. Bureau of American Ethnology Bulletin 78. Washington, DC: Government Printing Office.

Levy, R. 1979. The Linguistic Prehistory of Central California: Historical Linguistics and Culture Process. Manuscript on file, Department of Anthropology, University of Kentucky, Lexington.

Mansfield, George C. 1918. *History of Butte County, California*. Los Angeles, CA: Historic Record Company.

McGie, Joseph F. 1970. *Gridley Centennial Pictorial-History Book*. Gridley, CA: Junior Women's Club of Gridley.

Moratto, M. J. 1984. *California Archaeology.* Academic Press.

Peak and Associates, Inc. 1981 *Archaeological investigation of CA-Sac-370 and CA-Sac-379, the Rancho Murieta Early Man Sites in Eastern Sacramento County*. Sacramento, CA.

Powers, S. 1877. Tribes of California. *Contributions to North American Ethnology III*. United States Geographical and Geological Survey of the Rocky Mountain Region, Washington, D.C.

Robinson, W. W. 1948. *Land in California*. Berkeley: University of California Press.

Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee. 1995. Available: <http://www.vertpaleo.org/society/polstatconformimpactmigig.cfm>

Talbitzer, Bill. 1987. *Butte County: An Illustrated History*. Northridge, CA: Windsor Publications.

Three Rivers Levee Improvement Authority. 2006. *Draft Environmental Impact Report for the Feather River Levee Repair Project, an Element of the Yuba-Feather Supplemental Flood Control Project.* State Clearinghouse N. 20060602071. Prepared by EDAW. August. Sacramento, CA.

Treganza, A. E. and R. F. Heizer. 1953 Additional data on the Farmington Complex: A Stone Implement Assemblage of Probably Early Post-Glacial Date from Central California. *University of California Archaeological Survey Report* 22:28–38.

URS Corporation. 2006. Cultural Resources Section Application for Certification, Colusa Generating Station. November.

U.S. General Land Office. 1856-1881. *Grantee Patents, Township No. 17 North, Range No. 1 East.* On file, Bureau of Land Management, Sacramento, CA.

U.S. Surveyor General's Office. 1856a. *Map of Township No. 17 North, Range No. 1 East, Mount Diablo Meridian.* On file, Bureau of Land Management, Sacramento, CA.

———. 1856b. *Map of Township No. 18 North, Range No. 1 East, Mount Diablo Meridian*. On file, Bureau of Land Management, Sacramento, CA.

Wells, Harry L., and W. L. Chambers. 1882. History of Butte County, California. San Francisco: Harry L. Wells. Reprinted by Howell-North books, Berkeley, 1973.

Whistler, K. A. 1977. Wintun Prehistory: An Interpretation Based on Plant and Animal Nomenclature. *Proceedings of the Third Annual Meeting of the Berkeley Linguistics Society*, pp. 157−174. Berkeley.

———. 1980. Pomo Prehistory: A Case for Archaeological Linguistics. Sonoma State University, Anthropological Studies Center Manuscripts S-2107. Rohnert Park, CA.

Section 3.6 Geology, Soils, and Seismicity

Advanced National Seismic System. 2008. *Composite Earthquake Catalog*. Available: <http://www.quake.geo.berkeley.edu/cnss>.

Bryant, W., and Hart, E. 2007. *Fault Rupture Hazard Zones in California*. Special Publication 42, Interim Revision 2007, California Geological Survey.

Busacca, A.J., et. al. (1989), Late Cenezoic Stratigraphy of the Feather and Yuba RIvers Area, California, with a Section on Soil Development in Mixed Alluvium at Honcut Creek, USGS.

California Building Code. 2007. California Building Standards Commission.

California Department of Water Resources. 2009. *Land Subsidence and Groundwater Elevation Data*. Available: <www.nd.water.ca.gov/Data/Extensometers/Data/index.cfm>.

———. 2008. *Water Data Library*. Available: <http://wdl.water.ca.gov/gw/>.

———. 2003. California's Groundwater, Bulletin No. 118, Update 2003.

———. 2001. *Geology and Hydrogeology of the Freshwater Bearing Aquifer Systems of the Northern Sacramento Valley, California*. DWR Bulletin 118-7 (pre-publication draft geologic sections).

California Geological Survey. 2001. Geographic Information System Data Files, GIS Files of Official Alquist-Priolo Earthquake Fault Zones, CD 2001-06– Northern and Eastern Region.

California Public Utilities Commission. 2002. *Wild Goose Storage, Inc. Expansion Project: Draft Supplemental Environmental Impact Report*. March. Prepared by MHA Environmental Consulting, Inc.

Colusa County. 1989. *Colusa County General Plan*. Final. Adopted January 13, 1989. Published March 1989. Prepared by Sedway Cooke Associates.

Hart, E. W., and W. A. Bryant. 1997 (revised 2007). *Fault-Rupture Hazard Zones in California: Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zone Maps*. (Special Publication 42.) California Division of Mines and Geology.

Harwood, D. S., and Helley, E. J. 1987. *Late Cenozoic Tectonism of the Sacramento Valley, California*. U.S. Geological Survey Professional Paper 1359, scale 1:250,000.

Helley, E., and D. Harwood. 1985. Geologic map of the late Cenozoic deposits of the Sacramento Valley and Northern Sierran Foothills, California. U.S. Geological Survey.

Jennings, C. W. 1994 (revised 2005). *Revised Fault Activity Map of California and Adjacent Areas with Locations and Ages of Recent Volcanic Eruptions*. California Geological Survey, Geologic Data Map No. 6, scale 1:750,000.

Jennings, C. W., and Strand, R. 1960. Geologic map of California, Ukiah sheet, 1:250,000.

Kleinfelder, Inc. 2001. *Seismic Hazards Site Investigation and Risk Assessment, Wild Goose Natural Gas Pipeline Colusa and Butte Counties, California*. November. Project No. 23-484855. Martin, G. R., and M. Lew (Interim Revision 2007), Recommended Procedure for Implementation of DMG Special Publication 117–Guidelines for Analyzing and Mitigating Liquefaction in California, Southern California Earthquake Center, March.

Natural Resources Conservation Service. 2008. Soil Survey Geographic Database. U.S. Department of Agriculture.

Petersen, M. D., W. A. Bryant, C. H. Cramer, T. Cao, M. S. Reichle, A. D. Frankel, J. J. Lienkaemper, P. A. McCrory, and D. P. Schwartz. 1999. *Probabilistic Seismic Hazard Assessment for the State of California*. Division of Mines and Geology Open File Report 96-08: Fault parameters. Available: <http://www.consrv.ca.gov/cgs/rghm/psha/ofr9608/Pages/index.aspx>

Redwine, L.E. (1972), The Tertiary Princeton Submarine Valley System Beneath the Sacramento Valley, California: Los Angeles, University of California, Ph.D. dissertation.

Reed, W. R. 2006. *Soil Survey of Colusa County, California*. U.S. Department of Agriculture Natural Resources Conservation Service in cooperation with Colusa County Resource Conservation District, State of California Department of Conservation, Regents of the University of California, U.S. Department of Agriculture Forest Service, and U.S. Department of the

Interior Bureau of Land Management and Fish and Wildlife. Washington, DC: U.S. Government Printing Office.

Swan and Taylor 1986 Geological assessment of the seismic potential of the Bartlett Springs shear zone for Scott Dam, Lake County, California: Final Report by Geomatrix Consultants for Pacific Gas and Electric Company, 51.

Thesken, R.S. 2000. *Afton Gas Field*. Publication No. TR50, California Department of Conservation; Division of Oil, Gas, and Geothermal Resources.

Thesken, R. S. 1993. *Bounde Creek and Princeton Gas Fields*. Publication No. TR45, California Department of Conservation; Division of Oil, Gas, and Geothermal Resources.

Unruh, J. R., G. D. Simpson, C. S. Hitchcock, and W. R. Lettis. 1997. *Seismotectonic Evaluation—Stony Gorge and East Park Dams—Orland Project, Montecello Dam—Solano Project, Northern Coast Ranges, California*. October. Report prepared for the U. S. Bureau of Reclamation by William Lettis and Associates.

U.S. Geological Survey. 2008. Java Ground Motion Calculator.

United States Geological Survey (2008), 2008 National Seismic Hazards Maps – Fault Parameters webpage: http://gldims.cr.usgs.gov/webapps/cfusion/Sites/hazfaults_search/hf_search_main.cfm

Wakabayashi, J., and D. L. Smith. 1994. Evaluation of recurrence intervals, characteristic earthquakes and slip rates associated with thrusting along the Coast Range–Central Valley geomorphic boundary, California. *Bulletin of the Seismological Society of America* 84:1,960–1,970.

Section 3.7 Hazards and Hazardous Materials

Colusa County. 1989. *Colusa County General Plan*. Final. Adopted January 13, 1989. Published March 1989. Prepared by Sedway Cooke Associates.

International Gas Consulting (IGC). 2007. Safety Record Study of Underground Gas Storage in Depleted Gas Reservoirs: A Safe Industry in the Past, Present, and Future. July 16, 2007. Available: <http://www.cpuc.ca.gov/environment/info/dudek/sngs/SupplementtoPEAefiled071607.pdf>. Accessed May 2008.

Wallace-Kuhl & Associates [WKA] 2008. Phase I Environmental Site Assessment Prepared for the Central Valley Natural Gas Project.

Section 3.8 Hydrology and Water Quality

California Department of Oil, Gas, and Geothermal Resources. 1983. *California Oil and Gas Fields, Northern California*. Volume 3.

California Department of Water Resources. 2008. *Water Data Library*. Available: <http://wdl.water.ca.gov/gw/>.

———. 2003. *California's Groundwater*. Bulletin No. 118.

———. 1994. *Ground Water Levels in the Sacramento Valley Ground Water Basin, Colusa County*. Sacramento, CA: California Department of Water Resources, Northern District.

———. 1993. *Ground Water Levels in the Sacramento Valley Ground Water Basin, Butte County*. Sacramento, CA: California Department of Water Resources, Northern District.

California Public Utilities Commission. 2002. *Wild Goose Storage, Inc. Expansion Project: Draft Supplemental Environmental Impact Report*. March. Prepared by MHA Environmental Consulting, Inc.

Central Valley Regional Water Quality Control Board. 1998. *Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Basin Plan)*. Sacramento, CA. September.

CH2M Hill, Inc. and GEI Consultants. 2006. *Sacramento Valley Integrated Regional Water Management Plan*. December.

Colusa County. 2008. *Draft Colusa County Groundwater Management Plan*. May 18, 2009. Main Report: Volume 1 of 2. Prepared by Wood Rodgers.

——. 1989. *Colusa County General Plan*. Final. Adopted January 13, 1989. Published March 1989. Prepared by Sedway Cooke Associates.

Federal Emergency Management Agency. 2009. *Map Service Center*. Available: <http://map1.msc.fema.gov/>.

Western Regional Climate Center. 2008. Western Regional Climate Center web site. Available: <http://www.wrcc.dri.edu>.

Section 3.9 Land Use and Planning

California Department of Conservation, Division of Land Use Protection. 2008. Colusa County Important Farmland 2006. Available: <ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2006/col06.pdf>. Accessed: August 25, 2008.

California Department of Finance. 2007. California County Profiles: Colusa County. Available: <http://www.dof.ca.gov/HTML/FS_DATA/profiles/pf_home.php>. Accessed: August 12, 2008.

California Farm Bureau Federation. 2008a. County Farm Bureaus: Colusa County. Available: <http://www.cfbf.com/counties/id=6>. Accessed: August 12, 2008.

Colusa County. 1989. *Colusa County General Plan*. Final. Adopted January 13, 1989. Published March 1989. Prepared by Sedway Cooke Associates.

U.S. Fish and Wildlife Service and Sacramento National Wildlife Refuge Complex. 2008. Sacramento, Delevan, Colusa, and Sutter National Wildlife Refuges: Draft Comprehensive Conservation Plan. July. Available: <http://www.fws.gov/sacramentovalleyrefuges/CCP.html>.

Section 3.10 Energy and Mineral Resources

California Public Utilities Commission. 2002. Wild Goose Storage, Inc. Expansion Project. Draft Supplemental Environmental Impact Report. Prepared by MHA Environmental Consulting, Inc. March.

Colusa County. 1989. *Colusa County General Plan*. Final. Adopted January 13, 1989. Published March 1989. Prepared by Sedway Cooke Associates.

Colusa County Economic Development Corporation. 2008. Business and Industry. Available: <http://www.colusacountyedc.com/demographics/business-industry.htm>.

Section 3.11 Noise

California Department of Health. 1977. Model Community Noise Control Ordinance. Sacramento, CA

California Department of Transportation. 2004. *Transportation- and Construction-Induced Vibration Guidance Manual*. Sacramento, CA.

California Department of Transportation. 1998. *Traffic Noise Analysis Technical Noise Supplement.* Sacramento, CA.

Colusa County. 1989. *Colusa County General Plan*. Final. Adopted January 13, 1989. Published March 1989. Prepared by Sedway Cooke Associates.

Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment*.

Hoover & Keith. 1996. *Noise Control for Buildings, Manufacturing Plants, Equipment, and Products*. Houston, TX.

Hoover & Keith. 2009. Central Valley Gas Storage, LLC – ambient sound survey and noise impact evaluation. Houston, TX. June 17, 2009.

———. 2005. *Kirby Hills Gas Storage Facility—Results of Noise Impact Analyses for a Proposed New Natural Gas Facility*. Houston, TX.

———. 2008. *Steckman Ridge Storage Project Well Drilling Noise Analysis and Mitigation Plan*. Houston, TX.

Section 3.12 Population and Housing

Colusa County Economic Development Corporation. 2008. Income. Available: <http://www.colusacountyedc.com/demographics/income.htm>. Accessed: August 12, 2008.

Knowledgeplex. 2008. Area Overview: Colusa County. Available: <http://www.dataplace.org/area_overview/index.html>.

Onboard Informatics. 2008. Colusa County, California. Available: <http://www.city-data.com/county/Colusa_County-CA.html.>

Section 3.13 Public Services

Colusa County. 1989. *Colusa County General Plan*. Final. Adopted January 13, 1989. Published March 1989. Prepared by Sedway Cooke Associates.

Section 3.14 Recreation

Colusa California Online Guide. 2008. Colusa California Online Guide. Available: <http://colusacaliforniaonline.com>. Accessed: May 28, 2008.

Colusa County. 1989. *Colusa County General Plan*. Final. Adopted January 13, 1989. Published March 1989. Prepared by Sedway Cooke Associates.

Gaines Ranch, 2009. *Gaines Ranch Duck Clubs – Waterfowl Properties*. Available: http://www.gainesranch.net/Duck_Clubs.html. Accessed: May 27, 2009.

U.S. Fish and Wildlife Service and Sacramento National Wildlife Refuge Complex. 2008. Homepage. Available: <http://www.fws.gov/sacramentovalleyrefuges/CCP.html>.

Section 3.15 Transportation and Traffic

California Department of Transportation. 2008. *Annual Average Daily Truck Traffic on the State Highway System*. September 2008.

Colusa County. 1989. *Colusa County General Plan*. Final. Adopted January 13, 1989. Published March 1989. Prepared by Sedway Cooke Associates.

Schantz, Jerry. Information Systems Manager. County of Colusa Department of Public Works, Colusa, CA. May 20, 2009—email communication.

Section 3.16 Utilities and Service Systems

California Department of Toxic Substances Control. 2008. EnviroStor database. Commercial Offsite Hazardous Waste Facilities. Available: <http://www.envirostor.dtsc.ca.gov/public/commercial_offsite.asp>. Accessed August 22, 2008.

California Department of Toxic Substances Control. 2007. California Commercial Offsite Hazardous Waste Facilities. Last Revised: March 2007. Available: <http://www.dtsc.ca.gov/HazardousWaste/upload/LIST_HWM_Commercial_Facilities.pdf.> Accessed on August 22, 2008.

California Integrated Waste Management Board. 2008. Solid Waste Information System (SWIS) database facility listings. Available: <http://www.ciwmb.ca.gov/SWIS/SearchList/List Colusa>. Accessed: August 22, 2008.

California Integrated Waste Management Board. 2004. Landfill Profile Search: California Waste Stream Profiles. Available: <http://www.ciwmb.ca.gov/Profiles/Facility/Landfill/Default.asp>. Accessed: August and November 2004.

California Integrated Waste Management Board. 2007. Norcal Waste Systems Ostrom Road Landfill, Inc. homepage. Available: <http://www.ostromroadlandfill.com>. Accessed September 16, 2008.

California Public Utilities Commission. 2002. Wild Goose Storage, Inc. Expansion Project. Draft Supplemental Environmental Impact Report. Prepared by MHA Environmental Consulting, Inc. March.

Colusa County. 1989. *Colusa County General Plan*. Final. Adopted January 13, 1989. Published March 1989. Prepared by Sedway Cooke Associates.

Section 3.17 Cumulative Analysis and Growth-Inducing Impacts

Butte County Air Quality Management District. 2006. Authority to Construction Application #02-04-06. Chico, CA.

California Public Utilities Commission. 2008. *Proponent's Environmental Assessment Checklist for Underground Gas Storage Facilities*. November 2008.

Chapter 4. Alternatives

No citations

Chapter 6
List of Preparers

ICF Jones & Stokes

Chris Brungardt	Project Director
Susan Bushnell	Project Manager
Jennifer Stock	Aesthetics
Chris Small	Agricultural Resources
Margaret Widdowson, PhD	Biological Resources (botany/wetlands)
Bud Widdowson	Biological Resources (wildlife)
Stephanie Myers	Biological Resources (endangered species)
Barry Scott	Cultural and Historical Resources
Terry Rivasplata	Land Use and Planning Agriculture Population and Housing Cumulative Analysis and Growth-Inducing Impacts
Dave Buehler, PE	Noise
Jennifer Barnes, PE	Transportation and Traffic
Tim Messick	Graphics and Visual Simulations
Daniel Schiff	Geographic Information Systems
Larry Goral	Lead Editor
Liz King	Support Editor
Corrine Ortega	Publications Specialist

ECO:LOGIC Engineering

Doug Brewer	Hydrology and Water Quality

Rimpo & Associates, Inc.

Tim Rimpo	Air Quality and GHG Analysis

Valley Environmental Consulting LLC

Joel Butterworth	Paleontological Resources Wetland Delineation

Wallace-Kuhl & Associates

Ben McLernon	Phase I Environmental Site Assessment

Egret Inc.

Joan Lynn	Energy and Mineral Resources Public Services Recreation Utilities and Service Systems

Rooney Engineering

Mike Mathwig	Peer review for Geology, Soils, and Seismicity and pipeline engineering

Kleinfelder

Byron Anderson and Bruce Hilton	Geology, Soils, and Seismicity
Joe Ziles	Hydrology and Water Quality

Appendix A

Landowner List

Central Valley Gas Storage Project
Landowner List for Selected Route

APN	Owner Name	Mail Address	Mail City/State/ZIP	Land Use	Owners Affected by Selected Route
012-110-060(Ptn) 012-120-052	Leonard F. & Marilyn W. Speth Speth Family Trust	1563 Del Lago	Yuba City, CA 95991	Agricultural	storage facility
012-110-060(Ptn) 012-110-048 012-110-020	Christopher E. Torres	P.O. Box 349	Princeton, CA 95970	Truck Crops	storage facility
012-110-019	Linda M. Cardoso	3105 Sierra Vista Drive	Yuba City, CA 95993	Agricultural (nec)	storage facility
012-110-096 012-110-095	Ronald A. & Celeste S. Glassgow	P.O. Box 16	Princeton, CA 95970	Truck Crops	storage facility
012-110-045 012-110-052 012-110-053 012-110-043 012-110-061 012-110-017	Sunrise Sunset Limited Partnership Jerry & Carole Southam	1749 County Road Y	Butte City, CA 95920	Truck Crops	X
012-110-100	Andrew & Lorraine Larsen	P.O. Box 1285 143 Clay Street	Colusa, CA 95932	Agricultural	storage facility
012-110-044 012-110-097 012-110-098 012-110-099	David W. Lanza, Trustee for the David W. Lanza Trust; and Patrick Laughlin, Trustee of the Patrick Laughlin Trust	7440 E. Highway 140	Merced, CA 95340	Agricultural	storage facility
012-110-051 012-110-041 012-110-021	Fred C. Southam Southam & Son A Partnership	P.O. Box 126	Princeton, CA 95970	Agricultural (nec)	X (& storage facility on parcel 21)
012-110-014	Lucille Bruggman (& Kenneth)	2650 Cactus Ave	Chico, CA 95926	Truck Crops	storage facility
012-110-101	Jayme & Robert P. Britt	6967 Dodge Road	Colusa, CA 95932	SFR	storage facility
012-110-070	Ivy G. Zunwalt & Associates,	520 Market St. #4	Colusa, CA 95932	Truck Crops	x
012-110-073 012-110-072	Braly George Zumwalt	P.O. Box 35	Princeton, CA 95970	Agricultural (nec)	
NEW APN: 012-110-103 OLD APN: 012-110-050	Colusa Farms Llc	12052 Linda Flora Dr	Ojai, CA 93023-9720	Agricultural (nec)	X (& access road)

Central Valley Gas Storage Project
Landowner List for Selected Route

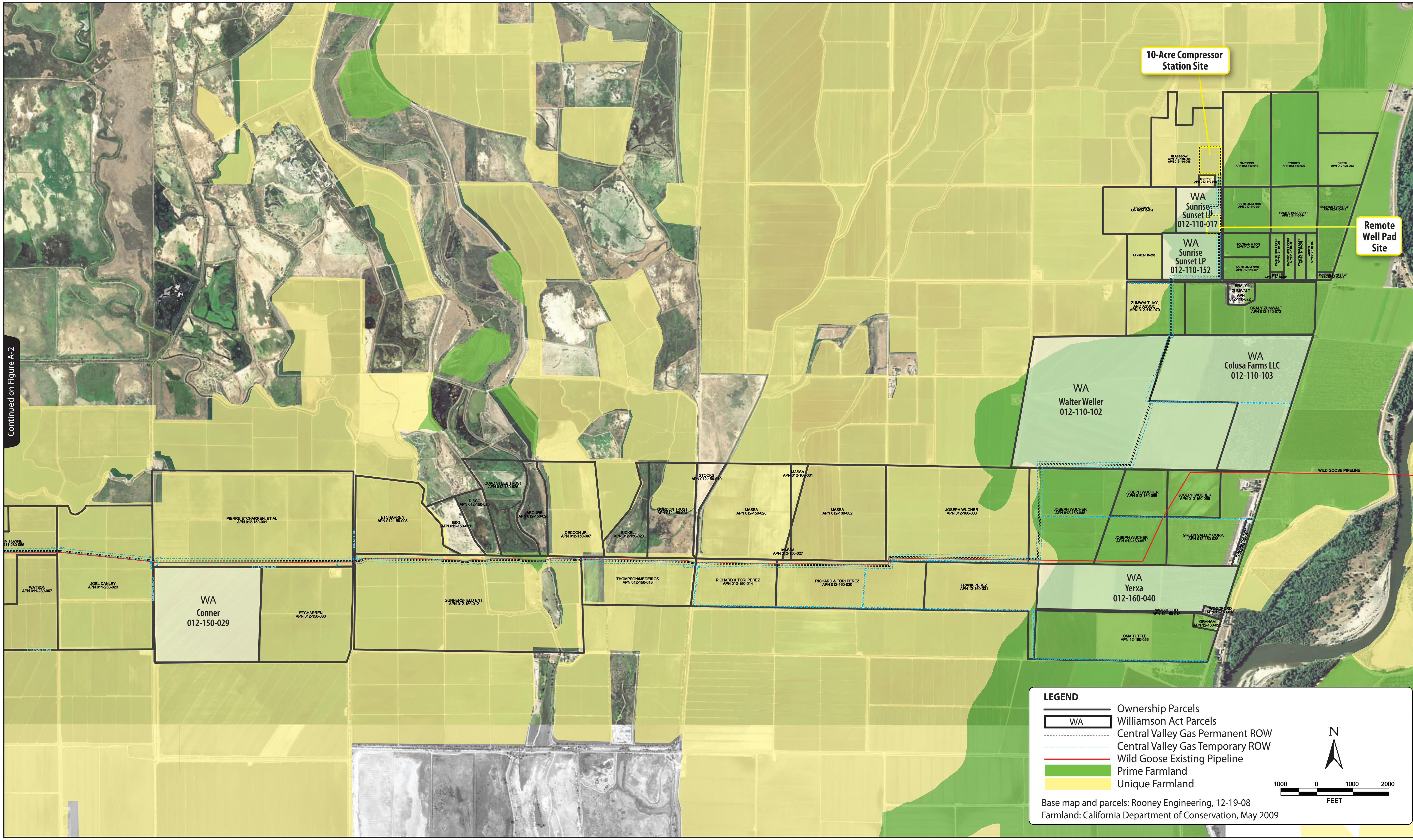
APN	Owner Name	Mail Address	Mail City/State/ZIP	Land Use	Owners Affected by Selected Route
012-110-049 012-110-102	Walter B. Weller William Weller	920 County Road	Princeton, CA 95970	Agricultural Preserve	X
012-160-057 012-160-056 012-160-055	Joseph L & Jenny B Wucher	18 Barcelona Cir	Redwood City, CA 94065	Agricultural (nec) Agricultural (nec)	**access road**
012-160-003 012-160-048	Joseph L & Jenny B Wucher (1/2 int.)/ Green Valley Corporation DBA Barry Swenson Builder (1/2 interest)	436 N Montgomery Ct	Visalia, CA 93291	Truck Crops Agricultural (nec)	X
012-160-029	Farmer's Rice Cooperative	2525 Natomas Drive, Suite 300 Mailing: P.O. Box 15223 Sacramento, CA 95851-0223	Sacramento, CA 95833	Industrial	**access road**
012-160-038	Green Valley Corporation, a CA corp	701 N. First Street	San Jose, CA 95112		**access road**
012-160-040 012-160-013 012-160-018	Woodford A & Kathryn M Yerxa	P.O. Box 209	Colusa, CA 95932	Agricultural (nec)	**access road**
012-160-025	David Graham	P.O. Box 222873	Carmel, CA 93922-2873	Agricultural (nec)	
012-150-014 012-160-030 012-160-031	Richard Joe & Tori L Perez	6434 Road 48	Willows, CA 95988	Truck Crops Truck Crops Truck Crops	X
012-160-026	Oma R. Tuttle	139 Country Club Drive	Colusa, CA 95932	Agricultural (nec)	
012-150-028 012-150-027 012-160-002	Eugene M & Ana I Massa	P.O. Box 215 street address: 752 Center Street	Princeton, CA 95970	Truck Crops Truck Crops Truck Crops	
012-150-013	Evelyn Thompson John H & Deborah M Medeiros Golden Gate Drywall	399 Beach Rd	Burlingame, CA 94010	Truck Crops	X
012-150-024	Betty Jane Gordon Survivors Trust Frederick Meyers	7016 Linda Sue Way	Fair Oaks, CA 95628	Truck Crops	
012-150-023	William & Judith Bickell and Thomas E Bickell	6165 Strawberry Station Loop	Roseville, CA 95747	Easement	
012-150-012	Gunnersfield Enterprises Inc	P.O. Box 626	Maxwell, CA 95955	Truck Crops	X
012-150-020	Edwin J & Edith E Laboure	1691 Whitman Rd	Concord, CA 94518	Agricultural (nec)	
012-150-026	Bruce A Billings & Tillotson 1995 Trust	423 N Murdock Ave	Willows, CA 95988	Easement	
012-150-025	Robert Joseph & Laura Mae Risso	1209 Terra Nova Blvd	Pacifica, CA 94044	Easement	
012-150-021	G & G Ptshp	P.O. Box 362	Princeton, CA 95970	Easement	

Central Valley Gas Storage Project
Landowner List for Selected Route

APN	Owner Name	Mail Address	Mail City/State/ZIP	Land Use	Owners Affected by Selected Route
012-150-001 012-150-030 012-150-005	Pierre & Denise M Etcharren	733 Pacheco St	San Francisco, CA 94116	Truck Crops Truck Crops Truck Crops	X
012-150-029	James M Vierra & Beverly J Conner	P.O. Box 130	Maxwell, CA 95955	Truck Crops	
011-230-023	Lorene K Stephen & Joel N. Danley	5771 County Road 65	Willows, CA 95988	Truck Crops	X
011-230-067	Nancy Ann Watson	P.O. Box 788	Edisto Island, SC 29438	Truck Crops	
011-230-066	Kevin D & Patricia I Towne	1057 La Salle Dr	Sacramento, CA 95864	Truck Crops	X
011-230-065	Janet M Niehues	1558 County Road D	Willows, CA 95988	Truck Crops	
011-230-064	Cleveland & Lisa Teeter	1055 Green St	Willows, CA 95988	Truck Crops	X
011-230-009 011-230-051	Robert & Kathy Sutton	P.O. Box 149	Maxwell, CA 95955	Truck Crops	X
011-230-072	Justin P & Cindy Sites	P.O. Box 366	Maxwell, CA 95955	Truck Crops	
011-230-003 012-150-007	Peter Ceccon Jr.	Peter's mailing address: 894 Pacific Ave. Property address (sister): 6029 County Road	Willows, CA 95988	Truck Crops Truck Crops	X
011-060-002 011-060-003 011-230-001 011-230-002	James K Brian	5006 Hwy. 99W	Delevan, CA 95988	Truck Crops Truck Crops Truck Crops Truck Crops	X
011-220-093	Dennis Fox	P.O. Box 712	Maxwell, CA 95955		X
011-050-019 011-220-007	Lorraine E Corbin	4811 McDermott Rd.	Maxwell, CA 95955	Truck Crops Truck Crops	X
011-220-002	J Christopher Cutler Cutler & Cutler	601 Wilhaggin Dr	Sacramento, CA 95864	Truck Crops	X
011-220-001	Frances M Etchepare	P.O. Box 658	Maxwell, CA 95955	Agricultural (nec)	X
011-140-019	Jack L Barrett	P.O. Box 99	Maxwell, CA 95955	Truck Crops	X

Central Valley Gas Storage Project
Landowner List for Selected Route

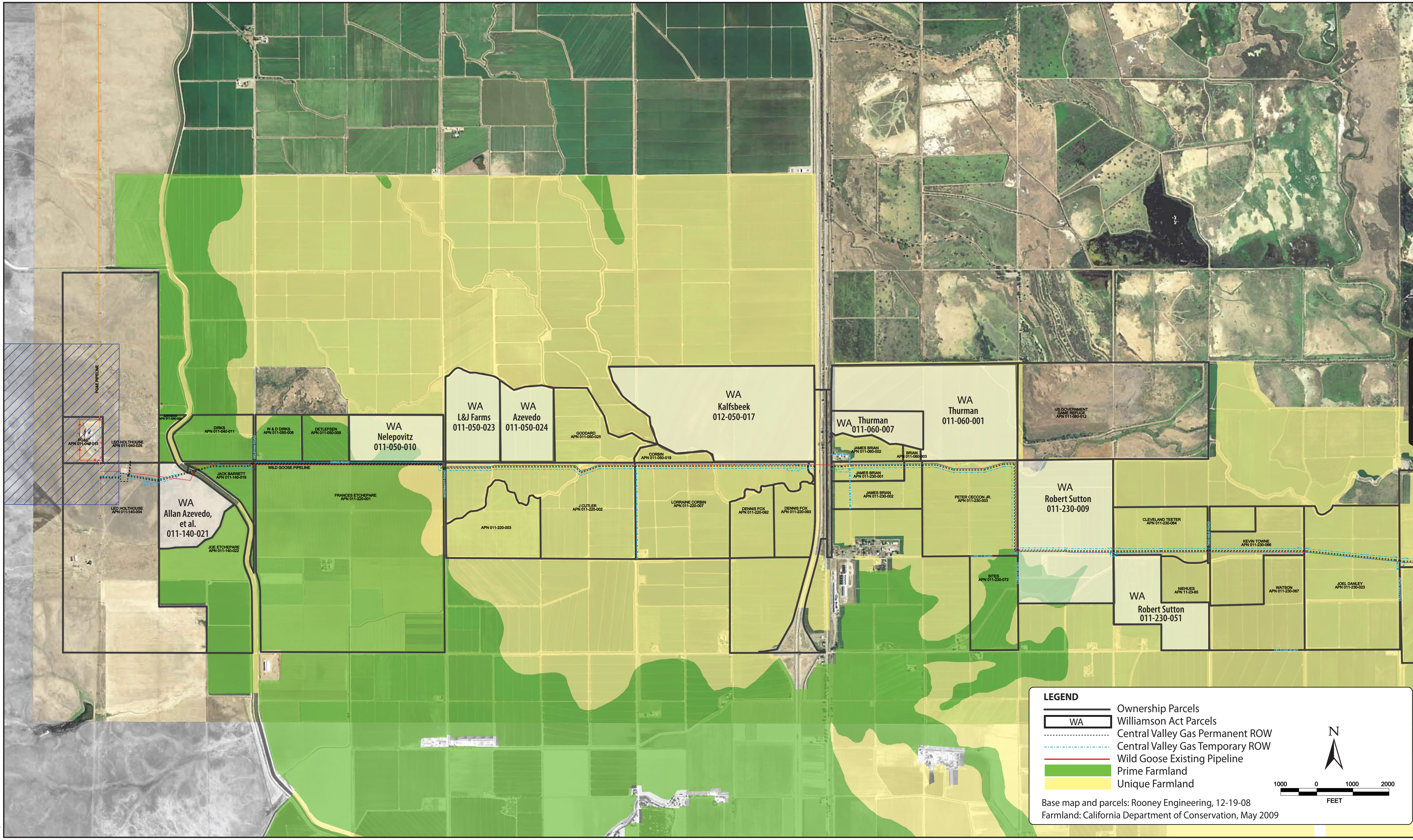
APN	Owner Name	Mail Address	Mail City/State/ZIP	Land Use	Owners Affected by Selected Route
011-140-022	Joseph M. & Lois Irene Etchepare Tenant: JeanMarie E. Etchepare (P.O. Box 547, Maxwell, CA)	P.O. Box 147	Maxwell, CA 95955	Agricultural	X
011-040-029 011-140-021	Allan E & Mary Anne Azevedo Right of Survivorship	P.O. Box 629	Maxwell, CA 95955	Truck Crops Pasture	X
011-040-023 011-040-026 011-140-004	Leo M & Diane M Holthouse	25039 Hwy 395 S	Canyon City, OR 97820	Farms Livestock Livestock	X
011-060-001 011-060-007	Arthur R Thurman	6170 County Road 39	Willows, CA 95988	Truck Crops	
011-050-017	John Kalfsbeek	P.O. Box 5971	Arbuckle, CA 95912	Truck Crops	
011-050-025	Thomas L & Phyllis A Goddard	252 Highway 45	Colusa, CA 95932	Truck Crops	
011-050-024	Mike Anthony & Roberta Diann Azevedo Living Trust	P.O. Box 233	Maxwell, CA 95955	Truck Crops	
011-050-023	LJ Farms, A General Partnership (John & Laura Iacopi)	12934 Ski View loop (also 2039 W. Lincoln Rd, Stockton, Ca 95207)	Truckee, CA 96161	Truck Crops	
011-050-010	Richard L & Marisa J Nelepovitz	30170 Sherwood Rd	Fort Bragg, CA 95437	Truck Crops	
011-050-009	Andrew F Detlefsen	5540 Loretz Rd	Willows, CA 95988	Truck Crops	
011-040-011 011-050-008	William & Dora Dirks	P.O. Box 9	Maxwell, CA 95955	Truck Crops Truck Crops	
					TOTAL LANDOWNERS: 57
					TOTAL AFFECTED LANDOWNERS: 24



Graphics ... 01099.07 (7-15-09) tm

ICF Jones & Stokes
an ICF International Company

Figure A-1
Williamson Act Parcels (Sheet 1 of 2)



Graphics ... 01099.07 (7-16-09) tm

ICF Jones & Stokes
an ICF International Company

Figure A-2
Williamson Act Parcels (Sheet 2 of 2)

Appendix B
Representative Photographs

Photo 1. Photo taken from the west side of SR 45. Looking southwest toward the proposed compressor station site, approximately 1 mile in the distance.

Photo 2. Photo taken from McAusland Road at Paradise Road. Looking south toward the proposed compressor station site, on the right side of the road, in front of the white building and trees.

Graphics … 01099.07 (7-14-09)

Photo 3. Photo taken from Southam Road, east of McAusland Road. Looking west toward the proposed compressor station site, to the right of the buildings and trees.

Photo 4. Photo taken from McAusland Road. Looking northwest across the proposed remote well pad site, located in rice fields on the left side of the road.

Photo 5. Photo looking at Colusa Drain where it is crossed by the preferred pipeline alignment. Large, perennial drainages will be bored.

Photo 6. Typical irrigation ditch that occurs throughout rice fields in the project area. The pipeline will be installed across most of these small irrigation ditches and canals using an open-cut trench method.

Graphics … 01099.07 (7-14-09)

Photo 7. Typical irrigation ditch that occurs throughout rice fields in the project area.

Photo 8. Representative photograph of an irrigation canal. Some canals will be trenched and others bored (depending on the size and habitat values of the canal).

Graphics … 01099.07 (7-14-09)

an ICF International Company

Photo 9. Representative photograph of a typical flooded rice field in the project area.

Photo 10. Representative photograph of an unpaved agricultural road in the project area. These agricultural roads will be used to access the gas pipeline construction corridor.

Graphics ... 01099.07 (7-14-09)

ICF Jones & Stokes
an ICF International Company

Appendix B-5
Representative Photographs

Photo 11. Photo looking west at the Delevan Compressor Station and PG&E Line 400/401.

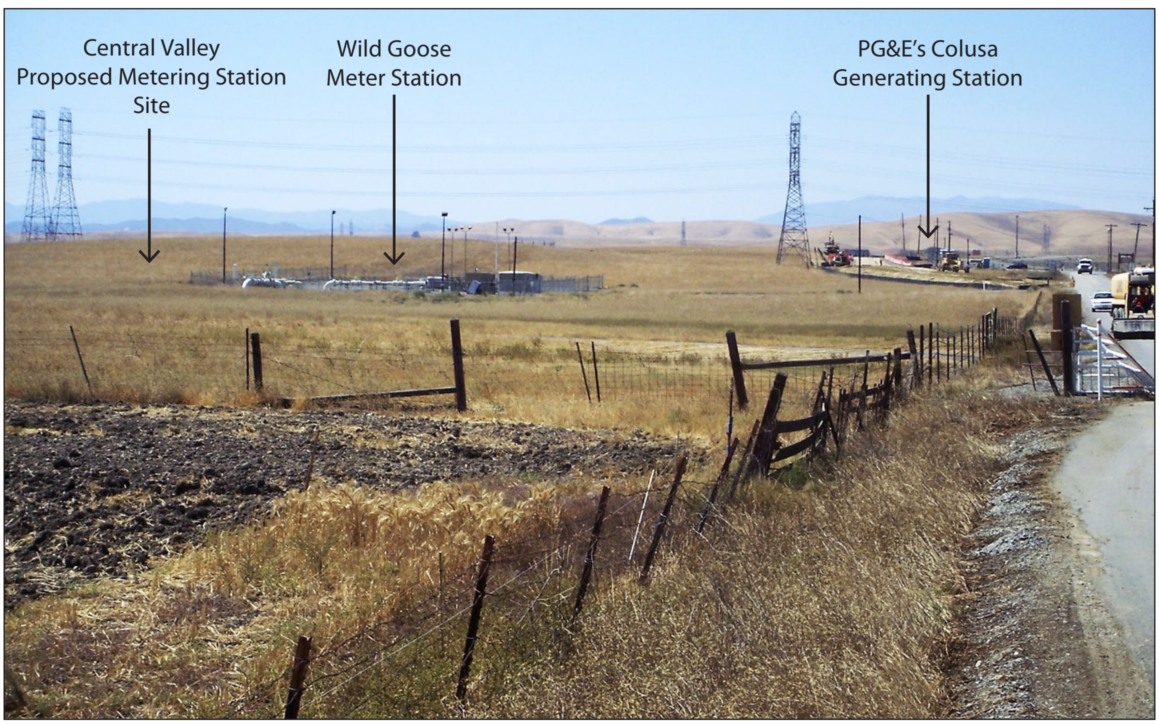


Photo 12. Photo looking west at the Wild Goose Meter Station and Central Valley's proposed metering station site. The proposed metering station site is located in the annual grasslands adjacent to the Wild Goose Meter Station.

Graphics ... 01099.07 (7-14-09)

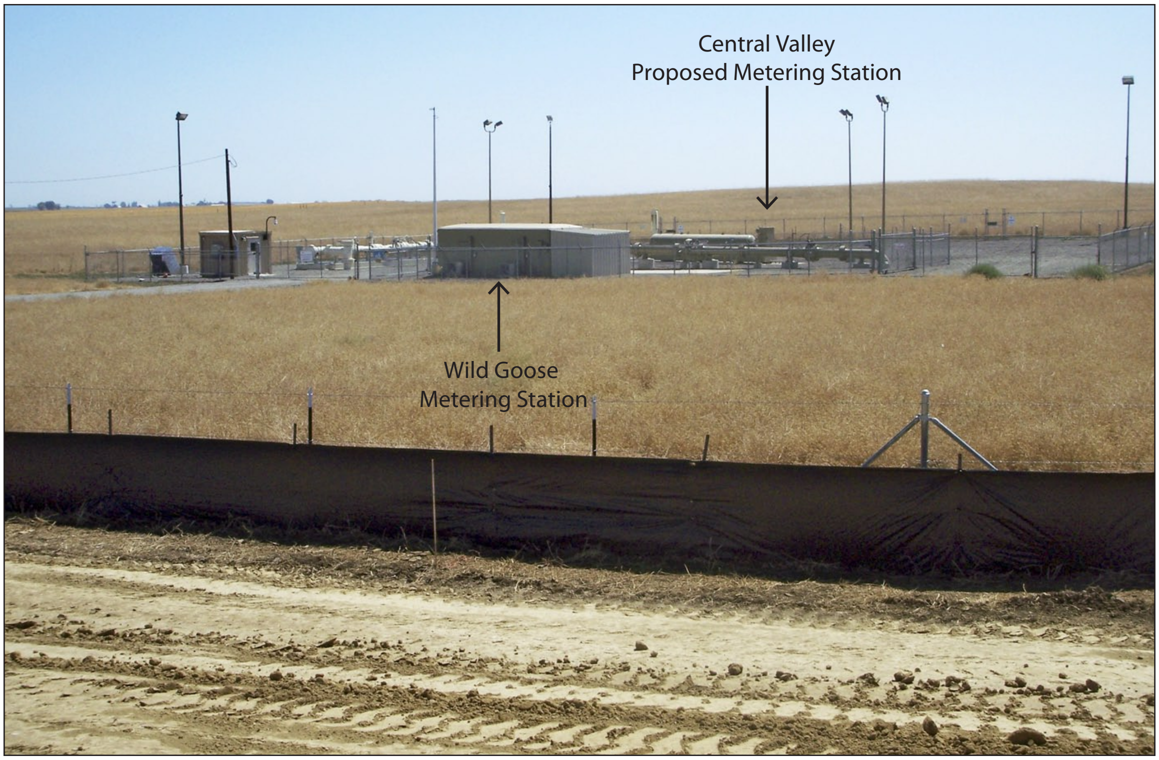
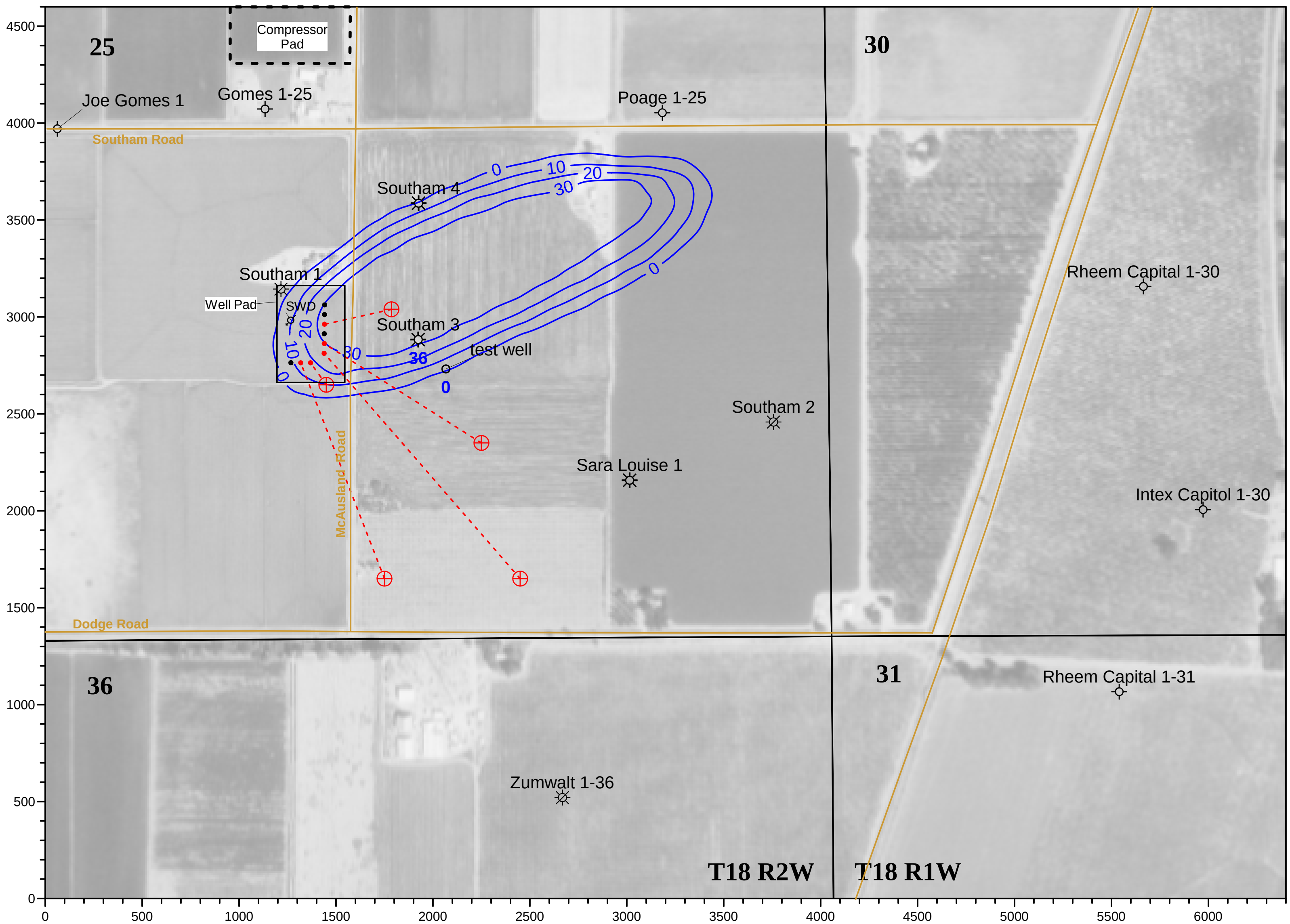


Photo 13. Photo looking south from the Delevan Compressor Station access road at the proposed metering station site and existing Wild Goose Meter Station.

Graphics … 01099.07 (7-14-09)

Appendix C

Geologic Maps



Well Symbols

- surface location - upper sands
- surface location - lower sand
- bottom hole location - upper sands
- bottom hole location - lower sand
- gas well
- P&A gas well
- dry hole

100' x 100' Model Grid
6400' x 4600' Model Dimensions
65 x 47 = 3055 model grid blocks

Well locations are approximate

Base Map Data Source:
Whitestar Corp. digital map data
Projection: State Plane CA-II NAD 1927
model 0,0 = 1,989,900, 621,700

N
W E
S

SCALE, FEET
0 400 800

1980 Ft Sand
net/gross ratio = 0.944
porosity = 0.306
permeability = 90 md

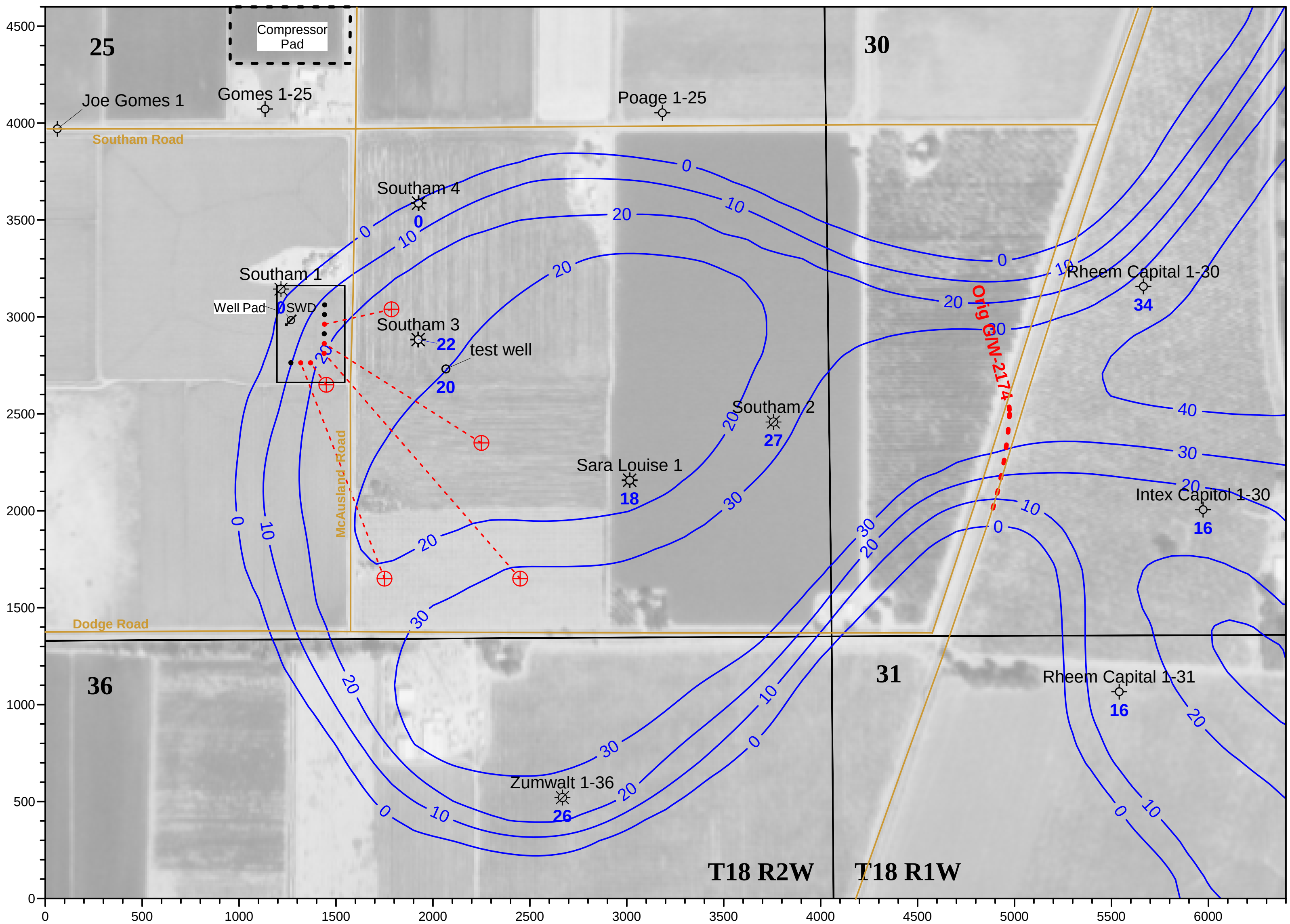
central Valley gas storage LLC

Colusa County, California

1980 Ft Sand Gross Thickness Map

Fairchild & Stan
PETROLEUM AND ENVIRONMENTAL CONSULTANTS

July 14, 2009



Well Symbols

- surface location - upper sands
- surface location - lower sand
- bottom hole location - upper sands
- bottom hole location - lower sand
- gas well
- P&A gas well
- dry hole

100' x 100' Model Grid
6400' x 4600' Model Dimensions
65 x 47 = 3055 model grid blocks

Well locations are approximate

Base Map Data Source:
Whitestar Corp. digital map data
Projection: State Plane CA-II NAD 1927
model 0,0 = 1,989,900, 621,700

SCALE, FEET
0 400 800

N
W E
S

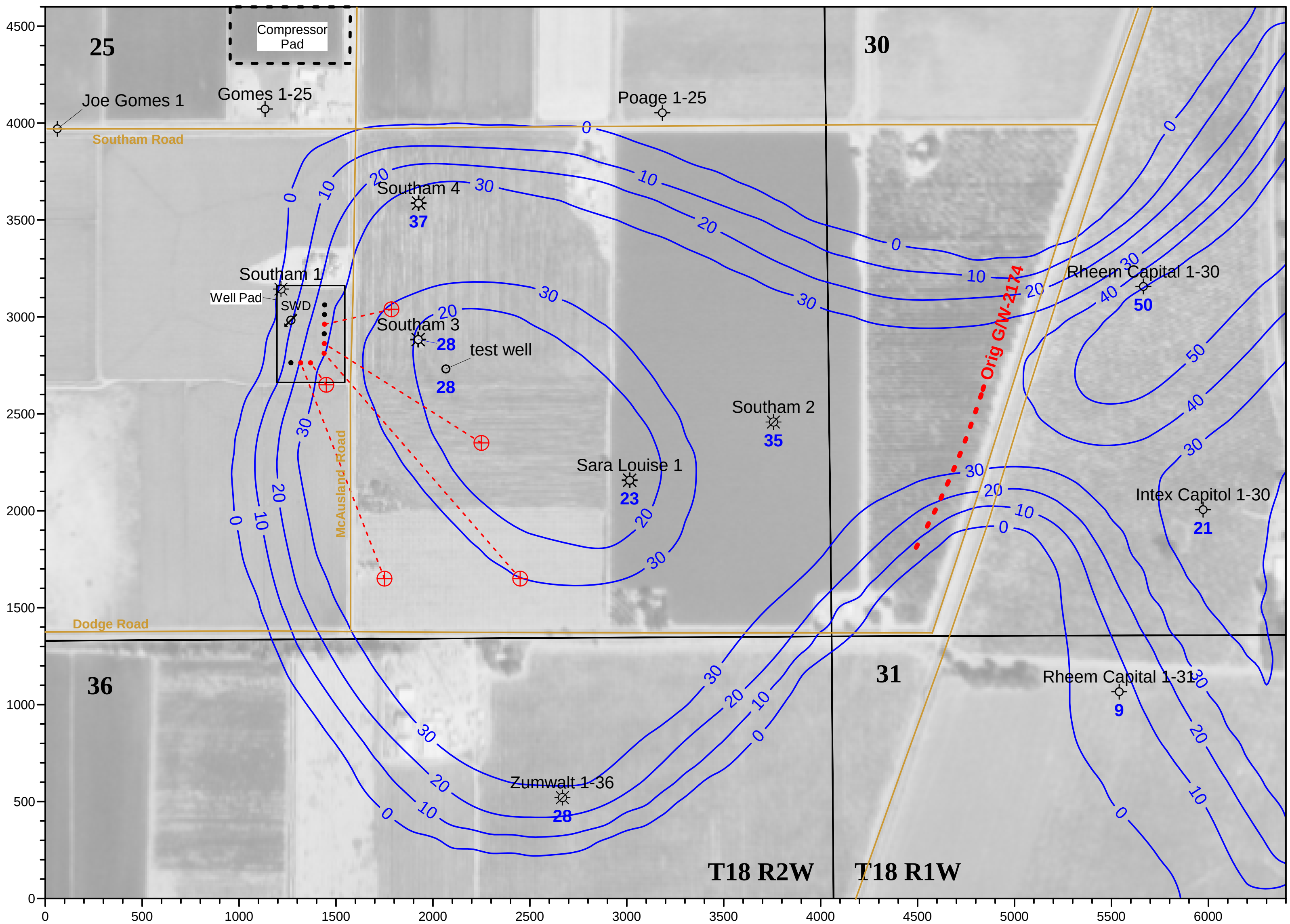
central Valley gas storage LLC

Colusa County, California

1st Sand
Gross Thickness Map

Fairchild & Stan
PETROLEUM AND ENVIRONMENTAL CONSULTANTS

July 14, 2009



Well Symbols

- surface location - upper sands
- surface location - lower sand
- bottom hole location - upper sands
- bottom hole location - lower sand
- gas well
- P&A gas well
- dry hole

100' x 100' Model Grid
6400' x 4600' Model Dimensions
65 x 47 = 3055 model grid blocks

Well locations are approximate

Base Map Data Source:
Whitestar Corp. digital map data
Projection: State Plane CA-II NAD 1927
model 0,0 = 1,989,900, 621,700

SCALE, FEET
0 400 800

N
W E
S

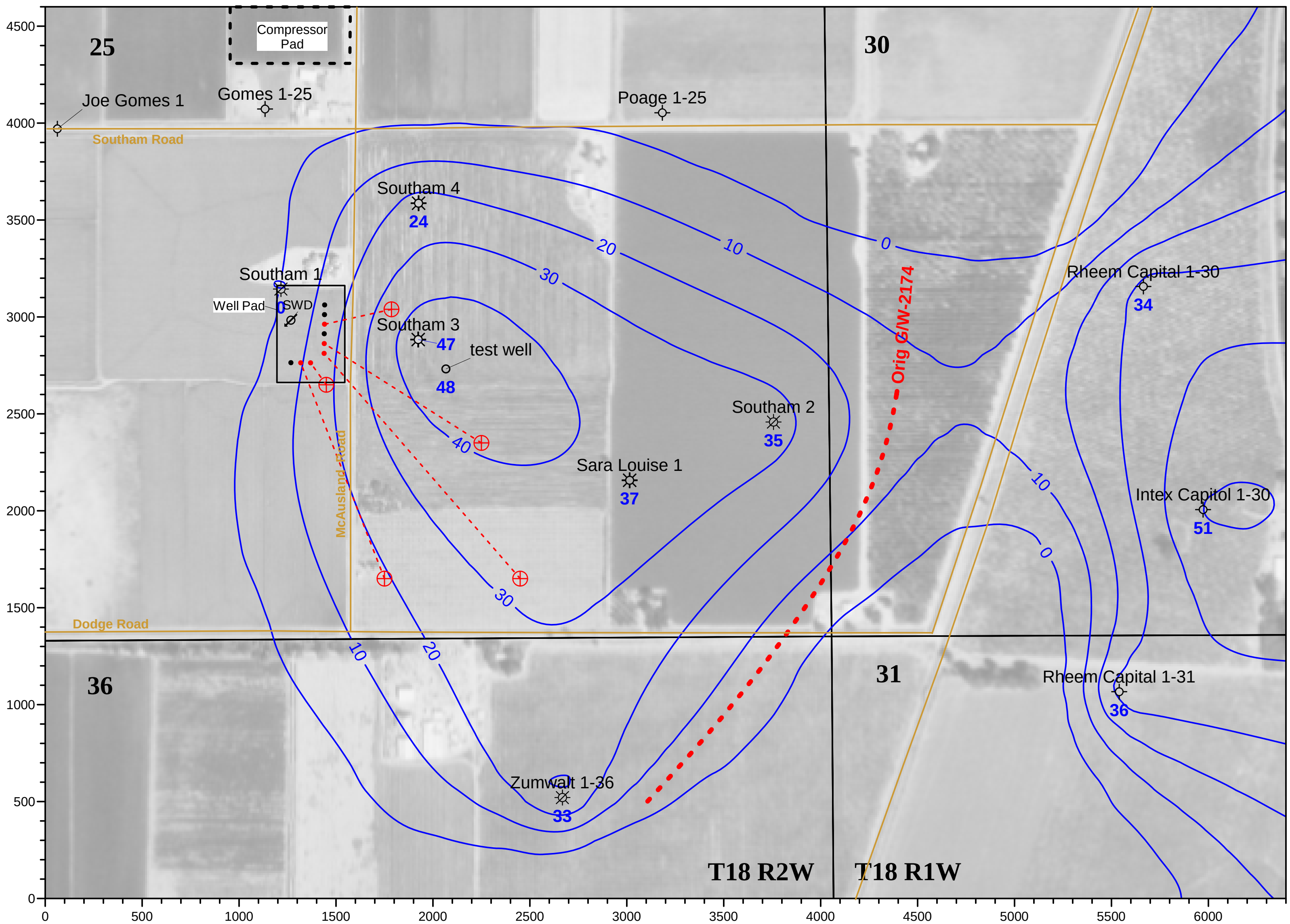
central Valley gas storage LLC

Colusa County, California

2nd Sand
Gross Thickness Map

Fairchild & Stan
PETROLEUM AND ENVIRONMENTAL CONSULTANTS

July 14, 2009



Well Symbols

- surface location - upper sands
- surface location - lower sand
- bottom hole location - upper sands
- bottom hole location - lower sand
- gas well
- P&A gas well
- dry hole

100' x 100' Model Grid
6400' x 4600' Model Dimensions
65 x 47 = 3055 model grid blocks

Well locations are approximate

Base Map Data Source:
Whitestar Corp. digital map data
Projection: State Plane CA-II NAD 1927
model 0,0 = 1,989,900, 621,700

SCALE, FEET
0 400 800

N W E S

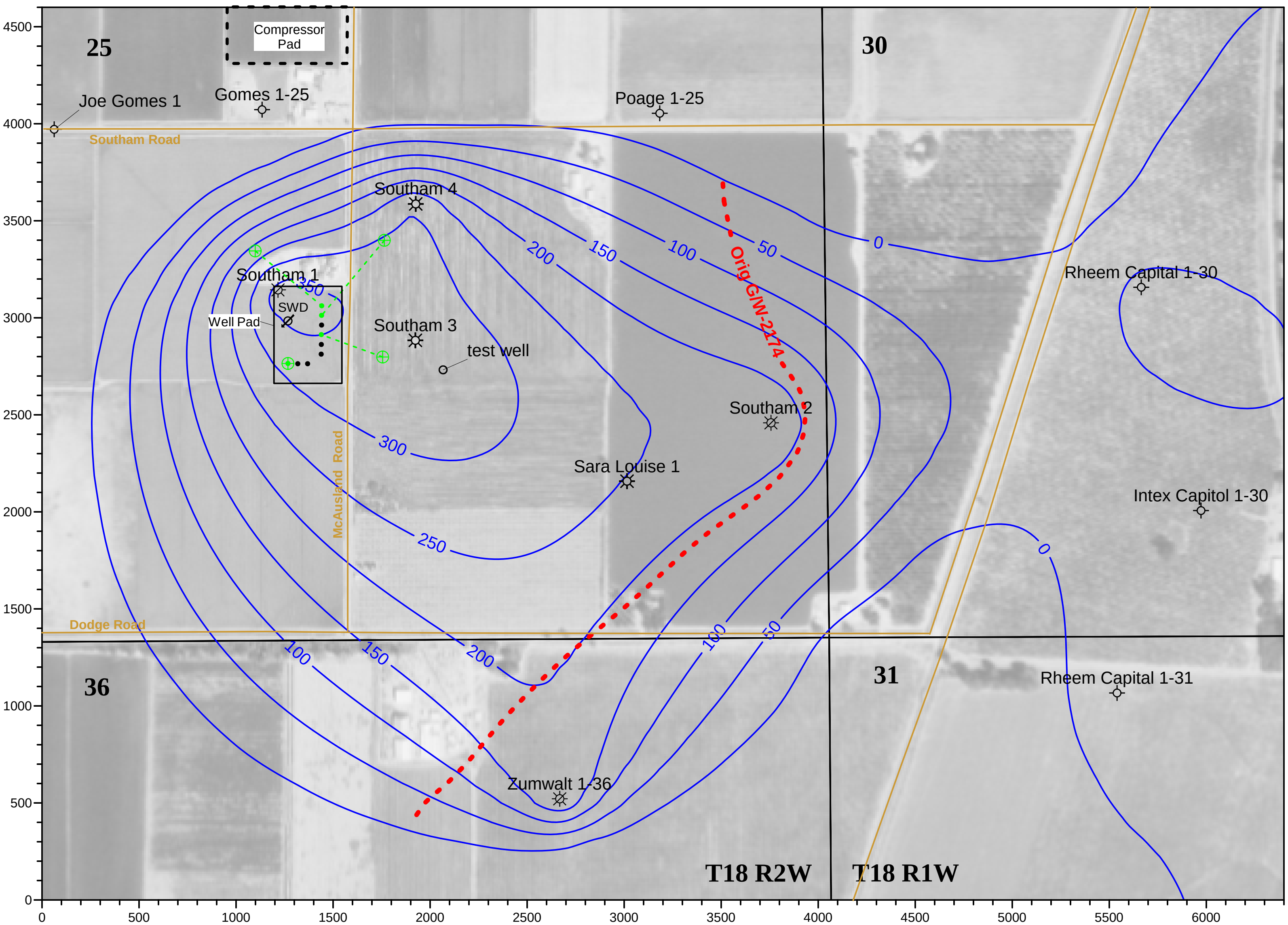
central Valley gas storage LLC

Colusa County, California

3rd Sand
Gross Thickness Map

Fairchild & Stan
PETROLEUM AND ENVIRONMENTAL CONSULTANTS

July 14, 2009



Well Symbols

- surface location - upper sands
- surface location - lower sand
- bottom hole location - upper sands
- bottom hole location - lower sand
- gas well
- P&A gas well
- dry hole

100' x 100' Model Grid
6400' x 4600' Model Dimensions
65 x 47 = 3055 model grid blocks

Well locations are approximate

Base Map Data Source:
Whitestar Corp. digital map data
Projection: State Plane CA-II NAD 1927
model 0,0 = 1,989,900, 621,700

SCALE, FEET
0 400 800

N
W E
S

central Valley gas storage LLC

Colusa County, California

Massive Sand
Gross Sand Thickness Map

Fairchild & Stan
PETROLEUM AND ENVIRONMENTAL CONSULTANTS

July 14, 2009

Appendix D
Air Quality Emissions

Construction Emissions

Summary

Daily and annual construction emissions are summarized in the following two tables. They include off-road vehicle emissions, on-road vehicle emissions, and temporary compressor emissions. The approach used to estimate emissions for each of these categories is described in the following sections.

Construction Emissions (lbs/day)						
	ROG	NOx	CO	PM10	PM2.5	CO2
2010						
Pounds per day (unmitigated)	26.1	168.9	115.4	227.2	51.8	29,242.7
2011						
Pounds per day (unmitigated)	72.8	384.0	296.3	38.1	20.5	49,149.9

Construction Emissions (lbs/day)						
	ROG	NOx	CO	PM10	PM2.5	CO2
2010						
Pounds per day (mitigated)	26.1	122.3	115.4	29.4	10.4	29,242.7
2011						
Pounds per day (mitigated)	72.8	316.3	296.3	16.7	13.5	49,149.9

Construction Emissions (tons/year)							Metric tons
	ROG	NOx	CO	PM10	PM2.5	CO2	CO2e
2010							
Tons per year (unmitigated)	1.5	6.0	6.5	2.4	0.7	1,534.4	1,392.39
2011							
Tons per year (unmitigated)	5.3	29.2	22.3	1.5	1.3	4,006.2	3,635.38

Construction Emissions (tons/year)							Metric tons
	ROG	NOx	CO	PM10	PM2.5	CO2	CO2e
2010							
Tons per year (mitigated)	1.5	4.5	6.5	0.5	0.3	1,534.4	1,392.39
2011							
Tons per year (mitigated)	5.3	23.8	22.3	1.2	1.1	4,006.2	3,635.38

Construction Emissions

Construction emissions are the combination of emissions from off-road vehicles, on-road vehicles, and the rental compression unit. The approach used to estimate emissions from each of these three categories is described separately below.

Off-Road Construction Emissions

Assumptions

Off-road emissions were estimated using the URBEMIS2007 model. Construction phasing and off-road equipment as listed in the project description were incorporated into URBEMIS. Several of the construction phases were further subdivided into subphases. For example, Table 2-6 of the project description lists the equipment that would be used during compressor station construction. However, construction of the compressor station would first involve the site clearing subphase, followed by several other subphases, including the civil work involved with the foundation, erecting the building, mechanical work, electrical work, and site cleanup. The emissions associated with each of these subphases were estimated separately using the schedule and equipment lists shown in the table below.

Also, due to problems associated with the building construction equipment phase of URBEMIS, the trenching phase was used in lieu of the building construction phase.

Mitigated emissions include fugitive dust controls, and exhaust controls to limit PM10, PM2.5 and NOx. The emission control reductions assume 25% reduction for PM10 and PM2.5 and 30% for NOx to account for the use of Tier II construction equipment. These percentage reductions were based on an estimate of how much Tier II equipment would reduce emissions below the 2010 fleet average and were estimated using the Sacramento Metropolitan Air Quality Management District's construction mitigation spreadsheet. These assumptions for Tier II equipment were applied to all off-road equipment except for the 14 sideboom pipelayers that would be used during pipeline construction. Nicor has indicated that these pipelayers would not be Tier II equipment.

Phase Assumptions

Phase: Fine Grading 7/1/2010 - 7/16/2010 - Well Pad Site Prep Grading
Total Acres Disturbed: 1
Maximum Daily Acreage Disturbed: 1
Fugitive Dust Level of Detail: Default
20 lbs per acre-day
On Road Truck Travel (VMT): 0
Off-Road Equipment:
1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.21 load factor for 8 hours per day
1 Water Trucks (189 hp) operating at a 0.59 load factor for 4 hours per day

Phase: Fine Grading 9/1/2010 - 9/24/2010 - Compressor Station Site Prep
Total Acres Disturbed: 11
Maximum Daily Acreage Disturbed: 11
Fugitive Dust Level of Detail: Default
20 lbs per acre-day
On Road Truck Travel (VMT): 0
Off-Road Equipment:
1 Graders (174 hp) operating at a 0.59 load factor for 8 hours per day
1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.21 load factor for 8 hours per day
1 Water Trucks (189 hp) operating at a 0.59 load factor for 4 hours per day

Phase: Fine Grading 6/1/2011 - 6/10/2011 - Metering Station Grading, Site Prep and Fencing
Total Acres Disturbed: 1
Maximum Daily Acreage Disturbed: 1
Fugitive Dust Level of Detail: Default
20 lbs per acre-day

On Road Truck Travel (VMT): 0
Off-Road Equipment:
1 Graders (174 hp) operating at a 0.59 load factor for 8 hours per day
1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.21 load factor for 8 hours per day
1 Water Trucks (189 hp) operating at a 0.59 load factor for 4 hours per day

Phase: Trenching 7/19/2010 - 9/17/2010 - Nine Storage Well Drilling
Off-Road Equipment:
1 Bore/Drill Rigs (540 hp) operating at a 0.43 load factor for 24 hours per day
1 Generator Sets (800 hp) operating at a 0.43 load factor for 24 hours per day
1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Trenching 7/1/2010 - 9/30/2010 - Observation Well Conversions
Off-Road Equipment:
1 Aerial Lifts (60 hp) operating at a 0.46 load factor for 8 hours per day
1 Other Equipment (190 hp) operating at a 0.59 load factor for 8 hours per day
1 Water Trucks (189 hp) operating at a 0.59 load factor for 4 hours per day

Phase: Trenching 9/1/2010 - 11/30/2011 - Operate Temporary Compressor Unit
Off-Road Equipment:

Phase: Trenching 9/27/2010 - 12/31/2010 - Compressor Station Civil Foundations
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 8 hours per day
1 Generator Sets (60 hp) operating at a 0.74 load factor for 8 hours per day
2 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 8 hours per day
2 Pumps (53 hp) operating at a 0.74 load factor for 8 hours per day
2 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day
1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Trenching 1/3/2011 - 3/31/2011 - Compressor Station Building/Equipment Erection
Off-Road Equipment:
2 Aerial Lifts (60 hp) operating at a 0.46 load factor for 8 hours per day
1 Cranes (399 hp) operating at a 0.43 load factor for 8 hours per day
1 Generator Sets (60 hp) operating at a 0.74 load factor for 8 hours per day

Phase: Trenching 4/4/2011 - 7/15/2011 - Compressor Station Mechanical
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 8 hours per day
1 Generator Sets (60 hp) operating at a 0.74 load factor for 8 hours per day
1 Other Equipment (190 hp) operating at a 0.62 load factor for 8 hours per day
1 Rough Terrain Forklifts (93 hp) operating at a 0.6 load factor for 8 hours per day
8 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Trenching 3/1/2011 - 10/28/2011 - Pipeline Construction
Off-Road Equipment:
2 Air Compressors (106 hp) operating at a 0.48 load factor for 8 hours per day
5 Excavators (168 hp) operating at a 0.59 load factor for 8 hours per day
1 Graders (174 hp) operating at a 0.59 load factor for 8 hours per day
14 Other Equipment (190 hp) operating at a 0.62 load factor for 8 hours per day
7 Other General Industrial Equipment (100 hp) operating at a 0.51 load factor for 8 hours per day
4 Pumps (53 hp) operating at a 0.74 load factor for 8 hours per day
5 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day
4 Tractors/Loaders/Backhoes (108 hp) operating at a 0.21 load factor for 8 hours per day
3 Trenchers (63 hp) operating at a 0.59 load factor for 8 hours per day
10 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day
1 Water Trucks (189 hp) operating at a 0.59 load factor for 4 hours per day

Phase: Trenching 7/18/2011 - 10/14/2011 - Compressor Station Electrical
Off-Road Equipment:
1 Air Compressors (106 hp) operating at a 0.48 load factor for 8 hours per day
3 Generator Sets (13.4 hp) operating at a 0.74 load factor for 8 hours per day
2 Other Equipment (190 hp) operating at a 0.62 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.21 load factor for 8 hours per day

Phase: Trenching 6/13/2011 - 7/8/2011 - Metering Station Civil
Off-Road Equipment:
1 Generator Sets (60 hp) operating at a 0.74 load factor for 8 hours per day
1 Other Equipment (190 hp) operating at a 0.59 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.21 load factor for 8 hours per day
1 Water Trucks (189 hp) operating at a 0.59 load factor for 4 hours per day

Phase: Trenching 7/11/2011 - 9/2/2011 - Metering Mechanical
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 8 hours per day
1 Generator Sets (60 hp) operating at a 0.74 load factor for 8 hours per day
2 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Trenching 9/5/2011 - 10/7/2011 - Metering Station Electrical Insulation Paint
Off-Road Equipment:
1 Air Compressors (106 hp) operating at a 0.48 load factor for 8 hours per day
3 Generator Sets (13.4 hp) operating at a 0.74 load factor for 8 hours per day
2 Other Equipment (190 hp) operating at a 0.59 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.21 load factor for 8 hours per day

Phase: Trenching 10/10/2011 - 10/31/2011 - Metering Station Hot Tap
Off-Road Equipment:
2 Other Equipment (190 hp) operating at a 0.59 load factor for 8 hours per day
1 Pumps (53 hp) operating at a 0.74 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day
2 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Modeling Results (URBEMIS Off-Road Construction, Daily)

Page: 1

7/14/2009 09:21:33 AM

Urbemis 2007 Version 9.2.4

Combined Summer Emissions Reports (Pounds/Day)

File Name: C:\Documents and Settings\Tim Rimpo\Application Data\Urbemis\Version9a\Projects\Central valley Construction 071409 Tier 2 excpt sidebooms new schedule.urb924

Project Name: Central Valley Gas Storage

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2010 TOTALS (lbs/day unmitigated)	14.54	155.35	57.29	0.00	220.02	5.43	225.45	45.95	4.99	50.95	16,832.82
2010 TOTALS (lbs/day mitigated)	14.54	108.81	57.29	0.00	23.55	4.07	27.62	4.92	3.75	8.67	16,832.82
2011 TOTALS (lbs/day unmitigated)	41.94	300.07	183.15	0.03	20.14	16.63	36.77	4.23	15.29	19.52	33,985.70
2011 TOTALS (lbs/day mitigated)	41.94	232.37	183.15	0.03	2.28	13.07	15.35	0.50	12.02	12.52	33,985.70

Page: 1

7/14/2009 10:40:21 AM

Urbemis 2007 Version 9.2.4

Detail Report for Summer Construction Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\Tim Rimpo\Application Data\Urbemis\Version9a\Projects\Central valley Construction 071409 Tier 2 excpt sidebooms new schedule.urb924

Project Name: Central Valley Gas Storage

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 7/1/2010-7/16/2010 Active Days: 12	3.33	29.67	15.58	0.00	20.01	1.28	21.29	4.18	1.17	5.35	3,066.30
Fine Grading 07/01/2010-07/16/2010	2.28	19.59	11.08	0.00	20.01	0.87	20.87	4.18	0.80	4.98	1,806.53
Fine Grading Dust	0.00	0.00	0.00	0.00	20.00	0.00	20.00	4.18	0.00	4.18	0.00
Fine Grading Off Road Diesel	2.24	19.52	9.90	0.00	0.00	0.86	0.86	0.00	0.79	0.79	1,689.16
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Trenching 07/01/2010-09/30/2010	1.06	10.08	4.50	0.00	0.01	0.41	0.42	0.00	0.38	0.38	1,259.78
Trenching Off Road Diesel	1.02	10.01	3.32	0.00	0.00	0.41	0.41	0.00	0.37	0.37	1,142.41
Trenching Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Time Slice 7/19/2010-8/31/2010 Active Days: 32	11.37	128.88	42.07	0.00	0.01	4.16	4.18	0.00	3.83	3.83	14,359.51
Trenching 07/01/2010-09/30/2010	1.06	10.08	4.50	0.00	0.01	0.41	0.42	0.00	0.38	0.38	1,259.78
Trenching Off Road Diesel	1.02	10.01	3.32	0.00	0.00	0.41	0.41	0.00	0.37	0.37	1,142.41
Trenching Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Trenching 07/19/2010-09/17/2010	10.31	118.80	37.57	0.00	0.01	3.75	3.76	0.00	3.45	3.46	13,099.73
Trenching Off Road Diesel	10.28	118.74	36.39	0.00	0.00	3.75	3.75	0.00	3.45	3.45	12,982.36
Trenching Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Time Slice 9/1/2010-9/17/2010 Active Days: 13	14.54	155.35	57.29	0.00	**220.02**	5.43	**225.45**	**45.95**	4.99	**50.95**	16,832.82
Fine Grading 09/01/2010-09/24/2010	3.17	26.47	15.22	0.00	220.01	1.26	221.27	45.95	1.16	47.11	2,473.31
Fine Grading Dust	0.00	0.00	0.00	0.00	220.00	0.00	220.00	45.94	0.00	45.94	0.00
Fine Grading Off Road Diesel	3.13	26.38	13.65	0.00	0.00	1.26	1.26	0.00	1.16	1.16	2,316.82
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.04	0.09	1.57	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.49
Trenching 07/01/2010-09/30/2010	1.06	10.08	4.50	0.00	0.01	0.41	0.42	0.00	0.38	0.38	1,259.78
Trenching Off Road Diesel	1.02	10.01	3.32	0.00	0.00	0.41	0.41	0.00	0.37	0.37	1,142.41

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Trenching Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Trenching 07/19/2010-09/17/2010	10.31	118.80	37.57	0.00	0.01	3.75	3.76	0.00	3.45	3.46	13,099.73
Trenching Off Road Diesel	10.28	118.74	36.39	0.00	0.00	3.75	3.75	0.00	3.45	3.45	12,982.36
Trenching Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 9/20/2010-9/24/2010 Active Days: 5	4.23	36.55	19.72	0.00	220.01	1.68	221.69	45.95	1.54	47.49	3,733.09
Fine Grading 09/01/2010-09/24/2010	3.17	26.47	15.22	0.00	220.01	1.26	221.27	45.95	1.16	47.11	2,473.31
Fine Grading Dust	0.00	0.00	0.00	0.00	220.00	0.00	220.00	45.94	0.00	45.94	0.00
Fine Grading Off Road Diesel	3.13	26.38	13.65	0.00	0.00	1.26	1.26	0.00	1.16	1.16	2,316.82
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.04	0.09	1.57	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.49
Trenching 07/01/2010-09/30/2010	1.06	10.08	4.50	0.00	0.01	0.41	0.42	0.00	0.38	0.38	1,259.78
Trenching Off Road Diesel	1.02	10.01	3.32	0.00	0.00	0.41	0.41	0.00	0.37	0.37	1,142.41
Trenching Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 9/27/2010-9/30/2010 Active Days: 4	6.53	54.25	26.04	0.00	0.02	2.84	2.87	0.01	2.62	2.62	5,698.18
Trenching 07/01/2010-09/30/2010	1.06	10.08	4.50	0.00	0.01	0.41	0.42	0.00	0.38	0.38	1,259.78
Trenching Off Road Diesel	1.02	10.01	3.32	0.00	0.00	0.41	0.41	0.00	0.37	0.37	1,142.41
Trenching Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 09/27/2010-12/31/2010	5.48	44.18	21.54	0.00	0.02	2.43	2.45	0.01	2.24	2.24	4,438.41
Trenching Off Road Diesel	5.37	43.98	18.00	0.00	0.00	2.42	2.42	0.00	2.23	2.23	4,086.30
Trenching Worker Trips	0.10	0.20	3.54	0.00	0.02	0.01	0.03	0.01	0.01	0.01	352.11
Time Slice 10/1/2010-12/31/2010 Active Days: 66	5.48	44.18	21.54	0.00	0.02	2.43	2.45	0.01	2.24	2.24	4,438.41
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 09/27/2010-12/31/2010	5.48	44.18	21.54	0.00	0.02	2.43	2.45	0.01	2.24	2.24	4,438.41
Trenching Off Road Diesel	5.37	43.98	18.00	0.00	0.00	2.42	2.42	0.00	2.23	2.23	4,086.30
Trenching Worker Trips	0.10	0.20	3.54	0.00	0.02	0.01	0.03	0.01	0.01	0.01	352.11

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 1/3/2011-2/28/2011 Active Days: 41	1.70	13.29	7.74	0.00	0.01	0.79	0.80	0.00	0.73	0.73	1,479.83
Trenching 01/03/2011-03/31/2011	1.70	13.29	7.74	0.00	0.01	0.79	0.80	0.00	0.73	0.73	1,479.83
Trenching Off Road Diesel	1.66	13.21	6.28	0.00	0.00	0.79	0.79	0.00	0.72	0.72	1,323.28
Trenching Worker Trips	0.04	0.08	1.46	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.55
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 3/1/2011-3/31/2011 Active Days: 23	35.04	261.37	155.15	0.02	0.12	14.37	14.49	0.04	13.22	13.26	29,655.45
Trenching 01/03/2011-03/31/2011	1.70	13.29	7.74	0.00	0.01	0.79	0.80	0.00	0.73	0.73	1,479.83
Trenching Off Road Diesel	1.66	13.21	6.28	0.00	0.00	0.79	0.79	0.00	0.72	0.72	1,323.28
Trenching Worker Trips	0.04	0.08	1.46	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.55
Trenching 03/01/2011-10/28/2011	33.33	248.08	147.41	0.02	0.11	13.58	13.69	0.04	12.49	12.53	28,175.62
Trenching Off Road Diesel	32.76	246.95	126.97	0.00	0.00	13.52	13.52	0.00	12.44	12.44	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 4/1/2011-4/1/2011 Active Days: 1	33.33	248.08	147.41	0.02	0.11	13.58	13.69	0.04	12.49	12.53	28,175.62
Trenching 03/01/2011-10/28/2011	33.33	248.08	147.41	0.02	0.11	13.58	13.69	0.04	12.49	12.53	28,175.62
Trenching Off Road Diesel	32.76	246.95	126.97	0.00	0.00	13.52	13.52	0.00	12.44	12.44	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 4/4/2011-5/31/2011 Active Days: 42	38.94	275.15	168.64	0.03	0.13	15.44	15.57	0.05	14.20	14.24	31,512.33
Trenching 03/01/2011-10/28/2011	33.33	248.08	147.41	0.02	0.11	13.58	13.69	0.04	12.49	12.53	28,175.62
Trenching Off Road Diesel	32.76	246.95	126.97	0.00	0.00	13.52	13.52	0.00	12.44	12.44	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 04/04/2011-07/15/2011	5.61	27.06	21.23	0.00	0.02	1.85	1.88	0.01	1.71	1.71	3,336.71
Trenching Off Road Diesel	5.49	26.82	16.85	0.00	0.00	1.84	1.84	0.00	1.70	1.70	2,867.07
Trenching Worker Trips	0.12	0.24	4.38	0.00	0.02	0.01	0.04	0.01	0.01	0.02	469.65
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 6/1/2011-6/10/2011 Active Days: 8	**41.94**	**300.07**	**183.15**	**0.03**	20.14	**16.63**	36.77	4.23	**15.29**	19.52	**33,985.70**

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Fine Grading 06/01/2011-06/10/2011	3.00	24.92	14.50	0.00	20.01	1.19	21.20	4.18	1.10	5.28	2,473.37
Fine Grading Dust	0.00	0.00	0.00	0.00	20.00	0.00	20.00	4.18	0.00	4.18	0.00
Fine Grading Off Road Diesel	2.96	24.84	13.04	0.00	0.00	1.19	1.19	0.00	1.09	1.09	2,316.82
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.04	0.08	1.46	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.55
Trenching 03/01/2011-10/28/2011	33.33	248.08	147.41	0.02	0.11	13.58	13.69	0.04	12.49	12.53	28,175.62
Trenching Off Road Diesel	32.76	246.95	126.97	0.00	0.00	13.52	13.52	0.00	12.44	12.44	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 04/04/2011-07/15/2011	5.61	27.06	21.23	0.00	0.02	1.85	1.88	0.01	1.71	1.71	3,336.71
Trenching Off Road Diesel	5.49	26.82	16.85	0.00	0.00	1.84	1.84	0.00	1.70	1.70	2,867.07
Trenching Worker Trips	0.12	0.24	4.38	0.00	0.02	0.01	0.04	0.01	0.01	0.02	469.65
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 6/13/2011-7/8/2011 Active Days: 20	40.45	287.90	175.43	**0.03**	0.14	16.10	16.24	0.05	14.81	14.86	33,138.39
Trenching 03/01/2011-10/28/2011	33.33	248.08	147.41	0.02	0.11	13.58	13.69	0.04	12.49	12.53	28,175.62
Trenching Off Road Diesel	32.76	246.95	126.97	0.00	0.00	13.52	13.52	0.00	12.44	12.44	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 04/04/2011-07/15/2011	5.61	27.06	21.23	0.00	0.02	1.85	1.88	0.01	1.71	1.71	3,336.71
Trenching Off Road Diesel	5.49	26.82	16.85	0.00	0.00	1.84	1.84	0.00	1.70	1.70	2,867.07
Trenching Worker Trips	0.12	0.24	4.38	0.00	0.02	0.01	0.04	0.01	0.01	0.02	469.65
Trenching 06/13/2011-07/08/2011	1.51	12.75	6.79	0.00	0.01	0.67	0.67	0.00	0.61	0.61	1,626.05
Trenching Off Road Diesel	1.47	12.67	5.33	0.00	0.00	0.66	0.66	0.00	0.61	0.61	1,469.50
Trenching Worker Trips	0.04	0.08	1.46	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.55
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 7/11/2011-7/15/2011 Active Days: 5	41.02	287.49	176.78	**0.03**	0.14	16.19	16.33	0.05	14.89	14.94	32,920.33
Trenching 03/01/2011-10/28/2011	33.33	248.08	147.41	0.02	0.11	13.58	13.69	0.04	12.49	12.53	28,175.62
Trenching Off Road Diesel	32.76	246.95	126.97	0.00	0.00	13.52	13.52	0.00	12.44	12.44	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 04/04/2011-07/15/2011	5.61	27.06	21.23	0.00	0.02	1.85	1.88	0.01	1.71	1.71	3,336.71
Trenching Off Road Diesel	5.49	26.82	16.85	0.00	0.00	1.84	1.84	0.00	1.70	1.70	2,867.07
Trenching Worker Trips	0.12	0.24	4.38	0.00	0.02	0.01	0.04	0.01	0.01	0.02	469.65
Trenching 07/11/2011-09/02/2011	2.08	12.34	8.14	0.00	0.01	0.76	0.77	0.00	0.70	0.70	1,407.99
Trenching Off Road Diesel	2.03	12.26	6.68	0.00	0.00	0.75	0.75	0.00	0.69	0.69	1,251.45

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Trenching Worker Trips	0.04	0.08	1.46	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.55
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 7/18/2011-9/2/2011 Active Days: 35	37.44	277.58	165.51	0.03	0.13	15.20	15.33	0.05	13.98	14.03	31,912.12
Trenching 03/01/2011-10/28/2011	33.33	248.08	147.41	0.02	0.11	13.58	13.69	0.04	12.49	12.53	28,175.62
Trenching Off Road Diesel	32.76	246.95	126.97	0.00	0.00	13.52	13.52	0.00	12.44	12.44	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 07/11/2011-09/02/2011	2.08	12.34	8.14	0.00	0.01	0.76	0.77	0.00	0.70	0.70	1,407.99
Trenching Off Road Diesel	2.03	12.26	6.68	0.00	0.00	0.75	0.75	0.00	0.69	0.69	1,251.45
Trenching Worker Trips	0.04	0.08	1.46	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.55
Trenching 07/18/2011-10/14/2011	2.03	17.15	9.96	0.00	0.01	0.87	0.88	0.00	0.80	0.80	2,328.50
Trenching Off Road Diesel	1.96	17.01	7.40	0.00	0.00	0.86	0.86	0.00	0.79	0.79	2,054.54
Trenching Worker Trips	0.07	0.14	2.56	0.00	0.01	0.01	0.02	0.00	0.01	0.01	273.96
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 9/5/2011-10/7/2011 Active Days: 25	37.35	281.88	167.17	0.03	0.14	15.30	15.43	0.05	14.07	14.12	32,761.79
Trenching 03/01/2011-10/28/2011	33.33	248.08	147.41	0.02	0.11	13.58	13.69	0.04	12.49	12.53	28,175.62
Trenching Off Road Diesel	32.76	246.95	126.97	0.00	0.00	13.52	13.52	0.00	12.44	12.44	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 07/18/2011-10/14/2011	2.03	17.15	9.96	0.00	0.01	0.87	0.88	0.00	0.80	0.80	2,328.50
Trenching Off Road Diesel	1.96	17.01	7.40	0.00	0.00	0.86	0.86	0.00	0.79	0.79	2,054.54
Trenching Worker Trips	0.07	0.14	2.56	0.00	0.01	0.01	0.02	0.00	0.01	0.01	273.96
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 09/05/2011-10/07/2011	1.98	16.65	9.80	0.00	0.01	0.85	0.86	0.00	0.78	0.79	2,257.66
Trenching Off Road Diesel	1.91	16.51	7.25	0.00	0.00	0.84	0.84	0.00	0.78	0.78	1,983.70
Trenching Worker Trips	0.07	0.14	2.56	0.00	0.01	0.01	0.02	0.00	0.01	0.01	273.96
Time Slice 10/10/2011-10/14/2011 Active Days: 5	38.11	283.74	168.90	0.03	0.13	15.53	15.66	0.05	14.28	14.33	32,933.21
Trenching 03/01/2011-10/28/2011	33.33	248.08	147.41	0.02	0.11	13.58	13.69	0.04	12.49	12.53	28,175.62
Trenching Off Road Diesel	32.76	246.95	126.97	0.00	0.00	13.52	13.52	0.00	12.44	12.44	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 07/18/2011-10/14/2011	2.03	17.15	9.96	0.00	0.01	0.87	0.88	0.00	0.80	0.80	2,328.50
Trenching Off Road Diesel	1.96	17.01	7.40	0.00	0.00	0.86	0.86	0.00	0.79	0.79	2,054.54

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Trenching Worker Trips	0.07	0.14	2.56	0.00	0.01	0.01	0.02	0.00	0.01	0.01	273.96
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 10/10/2011-10/31/2011	2.75	18.51	11.53	0.00	0.01	1.08	1.09	0.00	0.99	1.00	2,429.09
Trenching Off Road Diesel	2.69	18.38	9.34	0.00	0.00	1.07	1.07	0.00	0.99	0.99	2,194.26
Trenching Worker Trips	0.06	0.12	2.19	0.00	0.01	0.01	0.02	0.00	0.01	0.01	234.82
Time Slice 10/17/2011-10/28/2011 Active Days: 10	36.08	266.59	158.94	0.02	0.12	14.66	14.78	0.04	13.48	13.53	30,604.71
Trenching 03/01/2011-10/28/2011	33.33	248.08	147.41	0.02	0.11	13.58	13.69	0.04	12.49	12.53	28,175.62
Trenching Off Road Diesel	32.76	246.95	126.97	0.00	0.00	13.52	13.52	0.00	12.44	12.44	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 10/10/2011-10/31/2011	2.75	18.51	11.53	0.00	0.01	1.08	1.09	0.00	0.99	1.00	2,429.09
Trenching Off Road Diesel	2.69	18.38	9.34	0.00	0.00	1.07	1.07	0.00	0.99	0.99	2,194.26
Trenching Worker Trips	0.06	0.12	2.19	0.00	0.01	0.01	0.02	0.00	0.01	0.01	234.82
Time Slice 10/31/2011-10/31/2011 Active Days: 1	2.75	18.51	11.53	0.00	0.01	1.08	1.09	0.00	0.99	1.00	2,429.09
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 10/10/2011-10/31/2011	2.75	18.51	11.53	0.00	0.01	1.08	1.09	0.00	0.99	1.00	2,429.09
Trenching Off Road Diesel	2.69	18.38	9.34	0.00	0.00	1.07	1.07	0.00	0.99	0.99	2,194.26
Trenching Worker Trips	0.06	0.12	2.19	0.00	0.01	0.01	0.02	0.00	0.01	0.01	234.82
Time Slice 11/1/2011-11/30/2011 Active Days: 22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

File Name: C:\Documents and Settings\Tim Rimpo\Application Data\Urbemis\Version9a\Projects\Central valley Construction 071409 Tier 2 excpt sidebooms new schedule.urb924
Project Name: Central Valley Gas Storage

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Summer Pounds Per Day, Mitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 7/1/2010-7/16/2010 Active Days: 12	3.33	20.81	15.58	0.00	2.15	0.96	3.11	0.45	0.88	1.33	3,066.30
Fine Grading 07/01/2010-07/16/2010	2.28	13.73	11.08	0.00	2.14	0.65	2.80	0.45	0.60	1.05	1,806.53
Fine Grading Dust	0.00	0.00	0.00	0.00	2.14	0.00	2.14	0.45	0.00	0.45	0.00
Fine Grading Off Road Diesel	2.24	13.67	9.90	0.00	0.00	0.65	0.65	0.00	0.60	0.60	1,689.16
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Trenching 07/01/2010-09/30/2010	1.06	7.07	4.50	0.00	0.01	0.31	0.31	0.00	0.28	0.29	1,259.78
Trenching Off Road Diesel	1.02	7.01	3.32	0.00	0.00	0.31	0.31	0.00	0.28	0.28	1,142.41
Trenching Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Time Slice 7/19/2010-8/31/2010 Active Days: 32	11.37	90.25	42.07	0.00	0.01	3.12	3.14	0.00	2.87	2.88	14,359.51
Trenching 07/01/2010-09/30/2010	1.06	7.07	4.50	0.00	0.01	0.31	0.31	0.00	0.28	0.29	1,259.78
Trenching Off Road Diesel	1.02	7.01	3.32	0.00	0.00	0.31	0.31	0.00	0.28	0.28	1,142.41
Trenching Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Trenching 07/19/2010-09/17/2010	10.31	83.18	37.57	0.00	0.01	2.82	2.82	0.00	2.59	2.59	13,099.73
Trenching Off Road Diesel	10.28	83.12	36.39	0.00	0.00	2.81	2.81	0.00	2.59	2.59	12,982.36
Trenching Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Time Slice 9/1/2010-9/17/2010 Active Days: 13	14.54	108.81	57.29	0.00	23.55	4.07	27.62	4.92	3.75	8.67	16,832.82
Fine Grading 09/01/2010-09/24/2010	3.17	18.55	15.22	0.00	23.54	0.95	24.49	4.92	0.87	5.79	2,473.31
Fine Grading Dust	0.00	0.00	0.00	0.00	23.53	0.00	23.53	4.91	0.00	4.91	0.00

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Fine Grading Off Road Diesel	3.13	18.47	13.65	0.00	0.00	0.95	0.95	0.00	0.87	0.87	2,316.82
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.04	0.09	1.57	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.49
Trenching 07/01/2010-09/30/2010	1.06	7.07	4.50	0.00	0.01	0.31	0.31	0.00	0.28	0.29	1,259.78
Trenching Off Road Diesel	1.02	7.01	3.32	0.00	0.00	0.31	0.31	0.00	0.28	0.28	1,142.41
Trenching Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Trenching 07/19/2010-09/17/2010	10.31	83.18	37.57	0.00	0.01	2.82	2.82	0.00	2.59	2.59	13,099.73
Trenching Off Road Diesel	10.28	83.12	36.39	0.00	0.00	2.81	2.81	0.00	2.59	2.59	12,982.36
Trenching Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 9/20/2010-9/24/2010 Active Days: 5	4.23	25.63	19.72	0.00	23.54	1.26	24.80	4.92	1.16	6.08	3,733.09
Fine Grading 09/01/2010-09/24/2010	3.17	18.55	15.22	0.00	23.54	0.95	24.49	4.92	0.87	5.79	2,473.31
Fine Grading Dust	0.00	0.00	0.00	0.00	23.53	0.00	23.53	4.91	0.00	4.91	0.00
Fine Grading Off Road Diesel	3.13	18.47	13.65	0.00	0.00	0.95	0.95	0.00	0.87	0.87	2,316.82
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.04	0.09	1.57	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.49
Trenching 07/01/2010-09/30/2010	1.06	7.07	4.50	0.00	0.01	0.31	0.31	0.00	0.28	0.29	1,259.78
Trenching Off Road Diesel	1.02	7.01	3.32	0.00	0.00	0.31	0.31	0.00	0.28	0.28	1,142.41
Trenching Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 9/27/2010-9/30/2010 Active Days: 4	6.53	38.06	26.04	0.00	0.02	2.14	2.16	0.01	1.96	1.97	5,698.18
Trenching 07/01/2010-09/30/2010	1.06	7.07	4.50	0.00	0.01	0.31	0.31	0.00	0.28	0.29	1,259.78

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Trenching Off Road Diesel	1.02	7.01	3.32	0.00	0.00	0.31	0.31	0.00	0.28	0.28	1,142.41
Trenching Worker Trips	0.03	0.07	1.18	0.00	0.01	0.00	0.01	0.00	0.00	0.00	117.37
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 09/27/2010-12/31/2010	5.48	30.98	21.54	0.00	0.02	1.83	1.85	0.01	1.68	1.69	4,438.41
Trenching Off Road Diesel	5.37	30.79	18.00	0.00	0.00	1.82	1.82	0.00	1.67	1.67	4,086.30
Trenching Worker Trips	0.10	0.20	3.54	0.00	0.02	0.01	0.03	0.01	0.01	0.01	352.11
Time Slice 10/1/2010-12/31/2010 Active Days: 66	5.48	30.98	21.54	0.00	0.02	1.83	1.85	0.01	1.68	1.69	4,438.41
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 09/27/2010-12/31/2010	5.48	30.98	21.54	0.00	0.02	1.83	1.85	0.01	1.68	1.69	4,438.41
Trenching Off Road Diesel	5.37	30.79	18.00	0.00	0.00	1.82	1.82	0.00	1.67	1.67	4,086.30
Trenching Worker Trips	0.10	0.20	3.54	0.00	0.02	0.01	0.03	0.01	0.01	0.01	352.11
Time Slice 1/3/2011-2/28/2011 Active Days: 41	1.70	9.33	7.74	0.00	0.01	0.59	0.60	0.00	0.55	0.55	1,479.83
Trenching 01/03/2011-03/31/2011	1.70	9.33	7.74	0.00	0.01	0.59	0.60	0.00	0.55	0.55	1,479.83
Trenching Off Road Diesel	1.66	9.25	6.28	0.00	0.00	0.59	0.59	0.00	0.54	0.54	1,323.28
Trenching Worker Trips	0.04	0.08	1.46	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.55
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 3/1/2011-3/31/2011 Active Days: 23	35.04	205.21	155.15	0.02	0.12	11.37	11.49	0.04	10.46	10.50	29,655.45
Trenching 01/03/2011-03/31/2011	1.70	9.33	7.74	0.00	0.01	0.59	0.60	0.00	0.55	0.55	1,479.83
Trenching Off Road Diesel	1.66	9.25	6.28	0.00	0.00	0.59	0.59	0.00	0.54	0.54	1,323.28
Trenching Worker Trips	0.04	0.08	1.46	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.55

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Trenching 03/01/2011-10/28/2011	33.33	195.88	147.41	0.02	0.11	10.78	10.89	0.04	9.91	9.95	28,175.62
Trenching Off Road Diesel	32.76	194.75	126.97	0.00	0.00	10.72	10.72	0.00	9.87	9.87	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 4/1/2011-4/1/2011 Active Days: 1	33.33	195.88	147.41	0.02	0.11	10.78	10.89	0.04	9.91	9.95	28,175.62
Trenching 03/01/2011-10/28/2011	33.33	195.88	147.41	0.02	0.11	10.78	10.89	0.04	9.91	9.95	28,175.62
Trenching Off Road Diesel	32.76	194.75	126.97	0.00	0.00	10.72	10.72	0.00	9.87	9.87	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 4/4/2011-5/31/2011 Active Days: 42	38.94	214.90	168.64	0.03	0.13	12.17	12.31	0.05	11.20	11.24	31,512.33
Trenching 03/01/2011-10/28/2011	33.33	195.88	147.41	0.02	0.11	10.78	10.89	0.04	9.91	9.95	28,175.62
Trenching Off Road Diesel	32.76	194.75	126.97	0.00	0.00	10.72	10.72	0.00	9.87	9.87	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 04/04/2011-07/15/2011	5.61	19.02	21.23	0.00	0.02	1.39	1.42	0.01	1.28	1.29	3,336.71
Trenching Off Road Diesel	5.49	18.78	16.85	0.00	0.00	1.38	1.38	0.00	1.27	1.27	2,867.07
Trenching Worker Trips	0.12	0.24	4.38	0.00	0.02	0.01	0.04	0.01	0.01	0.02	469.65
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 6/1/2011-6/10/2011 Active Days: 8	**41.94**	232.37	**183.15**	**0.03**	2.28	13.07	15.35	0.50	12.02	12.52	**33,985.70**
Fine Grading 06/01/2011-06/10/2011	3.00	17.47	14.50	0.00	2.15	0.89	3.04	0.45	0.82	1.27	2,473.37
Fine Grading Dust	0.00	0.00	0.00	0.00	2.14	0.00	2.14	0.45	0.00	0.45	0.00

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Fine Grading Off Road Diesel	2.96	17.39	13.04	0.00	0.00	0.89	0.89	0.00	0.82	0.82	2,316.82
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.04	0.08	1.46	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.55
Trenching 03/01/2011-10/28/2011	33.33	195.88	147.41	0.02	0.11	10.78	10.89	0.04	9.91	9.95	28,175.62
Trenching Off Road Diesel	32.76	194.75	126.97	0.00	0.00	10.72	10.72	0.00	9.87	9.87	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 04/04/2011-07/15/2011	5.61	19.02	21.23	0.00	0.02	1.39	1.42	0.01	1.28	1.29	3,336.71
Trenching Off Road Diesel	5.49	18.78	16.85	0.00	0.00	1.38	1.38	0.00	1.27	1.27	2,867.07
Trenching Worker Trips	0.12	0.24	4.38	0.00	0.02	0.01	0.04	0.01	0.01	0.02	469.65
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 6/13/2011-7/8/2011 Active Days: 20	40.45	223.85	175.43	**0.03**	0.14	12.68	12.82	0.05	11.66	11.71	33,138.39
Trenching 03/01/2011-10/28/2011	33.33	195.88	147.41	0.02	0.11	10.78	10.89	0.04	9.91	9.95	28,175.62
Trenching Off Road Diesel	32.76	194.75	126.97	0.00	0.00	10.72	10.72	0.00	9.87	9.87	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 04/04/2011-07/15/2011	5.61	19.02	21.23	0.00	0.02	1.39	1.42	0.01	1.28	1.29	3,336.71
Trenching Off Road Diesel	5.49	18.78	16.85	0.00	0.00	1.38	1.38	0.00	1.27	1.27	2,867.07
Trenching Worker Trips	0.12	0.24	4.38	0.00	0.02	0.01	0.04	0.01	0.01	0.02	469.65
Trenching 06/13/2011-07/08/2011	1.51	8.95	6.79	0.00	0.01	0.50	0.51	0.00	0.46	0.46	1,626.05
Trenching Off Road Diesel	1.47	8.87	5.33	0.00	0.00	0.50	0.50	0.00	0.46	0.46	1,469.50
Trenching Worker Trips	0.04	0.08	1.46	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.55
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 7/11/2011-7/15/2011 Active Days: 5	41.02	223.56	176.78	**0.03**	0.14	12.74	12.88	0.05	11.72	11.77	32,920.33

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Trenching 03/01/2011-10/28/2011	33.33	195.88	147.41	0.02	0.11	10.78	10.89	0.04	9.91	9.95	28,175.62
Trenching Off Road Diesel	32.76	194.75	126.97	0.00	0.00	10.72	10.72	0.00	9.87	9.87	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 04/04/2011-07/15/2011	5.61	19.02	21.23	0.00	0.02	1.39	1.42	0.01	1.28	1.29	3,336.71
Trenching Off Road Diesel	5.49	18.78	16.85	0.00	0.00	1.38	1.38	0.00	1.27	1.27	2,867.07
Trenching Worker Trips	0.12	0.24	4.38	0.00	0.02	0.01	0.04	0.01	0.01	0.02	469.65
Trenching 07/11/2011-09/02/2011	2.08	8.66	8.14	0.00	0.01	0.57	0.58	0.00	0.52	0.53	1,407.99
Trenching Off Road Diesel	2.03	8.58	6.68	0.00	0.00	0.57	0.57	0.00	0.52	0.52	1,251.45
Trenching Worker Trips	0.04	0.08	1.46	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.55
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 7/18/2011-9/2/2011 Active Days: 35	37.44	216.59	165.51	0.03	0.13	12.00	12.13	0.05	11.04	11.08	31,912.12
Trenching 03/01/2011-10/28/2011	33.33	195.88	147.41	0.02	0.11	10.78	10.89	0.04	9.91	9.95	28,175.62
Trenching Off Road Diesel	32.76	194.75	126.97	0.00	0.00	10.72	10.72	0.00	9.87	9.87	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 07/11/2011-09/02/2011	2.08	8.66	8.14	0.00	0.01	0.57	0.58	0.00	0.52	0.53	1,407.99
Trenching Off Road Diesel	2.03	8.58	6.68	0.00	0.00	0.57	0.57	0.00	0.52	0.52	1,251.45
Trenching Worker Trips	0.04	0.08	1.46	0.00	0.01	0.00	0.01	0.00	0.00	0.01	156.55
Trenching 07/18/2011-10/14/2011	2.03	12.05	9.96	0.00	0.01	0.65	0.66	0.00	0.60	0.60	2,328.50
Trenching Off Road Diesel	1.96	11.91	7.40	0.00	0.00	0.64	0.64	0.00	0.59	0.59	2,054.54
Trenching Worker Trips	0.07	0.14	2.56	0.00	0.01	0.01	0.02	0.00	0.01	0.01	273.96
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time Slice 9/5/2011-10/7/2011 Active Days: 25	37.35	219.63	167.17	0.03	0.14	12.07	12.21	0.05	11.10	11.15	32,761.79

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Trenching 03/01/2011-10/28/2011	33.33	195.88	147.41	0.02	0.11	10.78	10.89	0.04	9.91	9.95	28,175.62
Trenching Off Road Diesel	32.76	194.75	126.97	0.00	0.00	10.72	10.72	0.00	9.87	9.87	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 07/18/2011-10/14/2011	2.03	12.05	9.96	0.00	0.01	0.65	0.66	0.00	0.60	0.60	2,328.50
Trenching Off Road Diesel	1.96	11.91	7.40	0.00	0.00	0.64	0.64	0.00	0.59	0.59	2,054.54
Trenching Worker Trips	0.07	0.14	2.56	0.00	0.01	0.01	0.02	0.00	0.01	0.01	273.96
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 09/05/2011-10/07/2011	1.98	11.70	9.80	0.00	0.01	0.64	0.65	0.00	0.59	0.59	2,257.66
Trenching Off Road Diesel	1.91	11.55	7.25	0.00	0.00	0.63	0.63	0.00	0.58	0.58	1,983.70
Trenching Worker Trips	0.07	0.14	2.56	0.00	0.01	0.01	0.02	0.00	0.01	0.01	273.96
Time Slice 10/10/2011-10/14/2011 Active Days: 5	38.11	220.92	168.90	0.03	0.13	12.24	12.38	0.05	11.26	11.31	32,933.21
Trenching 03/01/2011-10/28/2011	33.33	195.88	147.41	0.02	0.11	10.78	10.89	0.04	9.91	9.95	28,175.62
Trenching Off Road Diesel	32.76	194.75	126.97	0.00	0.00	10.72	10.72	0.00	9.87	9.87	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 07/18/2011-10/14/2011	2.03	12.05	9.96	0.00	0.01	0.65	0.66	0.00	0.60	0.60	2,328.50
Trenching Off Road Diesel	1.96	11.91	7.40	0.00	0.00	0.64	0.64	0.00	0.59	0.59	2,054.54
Trenching Worker Trips	0.07	0.14	2.56	0.00	0.01	0.01	0.02	0.00	0.01	0.01	273.96
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 10/10/2011-10/31/2011	2.75	12.99	11.53	0.00	0.01	0.81	0.82	0.00	0.75	0.75	2,429.09
Trenching Off Road Diesel	2.69	12.87	9.34	0.00	0.00	0.81	0.81	0.00	0.74	0.74	2,194.26
Trenching Worker Trips	0.06	0.12	2.19	0.00	0.01	0.01	0.02	0.00	0.01	0.01	234.82
Time Slice 10/17/2011-10/28/2011 Active Days: 10	36.08	208.87	158.94	0.02	0.12	11.59	11.71	0.04	10.66	10.70	30,604.71

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Trenching 03/01/2011-10/28/2011	33.33	195.88	147.41	0.02	0.11	10.78	10.89	0.04	9.91	9.95	28,175.62
Trenching Off Road Diesel	32.76	194.75	126.97	0.00	0.00	10.72	10.72	0.00	9.87	9.87	25,983.94
Trenching Worker Trips	0.57	1.13	20.44	0.02	0.11	0.06	0.17	0.04	0.05	0.09	2,191.68
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 10/10/2011-10/31/2011	2.75	12.99	11.53	0.00	0.01	0.81	0.82	0.00	0.75	0.75	2,429.09
Trenching Off Road Diesel	2.69	12.87	9.34	0.00	0.00	0.81	0.81	0.00	0.74	0.74	2,194.26
Trenching Worker Trips	0.06	0.12	2.19	0.00	0.01	0.01	0.02	0.00	0.01	0.01	234.82
Time Slice 10/31/2011-10/31/2011 Active Days: 1	2.75	12.99	11.53	0.00	0.01	0.81	0.82	0.00	0.75	0.75	2,429.09
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 10/10/2011-10/31/2011	2.75	12.99	11.53	0.00	0.01	0.81	0.82	0.00	0.75	0.75	2,429.09
Trenching Off Road Diesel	2.69	12.87	9.34	0.00	0.00	0.81	0.81	0.00	0.74	0.74	2,194.26
Trenching Worker Trips	0.06	0.12	2.19	0.00	0.01	0.01	0.02	0.00	0.01	0.01	234.82
Time Slice 11/1/2011-11/30/2011 Active Days: 22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Fine Grading 7/1/2010 - 7/16/2010 - Well Pad Site Prep Grading

For Soil Stablizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

For Soil Stablizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Fine Grading 9/1/2010 - 9/24/2010 - Compressor Station Site Prep

For Soil Stablizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

For Soil Stablizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Graders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Graders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Fine Grading 6/1/2011 - 6/10/2011 - Metering Station Grading, Site Prep and Fencing

For Soil Stablizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

For Soil Stablizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Graders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Graders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 7/1/2010 - 9/30/2010 - Observation Well Conversions

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Aerial Lifts, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Aerial Lifts, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 7/19/2010 - 9/17/2010 - Nine Storage Well Drilling

For Bore/Drill Rigs, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Bore/Drill Rigs, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Welders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Welders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 9/27/2010 - 12/31/2010 - Compressor Station

Civil Foundations

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Other General Industrial Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other General Industrial Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Pumps, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Pumps, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Cranes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Cranes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 1/3/2011 - 3/31/2011 - Compressor Station Building/Equipment Erection

For Aerial Lifts, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Aerial Lifts, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Cranes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Cranes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 3/1/2011 - 10/28/2011 - Pipeline Construction

For Welders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Welders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Trenchers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Trenchers, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Air Compressors, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Air Compressors, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Excavators, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Graders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Graders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Other General Industrial Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other General Industrial Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Pumps, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Pumps, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 4/4/2011 - 7/15/2011 - Compressor Station Mechanical

For Cranes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Cranes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Welders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Welders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Rough Terrain Forklifts, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rough Terrain Forklifts, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 6/13/2011 - 7/8/2011 - Metering Station Civil

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 7/11/2011 - 9/2/2011 - Metering Mechanical

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Cranes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Cranes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Welders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Welders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 7/18/2011 - 10/14/2011 - Compressor Station Electrical

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Air Compressors, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Air Compressors, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 9/5/2011 - 10/7/2011 - Metering Station Electrical Insulation Paint

For Air Compressors, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Air Compressors, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 10/10/2011 - 10/31/2011 - Metering Station Hot Tap

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Welders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Welders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Pumps, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Pumps, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

Modeling Results (URBEMIS Off-Road Construction, Annual)

Page: 1
7/14/2009 10:49:55 AM

Urbemis 2007 Version 9.2.4

Summary Report for Annual Emissions (Tons/Year)

File Name: C:\Documents and Settings\Tim Rimpo\Application Data\Urbemis\Version9a\Projects\Central valley Construction 071409 Tier 2 excpt sidebooms new schedule.urb924
Project Name: Central Valley Gas Storage

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2010 TOTALS (tons/year unmitigated)	0.50	4.91	1.95	0.00	2.10	0.20	2.30	0.44	0.18	0.62	524.76
2010 TOTALS (tons/year mitigated)	0.50	3.44	1.95	0.00	0.23	0.15	0.38	0.05	0.14	0.19	524.76
Percent Reduction	0.00	29.93	0.00	0.00	89.26	24.93	83.67	89.23	24.94	70.26	0.00
2011 TOTALS (tons/year unmitigated)	3.35	24.41	14.70	0.00	0.09	1.35	1.44	0.02	1.24	1.26	2,801.40
2011 TOTALS (tons/year mitigated)	3.35	19.03	14.70	0.00	0.02	1.06	1.08	0.01	0.98	0.99	2,801.40
Percent Reduction	0.00	22.05	0.00	0.00	78.03	21.14	24.76	71.47	21.15	21.98	0.00

Page: 1

7/14/2009 10:50:10 AM

Urbemis 2007 Version 9.2.4

Detail Report for Annual Construction Unmitigated Emissions (Tons/Year)

File Name: C:\Documents and Settings\Tim Rimpo\Application Data\Urbemis\Version9a\Projects\Central valley Construction 071409 Tier 2 excpt sidebooms new schedule.urb924
Project Name: Central Valley Gas Storage

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2010	0.50	4.91	1.95	0.00	2.10	0.20	2.30	0.44	0.18	0.62	524.76
Fine Grading 07/01/2010-07/16/2010	0.01	0.12	0.07	0.00	0.12	0.01	0.13	0.03	0.00	0.03	10.84
Fine Grading Dust	0.00	0.00	0.00	0.00	0.12	0.00	0.12	0.03	0.00	0.03	0.00
Fine Grading Off Road Diesel	0.01	0.12	0.06	0.00	0.00	0.01	0.01	0.00	0.00	0.00	10.13
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70
Trenching 07/01/2010-09/30/2010	0.03	0.33	0.15	0.00	0.00	0.01	0.01	0.00	0.01	0.01	41.57
Trenching Off Road Diesel	0.03	0.33	0.11	0.00	0.00	0.01	0.01	0.00	0.01	0.01	37.70
Trenching Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.87
Trenching 07/19/2010-09/17/2010	0.23	2.67	0.85	0.00	0.00	0.08	0.08	0.00	0.08	0.08	294.74
Trenching Off Road Diesel	0.23	2.67	0.82	0.00	0.00	0.08	0.08	0.00	0.08	0.08	292.10
Trenching Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.64
Fine Grading 09/01/2010-09/24/2010	0.03	0.24	0.14	0.00	1.98	0.01	1.99	0.41	0.01	0.42	22.26
Fine Grading Dust	0.00	0.00	0.00	0.00	1.98	0.00	1.98	0.41	0.00	0.41	0.00
Fine Grading Off Road Diesel	0.03	0.24	0.12	0.00	0.00	0.01	0.01	0.00	0.01	0.01	20.85
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.41
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 09/27/2010-12/31/2010	0.19	1.55	0.75	0.00	0.00	0.09	0.09	0.00	0.08	0.08	155.34
Trenching Off Road Diesel	0.19	1.54	0.63	0.00	0.00	0.08	0.08	0.00	0.08	0.08	143.02

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Trenching Worker Trips	0.00	0.01	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.32
2011	3.35	24.41	14.70	0.00	0.09	1.35	1.44	0.02	1.24	1.26	2,801.40
Trenching 01/03/2011-03/31/2011	0.05	0.43	0.25	0.00	0.00	0.03	0.03	0.00	0.02	0.02	47.35
Trenching Off Road Diesel	0.05	0.42	0.20	0.00	0.00	0.03	0.03	0.00	0.02	0.02	42.35
Trenching Worker Trips	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.01
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 03/01/2011-10/28/2011	2.90	21.58	12.82	0.00	0.01	1.18	1.19	0.00	1.09	1.09	2,451.28
Trenching Off Road Diesel	2.85	21.49	11.05	0.00	0.00	1.18	1.18	0.00	1.08	1.08	2,260.60
Trenching Worker Trips	0.05	0.10	1.78	0.00	0.01	0.00	0.01	0.00	0.00	0.01	190.68
Trenching 04/04/2011-07/15/2011	0.21	1.01	0.80	0.00	0.00	0.07	0.07	0.00	0.06	0.06	125.13
Trenching Off Road Diesel	0.21	1.01	0.63	0.00	0.00	0.07	0.07	0.00	0.06	0.06	107.51
Trenching Worker Trips	0.00	0.01	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.61
Fine Grading 06/01/2011-06/10/2011	0.01	0.10	0.06	0.00	0.08	0.00	0.08	0.02	0.00	0.02	9.89
Fine Grading Dust	0.00	0.00	0.00	0.00	0.08	0.00	0.08	0.02	0.00	0.02	0.00
Fine Grading Off Road Diesel	0.01	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.27
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63
Trenching 06/13/2011-07/08/2011	0.02	0.13	0.07	0.00	0.00	0.01	0.01	0.00	0.01	0.01	16.26
Trenching Off Road Diesel	0.01	0.13	0.05	0.00	0.00	0.01	0.01	0.00	0.01	0.01	14.70
Trenching Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.57
Trenching 07/11/2011-09/02/2011	0.04	0.25	0.16	0.00	0.00	0.02	0.02	0.00	0.01	0.01	28.16
Trenching Off Road Diesel	0.04	0.25	0.13	0.00	0.00	0.02	0.02	0.00	0.01	0.01	25.03
Trenching Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.13
Trenching 07/18/2011-10/14/2011	0.07	0.56	0.32	0.00	0.00	0.03	0.03	0.00	0.03	0.03	75.68
Trenching Off Road	0.06	0.55	0.24	0.00	0.00	0.03	0.03	0.00	0.03	0.03	66.77

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Diesel											
Trenching Worker Trips	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.90
Trenching 09/05/2011-10/07/2011	0.02	0.21	0.12	0.00	0.00	0.01	0.01	0.00	0.01	0.01	28.22
Trenching Off Road Diesel	0.02	0.21	0.09	0.00	0.00	0.01	0.01	0.00	0.01	0.01	24.80
Trenching Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.42
Trenching 10/10/2011-10/31/2011	0.02	0.15	0.09	0.00	0.00	0.01	0.01	0.00	0.01	0.01	19.43
Trenching Off Road Diesel	0.02	0.15	0.07	0.00	0.00	0.01	0.01	0.00	0.01	0.01	17.55
Trenching Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.88

Page: 1
7/14/2009 10:50:25 AM

Urbemis 2007 Version 9.2.4

Detail Report for Annual Construction Mitigated Emissions (Tons/Year)

File Name: C:\Documents and Settings\Tim Rimpo\Application Data\Urbemis\Version9a\Projects\Central valley Construction 071409 Tier 2 excpt sidebooms new schedule.urb924
Project Name: Central Valley Gas Storage

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Annual Tons Per Year, Mitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2010	0.50	3.44	1.95	0.00	0.23	0.15	0.38	0.05	0.14	0.19	524.76
Fine Grading 07/01/2010-07/16/2010	0.01	0.08	0.07	0.00	0.01	0.00	0.02	0.00	0.00	0.01	10.84
Fine Grading Dust	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
Fine Grading Off Road Diesel	0.01	0.08	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.13
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70
Trenching 07/01/2010-	0.03	0.23	0.15	0.00	0.00	0.01	0.01	0.00	0.01	0.01	41.57

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
09/30/2010											
Trenching Off Road Diesel	0.03	0.23	0.11	0.00	0.00	0.01	0.01	0.00	0.01	0.01	37.70
Trenching Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.87
Trenching 07/19/2010-09/17/2010	0.23	1.87	0.85	0.00	0.00	0.06	0.06	0.00	0.06	0.06	294.74
Trenching Off Road Diesel	0.23	1.87	0.82	0.00	0.00	0.06	0.06	0.00	0.06	0.06	292.10
Trenching Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.64
Fine Grading 09/01/2010-09/24/2010	0.03	0.17	0.14	0.00	0.21	0.01	0.22	0.04	0.01	0.05	22.26
Fine Grading Dust	0.00	0.00	0.00	0.00	0.21	0.00	0.21	0.04	0.00	0.04	0.00
Fine Grading Off Road Diesel	0.03	0.17	0.12	0.00	0.00	0.01	0.01	0.00	0.01	0.01	20.85
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.41
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 09/27/2010-12/31/2010	0.19	1.08	0.75	0.00	0.00	0.06	0.06	0.00	0.06	0.06	155.34
Trenching Off Road Diesel	0.19	1.08	0.63	0.00	0.00	0.06	0.06	0.00	0.06	0.06	143.02
Trenching Worker Trips	0.00	0.01	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.32
2011	3.35	19.03	14.70	0.00	0.02	1.06	1.08	0.01	0.98	0.99	2,801.40
Trenching 01/03/2011-03/31/2011	0.05	0.30	0.25	0.00	0.00	0.02	0.02	0.00	0.02	0.02	47.35
Trenching Off Road Diesel	0.05	0.30	0.20	0.00	0.00	0.02	0.02	0.00	0.02	0.02	42.35
Trenching Worker Trips	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.01
Trenching 09/01/2010-11/30/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Off Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trenching 03/01/2011-10/28/2011	2.90	17.04	12.82	0.00	0.01	0.94	0.95	0.00	0.86	0.87	2,451.28
Trenching Off Road Diesel	2.85	16.94	11.05	0.00	0.00	0.93	0.93	0.00	0.86	0.86	2,260.60
Trenching Worker Trips	0.05	0.10	1.78	0.00	0.01	0.00	0.01	0.00	0.00	0.01	190.68

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Trenching 04/04/2011-07/15/2011	0.21	0.71	0.80	0.00	0.00	0.05	0.05	0.00	0.05	0.05	125.13
Trenching Off Road Diesel	0.21	0.70	0.63	0.00	0.00	0.05	0.05	0.00	0.05	0.05	107.51
Trenching Worker Trips	0.00	0.01	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.61
Fine Grading 06/01/2011-06/10/2011	0.01	0.07	0.06	0.00	0.01	0.00	0.01	0.00	0.00	0.01	9.89
Fine Grading Dust	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
Fine Grading Off Road Diesel	0.01	0.07	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.27
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63
Trenching 06/13/2011-07/08/2011	0.02	0.09	0.07	0.00	0.00	0.01	0.01	0.00	0.00	0.00	16.26
Trenching Off Road Diesel	0.01	0.09	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.70
Trenching Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.57
Trenching 07/11/2011-09/02/2011	0.04	0.17	0.16	0.00	0.00	0.01	0.01	0.00	0.01	0.01	28.16
Trenching Off Road Diesel	0.04	0.17	0.13	0.00	0.00	0.01	0.01	0.00	0.01	0.01	25.03
Trenching Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.13
Trenching 07/18/2011-10/14/2011	0.07	0.39	0.32	0.00	0.00	0.02	0.02	0.00	0.02	0.02	75.68
Trenching Off Road Diesel	0.06	0.39	0.24	0.00	0.00	0.02	0.02	0.00	0.02	0.02	66.77
Trenching Worker Trips	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.90
Trenching 09/05/2011-10/07/2011	0.02	0.15	0.12	0.00	0.00	0.01	0.01	0.00	0.01	0.01	28.22
Trenching Off Road Diesel	0.02	0.14	0.09	0.00	0.00	0.01	0.01	0.00	0.01	0.01	24.80
Trenching Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.42
Trenching 10/10/2011-10/31/2011	0.02	0.10	0.09	0.00	0.00	0.01	0.01	0.00	0.01	0.01	19.43
Trenching Off Road Diesel	0.02	0.10	0.07	0.00	0.00	0.01	0.01	0.00	0.01	0.01	17.55
Trenching Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.88

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Fine Grading 7/1/2010 - 7/16/2010 - Well Pad Site Prep Grading

For Soil Stablizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

For Soil Stablizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Fine Grading 9/1/2010 - 9/24/2010 - Compressor Station Site Prep

For Soil Stablizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

For Soil Stablizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Graders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Graders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Fine Grading 6/1/2011 - 6/10/2011 - Metering Station Grading, Site Prep and Fencing

For Soil Stablizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

For Soil Stablizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:

PM10: 5% PM25: 5%

For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:

PM10: 55% PM25: 55%

For Graders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Graders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 7/1/2010 - 9/30/2010 - Observation Well Conversions

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Aerial Lifts, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Aerial Lifts, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 7/19/2010 - 9/17/2010 - Nine Storage Well Drilling

For Bore/Drill Rigs, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Bore/Drill Rigs, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Welders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Welders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 9/27/2010 - 12/31/2010 - Compressor Station Civil Foundations

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Other General Industrial Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other General Industrial Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Pumps, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Pumps, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Cranes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Cranes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 1/3/2011 - 3/31/2011 - Compressor Station Building/Equipment Erection

For Aerial Lifts, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Aerial Lifts, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Cranes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Cranes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 3/1/2011 - 10/28/2011 - Pipeline Construction

For Welders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Welders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Trenchers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Trenchers, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Air Compressors, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Air Compressors, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Excavators, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Graders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Graders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Other General Industrial Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other General Industrial Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Pumps, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Pumps, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 4/4/2011 - 7/15/2011 - Compressor Station Mechanical

For Cranes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Cranes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Welders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Welders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Rough Terrain Forklifts, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rough Terrain Forklifts, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 6/13/2011 - 7/8/2011 - Metering Station Civil

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 7/11/2011 - 9/2/2011 - Metering Mechanical

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Cranes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Cranes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Welders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Welders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 7/18/2011 - 10/14/2011 - Compressor Station Electrical

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Air Compressors, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Air Compressors, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 9/5/2011 - 10/7/2011 - Metering Station Electrical Insulation Paint

For Air Compressors, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Air Compressors, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

The following mitigation measures apply to Phase: Trenching 10/10/2011 - 10/31/2011 - Metering Station Hot Tap

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Welders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Welders, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

For Pumps, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Pumps, the Diesel Oxidation Catalyst 30% mitigation reduces emissions by:

NOX: 30%

On-Road Construction Emissions

On-road construction emissions, summarized in the following table, were estimated using the following approach. First, the on-road vehicles associated with each construction phase were identified from the construction equipment list found in Table 2-5. Miles per day per vehicle and total vehicle miles per day (VMT) traveled were estimated for each vehicle class. Then, emissions (in pounds per day) were estimated for each vehicle class by multiplying VMT by the appropriate emission rates. The emissions rates were based on EMFAC2007 modeling runs shown in the tables that follow.

The maximum pounds per day estimates for each year were based on the total ppd for each phase occurring in each year. Maximum tons for each year were estimated by multiplying maximum pounds per day for each phase by the length of each phase that occurs in that particular year, and adding the total over all phases that occur in a year.

		ROG	NOx	CO	PM10	PM2.5	CO2
Max 2010	ppd->	2.90	9.54	24.10	0.94	0.83	2452.03
Max 2011	ppd->	22.21	79.99	79.13	0.45	0.14	5206.36
Max 2010	tpy->	0.22	0.73	1.51	0.02	0.02	113.45
Max 2011	tpy->	1.22	4.40	4.61	0.03	0.01	308.58

				ppd					
Well Pad	2010	miles/day/vehicle	total miles/day	ROG	NOx	CO	PM10	PM2.5	CO2
9	Service Company Trucks	50	450	0.10	0.45	3.44	0.13	0.11	547.83
11	Pickup Trucks	50	550	0.22	0.65	6.48	0.11	0.09	480.22
1	Conventional Service Rig	50	50	0.08	0.09	0.84	0.01	0.01	201.76
4	Crew Trucks	50	200	0.08	0.24	2.36	0.04	0.03	174.62
1	Boom Truck	50	50	1.24	4.26	2.23	0.30	0.30	186.15
				1.72	5.69	15.34	0.60	0.54	1590.59

				ppd					
	2010								
Compressor Station and Line 172		miles/day/vehicle	total miles/day	ROG	NOx	CO	PM10	PM2.5	CO2
8	Pickup Trucks	50	400	0.16	0.47	4.71	0.08	0.06	349.25
1	Tractor Trailer	40	40	0.94	3.15	1.69	0.22	0.20	337.57
4	Crew Trucks	50	200	0.08	0.24	2.36	0.04	0.03	174.62
				1.18	3.86	8.76	0.34	0.29	861.44

				ppd					
	2011								
	Compressor Station and Line 172	miles/day/vehicle	total miles/day	ROG	NOx	CO	PM10	PM2.5	CO2
14	Pickup Trucks	50	700	0.25	0.76	7.56	0.05	0.03	612.41
1	Tool Trailer	40	40	0.87	2.87	1.59	0.01	0.00	34.99
7	Crew Trucks	50	350	0.13	0.38	3.78	0.03	0.01	306.20
				1.25	4.01	12.93	0.08	0.04	953.60

				ppd					
	2011								
Metering Station and Line 400/401 Interconnect		miles/day/vehicle	total miles/day	ROG	NOx	CO	PM10	PM2.5	CO2
17	Pickup Trucks	50	850	0.31	0.92	9.18	0.06	0.03	743.64
12	Crew Trucks	50	600	0.22	0.65	6.48	0.04	0.02	524.92
3	Tool & Tractor Trailer	40	120	2.61	8.62	4.76	0.02	0.00	104.98
				3.14	10.20	20.42	0.13	0.06	1373.54

	2011			ppd					
Pipeline Construction		miles/day/vehicle	total miles/day	ROG	NOx	CO	PM10	PM2.5	CO2
23	Pickup Trucks	50	1150	0.42	1.25	12.42	0.08	0.05	1006.10
2	Flatbed Trucks	40	80	0.11	2.12	0.60	0.00	0.00	297.68
1	Winch Truck	40	40	0.87	2.87	1.59	0.01	0.00	34.99
6	Buses	40	240	0.32	6.37	1.80	0.00	0.00	893.04
1	Fuel Truck	40	40	0.87	2.87	1.59	0.01	0.00	34.99
3	Truck and Lowboy	40	120	2.61	8.62	4.76	0.02	0.00	104.98
6	Truck and Pole Trailer	40	240	5.22	17.24	9.52	0.05	0.00	209.97
1	Skid Truck	40	40	0.87	2.87	1.59	0.01	0.00	34.99
6	Parts Vans	50	300	6.53	21.55	11.91	0.06	0.00	262.46
				17.83	65.78	45.78	0.24	0.05	2879.22

EMFAC2007 Runs – Colusa County 2010 and 2011

```
Title   :   Colusa  County  APCD    Avg Annual  All CYrs    2009    to  2011    Default Title
Version :   Emfac2007  V2.3    Nov 1   2006
Run Date    :   5/28/2009  18:40:35
Scen    Year:   2010    --  All model   years   in  the range   1966    to  2010    selected
Season :   Annual
Area    :   Colusa  County  APCD
****************************************************************************************
    Year:   2010    --  Model   Years   1966    to  2010    Inclusive   --  Annual
    Emfac2007  Emission    Factors:    V2.3    Nov 1   2006

    District    Average District    Average Colusa  County  APCD

    Table   1:00    Running Exhaust Emissions   (grams/mile)

    Pollutant   Name:   Reactive    Org Gases   Temperature:    80F Relative    Humidity:   50%

    Speed
    MPH LDA LDT MDT HDT UBUS    MCY ALL

    5   0   1.033   0.701   10.616  0   0   4.861
    45  0   0.183   0.099   0.658   0   0   0.361


    Pollutant   Name:   Carbon  Monoxide    Temperature:    80F Relative    Humidity:   50%

    Speed
    MPH LDA LDT MDT HDT UBUS    MCY ALL

    5   0   13.094  7.617   19.174  0   0   14.569
    45  0   5.348   3.467   3.629   0   0   4.31


    Pollutant   Name:   Oxides  of  Nitrogen    Temperature:    80F Relative    Humidity:   50%

    Speed
    MPH LDA LDT MDT HDT UBUS    MCY ALL

    5   0   0.898   0.827   35.698  0   0   15.006
    45  0   0.538   0.451   13.292  0   0   5.697


    Pollutant   Name:   Carbon  Dioxide Temperature:    80F Relative    Humidity:   50%

    Speed
    MPH LDA LDT MDT HDT UBUS    MCY ALL
```

5	0	1242.79	1832.026	3831.377	0	0	2399.864
45	0	396.398	552.701	1689.746	0	0	949.499

Pollutant Name: Sulfur Dioxide Temperature: 80F Relative Humidity: 50%

Speed

MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.012	0.018	0.037	0	0	0.023
45	0	0.004	0.005	0.016	0	0	0.009

Pollutant Name: PM10 Temperature: 80F Relative Humidity: 50%

Speed

MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.07	0.11	2.412	0	0	1.028
45	0	0.012	0.016	0.455	0	0	0.193

Pollutant Name: PM10 - Tire Wear Temperature: 80F Relative Humidity: 50%

Speed

MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.008	0.008	0.036	0	0	0.019
45	0	0.008	0.008	0.036	0	0	0.019

Pollutant Name: PM10 - Brake Wear Temperature: 80F Relative Humidity: 50%

Speed

MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.013	0.013	0.028	0	0	0.019
45	0	0.013	0.013	0.028	0	0	0.019

Pollutant Name: Methane Temperature: 80F Relative Humidity: 50%

Speed

MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.103	0.103	0.493	0	0	0.261
45	0	0.038	0.035	0.031	0	0	0.035

Pollutant Name: PM2.5 Temperature: 80F Relative Humidity: 50%

Speed

MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.065	0.102	2.219	0	0	0.946
45	0	0.011	0.015	0.419	0	0	0.177

Pollutant Name: PM2.5 - Tire Wear Temperature: 80F Relative

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.002	0.002	0.009	0	0	0.005
45	0	0.002	0.002	0.009	0	0	0.005

Pollutant Name: PM2.5 - Brake Wear Temperature: 80F Relative

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.005	0.005	0.012	0	0	0.008
45	0	0.005	0.005	0.012	0	0	0.008

Title : Colusa County APCD Avg Annual All CYrs 2009 to 2011 Default Title
Version : Emfac2007 V2.3 Nov 1 2006
Run Date : 5/28/2009 18:40:35
Scen Year: 2011 -- All model years in the range 1967 to 2011 selected
Season : Annual
Area : Colusa County APCD
****

Year: 2011 -- Model Years 1967 to 2011 Inclusive -- Annual
Emfac2007 Emission Factors: V2.3 Nov 1 2006

District Average District Average Colusa County APCD

Table 1:00 Running Exhaust Emissions (grams/mile)

Pollutant Name: Reactive Org Gases Temperature: 80F Relative Humidity: 50%

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.934	0.653	9.883	0	0	4.567
45	0	0.164	0.091	0.614	0	0	0.336

Pollutant Name: Carbon Monoxide Temperature: 80F Relative Humidity: 50%

Speed
MPH LDA LDT MDT HDT UBUS MCY ALL

5	0	11.941	7.188	18.017	0	0	13.597
45	0	4.904	3.295	3.406	0	0	4.001

Pollutant Name: Oxides of Nitrogen Temperature: 80F Relative Humidity: 50%

Speed

MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.827	0.776	32.618	0	0	13.902
45	0	0.493	0.422	12.043	0	0	5.234

Pollutant Name: Carbon Dioxide Temperature: 80F Relative Humidity: 50%

Speed

MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	1251.774	1832.925	3830.756	0	0	2416.471
45	0	397.189	552.777	1689.342	0	0	956.649

Pollutant Name: Sulfur Dioxide Temperature: 80F Relative Humidity: 50%

Speed

MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.012	0.018	0.037	0	0	0.023
45	0	0.004	0.005	0.016	0	0	0.009

Pollutant Name: PM10 Temperature: 80F Relative Humidity: 50%

Speed

MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.069	0.115	2.138	0	0	0.929
45	0	0.012	0.016	0.416	0	0	0.179

Pollutant Name: PM10 - Tire Wear Temperature: 80F Relative Humidity: 50%

Speed

MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.008	0.008	0.036	0	0	0.019
45	0	0.008	0.008	0.036	0	0	0.019

Pollutant Name: PM10 - Brake Wear Temperature: 80F Relative Humidity: 50%

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.013	0.013	0.028	0	0	0.019
45	0	0.013	0.013	0.028	0	0	0.019

Pollutant Name: Methane Temperature: 80F Relative Humidity: 50%

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.097	0.1	0.459	0	0	0.246
45	0	0.035	0.033	0.029	0	0	0.032

Pollutant Name: PM2.5 Temperature: 80F Relative Humidity: 50%

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.064	0.107	1.967	0	0	0.855
45	0	0.011	0.015	0.383	0	0	0.165

Pollutant Name: PM2.5 - Tire Wear Temperature: 80F Relative Humidity:

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.002	0.002	0.009	0	0	0.005
45	0	0.002	0.002	0.009	0	0	0.005

Pollutant Name: PM2.5 - Brake Wear Temperature: 80F Relative Humidity:

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
5	0	0.005	0.005	0.012	0	0	0.008
45	0	0.005	0.005	0.012	0	0	0.008

Temporary Compressor Emissions

Temporary compressor emissions were based on the use of a catalytic converter to control emissions of ROG, NOx, and CO (DCL International, 2008). Emissions for PM10, PM2.5 and CO2 were based on U.S. EPA AP-42 emission factors (U.S. EPA, 2000).

Fuel Usage	**ppmvd**	**NOx**	
Btu/BHP-hr	@ 15% O2	lb/MMBtu	g/BHP-hr
7,600	4	0.015	0.05
	ppmvd	**CO**	
Btu/BHP-hr	@ 15% O2	lb/MMBtu	g/BHP-hr
7,600	56	0.126	0.43
Fuel Usage	**ppmvd**	**VOC**	
Btu/BHP-hr	@ 15% O2	lb/MMBtu	g/BHP-hr
7,600	25	0.032	0.11

Standard Temperature (SJVUAPCD)		
	68	deg F
Molar Volume	385.3	scf/mole
F-Factor	8710	scf/MMBtu @ 0% O2, 68 deg F

	ROG	**NOX**	**CO**	**PM10**	**PM2.5**	**CO2**
hp	Ppd	pounds/day	Ppd	Ppd	ppd	ppd
1485	8.67	3.99	33.98	0.86	0.86	9957.82
tpy	1.04	0.48	4.08	0.10	0.10	1194.94
horsepower		**PM10**	**PM2.5**	**CO2**		
1485	Lbs/MMBtu->	9.50E-03	9.50E-03	1.10E+02	AP-42 emission factrs	
	ppd->	0.86	0.86	9957.82		
	tpy ->	0.10	0.10	1194.94		
Temporary Compressor assumed to operate April 2009 through November, 2009						

DCL International Inc.

Head office address: 241 Bradwick Drive, Concord, Ontario, Canada L4K 1K5
Mailing address: P.O. Box 90, Concord, Ontario, Canada L4K 1B2
Tel: (905) 660-6450 *Toll free:* 1-800-872-1968 *Fax:* (905) 660-6435 *E-mail:* info@dcl-inc.com *Website:* www.dcl-inc.com

QUOTATION

To	Preston Batula	**Phone**	281-836-7562
	Exterran	**Fax**	281-836-8562
Date	October 16, 2008	**Email**	Preston.Batula@exterran.com

Quote No.: 16-749

RE: CATALYTIC CONVERTER

ENGINE DATA

Engine model	Waukesha F9390 GSI
Power	1642 hp @ 1000 rpm
Fuel	Pipeline Quality Natural Gas
Exhaust Flow	10,565 lb/hr
Exhaust Temperature	1,108 F

CATALYST SYSTEM DATA

	2 Elements Installed	**3 Elements Installed**
Catalyst Model	2-DC76-14	3-DC76-14
Catalyst Type	NSCR	NSCR
Number of Elements	**2**	**3**
Cell Density	300 cpsi	300 cpsi
Approx. Dimensions	37" OD x 61" OAL – converter 37" OD 220" OAL – catalytic silencer	37" OD x 61" OAL – converter 37" OD 220" OAL – catalytic silencer
Connection Size	14"	14"
Approx Weight	600 lbs - converter 1900 lbs - catalytic silencer	700 lbs – converter 2000 lbs – catalytic silencer
Approx. Pressure Drop	3-4" w.c. - converter 9-10"w.c. - catalytic silencer	4-5" w.c. - converter 10-12"w.c. - catalytic silencer

SILENCER SYSTEM DATA

Silencer Grade	Hospital	Hospital
Approx. Attenuation	35-40 dBA	35-40 dBA

EMISSION REQUIREMENTS

Exhaust Gas Component	**Converter Output (2 elements installed)**	**Converter Output (3 elements installed)**
NOx	10 ppm @ 15% O_2	4 ppm @ 15% O_2
CO	56 ppm @ 15% O_2	56 ppm @ 15% O_2
VOC	25 ppm @ 15% O_2	25 ppm @ 15% O_2
CHOH	0.02 g/bhp-hr	0.02 g/bhp-hr

Construction Emissions – Over Threshold Calculations

Time Slice	days	ppd - offroad	ppd - onroad	ppd - temporary compressor	ppd - total	NOx Threshold	Daily Pounds Over Threshold	Total Time Slice pounds over threshold	Total Time Slice tons over threshold
Time Slice 7/1/2010 - 7/16/2010	12	20.8	9.5	3.99	34.29	137	0	0.00	0.00
Time Slice 7/19/2010-8/31/2010	32	90.25	9.5	3.99	103.74	137	0	0.00	0.00
Time Slice 9/1/2010-9/17/2010	13	108.81	9.5	3.99	122.3	137	0	0.00	0.00
Time Slice 9/20/2010-9/24/2010	5	25.63	9.5	3.99	39.12	137	0	0.00	0.00
Time Slice 9/27/2010-9/30/2010	4	38.06	9.5	3.99	51.55	137	0	0.00	0.00
Time Slice 10/1/2010-12/31/2010	66	30.98	80	3.99	114.97	137	0	0.00	0.00
Time Slice 1/3/2011-2/28/2011	41	9.33	80	3.99	93.32	137	0	0.00	0.00
Time Slice 3/1/2011-3/31/2011	23	205.21	80	3.99	289.2	137	152.2	3500.60	1.75
Time Slice 4/1/2011-4/1/2011	1	195.88	80	3.99	279.87	137	142.87	142.87	0.07
Time Slice 4/4/2011-5/31/2011	42	214.9	80	3.99	298.89	137	161.89	6799.38	3.40
Time Slice 6/1/2011-6/10/2011	8	232.37	80	3.99	316.36	137	179.36	1434.88	0.72
Time Slice 6/13/2011-7/8/2011	20	223.85	80	3.99	307.84	137	170.84	3416.80	1.71
Time Slice 7/11/2011-7/15/2011	5	223.85	80	3.99	307.84	137	170.84	854.20	0.43
Time Slice 7/18/2011-9/2/2011	35	216.59	80	3.99	300.58	137	163.58	5725.30	2.86
Time Slice 9/5/2011-10/7/2011	25	219.63	80	3.99	303.62	137	166.62	4165.50	2.08
Time Slice 10/10/2011-10/14/2011	5	220.92	80	3.99	304.91	137	167.91	839.55	0.42
Time Slice 10/17/2011-10/28/2011	10	208.87	80	3.99	292.86	137	155.86	1558.60	0.78
Time Slice 10/31/2011-10/31/2011	1	12.99	80	3.99	96.98	137	0	0.00	0.00
Time Slice 11/1/2011-11/30/2011	22	0	80	3.99	83.99	137	0	0.00	0.00
TOTALs								28437.68	14.22

Operational Emissions

Summary of Operational Emissions

Operational Emissions (lbs/day)	ROG	NOx	CO	PM10	PM2.5
On-Road	0.19	0.18	2.87	0.55	0.10
Area Sources	0.00	0.01	0.01	0.00	0.00
Stationary Sources w/BACT	60.78	72.17	204.13	23.18	23.18
Blowdown	6.58	-	-	-	-
Totals	67.54	72.36	207.01	23.73	23.28

Operational Emissions (tons/year)	ROG	NOx	CO	PM10	PM2.5	CO2	CH4	N2O	CO2e	Metric tons CO2e
On-Road	0.04	0.04	0.52	0.10	0.02	50.85	0.00	0.00	51.32	46.57
Area Sources (excluding electricity)	0.00	0.00	0.00	0.00	0.00	2.92	0.00	0.00	2.92	2.65
Electricity (Direct + Indirect for Water)						0.34	0.00	0.00	0.34	0.31
Stationary Sources w/BACT	6.77	6.76	23.44	2.81	2.81	28,299.81	2.47	0.06	28,369.27	25,743.44
Blowdown	1.20	-	-	-	-	0.00	30.96	0.000	650.06	589.89
Totals	8.01	6.80	23.96	2.91	2.83	28,353.92	33.43	0.06	29,073.90	26,382.85

Stationary Source Emissions

Operational Emission Calculations

Equipment	Compressor Engine 1	Compressor Engine 2	Compressor Engine 3	Natural Draft Burner	Reboiler 1	Reboiler 2	Reboiler 3	Still Vent /w Thermal Oxidizer
Make	Caterpillar	Caterpillar	Caterpillar	NATCO				
Model	3612	3612	3612					
Rating (brake hp)	3550	3550	3550					300
(Units)	horsepower	horsepower	horsepower					MMscf/day
Fuel Rate	7436	7436	7436	0.4	2	2	2	1.396648045
(Units)	Btu/bhp-hr	Btu/bhp-hr	Btu/bhp-hr	MMBTU/hr	MMBTU/hr	MMBTU/hr	MMBTU/hr	MMBtu/hr
Max hours/day	24	24	24	24	24	24	24	24
Average hours/day	18	18	18	18	18	18	18	18
Max days/year	330	330	330	330	330	330	330	330
Max hours/year	5940	5940	5940	5940	5940	5940	5940	5940
CRITERIA EMISSIONS								
NOx								
Factor	0.7	0.7	0.7	0.083	0.1	0.1	0.1	0.098
(Units)	grams/bhp-hr	grams/bhp-hr	grams/bhp-hr	lb/MMBTU	lb/MMBTU	lb/MMBTU	lb/MMBTU	lb/MMBtu
Source	A	A	A	J	B	B	B	B
Pounds/day/unit	131.4	131.4	131.4	0.80	4.80	4.80	4.80	3.3
Tons/year/unit	16.5	16.5	16.5	0.49	0.59	0.59	0.59	0.41
BACT Effectiveness	0.92	0.92	0.92	0.00	0.00	0.00	0.00	0.00
Pounds/day/unit w/BACT	10.51	10.51	10.51	0.80	4.80	4.80	4.80	3.28
Tons/year/unit w/BACT	1.3	1.3	1.3	0.49	0.59	0.59	0.59	0.4
CO								
Factor	2.5	2.5	2.5	0.065	0.075	0.08	0.08	0.082
(Units)	grams/bhp-hr	grams/bhp-hr	grams/bhp-hr	lb/MMBTU	lb/MMBTU	lb/MMBTU	lb/MMBTU	lb/MMBtu
Source	A	A	A	J	B	B	B	B
Pounds/day/unit	469.2	469.2	469.2	0.63	3.60	3.60	3.60	2.7
Tons/year/unit	59.1	59.1	59.1	0.39	0.45	0.45	0.45	0.34
BACT Effectiveness	0.88	0.88	0.88	0.00	0.00	0.00	0.00	0.00
Pounds/day/unit w/BACT	56.30	56.30	56.30	0.63	3.60	3.60	3.60	2.75
Tons/year/unit w/BACT	7.1	7.1	7.1	0.39	0.45	0.45	0.45	0.3

Equipment	Compressor Engine 1	Compressor Engine 2	Compressor Engine 3	Natural Draft Burner	Reboiler 1	Reboiler 2	Reboiler 3	Still Vent /w Thermal Oxidizer
ROC								
Factor	0.25	0.25	0.25	0.040	0.006	0.006	0.006	0.0054
(Units)	grams/bhp-hr	grams/bhp-hr	grams/bhp-hr	lb/MMBTU	lb/MMBTU	lb/MMBTU	lb/MMBTU	lb/MMBtu
Source	B	B	B	J	B	B	B	B
Pounds/day/unit	46.9	46.9	46.9	0.38	0.29	0.29	0.29	0.181
Tons/year/unit	5.9	5.9	5.9	0.24	0.04	0.04	0.04	0.02
BACT Effectiveness	0.64	0.64	0.64	0.00	0.00	0.00	0.00	0.999
Pounds/day/unit w/BACT	16.89	16.89	16.89	0.38	0.29	0.29	0.29	0.000
Tons/year/unit w/BACT	2.1	2.1	2.1	0.24	0.04	0.04	0.04	0.000
SO2								
Factor	0.00313	0.00313	0.00313	0.00313	0.00313	0.00313	0.00313	0.00313
(Units)	lbs/MMBtu	lbs/MMBtu	lbs/MMBtu	lbs/MMBtu	lbs/MMBtu	lbs/MMBtu	lbs/MMBtu	lbs/MMBTu
Source	F	F	F	F	F	F	F	F
Pounds/day/unit	1.983	1.983	1.983	0.030	0.150	0.150	0.150	0.105
Tons/year/unit	0.25	0.25	0.25	0.004	0.02	0.02	0.02	0.01
PM10								
Factor	0.01110	0.01110	0.01110	0.00830	0.00830	0.00830	0.00830	0.0083
(Units)	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu
Source	B	B	B	B	B	B	B	C
Pounds/day/unit	7.032	7.032	7.032	0.080	0.398	0.398	0.398	0.28
Tons/year/unit	0.87	0.87	0.87	0.01	0.05	0.05	0.05	0.03
PM2.5								
Factor	0.01110	0.01110	0.01110	0.00830	0.00830	0.00830	0.00830	0.0083
(Units)	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu
Source	B	B	B	B	B	B	B	C
Pounds/day/unit	7.032	7.032	7.032	0.080	0.398	0.398	0.398	0.28
Tons/year/unit	0.87	0.87	0.87	0.01	0.05	0.05	0.05	0.03
CO2								
Factor	110.00000	110.00000	110.00000	110.00000	110.00000	110.00000	110.00000	110.00000
(Units)	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu
Factor	375.3	375.3	375.3	375.3	375.3	375.3	375.3	375.3
(Units)	lbs/MWH	lbs/MWH	lbs/MWH	lbs/MWH	lbs/MWH	lbs/MWH	lbs/MWH	lbs/MWH
Source	D	D	D	D	D	D	D	D
Pounds/day/unit	69690.192	69690.192	69690.192	1056.000	5280.000	5280.000	5280.000	3687.15
Tons/year/unit	8624.16	8624.16	8624.16	130.68	653.40	653.40	653.40	456.28

Equipment	Compressor Engine 1	Compressor Engine 2	Compressor Engine 3	Natural Draft Burner	Reboiler 1	Reboiler 2	Reboiler 3	Still Vent /w Thermal Oxidizer
CH4								
Factor	0.01300	0.01300	0.01300	0.01300	0.01300	0.01300	0.01300	0.01300
(Units)	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu
Source	G	G	G	G	G	G	G	G
Pounds/day/unit	8.236	8.236	8.236	0.125	0.624	0.624	0.624	0.44
Tons/year/unit	1.02	1.02	1.02	0.02	0.08	0.08	0.08	0.05
BACT Effectiveness	0.64	0.64	0.64	0.00	0.00	0.00	0.00	0.000
Pounds/day/unit w/BACT	2.97	2.97	2.97	0.12	0.62	0.62	0.62	0.436
Tons/year/unit w/BACT	0.4	0.4	0.4	0.02	0.08	0.08	0.08	0.054
N20								
Factor	0.00022	0.00022	0.00022	0.00022	0.00022	0.00022	0.00022	0.00022
(Units)	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu
Source	G	G	G	G	G	G	G	G
Pounds/day/unit	0.139	0.139	0.139	0.002	0.011	0.011	0.011	0.00737
Tons/year/unit	0.02	0.02	0.02	0.0003	0.001	0.001	0.001	0.001

References:
A. Based on manufacturer specifications: Caterpillar G3612 Gas Petroleum Engine
B. Based on emissions specification for similar equipment found in Wild Goose Storage Inc. permit application
C. EPA, AP-42, Section 1.4, 7/98, Table 1.4-1&2, Emission Factors for Natural Gas Combustion
D. EPA, AP-42, Section 3.2, 7/00, Table 3.2-2
E. Based on manufacturer specifications: Caterpillar G3616 Gas Petroleum Engine
F. Based on maximum sulfur in fuel @ 1 grain/100 scf (PG&E Tariff GR-21); 914 Btu/scf
G. California Climate Action Registry. 2007 General Reporting Protocol, Version 2.2.
H. Based on manufacturer specifications: Waukesha P9390/GSI
I. Based on manufacturer specifications: Caterpillar Gas Generator Set CAT G3412C LE Gas Engine
J. Based on NATCO Spec Sheet (June 15, 2009)

On-Road Vehicle Trip Emissions

Page: 1
6/1/2009
04:49:45 PM

Urbemis 2007 Version 9.2.4

Combined Summer Emissions Reports (Pounds/Day)

File Name: C:\Documents and Settings\Tim Rimpo\Application Data\Urbemis\Version9a\Projects\central valley operational June 1.urb924
Project Name: Central Valley Gas Storage

Project Location: California State-wide
On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006
Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.00	0.01	0.01	0.00	0.00	0.00	16.00

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.19	0.18	2.87	0.00	0.55	0.10	292.98

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.19	0.19	2.88	0.00	0.55	0.10	308.98

Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.00	0.01	0.01	0.00	0.00	0.00	16.00
Hearth							
Landscape							
Consumer Products							
Architectural Coatings							
TOTALS (lbs/day, unmitigated)	0.00	0.01	0.01	0.00	0.00	0.00	16.00

Area Source Changes to Defaults

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Compressor Station	0.19	0.18	2.87	0.00	0.55	0.10	292.98
TOTALS (lbs/day, unmitigated)	0.19	0.18	2.87	0.00	0.55	0.10	292.98

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2012 Temperature (F): 85 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Compressor Station		8.00	1000 sq ft	2.00	16.00	320.00
					16.00	320.00

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	50.0	0.8	99.0	0.2
Light Truck < 3750 lbs	50.0	1.8	93.6	4.6
Light Truck 3751-5750 lbs	0.0	0.5	99.5	0.0

Med Truck 5751-8500 lbs	0.0	1.0	99.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.0	0.0	76.5	23.5
Lite-Heavy Truck 10,001-14,000 lbs	0.0	0.0	42.9	57.1
Med-Heavy Truck 14,001-33,000 lbs	0.0	0.0	20.0	80.0
Heavy-Heavy Truck 33,001-60,000 lbs	0.0	0.0	0.0	100.0
Other Bus	0.0	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	100.0
Motorcycle	0.0	60.0	40.0	0.0
School Bus	0.0	0.0	0.0	100.0
Motor Home	0.0	0.0	90.0	10.0

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	20.0	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Compressor Station				100.0	0.0	0.0

Page: 1
6/1/2009
04:50:46 PM

Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Documents and Settings\Tim Rimpo\Application Data\Urbemis\Version9a\Projects\central valley operational June 1.urb924

Project Name: Central Valley Gas Storage

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.00	0.00	0.00	0.00	0.00	0.00	2.92

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.04	0.04	0.52	0.00	0.10	0.02	50.85

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.04	0.04	0.52	0.00	0.10	0.02	53.77

Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00	2.92
Hearth							
Landscape							
Consumer Products							
Architectural Coatings							
TOTALS (tons/year, unmitigated)	0.00	0.00	0.00	0.00	0.00	0.00	2.92

Area Source Changes to Defaults

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2

Compressor Station	0.04	0.04	0.52	0.00	0.10	0.02	50.85
TOTALS (tons/year, unmitigated)	0.04	0.04	0.52	0.00	0.10	0.02	50.85

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2012 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Compressor Station		8.00	1000 sq ft	2.00	16.00	320.00
					16.00	320.00

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	50.0	0.8	99.0	0.2
Light Truck < 3750 lbs	50.0	1.8	93.6	4.6
Light Truck 3751-5750 lbs	0.0	0.5	99.5	0.0
Med Truck 5751-8500 lbs	0.0	1.0	99.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.0	0.0	76.5	23.5
Lite-Heavy Truck 10,001-14,000 lbs	0.0	0.0	42.9	57.1
Med-Heavy Truck 14,001-33,000 lbs	0.0	0.0	20.0	80.0
Heavy-Heavy Truck 33,001-60,000 lbs	0.0	0.0	0.0	100.0
Other Bus	0.0	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	100.0
Motorcycle	0.0	60.0	40.0	0.0
School Bus	0.0	0.0	0.0	100.0
Motor Home	0.0	0.0	90.0	10.0

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	20.0	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			

% of Trips - Commercial (by land use)			
Compressor Station	100.0	0.0	0.0

Electricity GHG Emissions – Direct and Indirect (Water Use)

Table ES-1. Recommended revised water-energy proxies

	Indoor Uses		Outdoor Uses	
	Northern California kWh/MG	Southern California kWh/MG	Northern California kWh/MG	Southern California kWh/MG
Water Supply and Conveyance	2,117	9,727	2,117	9,727
Water Treatment	111	111	111	111
Water Distribution	1,272	1,272	1,272	1,272
Wastewater Treatment	1,911	1,911	0	0
Regional Total	5,411	13,022	3,500	11,111

Electricity Use

Electricity Use
PG&E Climate Zone 3 (Itron, 2006)

9.391698602	kwh/sf	For small office uses
2000	sf	
18783.3972	kwh/year	
18.7833972	mwh/year	

metric CO2	CH4	N20	CO2e
7.56	0.00	0.00	6.87

Water –Related Water use

12,930	gallons per month	
431	gallons per day	
157315	gallons per year	

Nauges

Greenhouse Gas Emission Factors	CO2	CH4	N2O
Electricity	804.54	0.01	0.00
Units	#/mwh	#/mwh	#/mwh

0.000431	millions gallons per day
0.157315	millions gallons per year

2.332141	kwh/day
851.231465	kwh/year

0.002332141	mwh/day
0.851231465	mwh/year

	CO2	CH4	N2O	Metric CO2e
Daily (pounds)	1.876301	1.56E-05	8.63E-06	
Annual (tons)	0.342425	2.85E-06	1.57E-06	0.31122772

Blowdown Emissions

Blowdown Assumptions		
Two emergency blowdowns per year		
Blowndown release per event	0.70	mmscf
Total emergency blowdown venting/year	1.40	mmscf
Total maintenance blowdown/year	0.110	mmscf
Total annual blowdown release	1.51	mmscf
Pounds CH4 per MMSCF	41,000.00	
Pounds CH4 released per year	61,910.00	
Tons CH4 released per year	30.96	
Pounds CH4 released per day	169.62	
tons ROG released per year	1.20	
pounds ROG released per day	6.58	

References:

Blowdown Amounts from:

Butte County Air Quality Management District. Undated. Authority to Construct Evaluation Application #02-04-06 (Wild Goose Storage, Inc.)

Pounds CH4 per MMscf from:

U.S. EPA. 2000. Emission Factors 3.2 Natural Gas-Fired Reciprocating Engines, Table 3.2.2, Footnote d.

Health Risk Assessment

The U.S. EPA's SCREEN3 model was used to evaluate the potential health risks associated with the project. Lakes Environmental Software's Screen View, version 3.0.0 of SCREEN3 was used. SCREEN3 was used to estimate the maximum downwind concentrations at distances ranging from 610 meters, which represents the closest residence, out to 5,000 meters in 100 meter increments. Three separate SCREEN3 runs were made, one for compressor emissions, one for reboiler emissions, and one for thermal oxidizer emissions.

Maximum 1-hour concentrations estimated by SCREEN3 were used to estimate acute health risks. Since SCREEN3 only generates 1-hour concentrations, these 1-hour values were converted to annual concentrations to estimate chronic and carcinogenic health risks. One-hour concentrations were converted to annual based on EPA "Screening Procedures for Estimating the Air Quality Impacts of Stationary Sources (EPA-454-R-92-019, October, 1992).

The three tables below show the HRA calculations for the compressor engines, the reboilers, and the oxidizer/incinerator unit that will control emissions from the glycol regenerator. The first column in the table below lists the relevant toxic air contaminants (TAC) and the second column shows the emission factors for each TAC. The third column lists the maximum emission rate in grams per second. For the compressor engines, the maximum emission rate represents all three compressor engines and includes the ROG emission reductions associated with BACT. The reboiler engines do not assume any emission controls, while the oxidizer assumes a 99.5 percent reduction in TACs.

All SCREEN3 modeling was conducted assuming a 1 gram per second emission rate. Stack parameters, the emission control efficiency for the oxidizer, and natural gas constituent data (used for GRI-GLYCalc) was provided by EAEngineering (Miller, M. – June 12, 2009 e-mails regarding emissions data). The dispersion modeling results for each of the three devices are shown in the fourth column. (SCREEN3 modeling results are shown after the following table). The values shown in the fifth column of the following table are the product of multiplying the third column by the fourth column. These fifth column values represent the maximum 1-hour downwind concentration, and are used to assess acute health risks. Column 6 shows the maximum annual concentration, which represents column 5 multiplied by 0.08, the EPA 1-hour to annual conversion factor (EPA-454-R-92-019, October, 1992). The acute risk factor is shown in column 7, and the acute risk in column 8. Acute risk is calculated by dividing the 1-hour concentration (column 5) by the acute risk factor (column 7). The chronic risk factor is shown in column 9, and the chronic risk is shown in column 10. Chronic risk is calculated by dividing the annual concentration (column 6) by the chronic risk factor (column 9). Column 11 shows the cancer potency factor for each pollutant, while the cancer risk is shown in column 11. Cancer risk is based on an equation developed by the California Office of Environmental Health Hazard Assessment (OEHHA). That equation includes the estimated annual concentration (column 6) and the cancer potency of each pollutant (column 11).

1	2	3	4	5	6	7	8	9	10	11	12
Compressor Engines											
Pollutant	Emission Factor (lb/MMBtu)	max emission rate (grams/second)	Worst Case Concentration (ug/m3) @ 1 gram/sec	Estimated 1-hour Concentration (ug/m3)	Estimated Annual Concentra tion (ug/m3)	Acute	Acute Risk	Chronic	Chronic Risk	Inhalation Cancer Potency (mg/kg-d)-1	Cancer Risk (chances per million)
1,1,2,2-Tetrachlorethane	1.53E-05	5.50E-05	1.345	7.40E-05	5.92E-06	N/A	N/A	N/A	N/A	2.00E-01	4.46E-10
1,1-Dichloroethane	1.13E-05	4.06E-05	1.345	5.46E-05	4.37E-06	N/A	N/A	N/A	N/A	5.70E-03	9.39E-12
1,3-Butadiene	6.64E-04	2.39E-03	1.345	3.21E-03	2.57E-04	N/A	N/A	20	1.28E-05	6.00E-01	5.81E-08
Acetaldehyde	2.79E-03	1.00E-02	1.345	1.35E-02	1.08E-03	470	2.87E-05	140	7.71E-06	1.00E-02	4.07E-09
Acrolein	2.63E-03	9.46E-03	1.345	1.27E-02	1.02E-03	2.5	5.09E-03	0.35	2.91E-03	N/A	N/A
Benzene	1.58E-03	5.68E-03	1.345	7.64E-03	6.11E-04	1300	5.88E-06	60	1.02E-05	1.00E-01	2.30E-08
Carbon Tetrachloride	1.77E-05	6.36E-05	1.345	8.56E-05	6.85E-06	1900	4.50E-08	40	1.71E-07	1.50E-01	3.87E-10
Chlorobenzene	1.29E-05	4.64E-05	1.345	6.24E-05	4.99E-06	N/A	N/A	1000	4.99E-09	N/A	N/A
Chloroform	1.37E-05	4.93E-05	1.345	6.63E-05	5.30E-06	150	4.42E-07	300	1.77E-08	1.90E-02	3.79E-11
Ethylbenzene	2.48E-05	8.92E-05	1.345	1.20E-04	9.59E-06	N/A	N/A	2000	4.80E-09	N/A	N/A
Ethylene Dibromide	2.13E-05	7.66E-05	1.345	1.03E-04	8.24E-06	N/A	N/A	0.8	1.03E-05	2.50E-01	7.76E-10
Formaldehyde	2.05E-02	7.37E-02	1.345	9.91E-02	7.93E-03	55	1.80E-03	9	8.81E-04	2.10E-02	6.28E-08
Methanol	3.06E-03	1.10E-02	1.345	1.48E-02	1.18E-03	28000	5.28E-07	4000	2.96E-07	N/A	N/A
Methylene Chloride	4.12E-05	1.48E-04	1.345	1.99E-04	1.59E-05	14000	1.42E-08	400	3.98E-08	3.50E-03	2.10E-11
Napthalene	9.71E-05	3.49E-04	1.345	4.70E-04	3.76E-05	N/A	N/A	9	4.17E-06	1.20E-01	1.70E-09
Styrene	1.19E-05	4.28E-05	1.345	5.75E-05	4.60E-06	21000	2.74E-09	900	5.12E-09	2.70E-01	4.68E-10
Toluene	5.58E-04	2.01E-03	1.345	2.70E-03	2.16E-04	37000	7.29E-08	300	7.20E-07	N/A	N/A
Vinyl Chloride	1.95E-04	7.01E-04	1.345	9.43E-04	7.54E-05	180000	5.24E-09	N/A	N/A	N/A	N/A
Xylene	1.95E-04	7.01E-04	1.345	9.43E-04	7.54E-05	22000	4.29E-08	700	1.08E-07	N/A	N/A
TOTALS							6.93E-03		3.83E-03		1.52E-07

Dehy Boilers	Emission Factor (lb/MMBtu)	max emission rate acute (grams/second)	Worst Case Concentration (ug/m3) @ 1 gram/sec	Estimated 1-hour Concentration (ug/m3)	Estimated Annual Concentra tion (ug/m3)	Acute	Acute Risk	Chronic	Chronic Risk	Inhalation Cancer Potency (mg/kg-d)-1	Cancer Risk (chances per million)
Benz(a)anthacene	1.82E-09	1.38E-09	118.9	1.64E-07	1.31E-08	N/A	N/A	N/A	N/A	3.90E-01	1.93E-12
Benzene	2.06E-06	1.56E-06	118.9	1.85E-04	1.48E-05	1300	1.42E-07	60	2.47E-07	1.00E-01	5.58E-10
Benzo(a)pyrene	1.18E-09	8.90E-10	118.9	1.06E-07	8.47E-09	N/A	N/A	N/A	N/A	3.9	1.24E-11
Benzo(b)fluoranthene	1.76E-09	1.34E-09	118.9	1.59E-07	1.27E-08	N/A	N/A	N/A	N/A	3.90E-01	1.87E-12
Benzo(k)fluoranthene	1.76E-09	1.34E-09	118.9	1.59E-07	1.27E-08	N/A	N/A	N/A	N/A	3.90E-01	1.87E-12
Chrysene	1.76E-09	1.34E-09	118.9	1.59E-07	1.27E-08	N/A	N/A	N/A	N/A	3.90E-02	1.87E-13

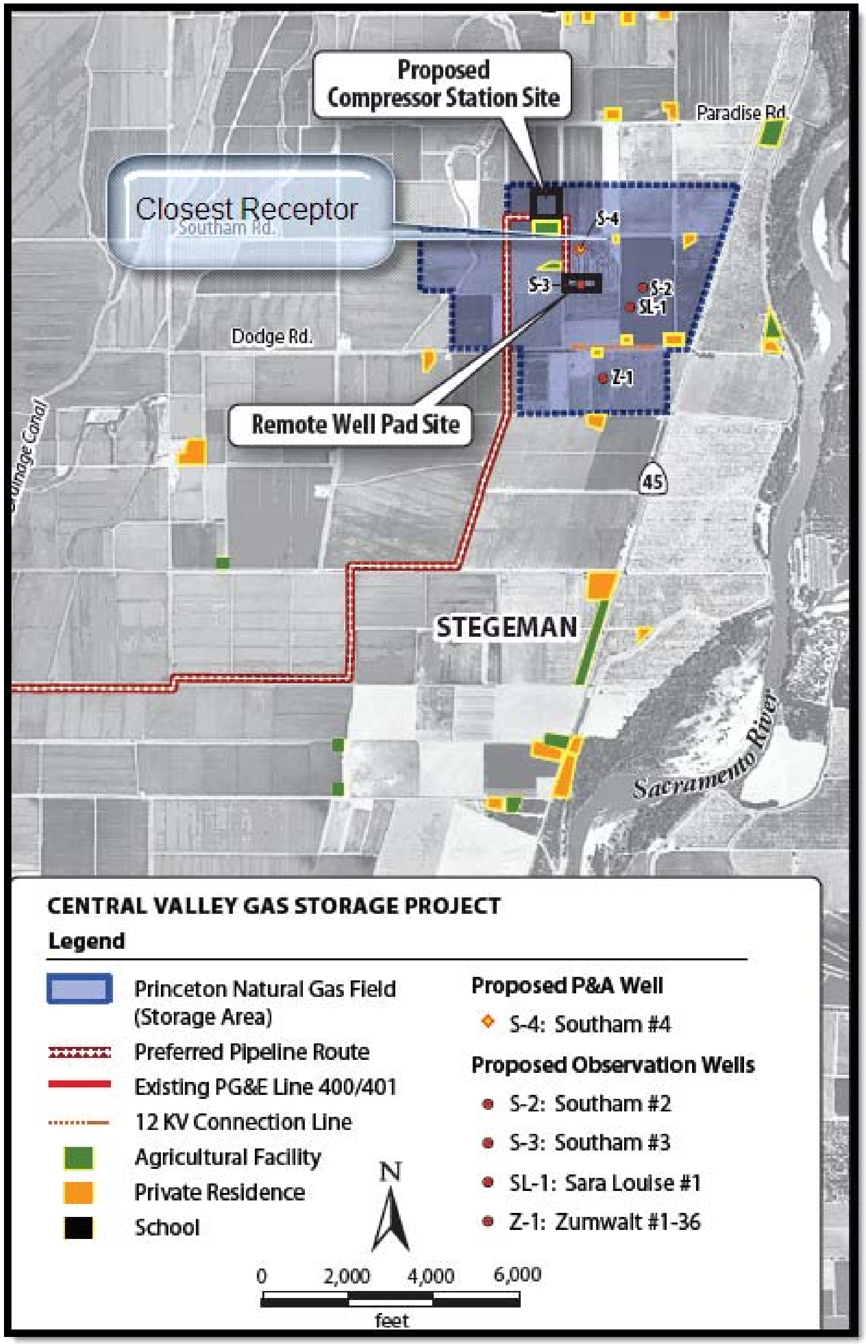
Dehy Boilers	Emission Factor (lb/MMBtu)	max emission rate acute (grams/second)	Worst Case Concentration (ug/m3) @ 1 gram/sec	Estimated 1-hour Concentration (ug/m3)	Estimated Annual Concentra tion (ug/m3)	Acute	Acute Risk	Chronic	Chronic Risk	Inhalation Cancer Potency (mg/kg-d)-1	Cancer Risk (chances per million)
Dibenzo(a,h)anthracene	1.18E-09	8.90E-10	118.9	1.06E-07	8.47E-09	N/A	N/A	N/A	N/A	4.10E+00	1.31E-11
Dichlorobenzene	1.18E-06	8.90E-07	118.9	1.06E-04	8.47E-06	N/A	N/A	N/A	N/A	4.00E-02	1.28E-10
Formaldehyde	7.35E-05	5.56E-05	118.9	6.62E-03	5.29E-04	55	1.20E-04	9	5.88E-05	2.10E-02	4.19E-09
Indeno(1,2,3-cd)pyrene	1.76E-09	1.34E-09	118.9	1.59E-07	1.27E-08	N/A	N/A	N/A	N/A	3.90E-01	1.87E-12
Naphthalene	5.98E-07	4.53E-07	118.9	5.38E-05	4.30E-06	N/A	N/A	9	4.78E-07	1.20E-01	1.95E-10
Toulene	3.33E-06	2.52E-06	118.9	3.00E-04	2.40E-05	3700	8.11E-08	300	8.00E-08	N/A	N/A
Arsenic	1.96E-07	1.48E-07	118.9	1.76E-05	1.41E-06	0.2	8.82E-05	0.015	9.41E-05	1.20E+01	6.38E-09
Beryllium	1.18E-08	8.90E-09	118.9	1.06E-06	8.47E-08	N/A	N/A	0.007	1.21E-05	8.40E+00	2.68E-10
Cadmium	1.08E-06	8.16E-07	118.9	9.70E-05	7.76E-06	N/A	N/A	0.02	3.88E-04	1.50E+01	4.39E-08
Chromium	1.37E-06	1.04E-06	118.9	1.23E-04	9.88E-06	N/A	N/A	0.2	4.94E-05	5.10E+02	1.90E-06
Copper	8.33E-07	6.31E-07	118.9	7.50E-05	6.00E-06	100	7.50E-07	N/A	N/A	N/A	N/A
Manganese	3.73E-07	2.82E-07	118.9	3.35E-05	2.68E-06	N/A	N/A	0.09	2.98E-05	N/A	N/A
Mercury	2.55E-07	1.93E-07	118.9	2.29E-05	1.83E-06	0.6	3.82E-05	0.03	6.12E-05	N/A	N/A
Nickel	2.06E-06	1.56E-06	118.9	1.85E-04	1.48E-05	6	3.09E-05	0.05	2.96E-04	9.10E-01	5.08E-09
Selenium	2.35E-08	1.78E-08	118.9	2.12E-06	1.69E-07	N/A	N/A	20	8.47E-09	N/A	N/A
TOTALS							1.21E-04		5.96E-05		1.96E-06
TOTALS Compressors and Boilers							7.05E-03		3.89E-03		2.11E-06

Incinerator (Oxidizer) Emissions	Emission Factor (lb/hr)	max emission rate (grams/second)	Worst Case Concentration (ug/m3) @ 1 gram/sec	Estimated 1-hour Concentration (ug/m3)	Estimated Annual Concentra tion (ug/m3)	Acute	Acute Risk	Chronic	Chronic Risk	Inhalation Cancer Potency (mg/kg-d)-1	Cancer Risk (chances per million)
Benzene	3.93E-02	4.96E-03	241.4	1.20E+00	1.20E-01	1300	9.20E-04	60	1.99E-03	1.00E-01	4.51E-06
Ethylbenzene	1.56E-01	1.96E-02	241.4	4.74E+00	4.74E-01	N/A	N/A	2000	2.37E-04	N/A	N/A
n-hexane	0.00E+00	0.00E+00	241.4	0.00E+00	0.00E+00	N/A	N/A	7000	0.00E+00	N/A	N/S
Toluene	7.96E-02	1.00E-02	241.4	2.42E+00	2.42E-01	3700	6.55E-04	300	8.08E-04	N/A	N/A
Xylene	2.06E-01	2.60E-02	241.4	6.27E+00	6.27E-01	22000	2.85E-04	700	8.95E-04	N/A	N/A
TOTALS							1.86E-03		3.93E-03		4.51E-06
TOTALS Compressors, Boilers, and Incinerator							8.91E-03		7.83E-03		6.62E-06

One-hour concentration converted to annual based on EPA "Screening Procedures for Estimating the AQ impact of Stationary Sources (EPA-454-R-92-019, October, 1992).

Emission Factors for Compressors from Table 3.2.3 of Chapter 3.2 AP-42 for Natural Gas Reciprocating Engines, 4-strok rich burn

Emission Factors for Reboilers from Table 1.4.3 of Chapter 1.4 AP-42 for Natural Gas Combustion Boilers.
Emission Factors for Oxidizer from GRI's GlyCalc software program.


Proposed
Compressor Station Site
Closest Receptor
Southam Rd.
Paradise Rd.
S-4
S-3
S-2
SL-1
Z-1
Dodge Rd.
Remote Well Pad Site
45
STEGEMAN
Sacramento River
CENTRAL VALLEY GAS STORAGE PROJECT
Legend
Princeton Natural Gas Field (Storage Area)
Preferred Pipeline Route
Existing PG&E Line 400/401
12 KV Connection Line
Agricultural Facility
Private Residence
School
Proposed P&A Well
S-4: Southam #4
Proposed Observation Wells
S-2: Southam #2
S-3: Southam #3
SL-1: Sara Louise #1
Z-1: Zumwalt #1-36
N
0
2,000
4,000
6,000
feet

Compressors

06/13/09

10:15:33

*** SCREEN3 MODEL RUN ***

*** VERSION DATED 96043 ***

C:\Projects\NiCor Energy Underground Nat Gas Storage\Respond to Comments\Revise

SIMPLE TERRAIN INPUTS:

SOURCE TYPE = POINT
EMISSION RATE (G/S) = 1.00000
STACK HEIGHT (M) = 18.3000
STK INSIDE DIAM (M) = 1.1000
STK EXIT VELOCITY (M/S)= 121.4400
STK GAS EXIT TEMP (K) = 720.0000
AMBIENT AIR TEMP (K) = 293.0000
RECEPTOR HEIGHT (M) = 2.0000
URBAN/RURAL OPTION = RURAL
BUILDING HEIGHT (M) = 0.0000
MIN HORIZ BLDG DIM (M) = 0.0000
MAX HORIZ BLDG DIM (M) = 0.0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.

THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = 213.639 M**4/S**3; MOM. FLUX = 1815.449 M**4/S**2.

*** FULL METEOROLOGY ***

****

*** SCREEN AUTOMATED DISTANCES
***

****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST	CONC	U10M	USTK	MIX	HT	PLUME	SIGMA	SIGMA

(M)	(UG/M**3)	STAB	(M/S)	(M/S)	(M)	HT	(M)	Y	(M)
-------	----------	----	-----	-----	------	------	------	------	-----
610	0.6429	1	3	3.1	960	327.43	148.75	171.35	NO
700	0.9342	1	3	3.1	960	327.43	167.14	224.16	NO
800	0.9931	1	3	3.1	960	327.43	187.19	292.84	NO
900	1.132	1	1.5	1.6	637.6	636.56	250.34	397.95	NO
1000	1.303	1	1.5	1.6	637.6	636.56	272.14	486.29	NO
1100	1.345	1	1.5	1.6	637.6	636.56	287.63	582.71	NO
1200	1.316	1	1.5	1.6	637.6	636.56	302.09	690.56	NO
1300	1.262	1	1.5	1.6	637.6	636.56	316.76	810.32	NO
1400	1.22	4	20	21.9	6400	62.48	93.41	41.81	NO
1500	1.201	4	20	21.9	6400	62.48	99.35	43.54	NO
1600	1.177	4	20	21.9	6400	62.48	105.25	45.23	NO
1700	1.149	4	20	21.9	6400	62.48	111.13	46.9	NO
1800	1.119	4	20	21.9	6400	62.48	116.97	48.53	NO
1900	1.087	4	20	21.9	6400	62.48	122.78	50.14	NO
2000	1.054	4	20	21.9	6400	62.48	128.56	51.72	NO
2100	1.021	4	20	21.9	6400	62.48	134.32	53.27	NO
2200	0.989	4	20	21.9	6400	62.48	140.05	54.8	NO
2300	0.9571	4	20	21.9	6400	62.48	145.76	56.31	NO
2400	0.9259	4	20	21.9	6400	62.48	151.44	57.8	NO
2500	0.8994	4	15	16.4	4800	77.21	157.49	60.3	NO
2600	0.8807	4	15	16.4	4800	77.21	163.12	61.72	NO
2700	0.8616	4	15	16.4	4800	77.21	168.72	63.13	NO
2800	0.8425	4	15	16.4	4800	77.21	174.3	64.52	NO
2900	0.8233	4	15	16.4	4800	77.21	179.86	65.9	NO
3000	0.8043	4	15	16.4	4800	77.21	185.4	67.26	NO
3500	0.7135	4	15	16.4	4800	77.21	212.85	73.43	NO
4000	0.6718	2	1.5	1.6	637.6	636.56	556.11	530.47	NO
4500	0.6934	5	3	3.7	10000	133.11	201.77	62.18	NO
5000	0.7255	5	2.5	3.1	10000	140.31	221.62	65.72	NO
MAXIMUM	1-HR	CONCENTRATION	AT	OR	BEYOND	610	M:		
1097	1.345	1	1.5	1.6	637.6	636.56	287.05	578.65	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED

DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

```
***************************************
*** SUMMARY OF SCREEN MODEL RESULTS ***
***************************************

CALCULATION       MAX CONC    DIST TO   TERRAIN
 PROCEDURE       (UG/M**3)    MAX (M)    HT (M)
--------------    -----------   -------   -------
SIMPLE TERRAIN      1.345         1097.        0.

***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

Reboilers							
6/13/2009							
10:18:02							
***	SCREEN3	MODEL	RUN	***			
***	VERSION	DATED	96043	***			
C:\Projects\NiCor	Energy	Underground	Nat	Gas	Storage\Respond	to	Comments\Revise
SIMPLE	TERRAIN	INPUTS:					
SOURCE	TYPE	=	POINT				
EMISSION	RATE	(G/S)	=	1			
STACK	HEIGHT	(M)	=	6			
STK	INSIDE	DIAM	(M)	=	0.3		
STK	EXIT	VELOCITY	(M/S)=	10.0444			
STK	GAS	EXIT	TEMP	(K)	=	810	
AMBIENT	AIR	TEMP	(K)	=	293		
RECEPTOR	HEIGHT	(M)	=	2			
URBAN/RURAL	OPTION	=	RURAL				
BUILDING	HEIGHT	(M)	=	0			
MIN	HORIZ	BLDG	DIM	(M)	=	0	
MAX	HORIZ	BLDG	DIM	(M)	=	0	
THE	REGULATORY	(DEFAULT)	MIXING	HEIGHT	OPTION	WAS	SELECTED.

THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10 METERS WAS ENTERED.

STACK EXIT VELOCITY WAS CALCULATED FROM
VOLUME FLOW RATE = 0.70999998 (M**3/S)

BUOY. FLUX = 1.415 M**4/S**3; MOM. FLUX = 0.821 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0 M ABOVE STACK BASE USED

DIST	CONC	U10M	USTK	MIX	HT	PLUME	SIGMA	SIGMA	
(M)	(UG/M**3)	STAB	(M/S)	(M/S)	(M)	HT	(M)	Y	(M)
-------	----------	----	-----	-----	------	------	------	------	-----
610	118.9	4	1.5	1.5	480	24.53	43.69	22.14	NO
700	106.1	4	1.5	1.5	480	24.53	49.47	24.61	NO
800	97.78	4	1	1	320	33.79	56.14	27.93	NO
900	90.61	4	1	1	320	33.79	62.39	30.52	NO
1000	83.27	4	1	1	320	33.79	68.59	33.06	NO
1100	76.35	4	1	1	320	33.79	74.73	35.04	NO
1200	71.61	6	1	1	10000	33.69	40.79	17.54	NO
1300	73.8	6	1	1	10000	33.69	43.76	18.27	NO
1400	75.24	6	1	1	10000	33.69	46.72	18.99	NO
1500	76.07	6	1	1	10000	33.69	49.66	19.69	NO
1600	76.38	6	1	1	10000	33.69	52.59	20.38	NO
1700	76.28	6	1	1	10000	33.69	55.51	21.06	NO
1800	75.84	6	1	1	10000	33.69	58.41	21.72	NO
1900	75.13	6	1	1	10000	33.69	61.29	22.38	NO
2000	74.21	6	1	1	10000	33.69	64.16	23.03	NO
2100	72.85	6	1	1	10000	33.69	67.03	23.58	NO
2200	71.44	6	1	1	10000	33.69	69.87	24.12	NO
2300	69.99	6	1	1	10000	33.69	72.71	24.64	NO
2400	68.52	6	1	1	10000	33.69	75.53	25.16	NO
2500	67.05	6	1	1	10000	33.69	78.35	25.67	NO
2600	65.59	6	1	1	10000	33.69	81.15	26.18	NO

2700	64.14	6	1	1	10000	33.69	83.94	26.67	NO
2800	62.71	6	1	1	10000	33.69	86.73	27.16	NO
2900	61.3	6	1	1	10000	33.69	89.5	27.64	NO
3000	59.92	6	1	1	10000	33.69	92.26	28.11	NO
3500	53.36	6	1	1	10000	33.69	105.95	30.04	NO
4000	47.84	6	1	1	10000	33.69	119.43	31.83	NO
4500	43.18	6	1	1	10000	33.69	132.74	33.52	NO
5000	39.21	6	1	1	10000	33.69	145.89	35.11	NO
MAXIMUM	1-HR	CONCENTRATION	AT	OR	BEYOND	610	M:		
610	118.9	4	1.5	1.5	480	24.53	43.69	22.14	NO

DWASH=	MEANS	NO	CALC	MADE	(CONC	=	0.0)
DWASH=NO	MEANS	NO	BUILDING	DOWNWASH	USED		
DWASH=HS	MEANS	HUBER-SNYDER	DOWNWASH	USED			
DWASH=SS	MEANS	SCHULMAN-SCIRE	DOWNWASH	USED			
DWASH=NA	MEANS	DOWNWASH	NOT	APPLICABLE,	X<3*LB		

****

***	SUMMARY	OF	SCREEN	MODEL	RESULTS	***

****

CALCULATION	MAX	CONC	DIST	TO	TERRAIN
PROCEDURE	(UG/M**3)	MAX	(M)	HT	(M)
--------------	-----------	-------	-------		
SIMPLE	TERRAIN	118.9	610	0	

****

**	REMEMBER	TO	INCLUDE	BACKGROUND	CONCENTRATIONS	**

****

Oxidizer									
6/13/2009									
10:20:25									
***	SCREEN3	MODEL	RUN	***					
***	VERSION	DATED	96043	***					
C:\Projects\NiCor	Energy	Underground	Nat	Gas	Storage\Respond	to	Comments\Revise		
SIMPLE	TERRAIN	INPUTS:							
SOURCE	TYPE	=	POINT						
EMISSION	RATE	(G/S)	=	1					
STACK	HEIGHT	(M)	=	2.1					
STK	INSIDE	DIAM	(M)	=	1.1				
STK	EXIT	VELOCITY	(M/S)=	0.3578					
STK	GAS	EXIT	TEMP	(K)	=	1033.2			
AMBIENT	AIR	TEMP	(K)	=	293				
RECEPTOR	HEIGHT	(M)	=	2					
URBAN/RURAL	OPTION	=	RURAL						
BUILDING	HEIGHT	(M)	=	0					
MIN	HORIZ	BLDG	DIM	(M)	=	0			
MAX	HORIZ	BLDG	DIM	(M)	=	0			
THE	REGULATORY	(DEFAULT)	MIXING	HEIGHT	OPTION	WAS	SELECTED.		
THE	REGULATORY	(DEFAULT)	ANEMOMETER	HEIGHT	OF	10	METERS	WAS	ENTERED.
STACK	EXIT	VELOCITY	WAS	CALCULATED	FROM				
VOLUME	FLOW	RATE	=	0.34	(M**3/S)				
BUOY.	FLUX	=	0.76	M**4/S**3;	MOM.	FLUX	=	0.011	M**4/S**2.
***	FULL	METEOROLOGY	***						
**********************************									
***	SCREEN	AUTOMATED	DISTANCES	***					
**********************************									
***	TERRAIN	HEIGHT	OF	0	M	ABOVE	STACK	BASE	USED

DIST	CONC	U10M	USTK	MIX	HT	PLUME	SIGMA	SIGMA	
(M)	(UG/M**3)	STAB	(M/S)	(M/S)	(M)	HT	(M)	Y	(M)
-------	----------	----	-----	-----	------	------	------	------	-----
610	241.4	4	1	1	320	17.44	43.65	22.07	NO
700	210.8	6	1	1	10000	22.51	25.29	12.68	NO
800	213.4	6	1	1	10000	22.51	28.37	13.59	NO
900	211.8	6	1	1	10000	22.51	31.44	14.49	NO
1000	207.3	6	1	1	10000	22.51	34.49	15.36	NO
1100	200.3	6	1	1	10000	22.51	37.52	16.16	NO
1200	192.6	6	1	1	10000	22.51	40.53	16.93	NO
1300	184.7	6	1	1	10000	22.51	43.52	17.68	NO
1400	176.6	6	1	1	10000	22.51	46.49	18.42	NO
1500	168.8	6	1	1	10000	22.51	49.45	19.14	NO
1600	161.1	6	1	1	10000	22.51	52.39	19.85	NO
1700	153.8	6	1	1	10000	22.51	55.31	20.55	NO
1800	146.9	6	1	1	10000	22.51	58.22	21.23	NO
1900	140.2	6	1	1	10000	22.51	61.12	21.9	NO
2000	134	6	1	1	10000	22.51	64	22.56	NO
2100	128.1	6	1	1	10000	22.51	66.87	23.12	NO
2200	122.7	6	1	1	10000	22.51	69.72	23.67	NO
2300	117.5	6	1	1	10000	22.51	72.56	24.21	NO
2400	112.7	6	1	1	10000	22.51	75.39	24.74	NO
2500	108.2	6	1	1	10000	22.51	78.21	25.26	NO
2600	104	6	1	1	10000	22.51	81.02	25.77	NO
2700	100.1	6	1	1	10000	22.51	83.82	26.27	NO
2800	96.33	6	1	1	10000	22.51	86.6	26.76	NO
2900	92.82	6	1	1	10000	22.51	89.38	27.25	NO
3000	89.52	6	1	1	10000	22.51	92.15	27.73	NO
3500	75.92	6	1	1	10000	22.51	105.85	29.69	NO
4000	65.53	6	1	1	10000	22.51	119.34	31.5	NO
4500	57.37	6	1	1	10000	22.51	132.66	33.2	NO
5000	50.83	6	1	1	10000	22.51	145.81	34.81	NO
MAXIMUM	1-HR	CONCENTRATION	AT	OR	BEYOND	610	M:		
610	241.4	4	1	1	320	17.44	43.65	22.07	NO

DWASH=	MEANS	NO	CALC	MADE	(CONC	=	0.0)
DWASH=NO	MEANS	NO	BUILDING	DOWNWASH	USED		

DWASH=HS	MEANS	HUBER-SNYDER	DOWNWASH	USED		
DWASH=SS	MEANS	SCHULMAN-SCIRE	DOWNWASH	USED		
DWASH=NA	MEANS	DOWNWASH	NOT	APPLICABLE,	X<3*LB	
**************************************						
***	SUMMARY	OF	SCREEN	MODEL	RESULTS	***
	**************************************					

GlyCalc Results

Page: 1

GRI-GLYCalc VERSION 4.0 - EMISSIONS SUMMARY

Case Name: Nicor Oxidizer
File Name: C:\Projects\NiCor Energy Underground Nat Gas Storage\Respond to Comments\Revised HRA\glycol deh calc.ddf
Date: June 13, 2009

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0725	1.740	0.2349
Ethane	0.0226	0.542	0.0731
Propane	0.0027	0.066	0.0089
Isobutane	0.0006	0.014	0.0019
n-Butane	0.0016	0.039	0.0053
Benzene	0.0393	0.942	0.1272
Toluene	0.0796	1.911	0.2579
Ethylbenzene	0.1556	3.734	0.5041
Xylenes	0.2058	4.938	0.6667
Total Emissions	0.5802	13.926	1.8800
Total Hydrocarbon Emissions	0.5802	13.926	1.8800
Total VOC Emissions	0.4852	11.644	1.5719
Total HAP Emissions	0.4802	11.525	1.5559
Total BTEX Emissions	0.4802	11.525	1.5559

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	14.5003	348.006	46.9809
Ethane	4.5146	108.350	14.6273
Propane	0.5471	13.129	1.7725
Isobutane	0.1150	2.761	0.3727
n-Butane	0.3245	7.788	1.0513
Benzene	7.8515	188.436	25.4388
Toluene	15.9213	382.111	51.5850
Ethylbenzene	31.1189	746.853	100.8252
Xylenes	41.1533	987.679	133.3367
Total Emissions	116.0464	2785.114	375.9903
Total Hydrocarbon Emissions	116.0464	2785.114	375.9903
Total VOC Emissions	97.0315	2328.757	314.3822
Total HAP Emissions	96.0450	2305.079	311.1857
Total BTEX Emissions	96.0450	2305.079	311.1857

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0109	0.262	0.0353
Ethane	0.0012	0.030	0.0040
Propane	0.0001	0.002	0.0002
Isobutane	<0.0001	<0.001	<0.0001
n-Butane	<0.0001	0.001	0.0001
Benzene	<0.0001	<0.001	0.0001
Toluene	<0.0001	0.001	0.0001
Ethylbenzene	<0.0001	0.001	0.0001
Xylenes	<0.0001	0.001	0.0001
Total Emissions	0.0124	0.297	0.0401
Total Hydrocarbon Emissions	0.0124	0.297	0.0401
Total VOC Emissions	0.0002	0.006	0.0008
Total HAP Emissions	0.0001	0.003	0.0004
Total BTEX Emissions	0.0001	0.003	0.0004

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	2.1802	52.325	7.0639
Ethane	0.2489	5.974	0.8065
Propane	0.0150	0.359	0.0485
Isobutane	0.0025	0.059	0.0080
n-Butane	0.0057	0.138	0.0186
Benzene	0.0038	0.091	0.0123
Toluene	0.0059	0.142	0.0192
Ethylbenzene	0.0080	0.193	0.0261
Xylenes	0.0077	0.185	0.0250
Total Emissions	2.4778	59.468	8.0281
Total Hydrocarbon Emissions	2.4778	59.468	8.0281
Total VOC Emissions	0.0487	1.168	0.1577
Total HAP Emissions	0.0255	0.612	0.0826
Total BTEX Emissions	0.0255	0.612	0.0826

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0834	2.002	0.2702

Appendix D. Continued

Page: 3

Ethane	0.0238	0.572	0.0772
Propane	0.0028	0.067	0.0091
Isobutane	0.0006	0.014	0.0019
n-Butane	0.0017	0.040	0.0053
Benzene	0.0393	0.943	0.1273
Toluene	0.0796	1.911	0.2580
Ethylbenzene	0.1556	3.735	0.5043
Xylenes	0.2058	4.939	0.6668
Total Emissions	0.5926	14.223	1.9201
Total Hydrocarbon Emissions	0.5926	14.223	1.9201
Total VOC Emissions	0.4854	11.650	1.5727
Total HAP Emissions	0.4804	11.528	1.5563
Total BTEX Emissions	0.4804	11.528	1.5563

Appendix E

List of Drainages

Appendix E-1. List of Drainages and Potential Crossing Methods

Drainage Number[1]	Drainage Type	Estimated Width (ft)	Wetland Vegetation Present at Crossing	Status as a Waters of the United States at Crossing	Potential Crossing Method[2]
D-1	Roadside Ditch	2	None	Other waters	Trench
D-1a	Roadside Ditch	3	Freshwater marsh	Wetland	Avoided by alignment
D-2	Roadside Ditch	1	None	Other waters	Trench
D-3	Roadside Ditch	1	None	Other waters	Avoided by alignment
D-4	Roadside Ditch	1	None	Other waters	Avoided by alignment
D-5	Canal	12	None	Other waters	Auger bore
D-6	Canal	15	Fremont cottonwood riparian woodland (above OHWM)	Other waters	Auger bore
D-6a	Agricultural Ditch	8	Freshwater marsh	Wetland	Trench
D-7	Canal	10	Fremont cottonwood riparian woodland (above OHWM)	Other waters	Auger bore
D-8	Agricultural Ditch	5	None	Other waters	Trench
D-9	Agricultural Ditch	5	None	Other waters	Trench
D-10	Canal	15	None	Other waters	Trench
D-10a	Canal	15	Scattered riparian woodland species (above OHWM)	Other waters	Auger bore
D-11	Agricultural Ditch	12	None	Other waters	Auger bore
D-12	Agricultural Ditch	15	None	Other waters	Avoided by alignment
D-13	Agricultural Ditch	5	None	Other waters	Avoided by alignment
D-14	Agricultural Ditch	12	Freshwater marsh	Wetland	Auger bore
D-15	Agricultural Ditch	3	Freshwater marsh	Wetland	Avoided by alignment
D-16	Agricultural Ditch	5	Freshwater marsh	Wetland	Avoided by alignment
D-17	Canal	12	None	Other waters	Auger bore (one crossing)
D-18	Canal	10	Freshwater marsh	Wetland	Avoided by alignment
D-19	Colusa Trough	80	Primarily open water with narrow fringe of freshwater marsh	Wetland/Other waters	HDD
D-19a	Willow Creek	40	Primarily open water with narrow fringe of freshwater marsh	Wetland/Other waters	Avoided by alignment
D-19b	Colusa Drain	45	Primarily open water with narrow fringe of freshwater marsh	Wetland/Other waters	Avoided by alignment
D-20	Canal	25	Freshwater marsh	Wetland	Avoided by alignment
D-21	Central Drain	30	Freshwater marsh	Wetland	Avoided by alignment

Drainage Number[1]	Drainage Type	Estimated Width (ft)	Wetland Vegetation Present at Crossing	Status as a Waters of the United States at Crossing	Potential Crossing Method[2]
D-22	Canal	15	Freshwater marsh	Wetland	Avoided by alignment
D-23	Logan Creek	60	Primarily open water with narrow fringe of freshwater marsh	Wetland/Other waters	Auger bore
D-24	Canal	25	Freshwater marsh	Wetland	Trench
D-25	Agricultural Ditch	10	Freshwater marsh	Wetland	Auger bore
D-26	Agricultural Ditch	10	Freshwater marsh	Wetland	Auger bore
D-27	Agricultural Ditch	12	Freshwater marsh	Wetland	Avoided by alignment
D-28	Agricultural Ditch	2	Freshwater marsh	Wetland	Avoided by alignment
D-29	Agricultural Ditch	10	Scattered freshwater marsh vegetation	Wetland	Avoided by alignment
D-30	Hunters Creek	50	None	Other waters	Auger bore
D-31	Canal	15	Freshwater marsh	Wetland	Auger bore
D-32	Canal	20	None	Other waters	Auger bore
D-33	Agricultural Ditch	15	Freshwater marsh	Wetland	Auger bore
D-34	Canal	20	Scattered freshwater marsh vegetation	Wetland	Avoided by alignment
D-35	Agricultural Ditch	3	Freshwater marsh	Wetland	Avoided by alignment
D-36	Agricultural Ditch	4	Freshwater marsh	Wetland	Avoided by alignment
D-37	Agricultural Ditch	5	None	Other waters	Avoided by alignment
D-38	Canal	25	None	Other waters	Auger bore
D-39	Agricultural Ditch	12	None	Other waters	Auger bore
D-40	Agricultural Ditch	10	None	Other waters	Trench
D-41	Agricultural Ditch	6	None	Other waters	Trench
D-42	Agricultural Ditch	8	Wetland	Wetland	Avoided by alignment
D-43	Hunters Creek	20 to 40	Fremont cottonwood riparian woodland (above OHWM)	Other waters	Auger bore or HDD (three crossings of Hunters Creek)
D-44	Agricultural Ditch	10	Freshwater marsh	Wetland	Trench
D-45	Agricultural Ditch	8	Freshwater marsh	Wetland	Trench

Drainage Number[1]	Drainage Type	Estimated Width (ft)	Wetland Vegetation Present at Crossing	Status as a Waters of the United States at Crossing	Potential Crossing Method[2]
D-46	Agricultural Ditch	6	Freshwater marsh	Wetland	HDD
D-46a	Roadside Ditch	3	Herbaceous weedy seasonal wetland	Wetland	HDD
D-47	Roadside Ditch	6	Freshwater marsh	Wetland	HDD
D-48	Agricultural Ditch	6	Freshwater marsh	Wetland	Avoided by alignment
D-49	Agricultural Ditch	8	None	Other waters	Trench
D-50	Agricultural Ditch	10	None	Other waters	Avoided by alignment
D-51	Agricultural Ditch	10	None	Other waters	Avoided by alignment
D-52	Agricultural Ditch	8	None	Other waters	Trench
D-53	Agricultural Ditch	8	Freshwater marsh	Wetland	Avoided by alignment
D-54	Agricultural Ditch	12	Freshwater marsh	Wetland	Avoided by alignment
D-55	Agricultural Ditch	6	Freshwater marsh	Wetland	Avoided by alignment
D-56	Agricultural Ditch	12	Freshwater marsh	Wetland	Avoided by alignment
D-57	Roadside Ditch	4	Seasonal wetland vegetation	Wetland	Auger bore
D-58	Roadside Ditch	6	Seasonal wetland vegetation	Wetland	Avoided by alignment
D-59a	Agricultural Ditch	8	None	Other waters	Avoided by alignment
D-59	Agricultural Ditch	8	Woody riparian and freshwater marsh	Wetland	Avoided by alignment
D-60	Agricultural Ditch	12	None	Other waters	Avoided by alignment
D-61	Glenn-Colusa Canal	90	None	Other waters	HDD
D-62	Agricultural Ditch	15	Freshwater marsh	Wetland	HDD

Table Notes:

[1]**Drainage Number**
The drainage number corresponds to the project alignment maps provided in Exhibit 1.

[2]**Potential Crossing Method**
The crossing methods will be determined as part of the pipeline engineering and design phase. Some of the drainages shown as "avoided by alignment" may actually be trenched or bored. The pipeline construction methods (including open-cut trench, auger bore, and horizontal directional [HDD] drilling methods) are described in detail in Chapter 2 of the PEA.

Appendix F
Impact Summary Checklist

Appendix F
Impact Summary Checklist

Introduction

As required by California Public Utilities Commission (CPUC) Rule 17.1 and General Order 131-D, the California Environmental Quality Act (CEQA) Initial Study Checklist was used to focus the impact analysis for the proposed project. The methods used for determining standards of significance for environmental issues in the PEA were obtained from the Appendix G CEQA Guidelines. The impact analysis for each of the environmental issues discussed in Chapter 3 of the PEA is based on these significance standards and applicable agency standards and thresholds.

Table ES-1 in the Executive Summary provides a summary of the individual potential impacts associated with the proposed project. Each of these potential impacts and associated applicant-proposed measures is discussed in detail in Chapter 3 of the PEA.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
I.	**AESTHETICS.** Would the project:				
a.	Have a substantial adverse effect on a scenic vista?				X
b.	Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings along a scenic highway?				X
c.	Substantially degrade the existing visual character or quality of the site and its surroundings?		X		
d.	Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?		X		

Potential impacts on aesthetics are described in Chapter 3, Section 3.1 of the PEA. Central Valley will implement the following APM as part of the project to avoid and minimize potentially significant impacts on aesthetics and visual resources in the project area.

AES-1: Implement measures to minimize visual impacts
The following measures will be implemented as part of the proposed project to minimize visual impacts of the project and to be consistent with Colusa County General Plan policies.

- Construction disturbances will be minimized to help reduce contrast between exposed soils and naturally vegetated areas, and clearing of vegetation and trees at facility sites will be minimized.
- Disturbed agricultural land will be replanted following pipeline construction, if requested by the landowner.
- The compressor station will be painted with non-glare, earth-tone colors to blend with the surrounding vegetation/landscape.
- Shielded, non-glare lighting will be used at facilities.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
II.	**AGRICULTURAL RESOURCES.** In determining whether impacts on agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation. Would the project:				
a.	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?		X		
b.	Conflict with existing zoning for agricultural use?		X		
c.	Conflict with a Williamson Act contract?			X	
d.	Involve other changes in the existing environment that, due to their location or nature, could result in conversion of Farmland to non-agricultural use?		X		

Potential impacts on agricultural resources are described in Chapter 3, Section 3.2 of the PEA. Central Valley will implement the following APMs as part of the project to avoid and minimize potentially significant impacts on agricultural resources in the project area.

AGRI-1: Compensate landowners for land acquired for easements and structures, crops, and improvements removed for project construction

As a public utility, Central Valley is required to offer appropriate compensation for land held in private ownership as part of the acquisition of utility easements. Central Valley will compensate landowners for any permanent crop losses at aboveground facility sites and temporary crop losses in the year of construction and, if applicable, will compensate for the permanent removal of any structures and agriculture-related improvements that is necessary to construct the project.

AGRI-2: Restore agricultural fields to preconstruction condition

Following construction, agricultural fields will be surveyed and regraded to their original elevation where needed, and all rice field dikes and check boxes will be repaired or replaced. Although the trench backfill in agricultural areas will be compacted to minimize settling, follow-up elevation surveys and finish grading will be provided, if necessary, to ensure that the field grading and irrigation flows are not adversely affected. Fences and irrigation facilities will be replaced or repaired to their original condition following construction.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
III.	**AIR QUALITY.**				
	When 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. Would the project:				
a.	Conflict with or obstruct implementation of the applicable air quality plan?				X
b.	Violate any air quality standard or contribute substantially to an existing or projected air quality violation?		X		
c.	Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is a nonattainment area for an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?		X		
d.	Expose sensitive receptors to substantial pollutant concentrations?		X		
e.	Create objectionable odors affecting a substantial number of people?			X	

Potential impacts related to air quality and greenhouse gas emissions are described in Chapter 3, Section 3.3 of the PEA. Central Valley will implement the following APMs as part of the project to avoid and minimize potentially significant impacts on air quality.

AIR-1: Implement measures to reduce PM10 dust generated by construction activities

The following measures will be implemented as part of the proposed project to minimize dust emissions and reduce short-term construction impacts to a less-than-significant level:

- Water all active construction areas (subject to vehicle travel) at least twice (as necessary) daily.
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet of freeboard.
- Water (as necessary) unpaved access roads, parking areas, and staging areas at construction sites that receive regular vehicle travel.
- Sweep daily with water sweepers all paved public roads where the pipeline ROW intersects the road.
- Sweep paved streets daily with water sweepers if visible soil material is carried onto adjacent public streets.

- Enclose, cover, water twice daily, or apply non-toxic soil binders to exposed stockpiles (e.g., dirt and sand).
- Limit traffic speeds on unpaved roads to 15 miles per hour.
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
- Replant vegetation in disturbed areas as quickly as possible, where determined appropriate and in consultation with the landowner.
- Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site.
- Limit the area subject to excavation, grading, and other construction activity at any one time.

Central Valley will notify the CPUC that it has been issued its "Authority to Construct" air permit before beginning construction of the compression facility.

AIR-2: Require measures to reduce NO_x emissions from all diesel powered construction equipment, including support equipment

Central Valley will implement the following measures to reduce NO_x emissions from all diesel powered construction equipment

- To the extent feasible, all construction diesel engines rated at 100 hp or more shall meet, at a minimum, the Tier 2 California Emissions Standards for Off-Road Compression-Ignition Engines as specified in Title 13 California Code of Regulations Section 2423(b)(1) unless such engine is not available for a particular type of equipment. In the event a Tier 2 engine is unavailable, that engine shall meet the Tier 1 standards. In the event that a Tier 1 engine is unavailable for any off-road engine larger than 100 hp, that engine shall be equipped with a catalyzed diesel particulate filter (soot filter), unless certified by the engine manufacturer that the use of such devices is not practical for specific engine types. For purposes of this mitigation, the use of such devices is considered not practical if:

    1. There is no available soot filter that has been certified by either the California Air Resources Board or the U.S. Environmental Protection Agency for the engine in question; or
    2. The construction equipment is intended to be on-site for 10 days or less.
    3. The use of a soot filter may be terminated immediately if one of the following conditions exists:
    4. The use of the soot filter is excessively reducing normal availability of the construction equipment due to increased downtime for maintenance and/or reduced power output due to an excessive increase in backpressure.

5. The soot filter is causing or is reasonably expected to cause significant engine damage.
6. The soot filer is causing or is reasonably expected to cause a significant risk to workers or the public
7. Any other seriously detrimental cause that has the approval of the CPUC prior to the termination being implemented.

- All heavy earthmoving equipment and heavy duty construction-related trucks with engines shall be properly maintained and the engines tuned to the engine manufacturer's specifications.
- To the extent feasible, unnecessary construction vehicle and idling time will be minimized. The ability to limit construction vehicle idling time is dependent upon the sequence of construction activities and when and where vehicles are needed or staged. Certain vehicles, such as large diesel powered vehicles, have extended warm-up times following start-up that limit their availability for use following startup. Where such diesel powered vehicles are required for repetitive construction tasks, these vehicles may require more idling time. The Proposed Project will apply a "common sense" approach to vehicle use; if a vehicle is not required for use immediately or continuously for construction activities, its engine will be shut off. Construction foremen will include briefings to crews on vehicle use as part of preconstruction conferences. Those briefings will include discussion of a "common sense" approach to vehicle use.

AIR-3: Central Valley will purchase NOx credits from the Colusa County Air Pollution Control District

Central Valley will purchase NOx emission credits from the CCAPCD in an amount that offsets all construction-related NOx emissions exceeding CCAPCD's significance threshold of 137 pounds per day, after implementation of AIR-2. Based on the NOx pounds per day emission estimates for each construction phase, and the length of those phases, NOx emissions would exceed the CCAPCD threshold by a total of 16,483 pounds, or 8.2 tons (see Appendix D). Consequently, Central Valley will need to purchase emission credits to offset this amount of NOx emissions.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
IV.	**BIOLOGICAL RESOURCES.** Would the project:				
a.	Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game (DFG) or U.S. Fish and Wildlife Service (USFWS)?		X		
b.	Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the DFG or USFWS?		X		
c.	Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marshes, vernal pools, coastal wetlands, etc.) through direct removal, filling, hydrological interruption, or other means?		X		
d.	Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?		X		
e.	Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?			X	
f.	Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan?				X

Potential impacts on biological resources are described in Chapter 3, Section 3.4 of the PEA. Central Valley will implement the following APMs as part of the project to avoid, minimize, and compensate for potentially significant impacts on biological resources in the project area.

BIO-1: Develop and implement a worker environmental awareness program

Before any work occurs in the project area, including grading, Central Valley will conduct mandatory contractor/worker environmental awareness training for construction, monitoring, supervisory, and engineering/inspection personnel. The awareness training will be provided to all construction personnel to discuss sensitive environmental resources known or having the potential occur in the project region; discuss best management plans; and permit conditions. If new construction personnel are added to the project, Central Valley will ensure that the personnel receive the mandatory training before starting work.

BIO-2: Obtain and comply with state, federal, and local permits

Before any construction activities are initiated and engineering plans and specifications have been finalized, Central Valley will obtain the permits listed below.

- CWA Section 404 nationwide permit from the USACE.
- CWA Section 401 water quality certification from the Central Valley Water Board (all Section 404 permits require a Section 401 water quality certification from RWQCB).
- CWA Section 402/NPDES permit from the State Water Board (requiring preparation of a SWPPP).
- Section 1602 Streambed Alteration Agreement and 2081 Agreement from DFG.
- Biological Opinion from USFWS.

Central Valley is responsible for obtaining all required permits and authorizations from local, state, and federal agencies. If a conflict arises between the provisions of any of the permits, Central Valley will comply with the provision that offers the greatest protection to water quality, species of special concern, and/or critical habitat. Copies of the permits will be provided to the contractor with the construction specifications.

BIO-3: Install temporary construction barrier fencing to protect sensitive biological resources adjacent to the construction zone

The construction specifications will require that a qualified biologist identify sensitive biological habitat onsite and identify areas to avoid during construction. Sensitive communities in the area that would generally be required for construction, including staging and access, will be fenced off to avoid disturbance in these areas. The contractor will install construction barrier fencing to identify environmentally sensitive areas. Sensitive resources that occur in and adjacent to the construction area include woody riparian vegetation, wetlands (including suitable habitat for federally-listed invertebrates), giant garter snake aquatic and upland habitat, western pond turtle aquatic habitat, elderberry shrubs that provide potential habitat for VELB, and trees that support nests of sensitive bird species.

Before construction, the contractor will work with the project engineer and a resource specialist to identify the locations that require barrier fencing, and will place stakes around the sensitive resource sites to indicate these locations. In some areas, staking and flagging may be appropriate and will be determined by the environmental compliance monitor. The protected area will be designated an environmentally sensitive area and clearly identified on the construction specifications. The fencing will be installed before construction activities are initiated and will be maintained throughout the construction period.

BIO-4: Minimize potential for the long-term loss of woody riparian vegetation

To the extent possible, Central Valley will direct the contractor to minimize the potential for the long-term loss of woody riparian vegetation by trimming vegetation rather than removing entire shrubs or trees. Using hand tools (e.g., clippers, chain saw), shrubs and trees may be trimmed to the extent necessary to gain access to the work zone. Cutting will be limited to the minimum area necessary and will only be done in areas that do not provide habitat for sensitive species. All cleared material/vegetation will be removed out of the riparian zone.

BIO-5: Compensate for the loss of woody riparian vegetation at a ratio of 2:1

Central Valley will compensate for the removal or loss of woody riparian vegetation (trees and shrubs) a minimum ratio of 2:1 (2 acres for every 1 acre removed). Central Valley will purchase mitigation bank credits at a locally approved bank or contribute funds to the National Fish and Wildlife Foundation in-lieu fee program. Central Valley will provide written evidence to CPUC and other appropriate resource agencies (e.g., DFG) that compensation has been established through the purchase of mitigation credits. The amount to be paid will be the fee that is in effect at the time the fee is paid.

BIO-6: Avoid and minimize disturbance of waters of the United States, including wetlands

To the extent possible, Central Valley will avoid and minimize impacts on waters of the United States, including wetlands by implementing the following measures. These measures will be incorporated into contract specifications and implemented by the construction contractor.

- The project will be designed, to the extent possible, to avoid direct and indirect impacts on waters of the United States, including wetlands.
- Construction activities will be avoided in saturated or ponded natural wetlands and drainages during the wet season (spring and winter) to the maximum extent possible. Where such activities are unavoidable, protective practices such as use of padding or vehicles with balloon tires will be employed.
- Exposed drainage banks and levees above drainages will be stabilized immediately upon completion of construction activities. Other waters of the United States will be restored in a manner that encourages vegetation to re-establish to its preproject condition and reduces the effects of erosion on the drainage system.

- Any trees, shrubs, debris, or soils that are inadvertently deposited below the OHWM of streams will be removed in a manner that minimizes disturbance of the drainage bed and bank.
- To the extent possible, in-stream construction within the OHWM of natural drainages crossed by a pipeline alignment will be restricted to the low-flow period (generally April through October).
- All activities will be completed promptly to minimize their duration and resultant impacts.

BIO-7: Conduct preconstruction surveys for active burrowing owl burrows and implement the California Department of Fish and Game guidelines for burrowing owl mitigation, if necessary

If wildlife surveys indicate that the annual grasslands west of the Glenn-Colusa Canal support potential burrows, Central Valley will retain a qualified biologist to conduct preconstruction surveys for active burrows according to DFG guidelines. DFG (1994) recommends that preconstruction surveys be conducted at all construction sites (except paved areas) and within a 250-foot-wide buffer zone around the construction site to locate active burrowing owl burrows.

If no burrowing owls are detected, then no further actions will be taken. If active burrowing owls are detected, the following measures will be implemented by Central Valley.

- When destruction of occupied burrows is unavoidable outside the nesting season (September 1–January 31), unsuitable burrows will be enhanced (enlarged or cleared of debris) or new burrows created (installing artificial burrows) at a ratio of 2:1 on protected lands approved by DFG. Newly created burrows will follow guidelines established by DFG.
- If owls must be moved away from the project construction area, passive relocation techniques (e.g., installing one-way doors at burrow entrances) will be used instead of trapping. At least 1 week will be necessary to accomplish passive relocation and allow owls to acclimate to alternate burrows.
- If active burrowing owl burrows are found and the owls must be relocated, Central Valley will offset the loss of foraging and burrow habitat in the project construction area by acquiring and permanently protecting foraging habitat (the acreage would be determined through consultation with DFG).
- If avoidance is the preferred method of dealing with potential impacts, no ground disturbing construction activities will occur within 160 feet of occupied burrows during the nonbreeding season (September 1–January 31) or within 250 feet during the breeding season (extends from March through August, peaking in April and May).

BIO-8: Avoid disturbance of tree-, shrub-, or ground-nesting white-tailed kite, northern harrier, loggerhead shrike, and non-special-status migratory birds and raptors

Central Valley will implement one of the following measures, depending on the specific construction timeframe, to avoid disturbance of tree-, shrub- or ground-nesting birds such as white-tailed kites, northern harriers, loggerhead shrikes, and white-faced ibis, and non-special-status migratory birds and raptors.

- For project components that are scheduled for construction during the breeding season for these species (generally between February 15 and August 15), a qualified wildlife biologist will be retained to conduct the following focused nesting surveys within the appropriate habitat.

  - Tree- and shrub-nesting surveys will be conducted in riparian and oak woodland habitats within or adjacent to the construction area to look for white-tailed kite, loggerhead shrike, and other non-special-status migratory birds and raptors.

  - Ground-nesting surveys will be conducted in annual grasslands and agricultural lands within and adjacent to the construction area to look for northern harrier and other non-special-status migratory birds.

  The surveys should be conducted within 2 weeks before initiation of construction activities and at any time between February 15 and August 15. If no active nests are detected, then no additional measures are required.

  If surveys indicate that migratory bird or raptor nests are found in any areas that would be directly affected by construction activities (e.g., the noise associated with construction would substantially exceed ambient noise levels associated with highway/road or agricultural noise), then a no-disturbance buffer will be established around the site to avoid disturbance or destruction of the nest site until after the breeding season or after a wildlife biologist determines that the young have fledged (usually late June to mid-July). The extent of these buffers will be determined by a wildlife biologist, and will depend on the level of noise or construction disturbance, line of sight between the nest and the disturbance, ambient levels of agricultural and highway/road noise and other disturbances, and other topographical or artificial barriers. These factors should be analyzed to make an appropriate decision on buffer distances.

- Construction activities that are scheduled to begin before the breeding season (i.e., begin between August 16 and February 15) (pre-existing construction) can proceed. Optimally, all necessary vegetation removal should be conducted before the breeding season (generally between February 15 and August 15) so that nesting birds or raptors would not occur in the construction area during construction activities. If any birds or raptors nest in the project vicinity under conditions existing before construction, then it is assumed that they are habituated (or will habituate) to the construction activities. Under this scenario, the preconstruction survey described previously should still be conducted on or after February 16 to identify any active nests in the vicinity, and active sites should be monitored by a wildlife biologist periodically until after the breeding season or after the young have fledged (usually late June to mid-July). If active nests are identified on or immediately adjacent to the project site, then all nonessential construction activities (e.g., equipment storage and meetings) should be avoided in the immediate vicinity of the nest site, but the remainder of construction activities may proceed.

All preconstruction surveys will be documented in a memo to the CPUC to support authorization of the notice to proceed for specific project components.

BIO-9: Establish a minimum 20-foot-wide buffer around all elderberry shrubs prior to construction in the area around the shrub

Before any ground-disturbing activity, Central Valley will ensure that a minimum 4-foot-tall temporary, plastic mesh–type construction fence is installed at least 20 feet from the driplines of elderberry shrubs that are within 100 feet of the construction area. The fencing will be installed in a way that prevents equipment from enlarging the work area beyond the delineated work area. The fencing will be checked and maintained weekly until all construction is completed.

No construction activity, including grading, will be allowed until this condition is satisfied. No grading, clearing, storage of equipment or machinery, or other disturbance or activity may occur until the CPUC environmental compliance monitor has inspected and approved all temporary construction fencing. The fencing and a note reflecting this condition will be shown on the construction plans.

BIO-10: Conduct preconstruction surveys for Swainson's hawk nests and implement appropriate restrictions

To ensure that possible impacts on nesting Swainson's hawks or their foraging habitat are less than significant, and that unauthorized take of Swainson's hawk does not occur, Central Valley will implement the following measures:

- Preconstruction surveys for nesting Swainson's hawks will be conducted in the project area. These surveys will occur during the breeding season before project activities begin.
- If a Swainson's hawk nest occurs in or adjacent to the project area and could be adversely affected by the increase in ambient noise levels associated with construction, Central Valley will follow DFG's recommendations for mitigating impacts to Swainson's hawks (California Department of Fish and Game 1994).

BIO-11: Conduct a preconstruction survey for western pond turtles and implement measures to avoid impacts

To avoid construction-related impacts on western pond turtles, Central Valley will retain a wildlife biologist to conduct a preconstruction survey for western pond turtles no more than 48 hours before the start of construction activities associated with the 14.9-mile gas pipeline component. The wildlife biologist will look for adult pond turtles. If a western pond turtle is located in the construction area, the biologist will move the turtle to a suitable aquatic site outside the construction area.

BIO-12: Implement avoidance and minimization measures during construction activities in giant garter snake habitat

Because of the nature and scale of anticipated adverse effects on giant garter snakes and their habitat, mitigation and compensation measures presented in this measure were derived primarily from the Service's Standard Avoidance and Minimization Measures during Construction Activities in Giant Garter Snake Habitat. Mitigation measures also are based on the guidance provided in the *Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California* (U.S. Fish and Wildlife Service 1997.)

Mitigation measures to avoid and minimize effects on the giant garter snake are as follows:

- At such time when construction plans are finalized, a biologist will conduct a preconstruction survey for giant garter snake and its habitat at each site where construction activities will occur. This survey will identify and document the specific locations of suitable habitat within, or adjacent to, proposed construction areas. The biologist will be responsible for submitting survey maps and immediately reporting the presence of the species, if found, to the USFWS in order to determine appropriate actions.

If giant garter snake habitat is identified during the preconstruction survey identified above, Central Valley will:

- Avoid construction activities within 200 feet from the banks of giant garter snake aquatic habitat and confine movement of heavy equipment to existing roadways to minimize habitat disturbance to the maximum extent feasible.
- Time construction activities within habitat so that they occur between May 1 and October 1. This is the active period for giant garter snakes and direct mortality is lessened, because snakes are expected to actively move and avoid danger.
- Inform construction personnel to recognize giant garter snakes and their habitat. Construction personnel should receive worker

environmental awareness training prior to undertaking work at construction sites.

- Survey the project area for giant garter snakes 24 hours prior to initiating construction activities. After construction has been initiated, a biologist will be available thereafter. If a snake is encountered during construction, the biologist will have the authority to stop all construction activity until appropriate corrective measures can be completed or it has been determined that the snake will not be harmed. A survey of the project area should be repeated if a lapse in construction activity of 2 weeks or greater has occurred. Sightings and acknowledgement of incidental take will be reported to the USFWS immediately.
- Confine clearing to the minimum area necessary to facilitate construction activities. Flag and designate avoided giant garter snake habitat within or adjacent to the project area as an environmentally sensitive area. This area should be avoided by all construction personnel.
- Ensure any dewatered habitat remains dry for at least 15 consecutive days after April 15 and prior to excavating or filling the dewatered habitat.
- Remove temporary fill and construction debris and, wherever feasible, restore disturbed areas to preproject conditions after construction activities. Restoration work may include such activities such as replanting species removed from banks or replanting emergent vegetation in the active channel.

BIO-13: Compensate for the temporary disturbance of giant garter snake habitat

Central Valley will compensate for temporary disturbance of giant garter snake habitat. This mitigation will be determined through consultation with USFWS and USACE and provided in the Biological Opinion. Based on a review of the Biological Opinions that were issued for the Wild Goose Gas Storage Expansion and Colusa Generating Station Projects, the USFWS will likely require a 1:1 ratio for temporary impacts to giant garter snake habitat. This mitigation ratio is consistent with the USFWS *Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted projects with Relatively Small Effects on Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California* (U.S. Fish and Wildlife Service 1997).

The Biological Opinion will be provided to the CPUC to support their issuance of a notice to proceed for project components that support suitable giant garter snake upland and aquatic habitat.

BIO-14: Implement avoidance and minimization measures during construction activities near vernal pool fairy shrimp and vernal pool tadpole shrimp habitat

Central Valley will avoid potential direct and indirect disturbance of vernal pool fairy shrimp and vernal pool tadpole shrimp habitat by implementing the following measures:

- The onsite biological monitor will be present during ground disturbance activities occurring west of the Glenn-Colusa Canal to ensure that habitat is avoided, will have the authority to stop all construction activities that may result in the destruction of habitat.
- Central Valley will prohibit all activities within 250 feet of suitable seasonal wetland habitat (unless there is a physical barrier such as a road or berm that eliminates a hydrologic connection and potential for indirect impacts to habitat during the winter months). This would include alteration of topography, dumping, burning, burying of garbage or fill materials, construction of access roads, placement of storm water drains, and use of pesticides or other toxic chemicals.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
V.	**CULTURAL RESOURCES.** Would the project:				
a.	Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?		X		
b.	Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?		X		
c.	Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?		X		
d.	Disturb any human remains, including those interred outside of formal cemeteries?		X		

Potential impacts on cultural resources (including archaeological, historic, and paleontological resources) are described in Chapter 3, Section 3.5 of the PEA. Central Valley will implement the following APMs as part of the project to avoid and minimize potentially significant impacts on known and unidentified cultural resources.

CR-1: Conduct additional field investigations and implement measures if sensitive cultural resources are found

Prior to construction, Central Valley will retain the services of a professional archaeologist to conduct onsite pedestrian inspections of those portions of the project area that are not flooded and that are considered by the archaeologist to have the potential to have archaeological deposits, and which have not already been subjected to archaeological inspection. Any identified cultural resources will be recorded on standard Department of Parks and Recreation site record forms. The archaeologist will consult with Central Valley to determine methods of avoiding impacts (such as boring under the resource or routing around the resource) on any potentially significant cultural resources that are identified as a result of these additional investigations. If any potentially significant cultural resources cannot be avoided, then additional documentation and data recovery efforts will be implemented by a qualified archaeologist in consultation with CPUC, USACE, and the State Historic Preservation Officer. Additional documentation will include preparation of formal NRHP and CRHR evaluations of recorded resources.

CR-2: Conduct archaeological monitoring and stop work if buried resources are discovered inadvertently

Central Valley and its construction contractor will take the steps specified below during project construction. A qualified archaeological monitor will inspect all ground-disturbing activities associated with pipeline construction preparation. Construction preparation will include removal of topsoil in agricultural areas, formation of berms to restrict flooding, and grading of staging areas. If buried cultural resources, such as chipped or ground stone, historic debris, building foundations, or human bone, are discovered inadvertently during ground-disturbing activities, work will stop in area of the find until a qualified archaeologist can assess the significance of the find and, if necessary, develop appropriate treatment measures in consultation with CPUC, the State Historic Preservation Officer, and other appropriate agencies. In the event that human remains are encountered, Mitigation Measure CR-3 will be implemented.

CR-3: Implement measures to comply with state laws relating to Native American remains

If human remains of Native American origin are discovered during project construction, it will be necessary to comply with state laws relating to the disposition of Native American burials, which fall under the jurisdiction of the NAHC (Public Resources Code, Section 5097). If any human remains are discovered or recognized 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 human remains, until:

- The Colusa County Coroner has been informed and has determined that no investigation of the cause of death is required and
- If the remains are of Native American origin,
  - The descendents of the deceased Native Americans have made a recommendation 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 a provided in Public Resources Code, Section 5097.98, or
  - NAHC is unable to identify a descendant or the descendant fails to make a recommendation within 24 hours after being notified by the NAHC.

CR-4: Implement measures to avoid effects on paleontological resources during construction

Central Valley will implement the following measures to avoid potential impacts on buried or previously unidentified paleontological resources.

Conduct paleontological resource training. As part of the preconstruction environmental training program, construction workers will be provided an overview of the paleontological resources that could occur in the project area. The training will be conducted to help construction workers to (1) identify potential paleontological resources encountered during excavation, and (2) review procedures in the event that a potential fossil is found. Specifically, the training may include a discussion of the following.

- Fossil identification (the paleontologist may present example fossils to the workers).
- The prohibition of collecting or intentionally disturbing fossils.
- Stopping all excavation and ground-disturbing work within 100 feet of the find.
- Procedures for notifying supervisors and site monitoring staff.
- A discussion of the paleontologist's authority to redirect or stop certain work operations.
- An overview of the actions that the paleontologist may take to identify the sensitivity of a fossil and to recover and curate a fossil.

Stop work if paleontological resources are discovered during construction. If a vertebrate fossil is discovered during construction, the contractor will stop work immediately in the area of the find until a qualified professional vertebrate paleontologist can assess the nature and importance of the find and recommend a course of action in consultation with CPUC and other appropriate agencies. If the fossil is determined to be of scientific importance, the course of action will involve preparation, recovery, and museum curation of the fossil. The course of action may also include preparation of a report for publication describing the find. Central Valley will be responsible for ensuring that the recommendations of the paleontologist regarding treatment and reporting are implemented.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
VI.	**GEOLOGY, SOILS, AND SEISMICITY.** Would the project:				
a.	Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:		X		
	1. 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.				
	2. Strong seismic groundshaking?				
	3. Seismic-related ground failure, including liquefaction?				
	4. Landslides?				
b.	Result in substantial soil erosion or the loss of topsoil?			X	
c.	Be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project and potentially result in an onsite or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse?		X		
d.	Be located on expansive soil creating substantial risks to life or property?		X		
e.	Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems in areas where sewers are not available for the disposal of wastewater?			X	

Potential impacts related to geology, soils, and seismicity are described in Chapter 3, Section 3.6 of the PEA. As part of the proposed project, Central Valley will implement the following measures to avoid and minimize long-term effects related to geologic, soil, and seismic site conditions in and adjacent to the proposed project area.

GEO-1: Develop site-specific seismic stress guidelines into facility design

Central Valley will retain a qualified professional geologist or geotechnical engineer to perform a site-specific seismic analysis for the project. The analysis will develop estimated peak ground accelerations and response spectra for the pipeline crossing site. The analysis will use geologic and seismic parameters, including distances to faults, major historical earthquakes, regional seismicity, and subsurface conditions.

GEO-2: Assess pipeline response to seismic ground accelerations and ground deformation resulting from seismic events

Central Valley will retain an expert in steel pipeline response to earthquakes who will use the results from the ground acceleration and liquefaction study (GEO-1) to assess the gas pipeline response to seismic, ground shaking, liquefaction, dynamic compaction, lateral spreading, and strains due to seismic wave propagation. The results and any recommendations contained in this analysis will be used in the design of the pipeline.

GEO-3: Construct project in accordance with state and county building and construction codes related to earthquake safety and structural stability

Central Valley will ensure that the project is constructed in accordance with all applicable state and county building and construction codes and ordinances related to earthquake safety and structural stability during ground shaking for above-ground structures. In addition, Central Valley will install safety vibration sensors in all relevant equipment to shut down operations should an earthquake occur that is of a magnitude that could jeopardize the integrity of the facilities. To support the project design, geotechnical soil borings will be performed to the extent necessary to determine the seismic structural design and construction requirements prescribed in the 2007 CBC.

GEO-4: Conduct geotechnical studies and implement specific measures in potential liquefaction-prone and expansive soil areas

Central Valley will conduct site-specific geotechnical studies and implement special construction in liquefaction-prone and expansive soil areas. Where appropriate, the measures listed below will be incorporated into the final facilities design.

- Excavation and removal or recompaction of liquefiable soils.
- In-situ ground densification.
- Ground modification and improvement.
- Deep foundations.
- Reinforced shallow foundations.
- Reinforced structures to resist deformation during liquefaction.

GEO-5: Assess pipeline response to surface deformation due to landslides or slumping at channel and canal pipeline crossings

Central Valley will ensure that the project is constructed in accordance with all applicable state and county building and construction codes and ordinances related to creek, drainage, and canal crossings. A qualified geologist and geotechnical engineer will be retained to evaluate the stability of the slopes or the pipeline design depth relative to existing slopes, or both, within these water drainages and canals.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
VII.	**HAZARDS AND HAZARDOUS MATERIALS.** Would the project:				
a.	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?		X		
b.	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?		X		
c.	Emit hazardous emissions or involve handling hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				X
d.	Be located on a site that 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?			X	
e.	Be located within an airport land use plan area or, where such a plan has not been adopted, be within two miles of a public airport or public use airport, and result in a safety hazard for people residing or working in the project area?				X
f.	Be located within the vicinity of a private airstrip and result in a safety hazard for people residing or working in the project area?			X	
g.	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				X
h.	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?		X		

Potential impacts related to hazards and hazardous materials are described in Chapter 3, Section 3.7 of the PEA. As part of the proposed project, Central Valley will implement the following measures to avoid and minimize potential impacts associated with construction and operation of the proposed project.

HAZ-1: Implement equipment maintenance and refueling restrictions

The construction equipment used for the proposed project will require periodic maintenance and refueling. To reduce the potential for contamination by spills, no refueling, storage, servicing, or maintenance of equipment will be allowed within 100 feet of sensitive environmental resources. No refueling or servicing will be allowed without the placement of absorbent material or drip pans underneath the vehicle to contain spilled fuel. Any fluids drained from the machinery during servicing will be collected in leak-proof containers and taken to an appropriate disposal or recycling facility. If such activities result in spilling or accumulation of a product on the soil, the contaminated soil will be assessed and disposed of properly. Under no circumstances will contaminated soils be added to a spoils pile.

Mobile refueling trucks likely will be used for onsite refueling of construction equipment. The refueling trucks will be independently licensed and regulated to haul and dispense fuels to ensure that the appropriate spill prevention techniques are implemented.

All maintenance materials (oils, grease, lubricants, antifreeze, and similar materials) will be stored at offsite staging areas. If these materials are required during field operations, they will be placed in a designated area away from site activities and sensitive resources.

During construction, vehicles and equipment not in use will be parked or stored at least 100 feet from water bodies, wetlands, known archaeological sites, and other sensitive resource areas. These areas will be identified on the construction drawings, as appropriate. All wash-down activities will be conducted at least 100 feet from sensitive environmental resources.

HAZ-2: Prepare and implement a construction and operation safety and emergency response plan

Central Valley will prepare a comprehensive Construction and Operation Safety and Emergency Response Plan that includes hazardous substance control, worker health and safety, incident response, and fire prevention and management. Each of these plan elements is briefly described below. The plan will be prepared prior to construction and submitted to the CPUC for review and approval.

Release of Hazardous Substances and Emergency Response Element
This element of the plan will include measures that will be implemented if an accidental release occurs or if any subsurface hazardous materials are encountered during construction and during future operation of the facility. The provisions outlined in this plan will include telephone numbers of county and state agencies and primary, secondary, and final clean-up procedures.

The plan will include the following measures to address hazardous materials generated from construction-related activities.

- Diesel fuel and petroleum-based lubricants will be stored only at designated staging areas.

- All hazardous material spills or threatened releases—including petroleum products such as gasoline, diesel, and hydraulic fluid, regardless of the quantity spilled—must be reported immediately if the spill has entered or threatens to enter a water of the state, has caused injury to a person, or threatens injury to public health.

Sudden Uncontrolled Release of Natural Gas and Emergency Response Element

This element of the plan will include measures that will be implemented if there was a failure or rupture of a pipeline or compressor station component during future operation of the facilities. The provisions outlined in this plan will include a callout procedure with telephone numbers of local fire and police responders, county and state agencies. The plan will address public safety measures, emergency evacuation routes and traffic control. Coordination and training with other parties like PG&E and the local fire and police departments will also be part of this plan.

Worker Health and Safety Element

This element of the plan will include provisions that establish worker training. This portion of the plan will also establish security measures to prevent unauthorized entry to cleanup sites and to reduce hazards outside the investigation/cleanup area. It will also address gas leaks, methods of evacuation, and general protection measures.

Fire Prevention and Management Element

To minimize the potential fire risks during summer construction activities, this element of the plan will identify fire management measures that will be implemented during construction and operation. The plan will include the notification procedures and emergency fire precautions listed below.

- All internal combustion engines, stationary and mobile, will meet applicable regulatory standards.
- Light trucks and cars with factory-installed (type) mufflers, in good condition, may be used on roads where the roadway is cleared of all vegetation.
- “No Smoking” signs and fire rules will be posted at the contractor field offices and areas visible to employees during the fire season.
- Equipment parking areas and small stationary engine sites will be cleared of all extraneous flammable materials.
- Fire extinguishers will be installed at the compressor station and metering station.
- Employee training in use of extinguishers and communication with the local fire departments will be provided to all personnel.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
VIII.	**HYDROLOGY AND WATER QUALITY.** Would the project:				
a.	Violate any water quality standards or waste discharge requirements?		X		
b.	Substantially deplete groundwater supplies or interfere substantially with groundwater recharge, resulting in 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 that would not support existing land uses or planned uses for which permits have been granted)?			X	
c.	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation onsite or offsite?		X		
d.	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 that would result in flooding onsite or offsite?		X		
e.	Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?			X	
f.	Otherwise substantially degrade water quality?		X		
g.	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?				X
h.	Place within a 100-year flood hazard area structures that would impede or redirect floodflows?			X	
i.	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?			X	
j.	Contribute to inundation by seiche, tsunami, or mudflow?				X

Potential impacts on hydrology and water quality are described in Chapter 3, Section 3.8. Central Valley will implement HAZ-1 and HAZ-2 the following APMs as part of the proposed project to reduce potential water quality and hydrology impacts associated with construction and operation of the proposed project.

HYDRO-1: Prepare and implement a storm water pollution prevention plan

The reclamation effort will involve restoration of temporarily disturbed areas (where necessary) and installation of erosion control measures to comply with County grading permits and the NPDES permit from the State Water Board. Central Valley will prepare a SWPPP that describes when, where, and how such site reclamation will occur. Site-specific erosion control measures (nonvegetative or mechanical techniques) will be determined on a site-specific basis as part of this SWPPP.

As part of the SWPPP, erosion and sediment control measures will be implemented to reduce the amount of soil that is displaced or transported from a land area and to control the discharge of soil particles that are displaced or transported. The standard control measures and practices listed below will be implemented during and after construction to reduce accelerated soil erosion and sedimentation impacts to a less-than-significant level.

- Remove only the vegetation that it is absolutely necessary to remove.
- Avoid off-road vehicle use outside the work zone.
- Avoid excessive trips along the ROW or access roads.
- Instruct all personnel on stormwater pollution prevention concepts to ensure that all are conscious of how their actions affect the potential for erosion and sedimentation.
- Perform initial cleanup.
- Compact subsurface backfill material.
- Apply an appropriate seed mix, where determined necessary, in nonagricultural areas and through coordination with the landowner.

Construction inspectors will be onsite during all construction activities and will reinforce the importance of confining all vehicular traffic to the existing ROW and access roads.

HYDRO-2: Prepare and implement a dewatering and discharge plan

Prior to construction of the gas pipeline, Central Valley will prepare a dewatering and discharge plan that describes the methods of dewatering and filtering the trench and hydrostatic test water; general locations where groundwater and hydrostatic test water will be discharged; and monitoring methods to ensure that surface waterways are not affected by the discharged water. A copy of this plan will be submitted to the CPUC for review and approval prior to its implementation.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
IX.	**LAND USE AND PLANNING.** Would the project:				
a.	Physically divide an established community?			X	
b.	Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, a general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?			X	
c.	Conflict with any applicable habitat conservation plan or natural community conservation plan?				X

Potential impacts related to land use and planning are described in Chapter 3, Section 3.9. As described in this section, no potentially significant impacts related to land use have been identified. Moreover, Central Valley will implement noise, visual, recreation, agricultural, and air quality measures as part of the proposed project to avoid and minimize potential land use impacts. No additional mitigation related to land use is necessary.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
X.	**MINERAL RESOURCES.** Would the project:				
a.	Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				X
b.	Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?				X

As described in Section 3.10, Mineral and Energy Resources, construction and operation of the proposed project would not likely interfere with or preclude the operation of mineral resource management in the region. Mineral resources will not be a significant environmental issue to address for the proposed project. Project implementation would not adversely affect any known natural gas or aggregate deposits. No significant aggregate deposits are mapped in the project area. Construction and operation of the project would not interfere with or preclude the operation of active natural gas fields in the region. The proposed project would also not conflict with Colusa County's policies for conservation of mineral resources.

Consequently, the proposed project would not have a significant effect on mineral and energy resources because it would not result in the loss of the availability of the resources specified in the significance criteria above. No mitigation is necessary.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XI.	**NOISE.** Would the project:				
a.	Expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?		X		
b.	Expose persons to or generate excessive groundborne vibration or groundborne noise levels?		X		
c.	Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?		X		
d.	Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?		X		
e.	Be located within an airport land use plan area, or, where such a plan has not been adopted, within two miles of a public airport or public use airport and expose people residing or working in the project area to excessive noise levels?				X
f.	Be located in the vicinity of a private airstrip and expose people residing or working in the project area to excessive noise levels?				X

Potential noise impacts are described in Chapter 3, Section 3.11. Central Valley will implement the following APM as part of the proposed project to reduce potential noise impacts associated with construction and operation of the proposed project.

NOI-1: Implement noise control measures

Central Valley will incorporate the following measures into the construction contract specifications to reduce and control noise generated from construction-related activities such that construction noise does not exceed 60 dBA-Lmax between 7 p.m. and 7 a.m. weekdays and all day on Sundays and legal holidays at adjacent residences.

- Prohibit noise-generating construction activity within 900 feet of occupied dwelling units between the hours of 7 p.m. and 7 a.m. on weekdays and all day on Sundays and legal holidays, unless written approval is obtained from the resident.
- Ensure that all construction equipment has sound-control devices no less effective than those provided on the original equipment. No equipment will have an unmuffled exhaust.

- Implement appropriate additional noise-reducing measures as may be necessary, including but not limited to:
  - Changing the location of stationary construction equipment,
  - Shutting off idling equipment,
  - Providing local enclosures or barriers around noise-generating equipment,
  - Rescheduling construction activity, and
  - Notifying nearby residents in advance of construction work.
- Using “heavy-duty” air filter/cleaner system on the engine intake to provide a reduction in engine air intake noise.
- Placing enclosures around equipment located outside the compressor building.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XII.	**POPULATION AND HOUSING.** Would the project:				
a.	Induce substantial population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?			X	
b.	Displace a substantial number of existing housing units, necessitating the construction of replacement housing elsewhere?			X	
c.	Displace a substantial number of people, necessitating the construction of replacement housing elsewhere?				X

Potential impacts on population and housing are described in Chapter 3, Section 3.12. As described in this section, there are several hotels, motels, RV parks, camping sites, rental properties, and housing opportunities in Colusa County or within a 60-mile commute radius. The temporary increase in demand for temporary housing associated with the project is expected to be accommodated regardless of the phase of the project or the time of year and is expected to provide economic benefits to the community. Accordingly, the impact of the proposed project on temporary housing is less than significant; no mitigation is necessary.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XIII.	**PUBLIC SERVICES.** Would the project:				
a.	Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities or a need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:				
	Fire protection?			X	
	Police protection?			X	
	Schools?				X
	Parks?				X
	Other public facilities?			X	

Potential impacts of the project on local and regional public services are described in Chapter 3, Section 3.13. This analysis determined that the potential impacts on public services would be less than significant. Therefore, no mitigation is necessary.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XIV.	**RECREATION.**				
	Would the project:				
a.	Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?			X	
b.	Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?				X

Potential impacts on local recreation facilities and activities are described in Chapter 3, Section 3.14. Central Valley will implement the following applicant-proposed measure as part of the proposed project to avoid conflicts with seasonal recreation activities in the project area.

REC-1: Coordinate with adjacent national wildlife refuges and landowners and implement measures to avoid conflicts with seasonal recreation activities

Prior to finalizing the construction schedule and engineering plans, Central Valley will contact the Sacramento and Delevan NWRs and landowners to discuss the construction schedule and appropriate measures that could be implemented to reduce the impact on seasonal recreation activities (hunting and bird-watching). Measures that may be implemented to ensure that construction does not conflict with fall/winter hunting season and birding on the adjacent wildlife refuges and private properties are listed below.

- Restrict construction activities to certain locations and times of day (avoiding early mornings and evening in hunting areas).
- Post signs that notify recreationists of construction activities.
- Mail and post fliers that notify the public of construction activities.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XV.	**TRANSPORTATION AND TRAFFIC.** Would the project:				
a.	Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections)?		X		
b.	Cause, either individually or cumulatively, exceedance of a level-of-service standard established by the county congestion management agency for designated roads or highways?		X		
c.	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?				X
d.	Substantially increase hazards because of a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?			X	
e.	Result in inadequate emergency access?			X	
f.	Result in inadequate parking capacity?			X	
g.	Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?				X

Potential impacts on transportation and traffic are described in Chapter 3, Section 3.15. In addition to implementing the following applicant-proposed measure, Central Valley will also enter into a road maintenance agreement with the County to cover any potential construction-related damage to public roads. The construction traffic plan described below will be prepared prior to construction and will be submitted to the County and CPUC for review.

TRA-1: Prepare and implement a construction traffic plan
Central Valley will prepare a construction traffic plan to minimize short-term construction-related impacts on local traffic. These measures will include installation of temporary warning signs at appropriate locations along major road intersections. The signs will be placed at strategic locations near points of access and will be removed after all construction-related activities are completed. The plan will include (but not be limited to) the measures listed below.

- Coordinate with Colusa County on any lane or road closures, if needed to construct improvements.
- Install traffic control devices.
- Provide alternate routes (detours), as necessary, to route local traffic around roadway construction.
- Provide notification of any road closures to residents in the vicinity of construction.
- Provide access to driveways, private roads, and agricultural roads outside the immediate construction zone.
- Consult with emergency service providers and develop an emergency access plan for emergency vehicle access in and adjacent to the construction zone.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XVI.	**UTILITIES AND SERVICE SYSTEMS.** Would the project:				
a.	Exceed wastewater treatment requirements of the applicable RWQCB?				X
b.	Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X
c.	Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X
d.	Have sufficient water supplies available to serve the project from existing entitlements and resources, or would new or expanded entitlements be needed?				X
e.	Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				X
f.	Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?			X	
g.	Conflict with federal, state, and local statutes and regulations related to solid waste?				X
h.	Interfere with existing services or utility infrastructure, resulting in the disruption of provider service?			X	

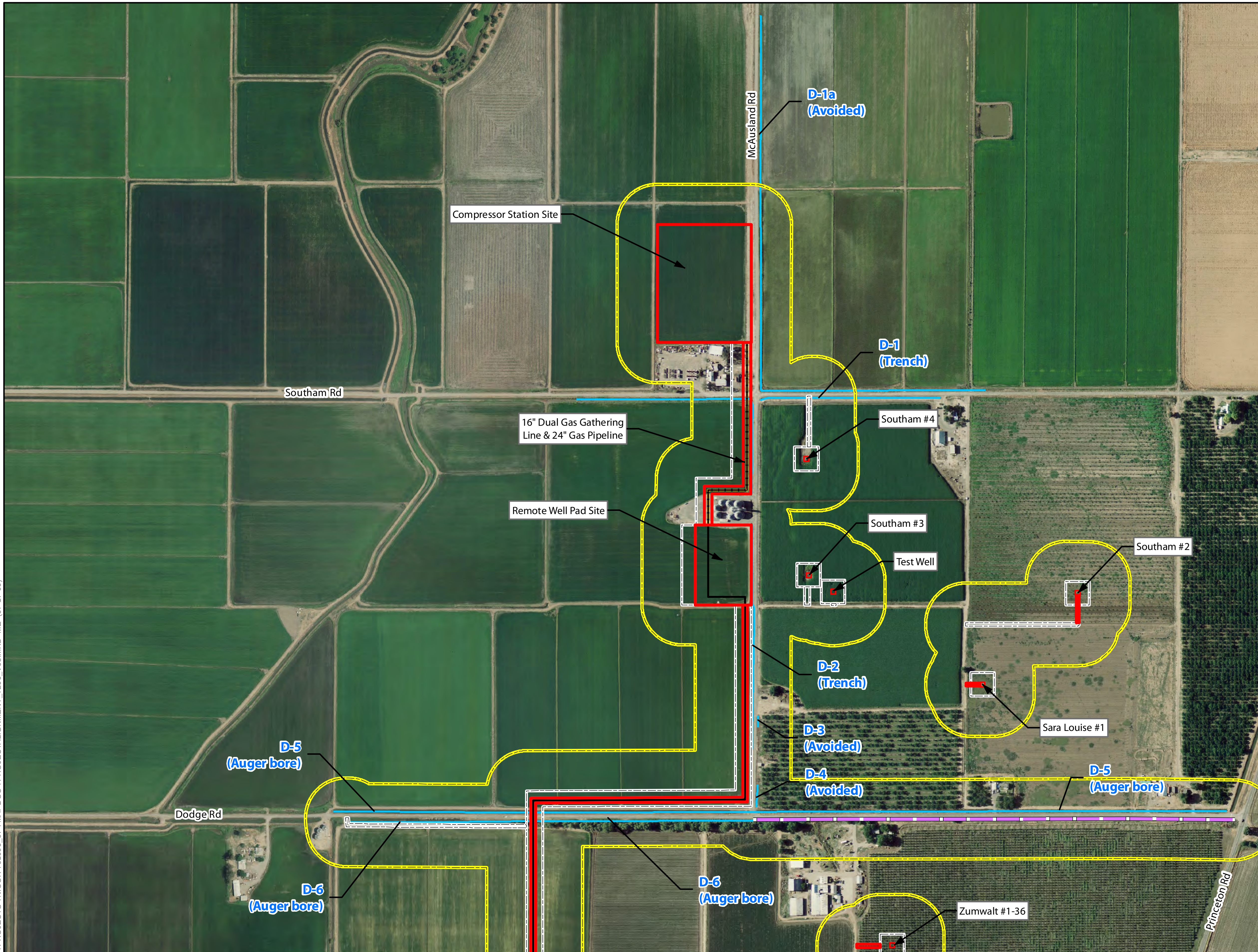
Potential impacts on utility and service systems that would support the project area are described in Chapter 3, Section 3.16. The analysis contained in this section determined that construction and operation of the proposed project would not result in significant impacts on local utilities and service systems. Accordingly, Central Valley is not proposing any additional measures related to utilities and services systems. No mitigation is necessary.

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
XVII.	**MANDATORY FINDINGS OF SIGNIFICANCE.**				
a.	Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?		X		
b.	Does the project have impacts that are individually limited but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)		X		
c.	Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?		X		

Central Valley is proposing to implement a variety of applicant-proposed measures as part of the proposed project to mitigate potential individual and cumulative impacts on environmental resources. Therefore, the proposed project would not result in potentially significant and unavoidable impacts related to the mandatory findings of significance listed above.

Exhibit 1

Project Alignment Maps



Sheet 1

Central Valley Gas Storage Project
Project Alignment Maps
July 2009

Project Elements

- HDD Bore Location
- Limit of Permanent Impact
- Limit of Temporary Impact
- Alignment Centerline
- PG&E 12kV Line
- PG&E 400/401 Line

Biological Elements

- 250-foot Biological Study Area
- Valley Elderberry Longhorn Beetle Habitat
- Drainages

Native Habitats

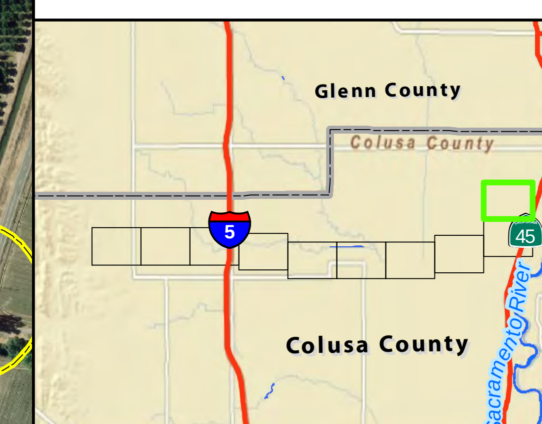
- Fremont Cottonwood Riparian Woodland
- Freshwater Marsh
- Non-Native Annual Grassland
- Horticultural Plantings
- Seasonal Wetlands

Aerial Source: Rooney Engineering Inc. 2008

N

0 250 500 1,000 Feet

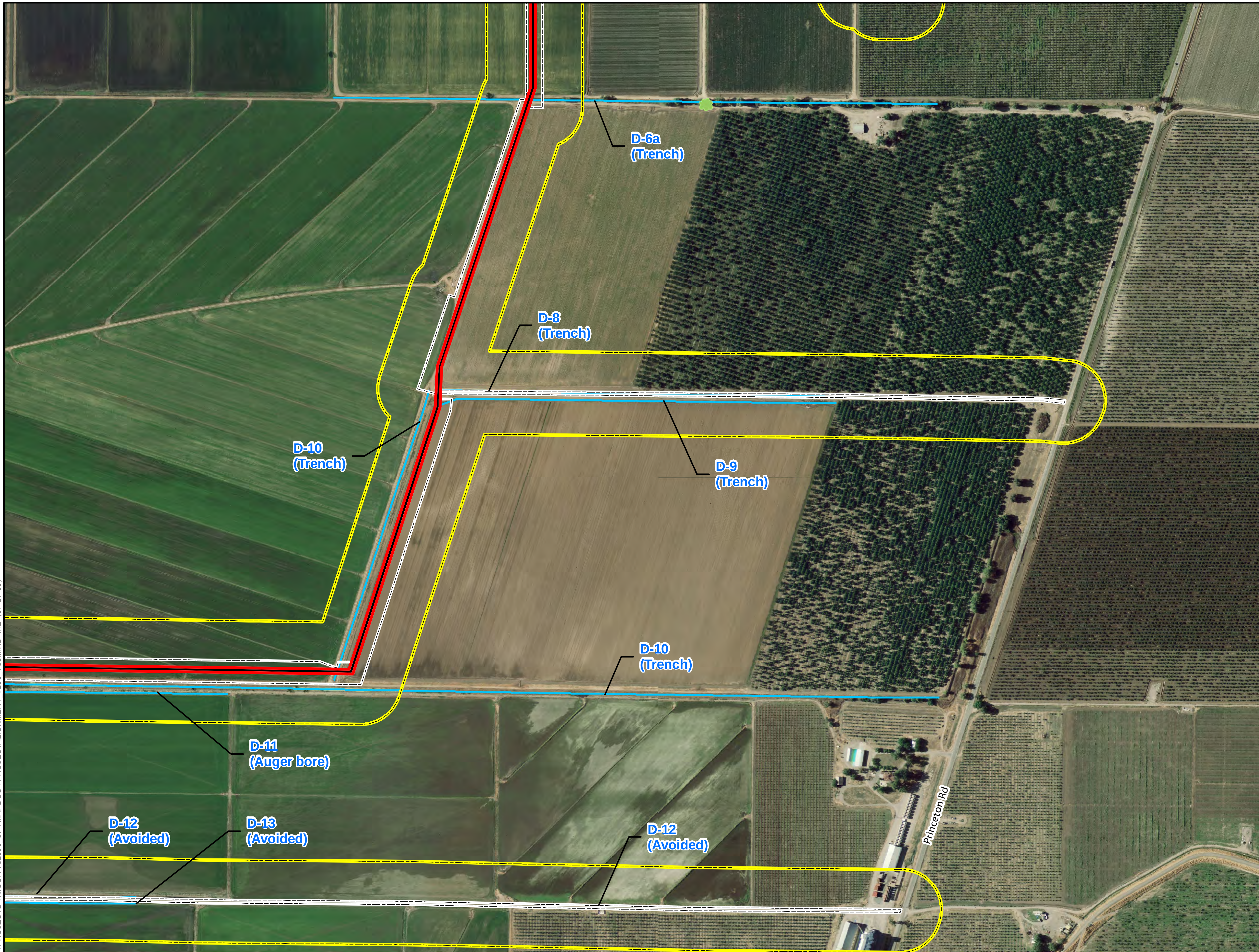
1 inch = 600 feet



Prepared by: ICF Jones & Stokes

Prepared for: central Valley gas storage LLC

Q:\PROJECTS\NICOR\01099_07\MAPDOC\PROJECTALIGNMENT_7200_V05.MXD ME (07-17-09)



Sheet 2

Central Valley Gas Storage Project
Project Alignment Maps
July 2009

Project Elements

- HDD Bore Location
- Limit of Permanent Impact
- Limit of Temporary Impact
- Alignment Centerline
- PG&E 12kV Line
- PG&E 400/401 Line

Biological Elements

- 250-foot Biological Study Area
- Valley Elderberry Longhorn Beetle Habitat
- Drainages

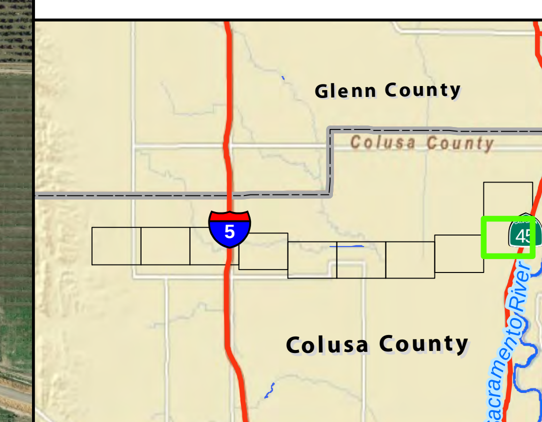
Native Habitats

- Fremont Cottonwood Riparian Woodland
- Freshwater Marsh
- Non-Native Annual Grassland
- Horticultural Plantings
- Seasonal Wetlands

Aerial Source: Rooney Engineering Inc. 2008

0 250 500 1,000 Feet

1 inch = 600 feet



Prepared by: ICF Jones & Stokes

Prepared for: central valley gas storage LLC

Q:\PROJECTS\NICOR\01099_07\MAPDOC\PROJECTALIGNMENT_7200_V05.MXD ME (07-17-09)

Q:\PROJECTS\NICOR\01099_07\MAPDOC\PROJECTALIGNMENT_7200_V05.MXD ME (07-17-09)

Sheet 4

Central Valley Gas Storage Project
Project Alignment Maps
July 2009

Project Elements

- HDD Bore Location
- Limit of Permanent Impact
- Limit of Temporary Impact
- Alignment Centerline
- PG&E 12kV Line
- PG&E 400/401 Line

Biological Elements

- 250-foot Biological Study Area
- Valley Elderberry Longhorn Beetle Habitat
- Drainages

Native Habitats

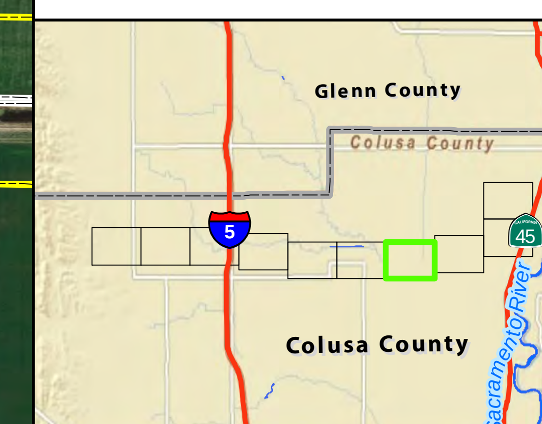
- Fremont Cottonwood Riparian Woodland
- Freshwater Marsh
- Non-Native Annual Grassland
- Horticultural Plantings
- Seasonal Wetlands

Aerial Source: Rooney Engineering Inc. 2008

N

0 250 500 1,000 Feet

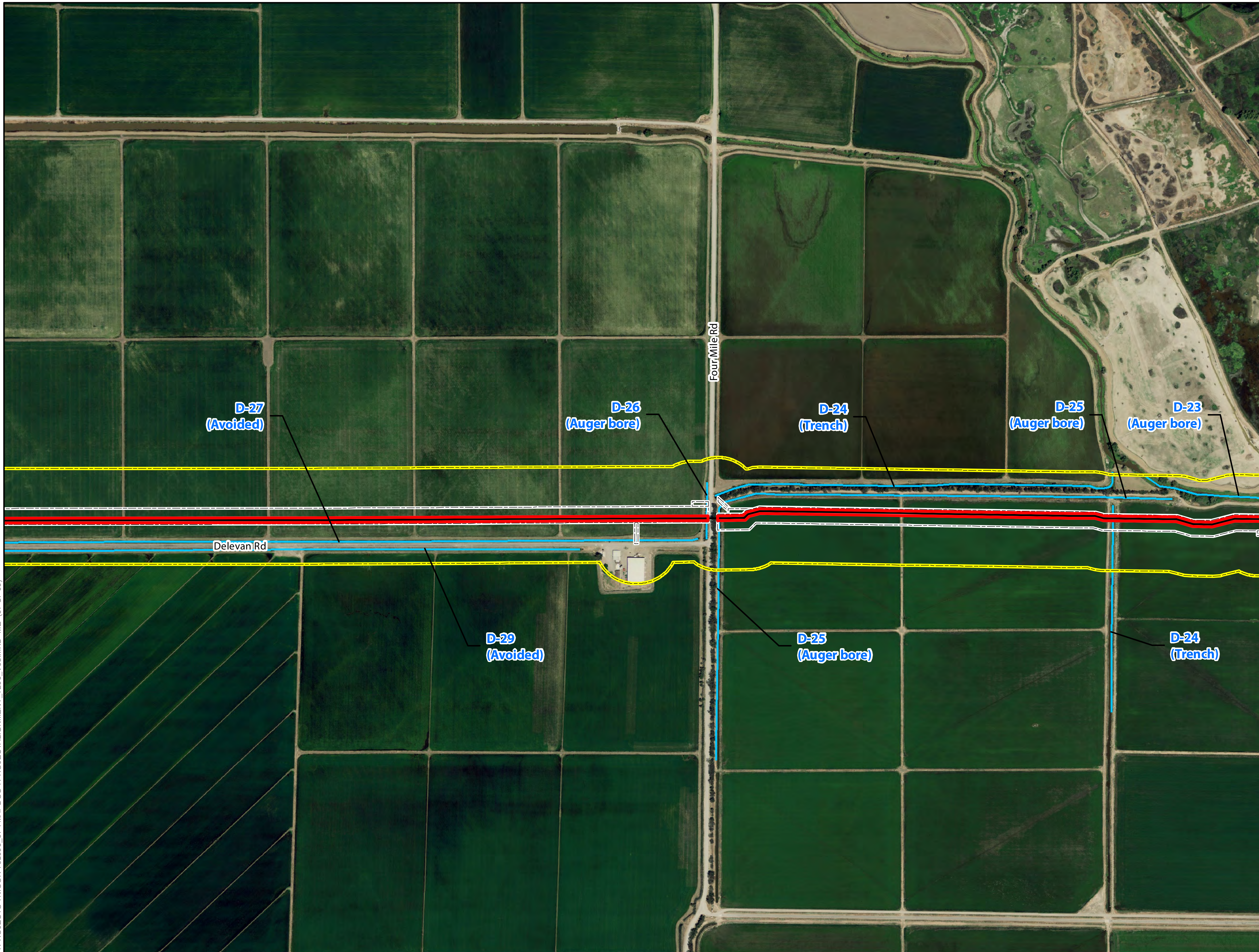
1 inch = 600 feet

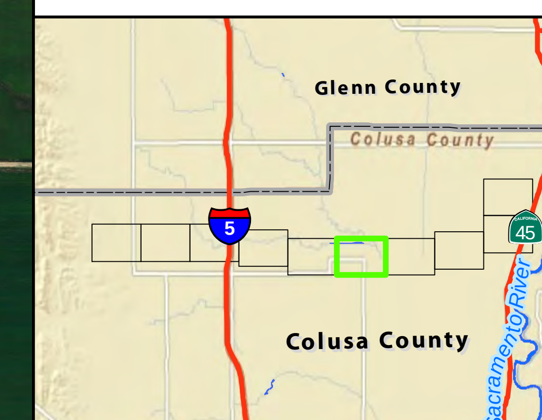


Prepared by: ICF Jones & Stokes

Prepared for: central valley gas storage LLC

Q:\PROJECTS\NICOR\01099_07\MAPDOC\PROJECTALIGNMENT_7200_V05.MXD ME (07-17-09)





Sheet 5

Central Valley Gas Storage Project
Project Alignment Maps
July 2009

Project Elements

- HDD Bore Location
- Limit of Permanent Impact
- Limit of Temporary Impact
- Alignment Centerline
- PG&E 12kV Line
- PG&E 400/401 Line

Biological Elements

- 250-foot Biological Study Area
- Valley Elderberry Longhorn Beetle Habitat
- Drainages

Native Habitats

- Fremont Cottonwood Riparian Woodland
- Freshwater Marsh
- Non-Native Annual Grassland
- Horticultural Plantings
- Seasonal Wetlands

Aerial Source: Rooney Engineering Inc. 2008

0 250 500 1,000 Feet

1 inch = 600 feet

Prepared by: ICF Jones & Stokes

Prepared for: central Valley gas storage LLC

Q:\PROJECTS\NICOR\01099_07\MAPDOC\PROJECTALIGNMENT_7200_V05.MXD ME (07-17-09)

Sheet 6

Central Valley Gas Storage Project
Project Alignment Maps
July 2009

Project Elements

- HDD Bore Location
- Limit of Permanent Impact
- Limit of Temporary Impact
- Alignment Centerline
- PG&E 12kV Line
- PG&E 400/401 Line

Biological Elements

- 250-foot Biological Study Area
- Valley Elderberry Longhorn Beetle Habitat
- Drainages

Native Habitats

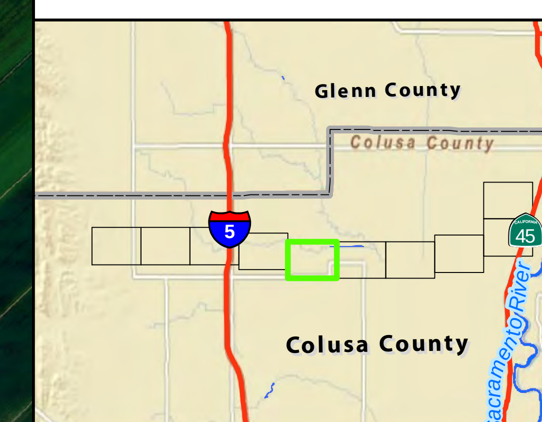
- Fremont Cottonwood Riparian Woodland
- Freshwater Marsh
- Non-Native Annual Grassland
- Horticultural Plantings
- Seasonal Wetlands

Aerial Source: Rooney Engineering Inc. 2008

N

0 250 500 1,000 Feet

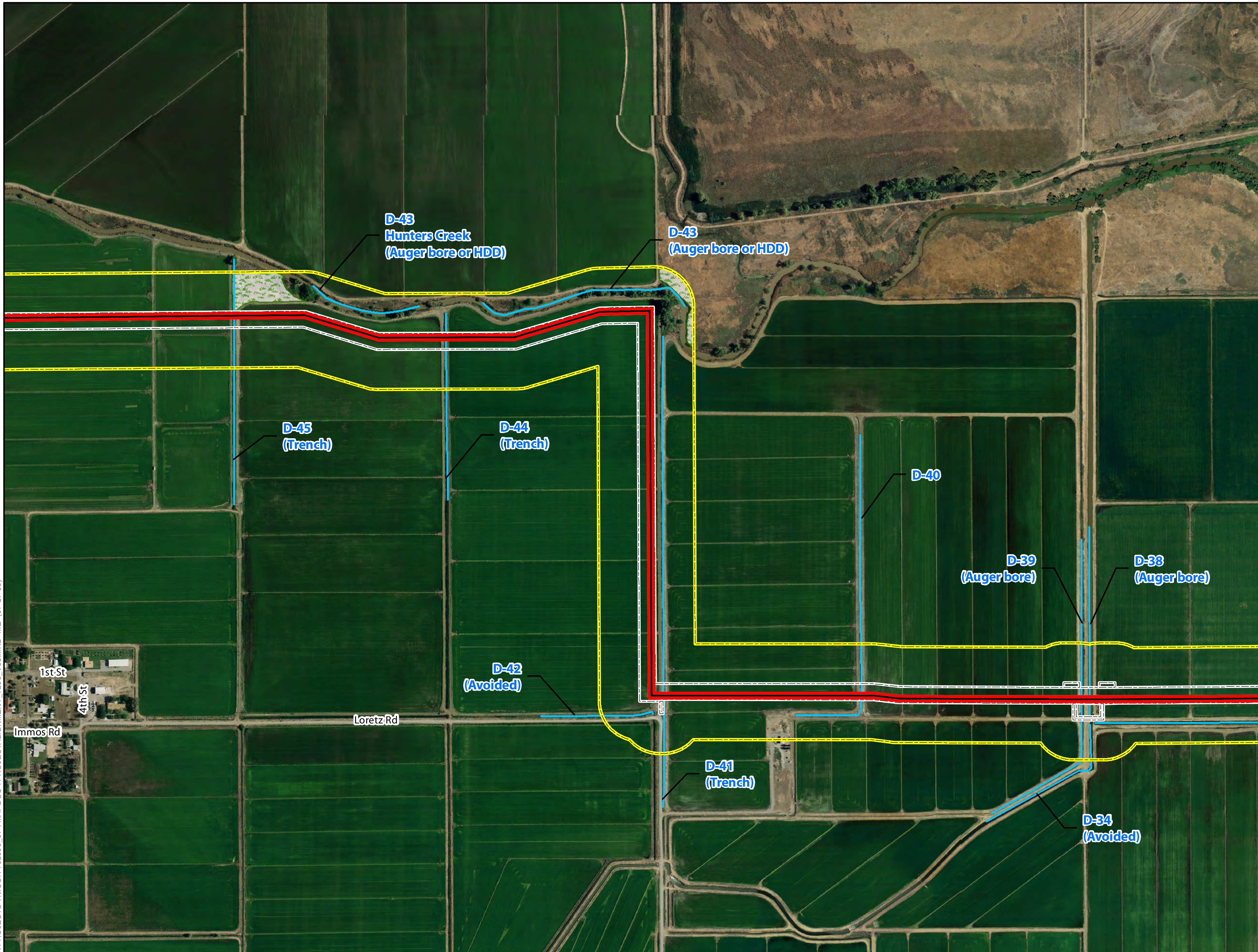
1 inch = 600 feet



Prepared by: ICF Jones & Stokes

Prepared for: central valley gas storage LLC

Q:\PROJECTS\NICOR\01099_07\MAPDOC\PROJECTALIGNMENT_7200_V05.MXD ME (07-17-09)



Sheet 7

Central Valley Gas Storage Project
Project Alignment Maps
July 2009

Project Elements

- HDD Bore Location
- Limit of Permanent Impact
- Limit of Temporary Impact
- Alignment Centerline
- PG&E 12kV Line
- PG&E 400/401 Line

Biological Elements

- 250-foot Biological Study Area
- Valley Elderberry Longhorn Beetle Habitat
- Drainages

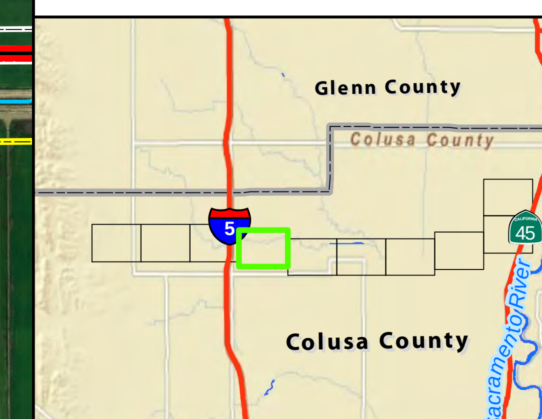
Native Habitats

- Fremont Cottonwood Riparian Woodland
- Freshwater Marsh
- Non-Native Annual Grassland
- Horticultural Plantings
- Seasonal Wetlands

Aerial Source: Rooney Engineering Inc. 2008

0 250 500 1,000 Feet

1 inch = 600 feet



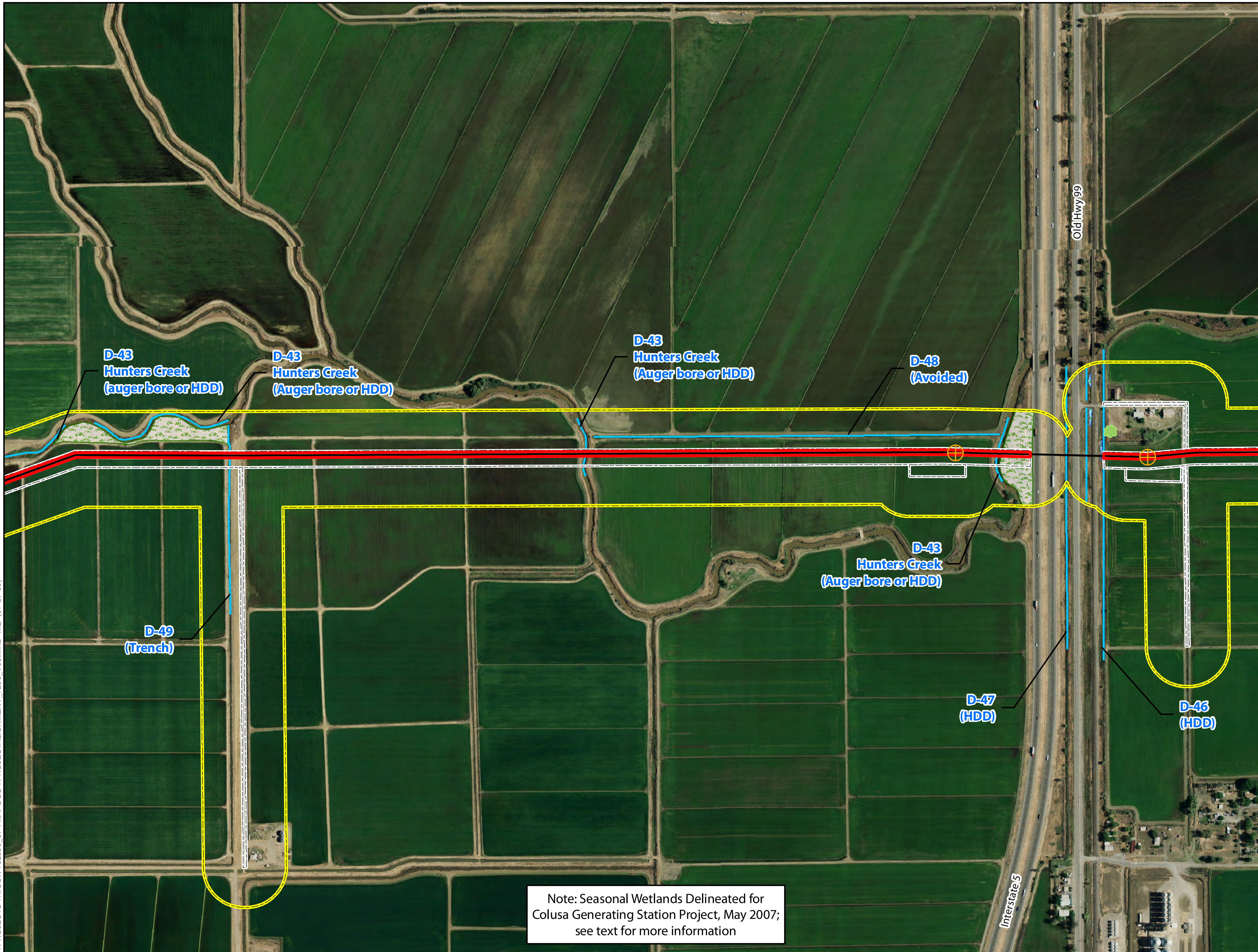
Prepared by: ICF Jones & Stokes

Prepared for: central Valley gas storage LLC

Q:\PROJECTS\NICOR\01099_07\MAPDOC\PROJECTALIGNMENT_7200_V05.MXD ME (07-17-09)

Sheet 8

Central Valley Gas Storage Project
Project Alignment Maps
July 2009



Project Elements

- HDD Bore Location
- Limit of Permanent Impact
- Limit of Temporary Impact
- Alignment Centerline
- PG&E 12kV Line
- PG&E 400/401 Line

Biological Elements

- 250-foot Biological Study Area
- Valley Elderberry Longhorn Beetle Habitat
- Drainages

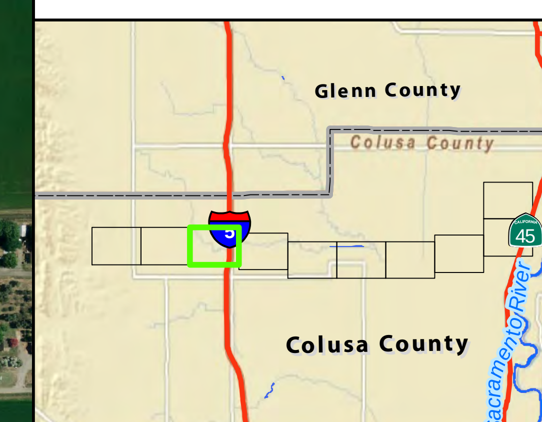
Native Habitats

- Fremont Cottonwood Riparian Woodland
- Freshwater Marsh
- Non-Native Annual Grassland
- Horticultural Plantings
- Seasonal Wetlands

Aerial Source: Rooney Engineering Inc. 2008

0 250 500 1,000 Feet

1 inch = 600 feet



Prepared by: ICF Jones & Stokes

Prepared for: central valley gas storage LLC

Q:\PROJECTS\NICOR\01099_07\MAPDOC\PROJECTALIGNMENT_7200_V05.MXD ME (07-17-09)

Sheet 9

Central Valley Gas Storage Project
Project Alignment Maps
July 2009

Project Elements

- HDD Bore Location
- Limit of Permanent Impact
- Limit of Temporary Impact
- Alignment Centerline
- PG&E 12kV Line
- PG&E 400/401 Line

Biological Elements

- 250-foot Biological Study Area
- Valley Elderberry Longhorn Beetle Habitat
- Drainages

Native Habitats

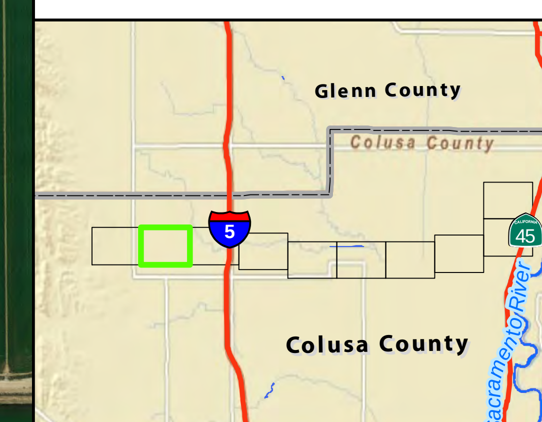
- Fremont Cottonwood Riparian Woodland
- Freshwater Marsh
- Non-Native Annual Grassland
- Horticultural Plantings
- Seasonal Wetlands

Aerial Source: Rooney Engineering Inc. 2008

N

0 250 500 1,000 Feet

1 inch = 600 feet



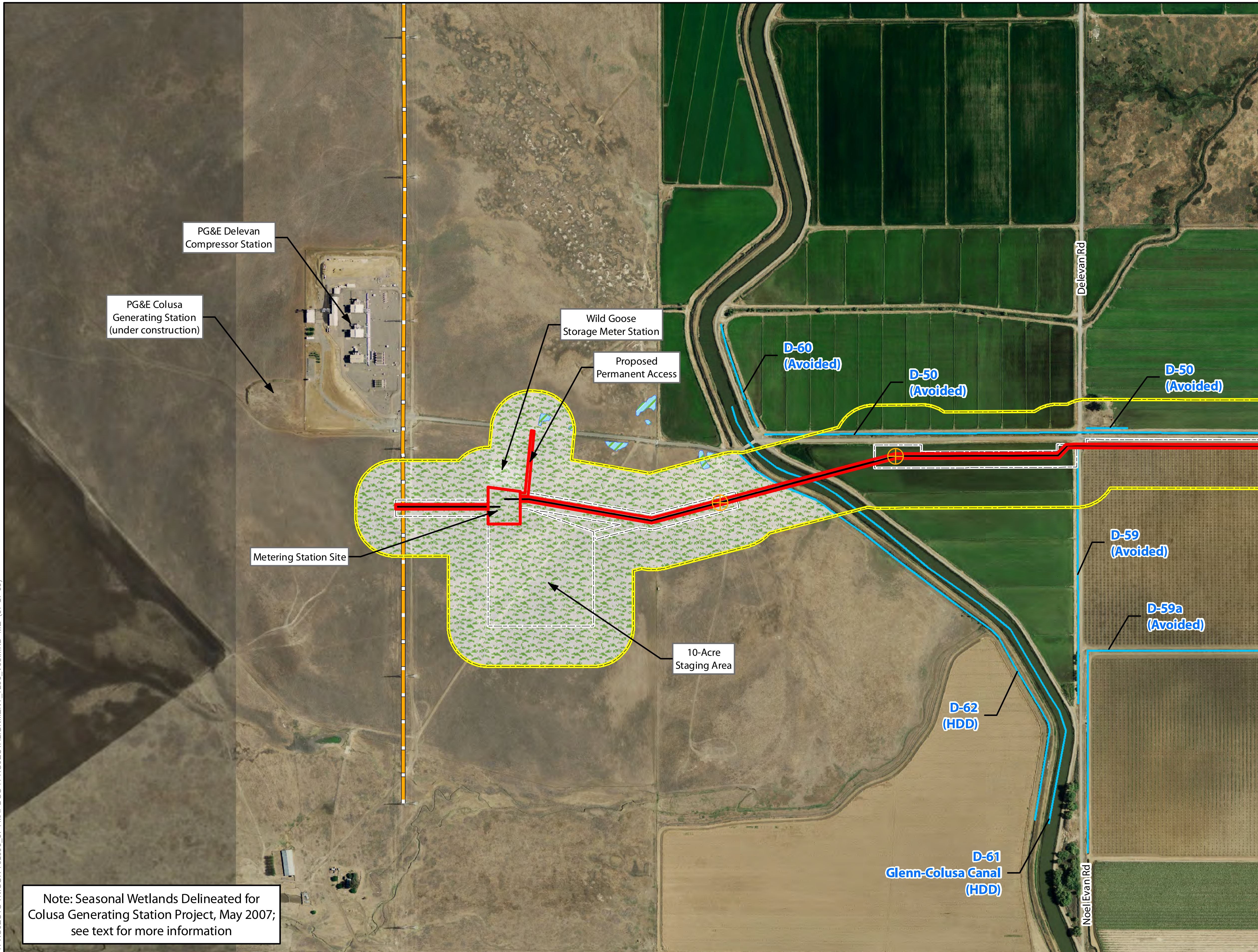
Prepared by: ICF Jones & Stokes

Prepared for: central Valley gas storage LLC

Q:\PROJECTS\NICOR\01099_07\MAPDOC\PROJECTALIGNMENT_7200_V05.MXD ME (07-17-09)

Sheet 10

Central Valley Gas Storage Project
Project Alignment Maps
July 2009



Project Elements

- HDD Bore Location
- Limit of Permanent Impact
- Limit of Temporary Impact
- Alignment Centerline
- PG&E 12kV Line
- PG&E 400/401 Line

Biological Elements

- 250-foot Biological Study Area
- Valley Elderberry Longhorn Beetle Habitat
- Drainages

Native Habitats

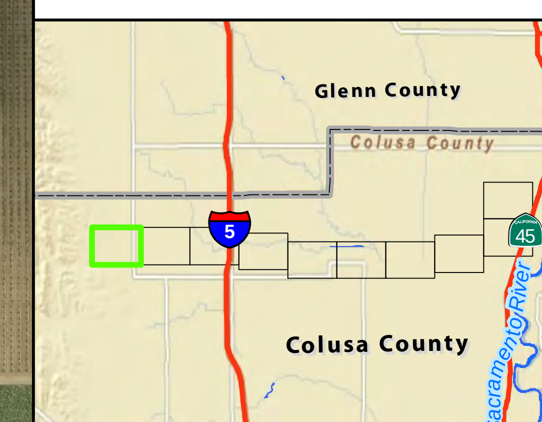
- Fremont Cottonwood Riparian Woodland
- Freshwater Marsh
- Non-Native Annual Grassland
- Horticultural Plantings
- Seasonal Wetlands

Aerial Source: Rooney Engineering Inc. 2008

N

0 250 500 1,000 Feet

1 inch = 600 feet



Prepared by: ICF Jones & Stokes

Prepared for: central Valley gas storage LLC

Q:\PROJECTS\NICOR\01099_07\MAPDOC\PROJECTALIGNMENT_7200_V05.MXD ME (07-17-09)