4. EXPANDED DESCRIPTION OF THE PROJECT

4.1 INTRODUCTION

Central Valley Gas Storage, LLC (Central Valley), a wholly owned subsidiary of Nicor, Inc., of Illinois, submitted an application to the California Public Utilities Commission (CPUC) for a Certificate of Public Convenience and Necessity (CPCN) for the purpose of developing the Central Valley Gas Storage Project (project). The application and accompanying Proponent's Environmental Assessment (PEA) describes the proposed project.

Central Valley proposes to convert, construct, and operate the depleted Princeton Gas Field, located south of the town of Princeton in Colusa County, California, as a natural gas storage facility (Figure 4-1 shows the regional location of the proposed project). The conversion of the depleted gas field will require the construction of surface facilities, including a compressor station, remote well pad site, observation wells, metering station, and natural gas connecting pipelines. Permanent and temporary acreages required to construct and operate the project are approximately 75 acres for permanent acreage (includes permanent right-of-way (ROW) easement for future maintenance and operation of connecting pipelines) and approximately 194 acres for temporary construction of project. The project includes construction, operation, and maintenance of the following components (Figure 4-2 shows an overview of the location of project components, and Appendix A, Project Alignment Sheets, provides a detailed view of each component):

- Princeton Gas Storage Field (natural gas storage reservoir)
- Surface facilities, including
    - Compressor station and associated facilities on a 10-acre site (including the installation of an approximate 3,500-foot-long electrical distribution line that would connect the compressor station to an existing 12 kV Pacific Gas & Electric Company (PG&E) line)
    - Remote well pad site on a 3.1-acre site that includes up to ten injection/withdrawal wells and a 130,000 -gallon saltwater storage tank
    - Saltwater disposal well (the existing Central Valley test well will be converted to a saltwater disposal well and connected to the remote well pad by a 800-foot-long, 6-inch water drain pipeline)
    - Observation wells (involves conversion of up to three existing wells, drilling one new well, and re-entry into one plugged well)
    - Metering station on a 1-acre site near PG&E Line 400/401
- Natural gas connecting pipelines, including
    - A 1,950-foot-long, dual 16-inch gathering line system to connect the injection/withdrawal wells to the compressor station
    - A 170-foot-long, 8-inch gas pipeline, and use of a meter skid and rental compressor unit for a temporary connection to PG&E Line 172
    - A 14.7-mile-long, 24-inch diameter gas pipeline, which would connect the compressor station to the metering station, plus a 580-foot interconnect from the edge of the metering station to PG&E Line 400/401. The gas pipeline would be buried approximately 5 feet below the ground surface.

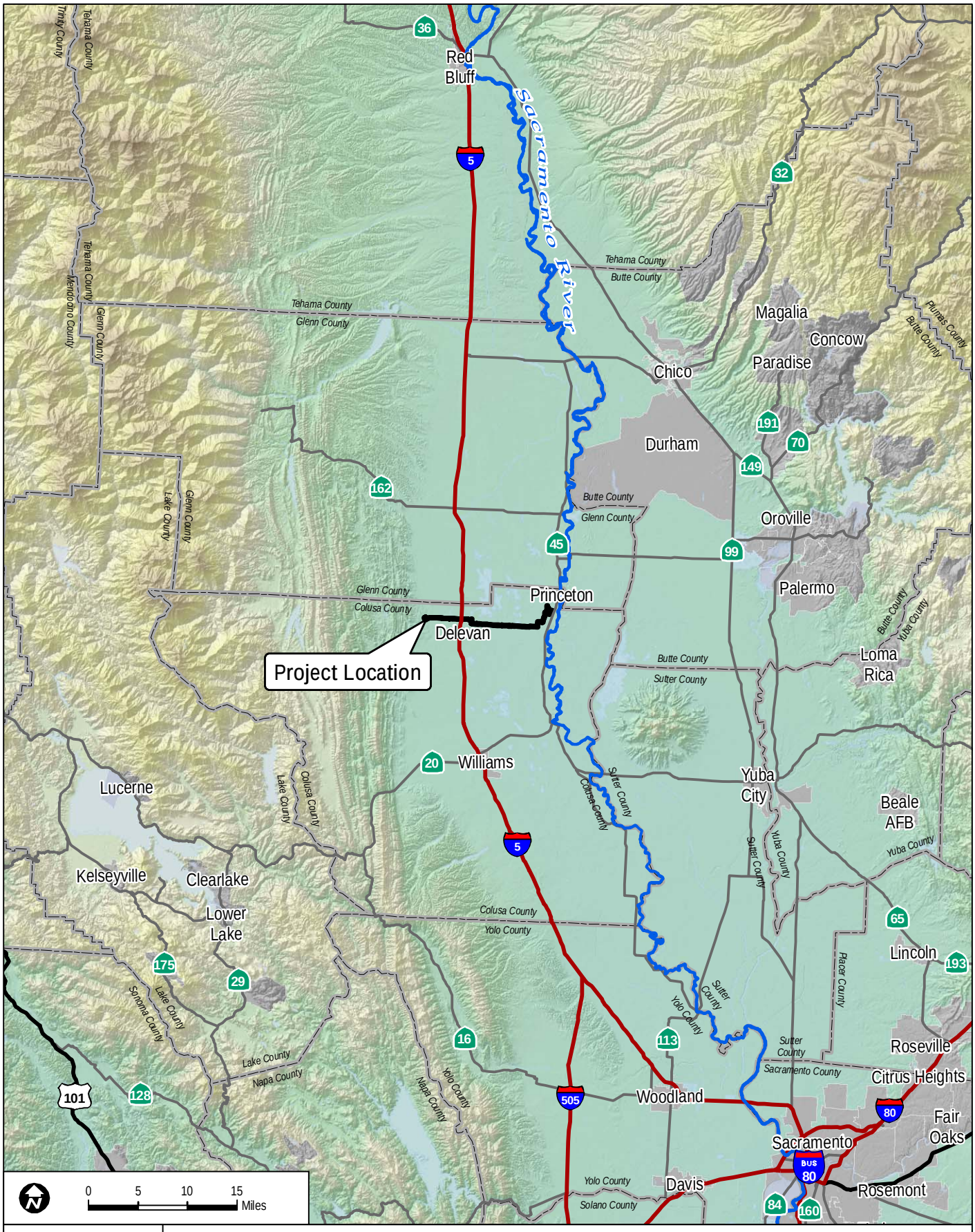
4.2 PROJECT PURPOSE AND NEED

The purpose of the proposed project is to add high-deliverability natural gas storage in northern California that is connected to PG&E Line 400/401. The project has 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.
- Mitigate potentially costly conditions related to California's reliance on imported gas by 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 and use the stored gas when supply is short and prices are higher.
- Develop a storage facility that is in close proximity to PG&E's existing gas transmission facilities (Line 400/401).

4.3 PROJECT LOCATION

The proposed project would be located in northeastern Colusa County, approximately 60 miles northwest of Sacramento (Figure 4-1). Figure 4-2 identifies the boundary of the underground natural gas storage area and project component sites including the compressor station, remote well pad site, metering station, and connecting pipelines. As shown in the figure, the Princeton Natural Gas Storage Area is generally located west of State Route (SR) 45, east of Boggs Road and south of Paradise Road. The existing wells to be converted for potential observation well use are located above the underground natural gas storage area. The proposed 10-acre compressor station site would be located immediately adjacent to, and on the west side of, McAusland Road, approximately 300 feet north of Southam Road. The proposed 3.1-acre remote well pad site would be located approximately 1,800 feet south of the compressor station site on McAusland Road south of Southam Road. The 1,950-foot-long dual 16-inch gas gathering line system proposed to connect the remote well pad site and the compressor station would be located within the same trench as the 14.7-mile, 24-inch gas pipeline along the west side of McAusland Road. The approximate 170-foot, temporary 8-inch gas pipeline to connect the well pad site to the nearby PG&E's Line 172 distribution line would primarily be located within the remote well pad site and within a 5-acre buffer area west of McAusland Road. The pipeline would exit the temporarily leased compressor unit and then run east towards PG&E Line 172 located in McAusland Road.



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SOURCE: USGS Topo 100K

FIGURE 4-1

Regional Map

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Central Valley Gas Storage Project

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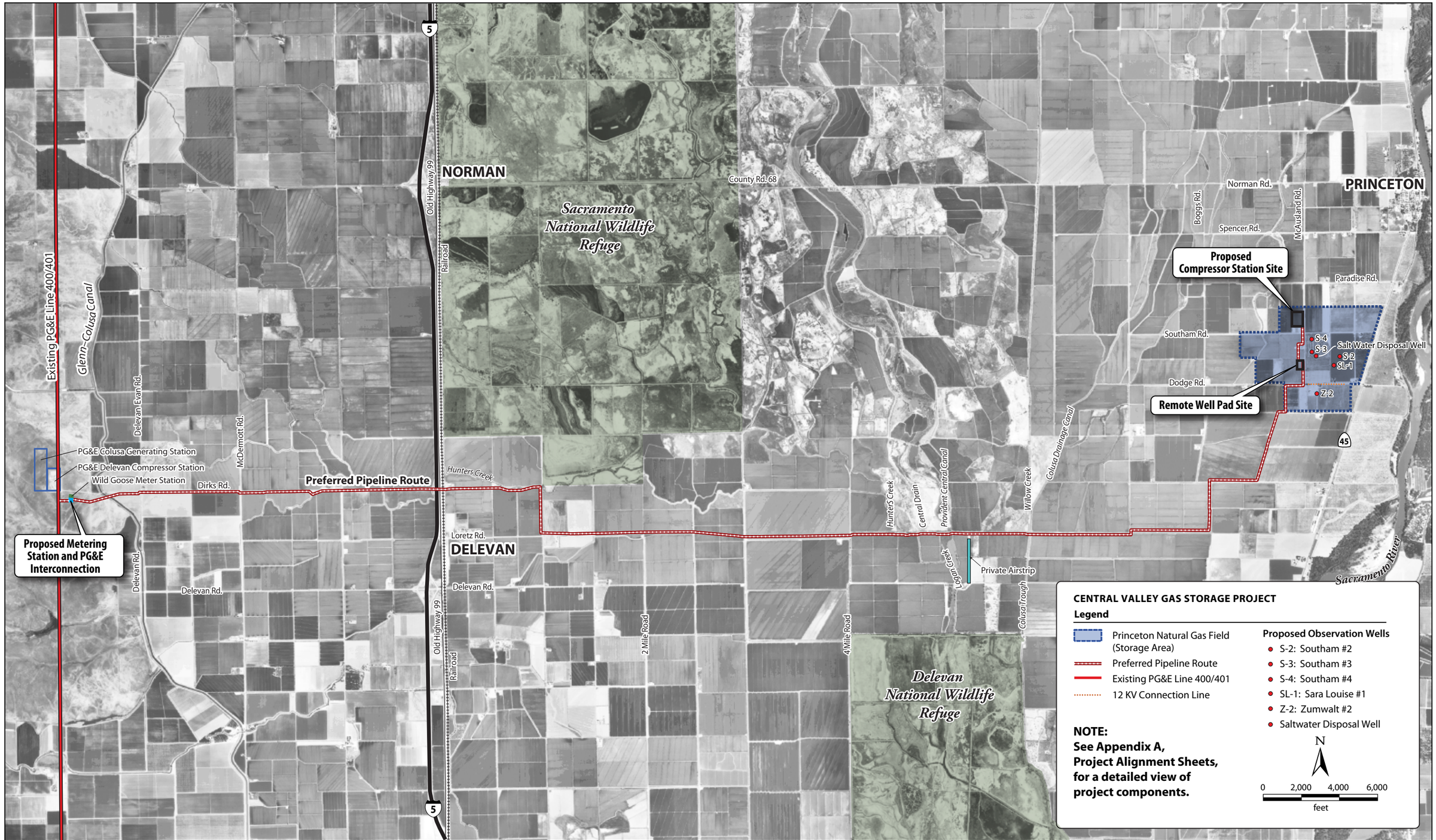

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SOURCE: ICF Jones & Stokes 2010c

FIGURE 4-2
Vicinity/Project Overview Map

Central Valley Gas Storage Project

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The 14.7-mile-long, 24-inch diameter bidirectional gas pipeline would connect the compressor station with the PG&E Transmission System (Line 400/401) located several hundred feet south of PG&E's Delevan Compressor Station. Upon exiting the compressor station, the pipeline alignment generally runs south and crosses Southam and Dodge roads, traversing approximately 1 mile of agricultural fields until it reaches a point north of the Wild Goose Storage pipeline easement. At this point the alignment turns west and parallels the Wild Goose pipeline. The alignment then proceeds to cross the Colusa Trough, Willow Creek, Hunters Creek, several unnamed tributary creeks, several agricultural and drainage canals, railroad tracks, and Old Highway 99. The alignment then continues west, crosses under Interstate 5 (I-5), through rice fields, unpaved agricultural roads, and paved public roads (Dirks and Delevan roads) and then crosses under the Glenn-Colusa Canal. After crossing under the canal, the alignment continues west until it reaches the proposed metering station site and eventually PG&E Line 400/401. The metering station would be located approximately 400 feet south of Dirks Road, southeast of the PG&E Delevan Compressor Station, and adjacent to the Wild Goose metering station.

4.4 PROJECT DESCRIPTION

The conversion of the depleted gas field to a working gas storage reservoir will require the construction of surface and subsurface facilities including a compressor station, remote well pad site, observation wells, saltwater disposal well and pipeline, metering station, and natural gas connecting pipelines. A detailed description of the project components is provided below.

4.4.1 Underground Natural Gas Reservoir

Central Valley proposes to convert, construct, and operate the depleted Princeton Gas Field as a natural gas storage facility. The project proposes that the working capacity of the field would be phased in over 2 years, commencing with 9 billion cubic feet (Bcf) in the first year and ultimately developing to provide 11 Bcf of working gas capacity. The field would be designed to achieve a maximum withdrawal and injection capability of 300 million standard cubic feet per day (MMscfd).

The gas reservoir consists of a sequence of five hydrologically separate sandstone layers located at varying depths. Figure 4-3 identifies the stratigraphy of the Princeton Gas Field and Figure 4-4 depicts a cross section of the Princeton Gas Field. The cross section of the field shows that the sandstone layers would be used for gas storage. The structural tops of the five sandstone layers range in depth from between 1,980 and 2,280 feet below the surface and are commonly referred to as the "Wild Goose Sands." 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.

In order to achieve the design working capacities and to displace water from the reservoir, Central Valley anticipates operating the storage reservoir within a pressure range of 500–1,400 pound per square inch (psi). An operating pressure of 1,400 psi indicates a pressure gradient of approximately 0.65 psi/feet or approximately 40% greater than the original pressure of the reservoir.

4.4.2 Surface Facilities

4.4.2.1 Compressor Station

The compressor station would be located on a 10-acre site at the eastern end of the project area. The proposed site, approximately 1.2 miles south of the unincorporated community of Princeton, is located immediately adjacent to, and on the western side of, McAusland Road above the Princeton Natural Gas Storage Area and approximately 300 feet north of Southam Road (Figure 4-2).

Figure 4-5 shows the preliminary compressor station site plan. As shown on the figure, three one-story buildings—a compressor building, auxiliary building, and utility building—would be constructed on site. The tallest building on site would be approximately 50 feet tall (compressor building). This building would have a 36-foot 3-inch eave and a 47-foot 5-inch ridge height. The building can most accurately be described as a large barn. The auxiliary building would be approximately 30 feet and the utility building approximately 19 feet tall. In addition, the tallest piece of equipment would be three engine exhaust stacks that are approximately 60 feet tall (42 inches in diameter), which exit from west of the compressor building. The site would be secured by a 7-foot-tall chain-link fence and graveled for access control, fire control, and maintenance purposes. Where liquid storage facilities (e.g., tanks) are proposed, these locations within the compressor station site would be fully encircled by earthen or concrete berms to prevent uncontrolled runoff from the site, or alternately, the liquids would be contained in double wall tanks. Site access would be provided from McAusland Road.

The proposed compressor station will have three 30-foot light poles with low-intensity lights (5 foot-candles[1]). These lights will illuminate the facility at all times. The facility will also have high-intensity floodlights (30 foot-candles) for nighttime servicing when needed.

Three 3,550 horsepower (hp) natural gas engines would be located within the compressor station site. These engines are necessary to drive the three reciprocating gas compressors proposed at the station. The current development plan to 11 Bcf working capacity requires that three units be installed initially. The site plan (Figure 4-5) shows a location for a fourth compressor unit; however, installation of this unit would be contingent upon market demand and reservoir technical considerations and would be subject to a future application to the CPUC. The compressor units would be fully enclosed within a building designed to minimize noise emission. 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.

The compressor station would be supplied power via a connection into an existing 12 kV PG&E line located south of the station along Dodge Road. PG&E would design, install, and maintain the 3,500-foot-long electrical distribution line that would run south from the compressor station along McAusland Road to the existing 12-kV PG&E line along Dodge Road. The power line connection would be a buried cable or an overhead line on existing poles along McAusland Road.

[1] A foot-candle is a measurement of light. In this case, it means at 1 foot from the source (bulb) you will receive 5 foot-candles of light.

The compressor station would contain natural-gas-fueled generators (640-kilowatt (KW) total) to support power requirements in the event of grid power loss. The generators would be installed and operated to meet CCAPCD air quality and Colusa County noise requirements.

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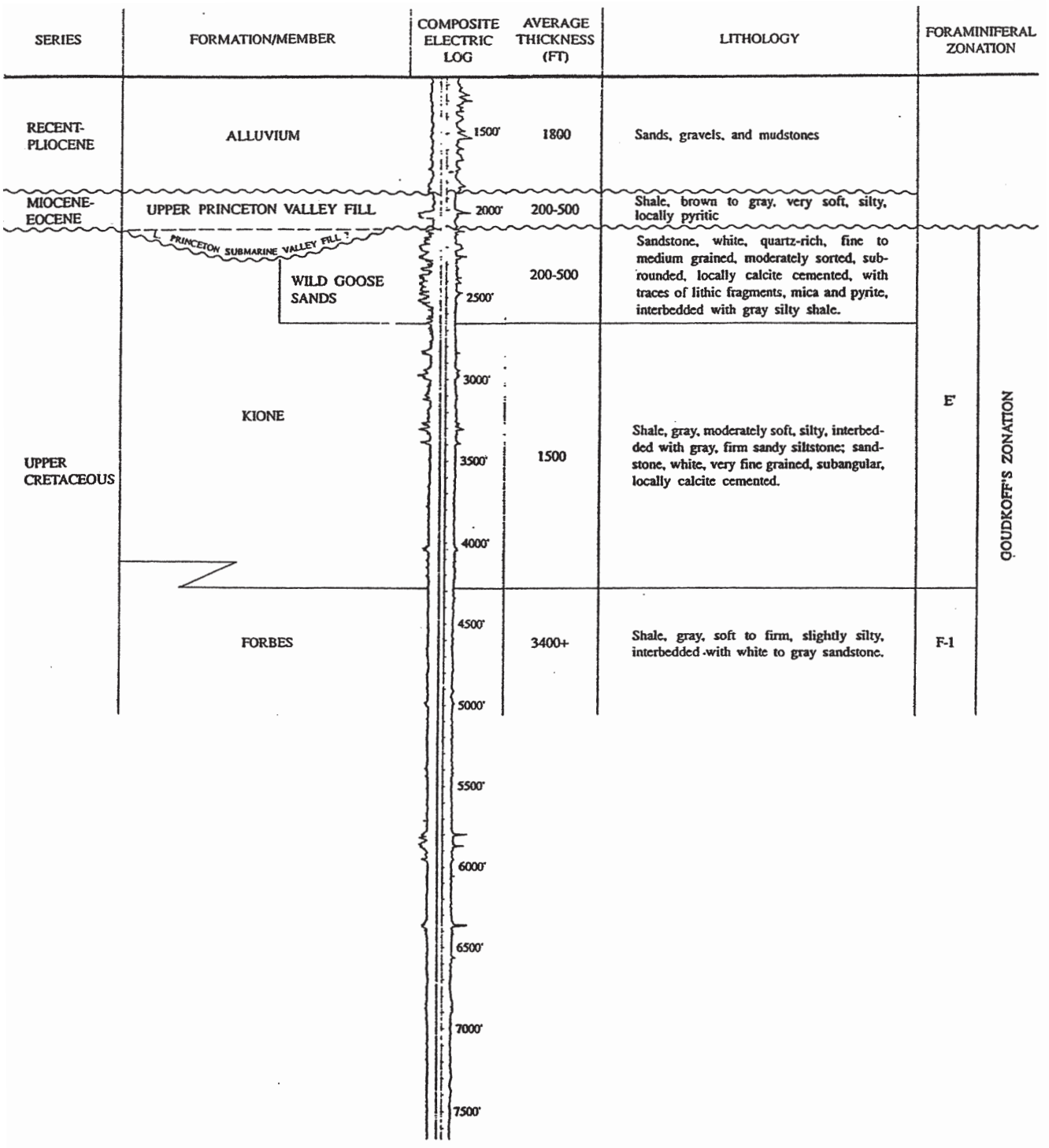

Stratigraphic column, Princeton Gas Field.

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SOURCE: ICF Jones & Stokes 2009

FIGURE 4-3

Stratigraphy of the Princeton Gas Field

Central Valley Gas Storage Project

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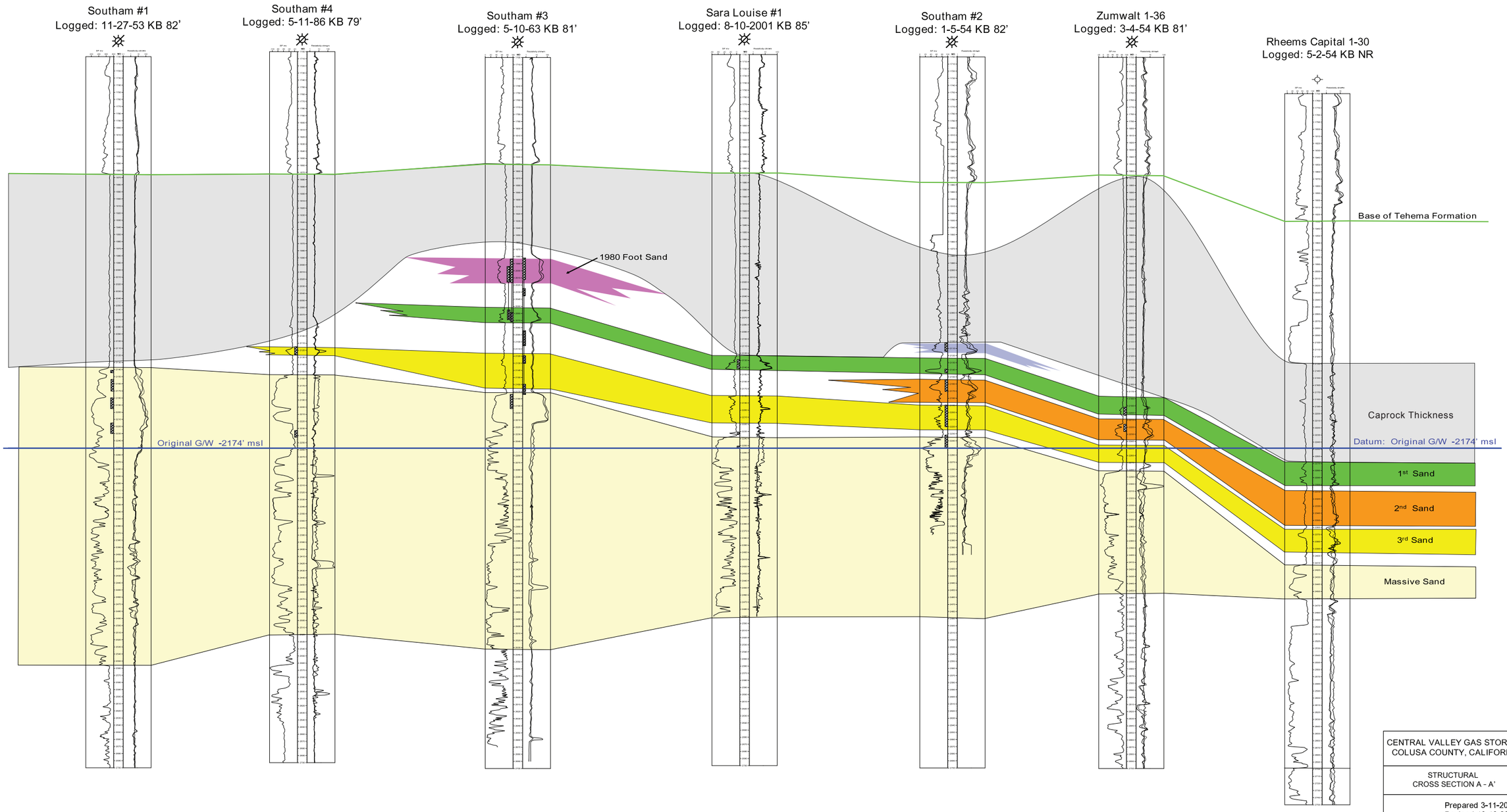
A (WEST)

A' (EAST)



CENTRAL VALLEY GAS STORAGE COLUSA COUNTY, CALIFORNIA
STRUCTURAL CROSS SECTION A - A'
Prepared 3-11-2008 Revised 10-16-2008

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

SOURCE: ICF Jones & Stokes 2010e

FIGURE 4-4
Cross Section of the Princeton Gas Field

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Central Valley Gas Storage Project

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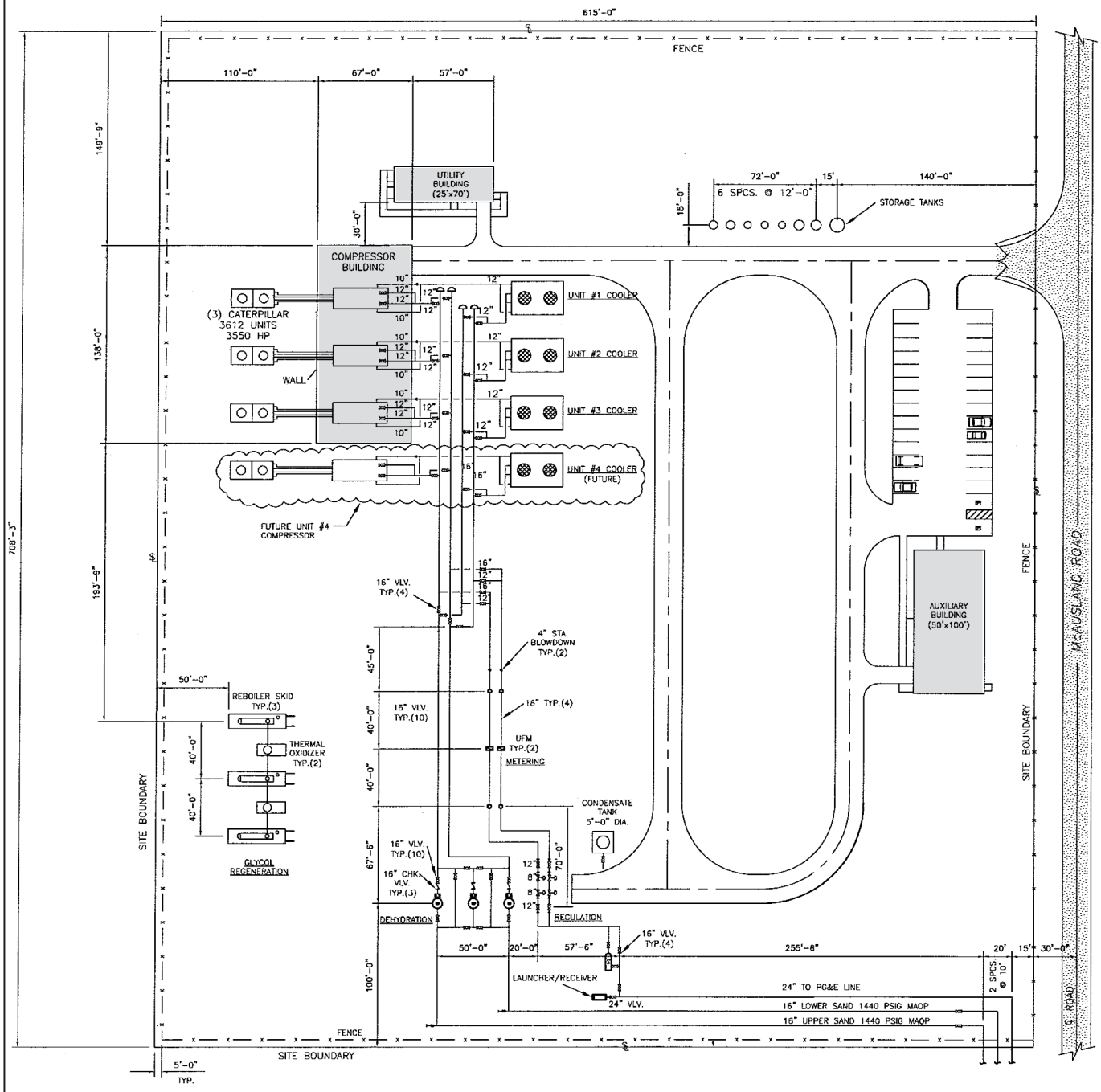

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SOURCE: ICF Jones & Stokes 2009

FIGURE 4-5

Preliminary Compressor Station Site Plan

Central Valley Gas Storage Project

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The gas piping and all pressure containing facilities at the compressor station would be designed in accordance with 49 CFR Part 192 (Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards) requirements to meet a maximum allowable operating pressure of 1,456 psi. The compressor station would be guarded with fire, heat, and gas detection systems that, when activated, would commence an alarm sequence with automatic shutdown controls of the compressor station. Compressor station gas process temperature, pressures, and flows would be measured at each compressor unit and at other points in the station. They would also be monitored by instrumentation connected to the Programmable Logic Control panel in the control room. An emergency shutdown (ESD) sequence would be triggered if an elevated alarm condition is registered, and ESD vents would immediately blow down the station piping to atmospheric pressure at a very high rate, usually in 3–5 minutes. In addition to ESD vents, relief vents would be installed in various locations on the aboveground piping and pressure vessels within the compressor station to protect from an accidental overpressure situation, as required by American Society of Mechanical Engineers codes.

The compressor station would contain three tri-ethylene glycol dehydration units rated at 100 MMscfd each and each equipped with a 1.4 million British thermal units (MMBTU) per hour tri-ethylene glycol reboiler. 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.

Metering at the compressor facility would be for check-metering purposes and would have bi-directional flow metering capability. Regulation facilities would consist of two control valves to regulate flow into and out of the pipelines at the compressor station. These valves would be electronically connected to the Programmable Logic Control system and can be remotely opened from the control room.

Operation of the compressor station would result in the venting of natural gas during emergency blow down events. It is assumed that one maintenance blow down per month (venting approximately 0.01 million standard cubic feet each) and two emergency plan blow down events per year (venting approximately 1.4 million standard cubic feet of gas per year) would occur during operations. Vented natural gas would be pressurized and would quickly dissipate into the atmosphere upon release.

A domestic water well is also proposed within the 10-acre compressor station site to supply water to the control building. Except for the use of water in the control building and occasional use through hose bibs (outdoor faucets), the gas storage facility would not consume water as part of the gas storage operation.

4.4.2.2 Remote Well Pad Site

At the eastern end of the project area, the remote well pad site would be located approximately 125 feet west of McAusland Road on a 3.1-acre site. The remote well pad site would be within and surrounded by an approximate 5-acre secured buffer area that is immediately adjacent to, and west of, McAusland Road. The majority of the approximate 5-acre area between the edge of the permanent well pad and the buffer fence line would remain unimpacted. An approximately 0.4-acre area of the buffer that is located east and adjacent to the well pad site boundary would be used as a temporary work space and staging area during construction. Based on project permit requirements, the buffer area could be planted with suitable vegetation, remain as habitat

for protected species, and be maintained as natural wetland. The remote well pad site, approximately 1,800 feet south of the compressor station site on McAusland Road south of Southam Road, would have controlled access off of McAusland Road via a project driveway (Figure 4-2). The preliminary site plan for the remote well pad is shown in Figure 4-6.

Injection/Withdrawal Wells and Well Pads

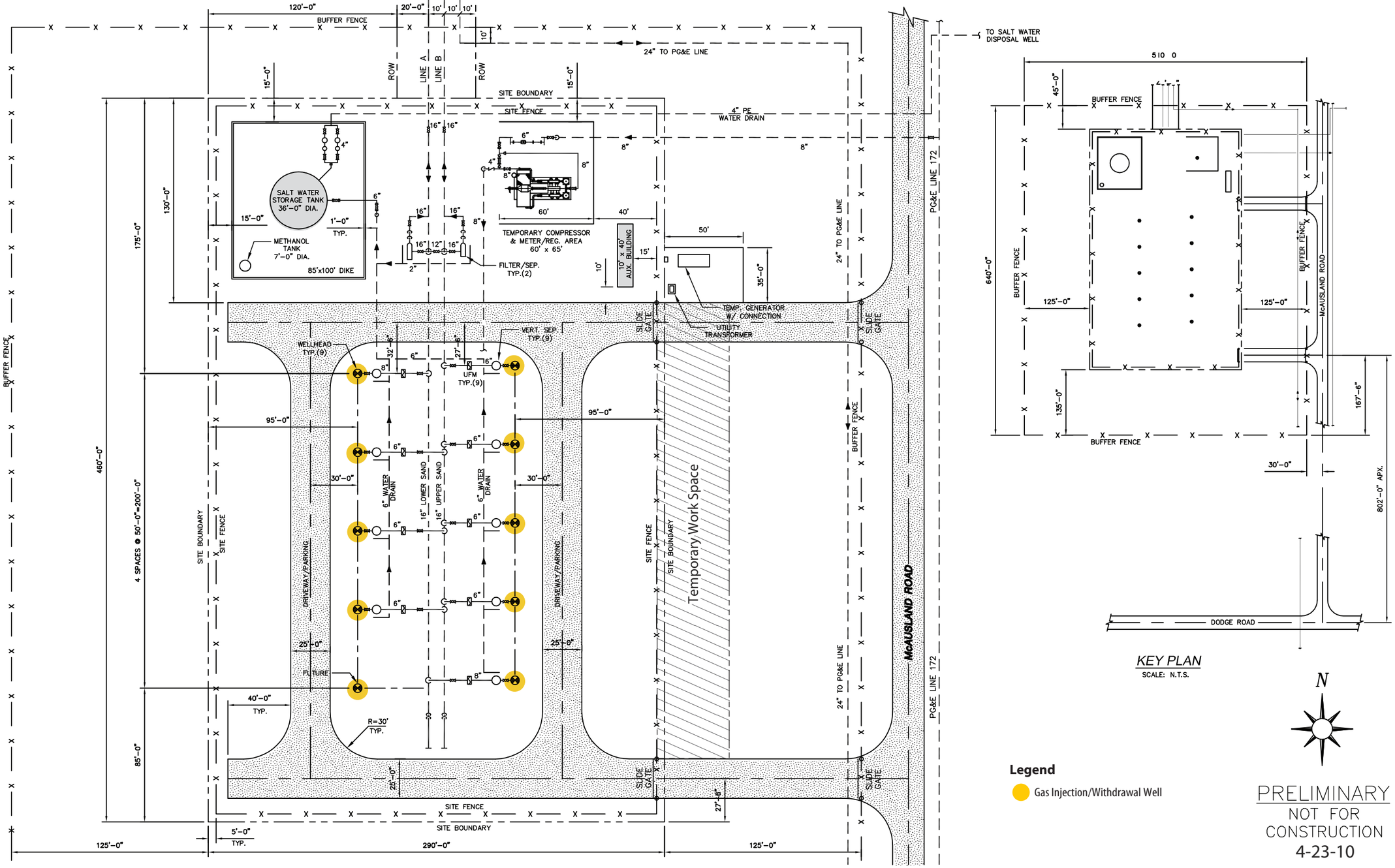
The project proposes up to ten injection/withdrawal (I/W) wells on the 3.1-acre remote well pad site. The well heads would be at least 220 feet away from the buffer fence. The well pad site would also include a 130,000 -gallon saltwater/surge tank, which would collect excess saltwater produced during gas storage withdrawal. The well pad site would include a ~~20-by-20~~10-by-40-foot auxiliary building, which would be approximately 13 feet tall. It should be noted that the applicant may reduce the size of this building when the detailed design plans are completed. The auxiliary building would contain electrical and telemetry equipment. The site would be enclosed by a 7-foot-tall chain-link fence. Access to the site would be provided from McAusland Road. One light fixture would be installed at the remote well pad site. The fixture would be a 400-watt high-pressure sodium light on a 30-foot pole adjacent to the auxiliary building. This light will only be used during operation and maintenance activities on an as-needed basis by the operator.

Each I/W well would feature a block valve on the flow line that extends from the wellhead. When the block valve is in the closed position, well pad facilities would be isolated 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. Also, each well would have dedicated metering and instrumentation that would transmit the data in real time to a panel in the central control room located at the compressor station auxiliary building where gas flows and pressures would be monitored by the operator.

The wells at the remote well pad site would be drilled to store and extract gas from several different sand layers. As proposed, two to three of the wells would be drilled into the lower Massive Sand and the remaining seven wells would be drilled into the Upper Sands. Figure 4-7 depicts a typical well-bore completion diagram. Due to different reservoir characteristics, the wells located in the Massive Sand would be operated separately from the wells located in the Upper Sand. In addition, since the Massive and Upper Sand are hydrologically isolated, the reservoir pressures of the layers may differ at any given time depending on 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.

4.4.2.3 Observation Well Conversions

Existing wells proposed for conversion to observation wells are located above the Princeton Natural Gas Storage Area. Observation wells are used to monitor the location and pressure of the gas in the storage formation. The three existing wells and one plugged and abandoned well considered for conversion, as well as one new well, are located to the east of the remote well pad site, and are shown on Figure 4-2. These wells and associated access roads are located in cultivated agricultural fields.



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SOURCE: ICF Jones & Stokes April 23, 2010

FIGURE 4-6
Preliminary Remote Well Pad Site Plan

Central Valley Gas Storage Project

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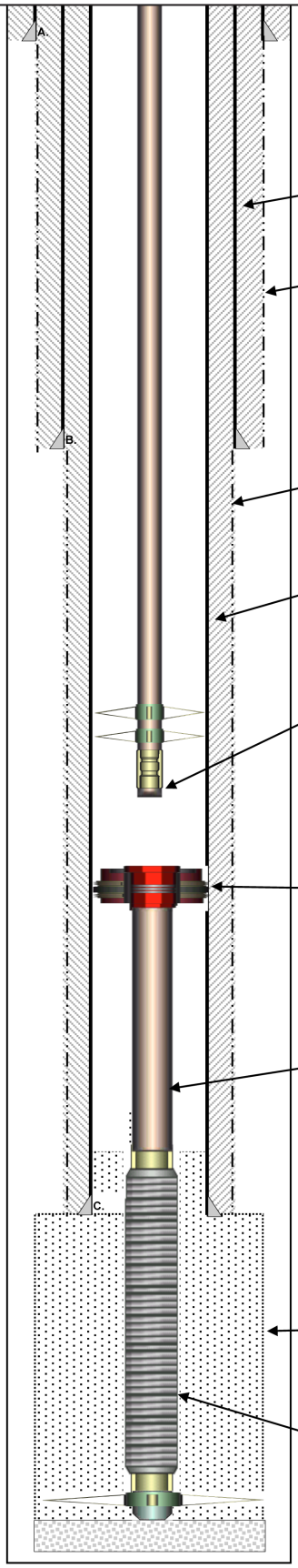

A. 20" Casing @ 40'

13 3/8" casing cemented to surface

17 1/2" Hole

B. 13 3/8" Surface Casing set @ 400'

12 1/4" Hole

8 5/8"casing cemented to surface

2 3/8" Tubing landed inside 8 5/8" casing

Packer set inside 8 5/8" casing

5 1/2 casing and hanger assembly

C. 8 5/8" Production Casing set on top of Storage Zone

7-7/8" hole under-reamed to 17" and gravel pack

5 1/2" Gravel Pack Screen

Total Vertical Depth from 2250 to 2350 ft

Note: Diagram not to scale.
Depths are approximate.

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SOURCE: ICF Jones & Stokes 2009

FIGURE 4-7
Well-bore Completion Diagram

Central Valley Gas Storage Project

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The project proposes to convert up to three existing wells (Southam (S) 3, S-4, and Sara Louise (SL) 1,) and re-entry of one previously plugged and abandoned production wells (S-2) into storage observation wells. One new observation well Zumwalt 2 (Z-2) will be drilled south of Dodge Road. The landowner has approved the removal of an old farm shed in order to provide the space needed to set up the drilling equipment necessary to drill the new observation well. The observation well would be drilled with similar equipment and in a similar manner as the storage injection and withdrawal wells. Prior to converting these wells, Central Valley, with the approval of DOGGR, 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. If a well fails integrity testing and cannot be repaired, the well would be plugged and abandoned in accordance with DOGGR regulations. According to DOGGR, a casing integrity test was conducted on S-4 in August 2009, and it was determined that the well will need remedial work (Bopp 2009). Two plugged and abandoned wells (S-1 and Z-1) located above the Princeton Natural Gas Storage Area would remain plugged and abandoned during project operations. As part of routine operations, Central Valley would conduct inspections of the well area approximately once a week to ensure no gas leaks occur. This requirement will be detailed in the project's operations manual. If a leak is detected, the well would be re-entered and remedial work would be performed to ensure that leakage does not continue. Although not proposed to be used as observation wells, there are an additional eight wells within a ¼ mile radius of the project area. According to DOGGR, many of these abandoned wells appear not to have been abandoned according to current standards. In accordance with DOGGR regulations, Central Valley will be responsible to review the condition of these wells and assure that natural gas does not migrate out of the intended zone of completion (Bopp 2009).

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 electrical wire-line logging of the well bore. Observation well measurements are used to ensure 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. If gas is observed migrating from its intended boundary, or if a pressure change associated with gas migration is detected, Central Valley would be alerted and would then be able to implement operational changes to address the issue and stop the migration. Each of these observation wells would occupy a finished, squared-off area of approximately 30 by 30 feet. Each well would be protected by a 7-foot chain-link fence, and the site would be graveled.

4.4.2.4 Saltwater Disposal Well and Tank

The project proposes one saltwater disposal well by converting the existing test well to dispose of saltwater that is produced during gas storage withdrawals (Figure 4-2). The saltwater disposal well will be connected to the remote well pad by an 800-foot, 6-inch water disposal pipeline (Figure 4-6). The majority of saltwater production is expected to emanate from the Massive Sand layer due to the large underlying saltwater aquifer and strong water drive characteristics. This saltwater would be injected into the water-bearing Upper Kione formation that lies structurally lower than the target storage zone. The saltwater would be injected to a depth (2,400–2,500 feet below ground surface) 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, a 130,000-gallon saltwater storage/surge tank would be constructed on site to collect excess water. The tank would be approximately 36 feet in diameter

by approximately 23 feet tall (including the approximately 1-foot-high foundation). As part of this project, a second well would be initiated at the remote well pad if, based on actual water volume trends, the water volumes were anticipated to continue in excess of the capacity of the first well (Figure 4-6).

4.4.2.5 Metering Station

The proposed metering station would be located in the western end of the project area, southeast of the PG&E Delevan Compressor Station, adjacent to the Wild Goose metering station, and approximately 400 feet south of Dirks Road. A 400-foot long, approximately 40-foot wide permanent access road off Dirks Road would be constructed as a component of the metering station. The location of the proposed metering station is shown on Figure 4-2. The proposed permanent access road is shown in project alignment sheet 11, which is found in Appendix A.

The intent of the metering station is two-fold: (1) 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 and (2) to add odorant before the gas enters the PG&E pipeline. The facility would include a chromatograph that measures the gas composition, instrumentation, and controls to interface with PG&E's system for local data logging and transmission of telemetry to the Central Valley compressor station control room.

PG&E would design, install, and operate the metering, odorization facilities, instrumentation, and telemetry for PG&E to remotely monitor and control the facilities. The odorizing tank would be approximately 8 by 30 feet and 10 feet tall, and the control building would be approximately 15 by 25 feet and 16 feet tall. PG&E would also complete the tap connection to 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 (a device used to convert an electrical control signal to a physical action) for remote and ESD operation, and a pressure regulator valve to provide overpressure protection to PG&E. Equipment would also be installed to monitor meter readings and control valves at the metering station site. The approximate 1-acre metering station site would be graveled and surrounded by a 7-foot chain-link fence. In addition, the metering station would have low-glare lights (5 foot-candles). The lights will be illuminated only when nighttime activities are necessary.

4.4.3 Natural Gas Connecting Pipelines

4.4.3.1 Connecting Pipeline from the Remote Well Pad Site to Compressor Station

The remote well pad site would be connected to the compressor station by a 1,950-foot-long, dual 16-inch gas gathering pipeline system that would run along the west side of McAusland Road (Figure 4-2).

4.4.3.2 Temporary Connection to PG&E Line 172

The project proposes a temporary connection to PG&E Line 172, which would allow the project to receive and inject gas on an interruptible basis before the permanent 14.7-mile, 24-inch pipeline to the PG&E Line 400/401 has been completed (Section 4.4.3.3, Interconnection to PG&E Line 400/401). This connection is for injection only and not for the delivery of gas back

into Line 172. The project applicant anticipates operating in this configuration for approximately 13 months prior to the completion of the main 24-inch pipeline.

The temporary connection to PG&E Line 172 would consist of an approximate 170-foot, temporary 8-inch gas pipeline to connect the well pad site to the nearby PG&E Line 172 distribution line located on the east side of McAusland Road. The location of the proposed PG&E Line 172 connection line is shown on Figure 4-6. The connector pipeline would be located inside the remote well pad site and within the buffer area. In addition, a temporary meter skid and rental compressor package would be installed on the ~~southern~~ northern portion of the 3.1-acre remote well pad site. Central Valley would be required to obtain a permit of operation from the CCAPCD for the operation of the rental compressor unit. Central Valley proposes to also install noise abatement features for this compressor unit to meet applicable Colusa County noise standards.

4.4.3.3 Interconnection to PG&E Line 400/401

A 24-inch diameter, 14.7-mile long bidirectional gas pipeline would be constructed to connect the proposed compressor station and metering station, plus a 580-foot interconnect from the edge of the metering station to the PG&E Line 400/401 located several hundred feet south of PG&E's Delevan Compressor Station (Figure 4-2). The proposed pipeline would primarily traverse agricultural lands between the proposed compressor station and metering station and non-native grassland between the metering station and interconnection with PG&E Line 400/401. A 30-foot-wide permanent pipeline easement encompassing approximately 55 acres would be required (the permanent easement would be 50 feet by the 24-inch connecting pipeline and the 16-inch gas gathering line between compressor station and remote well pad site). The permanent pipeline easement would be required to ensure that maintenance activities are provided adequate space to inspect and work on the pipeline and to ensure that people and or structures are located a safe distance from the pipeline. The proposed pipeline alignment, including auger bore and horizontal directional drilling (HDD) locations, is shown in the project alignment sheets provided in Appendix A.

Central Valley's engineering consultant would prepare an HDD and bore plan that contains detailed drawings and a frac-out contingency plan. A frac-out is when drilling mud reaches the earth's surface through cracks in bedrock or highly permeable soil horizons in the substrate's profile and is often visible as a plume in a waterbody or on land in the vicinity of the drill. The contingency 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) into a waterway. Continuous visual observations of waterways by the project contractor during HDD operations would be required as part of the contingency plan in order to monitor possible frac-out conditions.

Proposed natural gas connecting pipelines would be designed in accordance with 49 CFR 192.5 of U.S. Department of Transportation (USDOT), which establishes criteria for pipeline design based on risks to the surrounding community. Four design classification areas are established by the regulations: 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 highest risk areas. The proposed pipeline is located entirely in a Class I area and is not within any high consequence areas (HCAs).

Additionally, the natural gas connecting pipelines would be designed and constructed in accordance with USDOT requirements to meet a maximum allowable operating pressure of 1,070 psi and to meet potential seismically induced stresses. The pipeline system is comprised of 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. "Pigs" are cylindrical inspection devices used to perform cleaning, inspection and other internal functions are typically launched from a Y section in the pipeline. Once the pig is inserted into the pipeline the launching station is closed and the pig is pushed by the pressure of the natural gas in the pipeline towards the receiving station. Pigging, testing, and inspection activities would be performed as specified by USDOT 49 CFR 192. Pigging facilities would be installed aboveground within concrete containment basins, and liquids and/or wastes generated by the 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 stations. They can be operator controlled or automatically controlled in the event of an emergency shutdown sequence 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.

4.5 PROJECT LAND REQUIREMENTS

Table 4-1 provides the estimated permanent and temporary acreage area required for each project component.

Table 4-1: Permanent and Temporary Acreages Required to Construct and Operate the Project

Component	Permanent (acres)	Temporary (acres)
Compressor station	10.0	—
Remote well pad site (includes 10 injection/withdrawal wells, saltwater storage tank)	8.1[a]	—
14.7-mile 24-inch diameter gas pipeline	55.0[b]	177.28[c]
PG&E Line 172 connection pipeline, temporary meter skid, and rental compression unit[d]	0.05	—
Electrical distribution line[e]	—	—
Salt water disposal well	0.02	0.5
Salt water disposal pipeline	0.4[f]	0.6
Observation wells (4 conversions / 1 new)	0.1	2.8

Table 4-1 (Continued): Permanent and Temporary Acreages Required to Construct and Operate the Project

Component	Permanent (acres)	Temporary (acres)
Metering station at PG&E Interconnection	0.8	0.2
Temporary material and equipment staging areas	0.0	12.7[g]
New access roads	0.4[h]	0.0
Total Project Land Requirements	74.87	194.08

SOURCE: Schnegelsberg 2010.

[a] The 8.1 acres of land that will be acquired for the remote well pad site includes a 5-acre undeveloped buffer around the 3.1-acre remote well pad facility. This acreage also includes a 0.4-acre temporary work space and staging area on the east side of the well pad facility (Figure 4-6). There is no additional temporary easement that will be acquired for the remote well pad facility.

[b] This acreage represents the permanent easement that will be acquired for the future maintenance and operation of the gas pipeline system. The acreage includes the 1,950 feet of 16-inch diameter dual gas gathering line system between the remote well pad and compressor station site and the 580 feet between the metering station and PG&E Line 400/401. The acreage is based on a 30-foot-wide permanent ROW width for the 24-inch gas pipeline and a 50-foot-wide permanent ROW for the 1,950-foot-long gas gathering line system that occurs between the compressor station and remote well pad. This acreage includes only areas within the pipeline construction corridor that would be subject to surface disturbances. The acreage does not include the subsurface disturbance associated with bore work areas.

[c] The temporary acreage represents the total surface area required to construct the gas pipeline and does not include the below-ground HDD bore work areas (as shown as the temporary work area in Appendix A). The acreage is based on the Appendix A drawings and includes the 100-foot-wide construction corridor for the 24-inch gas pipeline and the 120-foot-wide corridor for the 1,950-foot-long gas gathering line system (to accommodate the three pipelines).

[d] The acreage represents the area required to construct and maintain the 170-foot-long, 8-inch PG&E Line 172 connection pipeline. This acreage also includes the overlap work area associated with the salt water disposal pipeline. The additional PG&E connection facilities are located inside the well pad area and within the saltwater disposal line corridor. The rental compression would be entirely located on the remote well pad site.

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

[f] The permanent easement acreage for the 800-foot-long salt water disposal pipeline does not include the overlap with the 24-inch gas pipeline and 8-inch connection pipeline. The overlap acreages are included in the 24-inch gas pipeline and PG&E Line 172 pipeline acreages.

[g] The temporary staging area acreages include the 10-acre staging area by the metering station and 2.7 acres of bore work areas along the connecting pipeline route.

[h] The new access road acreage includes the new access roads to the observation wells and meter station site.

4.6 CONSTRUCTION ACTIVITIES

The following presents an overview of the construction activities and methods proposed for the compressor station, remote well pad site, observation wells, metering station, and natural gas connecting pipelines. It also discusses site cleanup and temporary work space requirements.

4.6.1 Project Components

4.6.1.1 Compressor Station

Construction of the compressor station would include the following activities:

- Site preparation, including clearing and grading
- Construction of building foundations
- Installation of perimeter fencing
- Construction of structures to house compressor and associated facilities
- Installation of equipment and piping.

Temporary work space and staging areas would be located within the 10-acre site boundary. No new access roads would be required for construction and operation the compressor station (access would be provided off of McAusland Road). Total peak workforce for construction of the compressor station is anticipated to be 75 workers. Construction of the compressor station would take approximately 12–14 months.

4.6.1.2 Remote Well Pad Site

Construction of the 3.1-acre well pad would include the following activities:

- Site preparation, including clearing and grading
- Drilling of up to 10 I/W wells and potentially 1 saltwater disposal well, if needed
- Installation of well pad surface facilities, including a 6-foot-tall wellhead, gas/water separation equipment, gas flow meters, and miscellaneous piping and valves.

Construction of the remote well pad site would require a 0.4-acre temporary work space and staging area located east of the 3.1-acre well pad site boundary. The temporary work area is included within the approximately 8 acres that will be acquired for the remote well pad site and surrounding buffer area. Each well is anticipated to require 6–10 days to drill, and drilling rigs would operate 24 hours a day, 7 days a week until each well is complete. A new access road would be constructed off of McAusland Road headed west to access the remote well pad facility. The new access road would be approximately 125 feet long from McAusland Road to the entrance of the well pad site.

To minimize the potential for accidental spills, all fluids (e.g., drilling mud) used during well drilling would be pumped into large tanks and stored at the remote well pad site. The tanks would be stored on site for the duration of the well drilling program (approximately 8–10 weeks) and then transported for disposal at an appropriate facility.

Total peak workforce for construction of the well pad site is anticipated to be 15 workers. Construction of the well pad site including well drilling, construction of dual gas gathering and water gathering pipelines, observation well conversions, and facility installation would take approximately 3 months.

Wells would be designed and constructed in accordance with DOGGR regulations. In addition, Central Valley has included the following measures in the project design basis in order to protect wells and other equipment from damage as the result of internal corrosion caused by 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 saltwater disposal gathering system (6-inch nominal) from the wellhead site to the saltwater storage tank and through to the water injection well
- Non-metallic or metallic saltwater 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 operations and maintenance (O&M) plan to monitor for corrosion environments and perform mechanic cleaning and internal tooling at effective intervals.

4.6.1.3 Observation and Saltwater Disposal Well Conversions

Four existing well sites (S-3, S-4, SL-1, and the test well) and associated access roads would be graded and improved in order to accommodate construction equipment, such as a service rig and trucks for well logging and cementing operations required for conversion activities. No new access roads would be required for existing wells. The currently plugged and abandoned S-2 well is considered for conversion to an observation well. One new observation well (Z-2) is proposed within 600 feet of plugged and abandoned Z-1 well and will be accessed using an existing access road. Construction activities at these sites would include grading the site and grading new access roads.

Depending on the equipment needed, up to 0.5 acre of temporary workspace may be required at each of the six well sites and up to 0.8 acre to drill the new observation well. Observation and the saltwater disposal well conversions would take approximately 3 months and would occur concurrently with several other construction activities, including preparation of the remote well pad site and well drilling.

4.6.1.4 Metering Station

Construction of the metering station would include the following activities:

- Site preparation, including clearing and grading
- Construction of equipment and piping foundation
- Installation of perimeter fencing
- Installation of equipment and piping foundations
- Site cleanup and restoration.

Construction activities and a temporary construction equipment storage area would occur on the 1-acre metering station site (including the 0.8-acre permanent site and the 0.2 acre temporary workspace area depicted in Appendix A). In addition, the project proposes the construction of a permanent 400-foot long, approximately 40-foot wide access road off of Dirks Road to provide access to the metering station.

Total peak workforce for construction of the metering station is anticipated to be 30 workers. Construction of the metering station and interconnect into PG&E Line 400/401 would take approximately 2–3 months.

4.6.1.5 Natural Gas Connecting Pipelines

Construction of the proposed natural gas connecting pipelines would involve the following activities:

- Surveying ROW and construction easement
- ROW preparation (requires close coordination with rice field flooding schedule)

- Open cut trenching (includes boring or HDD where open cut trenching is not practical)
- Trench dewatering and spoils disposal
- Stringing, welding, and installation of pipeline
- ROW restoration
- Landowner coordination.

To ensure that potential conflicts and service disruptions do not occur during pipeline construction, Central Valley would coordinate closely with the Colusa County Public Works Department during final project design to identify potential utility conflicts and initiate relocation. Central Valley would also contact Underground Service Alert at least 2 days prior to the start of construction so that all owners of underground infrastructure registered with Underground Service Alert are informed of construction activities. Noticing would allow owners of infrastructure in the project area to mark areas near the construction site where underground infrastructure is located so that they are avoided during construction. Central Valley would also coordinate with Wild Goose Storage, LLC, to ensure that construction activities do not interfere with operation of the Wild Goose Storage gas pipeline and storage facility.

Central Valley would also work closely with landowners to avoid structures, agricultural facilities, and hunting areas as much as possible. Fences, drainages, conveyance features, water lines, and dikes damaged or removed during construction would be repaired or replaced to original condition. If an agricultural facility is inadvertently damaged during construction, the landowner would be alerted immediately, and the facility would be repaired.

The temporary construction ROW corridor for the connecting pipelines would be approximately 100 feet, while the permanent ROW easement would be 30 feet. It should be noted that for the1,950-foot alignment between the compressor station and the remote well pad site, the temporary construction corridor would be 120 feet (the permanent easement in this area would be 50 feet) in order to accommodate both the 24-inch pipeline and the 16-inch dual gas gathering line system, which would be located in the same trench. Along the remaining pipeline route, construction staging areas and soil stockpiling would primarily occur within the 100 foot temporary pipeline ROW corridor. To minimize the potential for loss of topsoil, Central Valley would require the project contractor to stockpile the upper 12 inches of native topsoil excavated during open cut trenching within the temporary pipeline ROW corridor and ultimately replace the topsoil at the top of the trench backfill once the connecting pipelines are installed. Temporary workspace and staging areas required for auger bore and HDD operations would be located outside of the 100-foot temporary pipeline ROW corridor. Each auger bore and HDD location would require an approximate 125-foot by 200-foot workspace area. Auger bore construction would be used for crossings (such as surface water features or roadways) less than 300 feet wide and 20 feet deep and would entail the excavation of bore pit on both sides of the crossing and the use of an auguring machine. An auger bore is used to install the pipe through the use of a drill mounted on a fixed track that is placed below grade within the entry and exit pits. HDD construction would be used for crossings greater than 300 feet wide and 20 feet deep and would entail the use of a pilot hole through which guided bores would be advanced by the drilling process. The auger bore and HDD locations along the pipeline alignment are shown in Appendix A.

HDD construction involves first drilling the hole in which the pipe will be placed followed by pulling the drilling pipe back out with the permanent pipeline connected to it (going backwards).

This is called the "pull back." Drilling portions of HDD activities would be limited to daylight hours. There is the potential for night work during the pull back operations.

Construction crews would access work and staging areas via existing agricultural access roads, which may be improved by minimal grading and gravelling to provide adequate access for heavy construction equipment and maintenance vehicles. The location of existing access roads is shown in the project alignment sheets provided in Appendix A.

Before being placed into commercial service, the pipeline would be hydrostatically tested in accordance with 49 CFR Part 192 (USDOT pipeline safety regulations). A hydrostatic test is a way in which leaks can be detected. Approximately 1.7 million gallons of water would be required for hydrostatic testing. Water used during hydrostatic testing would be discharged at one time into an on-site filtering system (hay bales) and then discharged into drainage ditches in surrounding agricultural areas. Non-chemically treated water is used for this test; however, as it passes through the pipeline, it can pick up items such as metal particles, material from the weld, and lubricants/rust inhibitors.

Total peak workforce for construction of the pipeline is anticipated to be 230 workers. Construction of the pipeline would take approximately 3–4 months.

4.6.2 Other Construction Activities

Site Restoration/Cleanup

Once all project components are constructed and the project has connected to PG&E Line 400/401, site cleanup and restoration would commence. Total peak workforce for site cleanup/restoration is anticipated to be 20 workers. Site cleanup/restoration activities would take approximately 2–3 months.

Temporary workspace

In addition to the temporary workspace requirements specified for each major project component discussed above, an additional 12.7 acres of land to establish temporary equipment and material staging areas, as well as workspace for auger bore and HDD activities outside of the 100-foot temporary pipeline construction ROW, would be required. A 10-acre staging area located adjacent to the proposed metering station has been identified as an equipment laydown area as well as a potential location for construction vehicle parking. The remaining 2.7 acres of land would be located along the pipeline alignment. These temporary workspace and auger bore and HDD areas are shown in the project alignment sheets provided in Appendix A.

4.6.3 Overall Construction Schedule

The overall construction schedule anticipated for the proposed project is 24 months (14–16 months for construction and 1 month for connection to PG&E line 400/401, followed by cleanup and restoration). Table 4-2 depicts a *representative* construction schedule and is shown here to demonstrate where the overlap in construction activities may occur for each project component. The actual construction schedule will be developed upon approval of the project by CPUC.

Construction activities associated with project components would generally occur Monday through Saturday between 7:00 a.m. and 7:00 p.m. except for well drilling, which would occur 7 days per week, 24 hours per day.

Table 4-2: Representative Construction Schedule

Project Activity	Preliminary Date Range
Remote well pad site preparation and construction~~Permit to construct decision adopted and effective (Certificate of Public Convenience and Necessity)~~	October–January 2011~~June 2010~~
Remote well pad well drilling and Zumwalt observation well drilling~~Acquisition of required permits~~	November–January 2011~~August 2009–May 2010~~
PG&E Line 172 connection pipeline construction~~ROW/property acquisition completed~~	November 2010–December 2010~~March 2010~~
Compressor station site preparation~~Final engineering/surveying completed~~	October 2010–January 2011 ~~May 2010~~
Begin to receive gas from PG&E Line 172~~Remote well pad preparation, I/W wells, and gathering line system~~	December 2010~~July–September 2010~~
Gas pipeline ROW preparation~~Observation well conversions~~	March–April 2011~~July–September 2010~~
Observation well conversions (including access roads)~~Construction window for compressor station*~~	October–December 2010~~September 2010–October 2011~~
Gas pipeline system construction~~Connection pipe and meter into PG&E Line 172 (including rental compressor)~~	April–September 2011~~August–September 2010~~
Metering station construction (including access road)~~Begin to receive gas from PG&E Line 172~~	May–October 2011~~September 2010~~
Compressor station mechanical construction~~Preparation of 24-inch gas pipeline ROW~~	November 2010–October 2011~~March–April 2011~~
Saltwater disposal well and 800-foot-long pipeline to remote well pad~~Construction window for 24-inch gas pipeline*~~	July–September 2011~~April–October 2011~~
Cleanup and restoration~~Construction window for metering station at PG&E*~~	August 2011–December 2012~~June–October 2011~~
Project connected to PG&E Line 400/401~~Project connected to PG&E Line 400/401~~	November 2011~~November 2011~~
~~Cleanup and restoration~~	~~April–June 2012~~

* It should be noted that 335 workers would be required for the peak construction period when construction of the compressor station, metering station, and 14.7-mile-long pipeline would occur concurrently.

SOURCE: ICF Jones & Stokes 2009

4.6.4 Construction Equipment Requirements

Tables 4-3 through 4-6 identify the equipment that may be used during construction of each major project component. Some of the equipment identified may be used to construct multiple components.

Table 4-3: 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 Track hoe

Table 4-3 (Continued): Estimated Compressor Station and PG&E Line 172 Connection Construction Equipment

Activity	Quantity of Equipment
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 crane
	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 4-4: 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, wire line, cement)
	1 Water truck
	5 Pickup trucks
Well conversions	1 Conventional service rig
	3 Service company trucks (e.g., wire line, cement)
	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 4-5: Estimated Pipeline Construction Equipment

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

Table 4-5 (Continued): Estimated Pipeline Construction Equipment

Equipment	Quantity of Equipment
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

Table 4-6: 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

Table 4-6 (Continued): Estimated Metering Station and Line 400/401 Interconnect Construction Equipment

Activity	Quantity of Equipment
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

4.7 OPERATION AND MAINTENANCE

Approximately six to eight full-time employees would be required to operate and maintain the proposed project facilities. Staff would be present at the compressor site during regular business hours Monday through Friday. Operations and maintenance staff will be able to remotely access the control room system during weekends via a computer. Staffing hours will be higher as warranted during maintenance activities or emergencies. An operations manager would represent Central Valley on site and would be accountable for the safe and reliable operation of the compressor station and pipeline facilities. All operations and maintenance (O&M) and instrumentation/electrical staff would report to the operations manager.

The central compressor site includes an auxiliary building featuring an office, control room, utility, and workshop area. O&M personnel would be present at the facility during regular business hours and would be on call after hours. There would be times when the facility would be manned 24 hours per day. 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.

The compressors, available for use 24 hours per day, would be used for both injection and withdrawal purposes. 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 customer's daily nominations, and pressure in the storage reservoir.

As required by the Office of Pipeline Safety and CPUC, a written operator qualification plan would be developed prior to the commencement of compressor station operations. The

qualification plan would outline the tasks to be performed by the operator in regards to the pipeline system, the compressor station, and well pad sites. In addition, an emergency response plan detailing how personnel would respond to emergency situations related to storage operations would be prepared prior to the commencement of commercial operations. Also, regular safety meetings would be held to ensure that O&M personnel are knowledgeable of and committed to all safety procedures within the facility. Lastly, a damage prevention plan would also be developed and would include a 24-hour number for property owners to call in the event of an on-site emergency.

All project facilities would be monitored and inspected regularly. The control room at the central compressor site would serve as the focal point for all project monitoring, control, and operation. The remote well pad site and metering station and monitoring and control functions would be connected to the control room computer system through a SCADA remote terminal unit located in the control building. Wells would be check metered so that the characteristics and performance of the gas storage reservoir and disposal operations can be properly monitored. Redundant safety systems would be installed at the central compressor facility. The pipeline would be inspected regularly for disturbance along the ROW. In addition, Central Valley would implement measures to prevent and repair leaks in the pipeline including maintaining piping connections, ensuring connections are welded, and participating in active monitoring of piping components for leaks. The remote well pad site would be inspected several times a week by site personnel, and the compressor site would be inspected daily.

In accordance with current federal, state, and local regulations, liquid wastes (e.g., lubricants, solvents) generated during operation of the compressor station would be securely stored on site in double- or single-walled tanks for a maximum of 90 days and would then be transported by a licensed hazardous waste hauler to an appropriate hazardous waste storage facility. Solid wastes (e.g., oily rags, oil filters) would be temporarily stored on site in secured, enclosed areas and then disposed of at an appropriate off-site facility.

4.8 APPLICANT PROPOSED MEASURES

Central Valley has included the following Applicant Proposed Measures (APMs) as part of the proposed project that reduce certain associated impacts to levels below significance. These APMs are part of the project description and are fully enforceable by the CPUC.

4.8.1 Aesthetics

Applicant Proposed Measure AES-1: Implement measures to minimize visual impacts. The following measures would 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 contact between exposed soil 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.
- All above ground structures 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.

4.8.2 Agricultural Resources

Applicant Proposed Measure 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 acquisitions of utility easements. Central Valley would 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 agricultural-related improvements that are necessary to construct the project.

Applicant Proposed Measure 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 would be provided, if necessary, to ensure that field grading and irrigation flaws are not adversely affected. Fences and irrigation facilities will be replaced or repaired to their original condition following construction.

4.8.3 Air Quality/Climate Change

Applicant Proposed Measure AIR-1: Implement measures to reduce PM_{10} dust generated by construction activities. The following measures would 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 one time.

Central Valley will notify the CPUC that the Colusa County Air Pollution Control District has issued an "Authority to Construct" air permit before beginning construction of the compression facility.

Applicant Proposed Measure AIR-2: Require measures to reduce NO_x and greenhouse gas (GHG) emissions from all diesel powered construction equipment, including support equipment. Central Valley would implement the following measures to reduce NO_x and GHG emissions from all diesel powered construction equipment and vehicles:

- To the extent feasible, all construction diesel engines rated at 100 hp or more shall meet, at 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 are not practical for specific engine types. For purposes of this measure, the use of such devices is considered not practical if any of the following conditions apply:
    1. There is no available soot filter that has been verified by either the California Air Resources Board of the U.S. Environmental Protection Agency (EPA) for the engine in question.
    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 apply:
        a. The use of a 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.
        b. The soot filter is causing or is reasonably expected to cause significant engine damage.
        c. The soot filter is causing or is reasonably expected to cause a significant risk to the workers or the public.
        d. 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 equipment and vehicle and idling time will be minimized. The ability to limit construction vehicle idling time is dependent upon the sequences 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. 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.

- Central Valley will institute a carpooling program to transport workers from staging areas to the work site.

Applicant Proposed Measure AIR-3: Central Valley will purchase NO_x credits from the Colusa County Air Pollution Control District. Central Valley will lease 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 B). Consequently, Central Valley will purchase emission credits to offset this amount of NO_x emissions.

Applicant Proposed Measure AIR-4: Implement GHG measures as a participant in the U.S. EPA's Natural Gas STAR program. Central Valley will participate in the U.S. EPA's Natural Gas STAR Program. Central Valley will sign a memorandum of understanding (MOU) with the U.S. EPA prior to initial startup of the compressor station. Within 6 months after signing the MOU, Central Valley will prepare an implementation plan that includes best management practices identified by the Natural Gas STAR program for transmission and distribution facilities. The implementation plan shall incorporate Partner Reported Opportunities (PRO) that cost-effectively reduce methane emissions. Within 45 days after completion of one calendar year of participation in the program, Central Valley will submit an annual report documenting the previous year's emission-reduction activities and corresponding methane emission reductions. Copies of all documents will be submitted to the CPUC.

Prior to startup of the compressor station, Central Valley will implement the following best management practices consistent with the Natural Gas STAR program. These measures may be incorporated in the implementation plan.

- The compressor engines will use compressed air starters instead of natural gas starters. This measure is consistent with PRO Fact Sheet #103.
- Central Valley will utilize programmable logic controllers, which will automate the startup sequence of the compressor units. This measure is consistent with PRO Fact Sheet #106.
- The temporary compressor will be a rich-burn, natural-gas-fueled engine equipped with an automated air-fuel ratio controller. This measure is consistent with PRO Fact Sheet #111.
- Dehydration facilities will be designed to separate and recover flash gas from the dehydrator reboilers, which can be used for fuel gas for the reboiler and vapor removal unit. Also, electric motor-driven tri-ethylene glycol pumps will be used in place of pumps powered by compressed natural gas. These measures are consistent with PRO Facts Sheets #201, 203, and 206.
- Ultrasonic meters will be installed at the compressor station and at each of the wellheads in place of orifice meters. This measure is consistent with PRO Fact Sheet #304.
- Pneumatic controls will be operated using pressurized instrument air rather than natural gas. This measure is consistent with Natural Gas STAR Lessons Learned document "Convert Gas Pneumatic Controls to Instrument Air."

Applicant Proposed Measure AIR-5: Implement measures to reduce CO_2E emissions during project operation. Based upon lower horsepower and hours of operation projections, the estimated CO_2E emissions from the project's stationary sources will be 15,952 metric tons per year (mtpy) CO_2E, for total project-wide GHG emissions of 16,596 mtpy. In any year, when CO_2E emissions exceed 10,000 mtpy, Central Valley will purchase offsets that will effectively cap its emissions at 10,000 mtpy by securing and retiring GHG offset credits by March 31 of a given year in a quantity equal to the previous calendar year's actual GHG emissions from the facility, minus 10,000 mtpy. Central Valley will purchase GHG offset credits from any or all of the following offset certification standards: American Carbon Registry, Climate Action Reserve, or the Voluntary Carbon Standard. Central Valley would report each year to the CPUC its GHG emissions and the number of GHG offsets purchased and retired to offset project emissions above 10,000 mtpy.

4.8.4 Biological Resources

Applicant Proposed Measure BIO-1: Develop and implement a worker environmental awareness program. Before any work occurs in the project area, including grading, Central Valley would conduct mandatory contractor/worker environmental awareness training for construction, monitoring, supervisory, and engineering/inspection personnel. The awareness training would be provided to all construction personnel to discuss sensitive environmental resources known or having the potential to occur in the project region, best management plans, and permit conditions. If new construction personnel are added to the project, Central Valley would ensure that the personnel receive the mandatory training before starting work.

Applicant Proposed Measure 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 would obtain the permits listed below:

- Clean Water Act (CWA) Section 404 nationwide permit from the U.S. Army Corps of Engineers (ACOE)
- CWA Section 401 water quality certification from the Central Valley Water Board (all Section 404 permits require a Section 401 water quality certification from the Regional Water Quality Control Board (RWQCB))
- CWA Section 402/National Pollutant Discharge Elimination System (NPDES) permit from the State Water Board (requiring preparation of a Stormwater Pollution Prevention Plan (SWPPP))
- Section 1602 Streambed Alteration Agreement and 2081 Agreement from the Department of Fish and Game (CDFG)
- Biological Opinion from the U.S. Fish and Wildlife Service (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 would 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.

Applicant Proposed Measure BIO-3: Install temporary construction barrier fencing to protect sensitive biological resources adjacent to the construction zone. The construction specifications would require that a qualified biologist identify sensitive biological habitat on site

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 would 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 the valley elderberry longhorn beetle (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 would be determined by the environmental compliance monitor. The protected area would be designated an environmentally sensitive area and clearly identified on the construction specifications. The fencing would be installed before construction activities are initiated and would be maintained throughout the construction period.

Applicant Proposed Measure BIO-4: Minimize potential for the long-term loss of woody riparian vegetation. To the extent possible, Central Valley would 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 would 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 would be removed out of the riparian zone.

Applicant Proposed Measure BIO-5: Compensate for the loss of woody riparian vegetation at a ratio of 2:1. Central Valley would 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 would 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 would provide written evidence to CPUC and other appropriate resource agencies (e.g., CDFG) that compensation has been established through the purchase of mitigation credits. The amount to be paid would be the fee that is in effect at the time the fee is paid.

Applicant Proposed Measure BIO-6: Avoid and minimize disturbance of waters of the United States, including wetlands. To the extent possible, Central Valley would avoid and minimize impacts on waters of the United States, including wetlands, by implementing the following measures. These measures would 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 pre-project condition and reduces the effects of erosion on the drainage system.
- Any trees, shrubs, debris, or soils that are inadvertently deposited below the ordinary high water mark (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.

Applicant Proposed Measure 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 CDFG guidelines. CDFG 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 CDFG. Newly created burrows will follow guidelines established by CDFG.
- 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 CDFG).
- 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 non-breeding season (September 1–January 31) or within 250 feet during the breeding season (extends from March through August, peaking in April and May).

Applicant Proposed Measure 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.

Applicant Proposed Measure 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.

Applicant Proposed Measure BIO-10: Conduct preconstruction surveys for Swainson's hawk nests and implement appropriate restrictions.[2] 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 CDFG's recommendations for mitigating impacts to Swainson's hawks (CDFG 1994).

Applicant Proposed Measure BIO-11: Conduct a preconstruction survey for western pond turtles and implement measures to avoid impacts.[3] 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.

Applicant Proposed Measure BIO-12: Implement avoidance and minimization measures during construction activities in giant garter snake habitat.[4] 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 USFWS'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 ACOE 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 (USFWS 1997).

Mitigation measures to avoid and minimize effects on the giant garter snake are as follows:

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[2] Swainson's hawk: USFWS Birds of Conservation Concern, Forest Service Region 5 Sensitive Species, and state-listed as threatened (Table 5.5-3).

[3] Western Pond Turtle: California Species of Special Concern (Table 5.5-3).

[4] Giant Garter Snake: Federally listed as threatened and state-listed as threatened (Table 5.5-3).

- 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 pre-project 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.

Applicant Proposed Measure 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 ACOE 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 ACOE 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 (USFWS 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.

Applicant Proposed Measure BIO-14: Implement avoidance and minimization measures during construction activities near vernal pool fairy shrimp and vernal pool tadpole shrimp habitat.[5] 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 on-site biological monitor will be present during ground disturbance activities occurring west of the Glenn-Colusa Canal to ensure that habitat is avoided and 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 stormwater drains, and the use of pesticides or other toxic chemicals.

4.8.5 Cultural Resources

Applicant Proposed Measure 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 on-site 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, ACOE, and the State Historic Preservation Officer. Additional documentation will include preparation of formal National Register of Historic Places (NRHP) and California Register of Historical Resources (CRHR) evaluations of recorded resources.

Applicant Proposed Measure 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 the area of the find

[5] Vernal Pool Fairy Shrimp: Federally listed as threatened. Vernal pool tadpole shrimp: Federally listed endangered (Table 5.5-3).

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, Applicant Proposed Measure CR-3 will be implemented.

Applicant Proposed Measure 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 Native American Heritage Commission (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 following occurs:

- The Colusa County Coroner has been informed and has determined that no investigation of the cause of death is required
- 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 as provided in Public Resources Code, Section 5097.98
    - NAHC is unable to identify a descendant or the descendant fails to make a recommendation within 24 hours after being notified by the NAHC.

Applicant Proposed Measure 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.

4.8.6 Geology, Soils, and Seismicity

Applicant Proposed Measure 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.

Applicant Proposed Measure 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 (APM 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.

Applicant Proposed Measure 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 aboveground 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 California Building Code (CBC).

Applicant Proposed Measure 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.

Applicant Proposed Measure 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.

4.8.7 Hazards and Hazardous Materials

Applicant Proposed Measure 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 on-site 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 off-site 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 washdown activities will be conducted at least 100 feet from sensitive environmental resources.

Applicant Proposed Measure 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 will be 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, as well as 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.

4.8.8 Hydrology and Water Quality

Applicant Proposed Measure HYDRO-1: Prepare and implement a stormwater 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 on site during all construction activities and will reinforce the importance of confining all vehicular traffic to the existing ROW and access roads.

Applicant Proposed Measure 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.

4.8.9 Noise

Applicant Proposed Measure 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 7:00 p.m. and 7:00 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 7:00 p.m. and 7:00 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
    - Notifying nearby residents in advance of construction work.

4.8.10 Recreation

Applicant Proposed Measure 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 National Wildlife Refuges (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.

4.8.11 Transportation and Traffic

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.

Applicant Proposed Measure 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 may 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.