2.0 Project Description

The proposed Whittier Main Oil Field Development Project (Project) would involve drilling wells and producing oil and gas from the Project Site, located on property owned by the City of Whittier that is part of the Puente Hills Landfill Native Habitat Preserve (Preserve). The Preserve is located at the eastern edge of Los Angeles County, bounded by the San Gabriel River on the west and the Chino Hills to the east (see Figure 2-1).

The 3,869-acre Preserve extends across three jurisdictions: the City of La Habra Heights; the City of Whittier; and the communities of Rowland Heights and Hacienda Heights, both in unincorporated Los Angeles County. Both the San Gabriel and Lower Los Angeles Rivers and Mountains Conservancy and the Wildlife Corridor Conservation Authority, public agencies, have jurisdictional interests in the western Puente Hills (PHLNHPA 2007).

The City owns approximately 1,290 acres of former oil fields in the Preserve in the hills north of the developed areas of the City. This area was commonly known as the Whittier Main Field, an active oil field that produced oil for more than 100 years with approximately 500 drilled wells until the early 1990s. The majority of the land encompassing the oil field was purchased from Chevron and Unocal Corporation by the City of Whittier. The City's purchase of the Whittier Main Oilfield was funded by a grant of Proposition A funds. Conditions of this funding require the City to obtain the consent of the Los Angeles County Regional Park and Open Space District (the District) for certain proposed uses or development of the land for anything other than open space or recreational use. In order to use the proposed surface within the oilfield area for drilling and pumping, the City will be required to either reimburse the Los Angeles County Proposition A District for the area used or provide a comparable area of land that can be used for open space. City staff is in contact with the Los Angeles County Proposition A District to determine the appropriate approach to comply with this requirement. The proposed lease includes a provision that the City will not issue a conditional use permit (CUP) until a release from protected area status is obtained from the Proposition A District.

The land is currently managed for the City by the Puente Hills Landfill Native Habitat Preservation Authority (Habitat Authority), a joint powers agency whose members include the City of Whittier, County of Los Angeles, the Hacienda Heights Improvement Association and Los Angeles County Sanitation Districts. On October 28, 2008, the City awarded a lease to Matrix Oil Corporation (Matrix) that could permit resumption of oil and gas extraction from the site. The agreement leases the City's mineral rights underlying the Whittier Main Field to Matrix and provides that, subject to a conditional use permit (CUP) and contractual provisions, Matrix could have certain rights, including drilling exploratory oil wells and extracting oil, gas, and other hydrocarbons, such as natural gas liquids, from the land. In exchange for these rights, the Project could generate a substantial long-term income stream for the City and for the preservation and enhancement of the Preserve's ecological resources and native habitat.

Matrix, the Applicant and the operator of the Whittier Main Oil Field, submitted a CUP application to the City of Whittier in April 2009 to drill, explore, and produce the remaining recoverable oil and gas reserves at the site. In October 2010, a Draft EIR was released to the public for a 60-day public comment period. Subsequently, in April of 2011, the Applicant amended its CUP application to modify the Project to reflect the Environmentally Superior Alternative identified in the October 2010 Draft EIR. This revised Project Description is the subject of this environmental review.

The proposed Project Site is a subset of the Preserve in the southeastern area, defined by a set of parcels owned by the City (see Figure 2-2). The portion of the Preserve within the City of Whittier is zoned Open Space.

The remainder of this chapter contains three sections. The first section identifies the proposed Project's objectives. The second section provides background information on the area and oil activities in the Whittier and Los Angeles areas. The third section details the phases of the proposed Project.

2.1 Proposed Project Objectives

Pursuant to Section 15124(b) of the CEQA Guidelines, the description of the proposed Project is to contain “a clearly written statement of objectives” that will aid the lead agency in developing a reasonable range of alternatives to evaluate in the EIR, will aid decision makers in preparing findings and, if necessary, a statement of overriding considerations.

The City, as owner and lessor of the oil field property, and Matrix, as prospective developer, operator, and lessee, each have interest in the Project.

2.1.1 City Objectives

- Generate a substantial, long-term income stream for the City.
- Provide long-term resources to help manage environmental issues associated with the Project within the Preserve.
- Minimize environmental impacts from the Project on the Preserve.
- Minimize noise impacts to surrounding areas.
- Minimize traffic impacts to surrounding areas.
- Minimize impacts to the functioning of the Core habitat of the Preserve.
- Minimize impacts to operational, recreational, and educational opportunities of the Preserve.
- Facilitate the long-term preservation and enhancement of the Preserve’s ecological resources and native habitat.
- Employ current technologies in an effort to reduce environmental impacts to less-than-significant levels.
- Maintain reasonable fire safety levels for the community and open space.

2.1.2 Matrix Objectives

- Develop the Whittier Main Oil Field, pursuant to the terms of the Oil and Gas Lease with the City of Whittier dated October 28, 2008, utilizing current "slant-drill, or high-angle well" technology and other state-of-the-art techniques, while maintaining safe and efficient operations.
- Minimize impacts to the Preserve, as defined in the Lease, by utilizing existing roads as much as possible, and placement of production equipment and facilities on one site utilizing up to seven acres.
- Operate in accordance with all prevailing laws and regulations to maximize safety and protect the environment.
- Minimize and mitigate negative impacts of the project on the local community.
- Stimulate the local economy by providing opportunities for qualified local businesses to sell goods and services and to qualified workers to apply for jobs.
- Maximize oil and gas production from the field, thereby maximizing royalty payments to the City of Whittier.

2.2 Historical Operations

Historical operations include both the history related to oil operations in the area and the formation of the Preserve. The following sections discuss both.

2.2.1 Whittier Main Oil Field Historical Operations

Oil drilling and production in the Los Angeles Basin has a long history. According to the California Division of Oil, Gas and Geothermal Resources (DOGGR) database, almost 30,000 oil wells have been drilled in the Los Angeles Basin in the last 100 to 150 years. Figure 2-3 shows the location of these wells.

The Whittier Main Oil Field is part of a larger oil-producing trend lying along the Whittier Fault Complex that runs southeast from Monterey Park through Montebello, Whittier, La Habra, Brea, and Yorba Linda. Historically, oil from the Miocene Puente and Pliocene Fernando formations has been produced from 1,000 to 6,000 feet below surface level.

The Whittier Main Oil Field is located in Los Angeles County, California, approximately 30 miles east of downtown Los Angeles. Oil was first discovered in the Puente Hills in 1884, approximately 7 miles north of Fullerton and 4 miles south of Puente, by William "Billy" Rowland on his father's former ranch, Rancho La Puente. By 1900, oil fields in the Puente Hills produced a combined 50,000 barrels of oil per month and the success of small, local companies attracted the attention of many larger outside oil interests (RMP 2007). Whittier Consolidated Oil Company discovered the Whittier field in 1901. The first commercial well, approximately

3,200 feet deep and completed in October of 1919, flowed 204 barrels per day (bpd) of 25 American Petroleum Institute (API) gravity oil.

Between 1980 and 1989, the Whittier Main Oil Field produced approximately 800 bpd. In 1989, the last normally producing year, the field produced 269,000 barrels of oil. Existing available technology limited oil extraction to depths between 1,000 and 6,000 feet and exclusively from vertical wells. In 1989, Chevron began abandonment of the Whittier Main Oil Field due to low oil prices.

The DOGGR database indicates that historically 494 wells have been located in the general area of the Whittier Main Oil Field (the Project Site), an additional 19 wells in the La Habra Heights area (east of the Project Site), and 49 wells in the Rideout Heights area (north of the Project Site along the Sycamore Canyon area, see Figure 2-3). Most wells are listed as plugged and a few are designated as idle. A plugged well is fully abandoned with cement in the well bore. An idle well is non-operational and not producing, but has not been plugged

In the general vicinity of the Project Site, historical operators included Chevron, Central, Chem-Rex, City of Whittier, Commonwealth, Lyon Brothers, Macrom, Mohawk, Montebello Mascot, New England Oil, Parcan Oil, Union Oil, Whitely, Taylor, and Whittier Strong.

Information from DOGGR on the oil and natural gas production since 1977 from the central Whittier field is plotted in Figure 2-4. The DOGGR database indicates some minimal production of gas until 1999 with most activity ceasing in 1992.

Oil activities continue in the Whittier Oil Field area (see Figure 2-4), where Matrix produces oil and gas from wells at two locations: Honolulu Terrace (2.7 miles northwest of the proposed Project Site) and Sycamore Canyon, also known as Rideout Heights (3.6 miles northwest of the proposed Project Site). Honolulu Terrace lies within a residential area outside of the Preserve boundary. The Sycamore Canyon wells are along Sycamore Canyon Road within the western edge of the Preserve boundary.

Table 2-1 shows the properties of crude oil and produced gas from tests performed on samples of oil and gas (casing gas) from one Honolulu Terrace well and one Sycamore Canyon well in October of 2009. The wells are drilled into a formation and reservoir that are anticipated to be the same or similar to the proposed Project wells.

Figure 2-1 Proposed Project Location

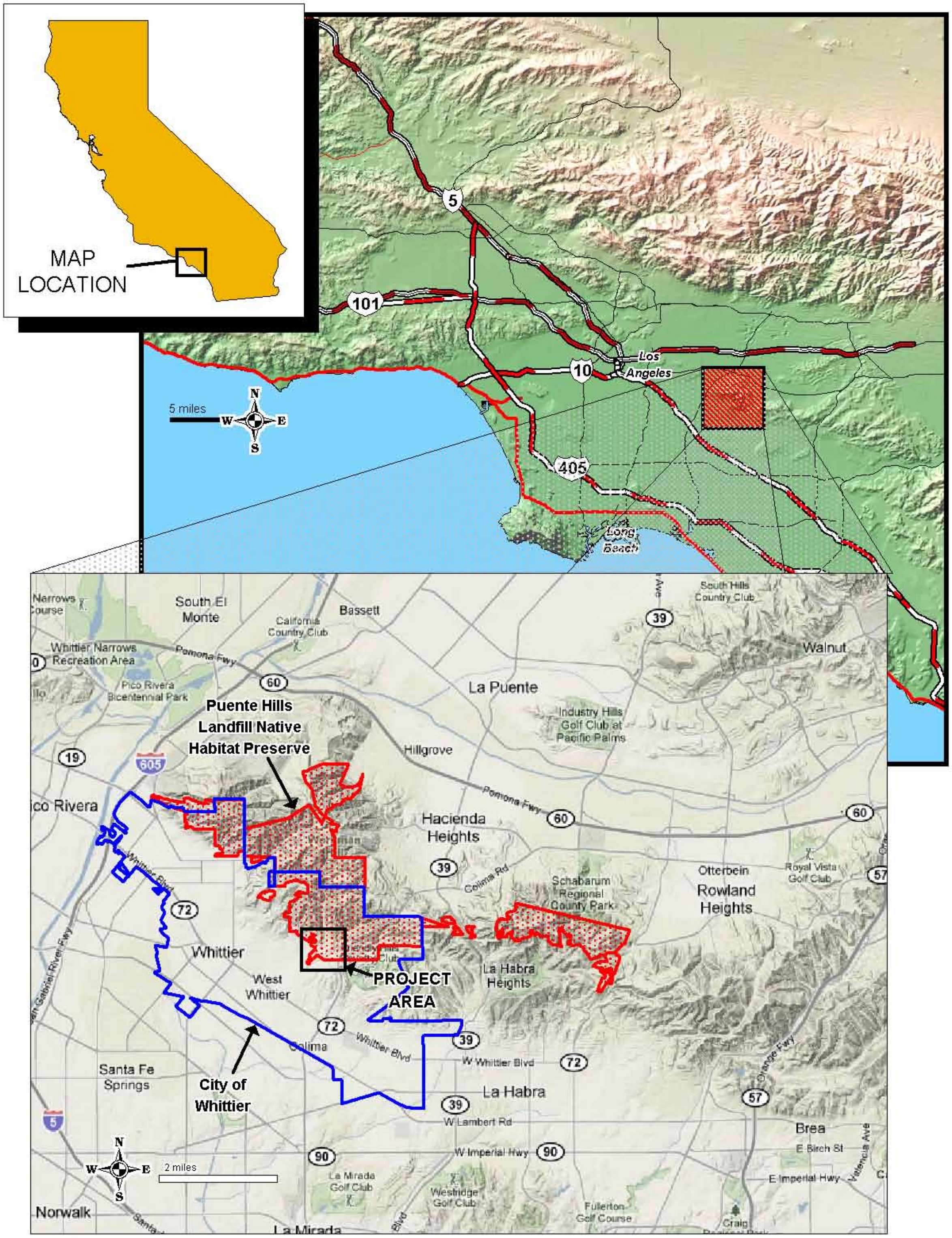
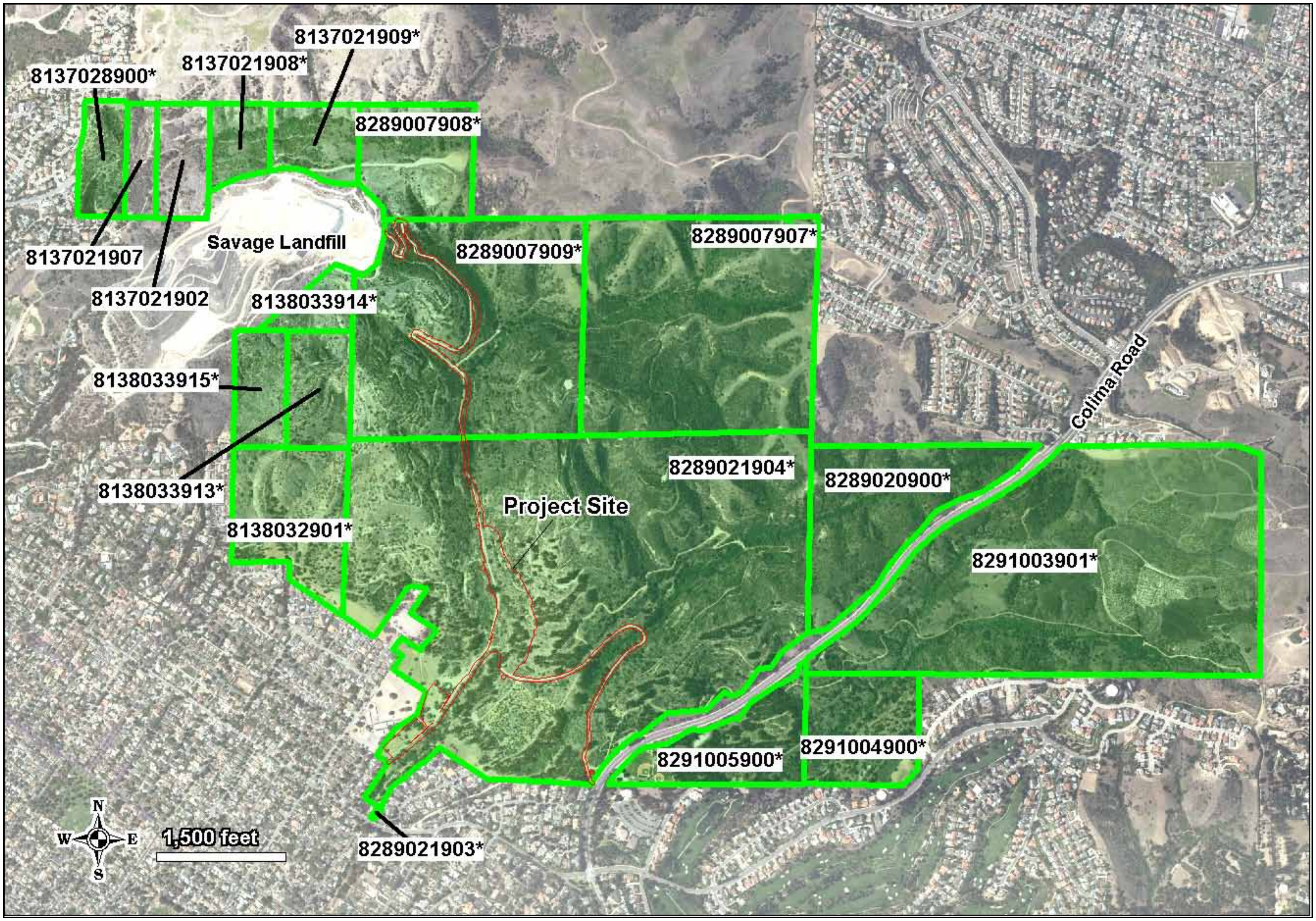
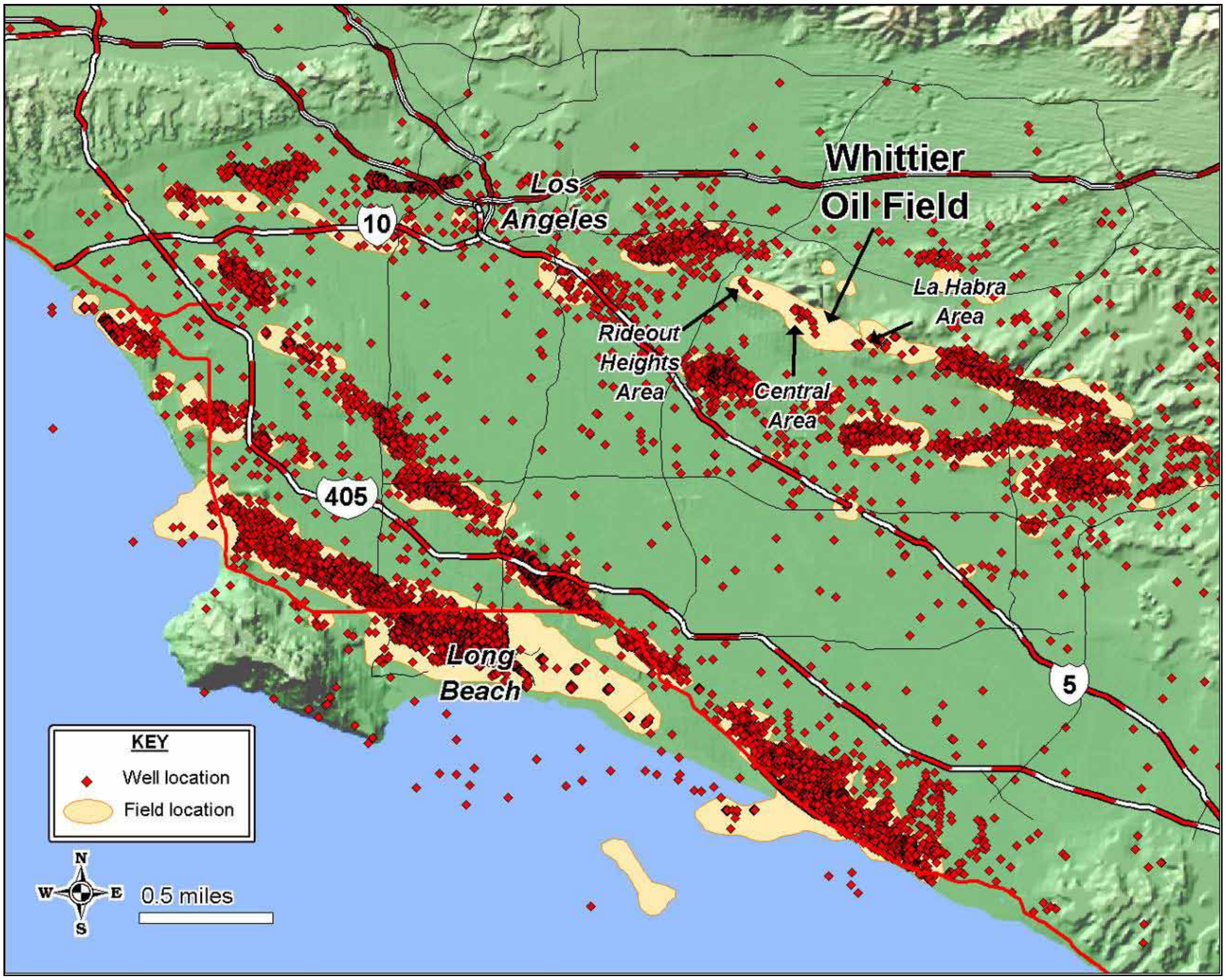


Figure 2-2 Proposed Project Lease Parcels



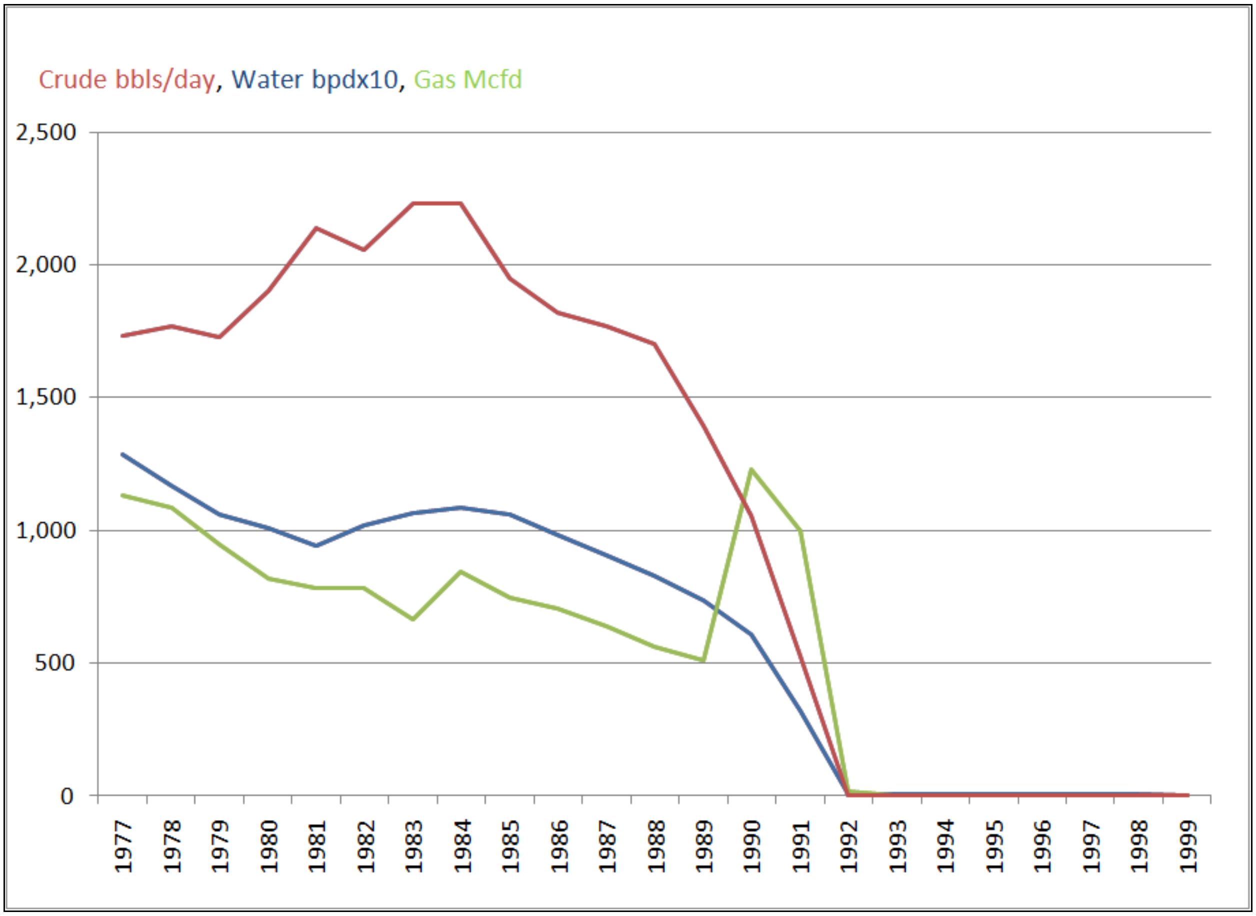
Note: * Parcels shaded were historically purchased with Proposition A funds. Source: City of Whittier. See Appendix A.

Figure 2-3 Historical Wells Drilled in the Los Angeles Basin



Source: DOGGR

Figure 2-4 Historical Production from the Whittier Main Oil Field



Notes: bbl = barrels; Mcfd = thousand standard cubic feet per day.
Source: DOGGR online database for Central Whittier Field

Table 2-1 Honolulu Terrace and Sycamore Canyon Well Sample Test Results

Property	Results
Crude Oil	
API Gravity	25.6 - 33.9
Water content	0.10-1.5 weight %
Hydrogen sulfide	< 1 ppm
Mercaptan sulfur	2 ppm
Vapor Pressure	2.8 - 6.3 Reid psi
Light ends	1.15 - 3.79 weight %
Gas	
Hydrogen sulfide	< 0.1 ppm volume
All sulfur compounds	0.1-1.2 ppm volume
Moisture	247-378 ppm volume
Carbon dioxide	0.28 - 19.8 mole %
Methane	65.2 - 69.3 mole %
Ethane	11.1 - 3.2 mole %
Propane	0.64 - 9.8 mole %
Butanes	1.42 - 6.1 mole %
Pentanes	0.81 - 3.4 mole %
C6+	3.3 - 4.8 mole %

Notes: ppm = parts per million; psi = pounds per square inch.
Two samples were taken, one from Well S22 (Sycamore Canyon) and one from Well 7 (Honolulu Terrace).

Continuing activity in the La Habra area, east of the Project Site, is currently limited to gas storage wells operated by the Southern California Gas Company (SCGC). There is also an oil and gas production operation located at 214 Canada Sombre Road in La Habra Heights.

Historic well drilling activities at the Whittier Main Oil Field used surface land to establish well-drilling and fluids-processing activities. Applicable laws and regulations and previous owners' agreements with landowners govern the rights to use the "surface" for these activities. In this context, previous owners are previous operators, such as Chevron.

The reservoir containing the oil and gas is underneath land used for businesses, parks, and residences. However, mineral rights can be severed (i.e., sold, transferred, or leased), distinct from surface rights, which are the rights to use the surface of the land for residential, agricultural, recreational, commercial, or other purposes.

A person or entity may own all or any fraction of the mineral rights for a parcel. A person or entity may also own rights to only one kind of mineral, such as oil and gas, or to only one formation or depth interval. The ownership of the producing mineral rights in a parcel is identified in the deed abstract for the property. The rights of the mineral owner to use the surface of the real property are dominant to the rights of the owner of the surface estate, but both owners are required to make reasonable efforts to accommodate the other's development of their rights in the land. The rights of a mineral owner to use the surface estate can only be restricted by an express grant of such rights from the mineral owner to the surface owner. Mineral rights are, in all respects, real property rights. Real property rights are those rights primarily established under the common law of California and generally governed by the California Civil Code, Division 2, Part 2.

In 1995, Chevron sold the Whittier Main Oil Field area, including surface and mineral rights, to the Trust for Public Lands, which is a nonprofit, land conservation organization that uses public and private monies to purchase and preserve open space. The sale included an environmental remediation program overseen by Chevron and the City, which was completed in 1997. Ultimately, the City of Whittier acquired both surface and mineral rights for the Whittier Main Oil Field.

On October 28, 2008, the City entered into an Oil, Gas, and Mineral Lease Agreement with Matrix Oil Corporation (Matrix) of Santa Barbara, California. This Agreement leases the entirety of the City's mineral rights underlying the Whittier Main Oil Field to Matrix and provides Matrix with certain other rights including drilling exploratory oil wells and extracting oil, gas, and other hydrocarbons from the land subject to review and approval of a conditional use permit. In exchange, Matrix would pay the City royalties on proceeds from the sale of produced oil and natural gas.

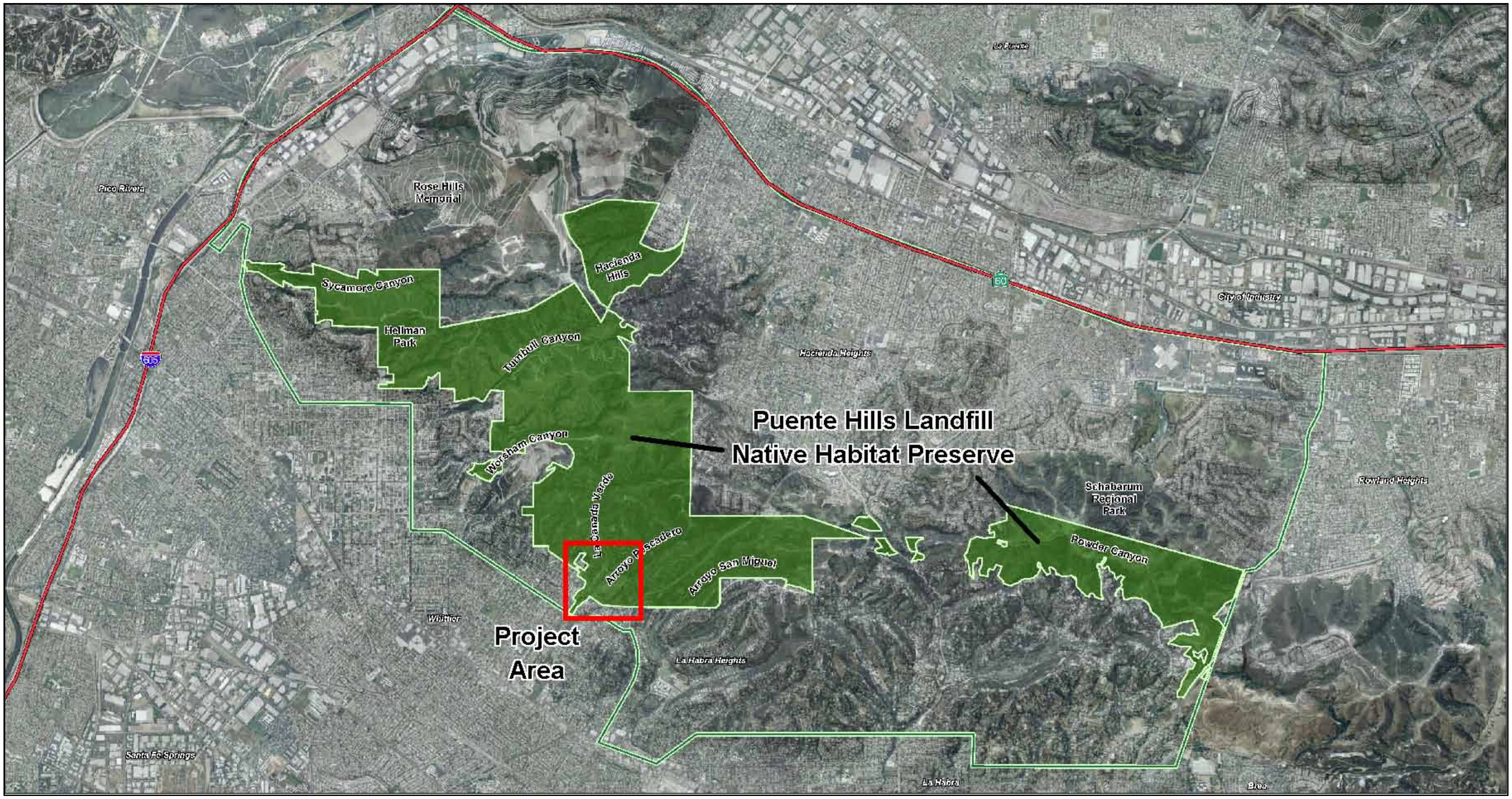
2.2.2 Preserve History and Current Operations

The Puente Hills Landfill Native Habitat Preservation Authority began in 1994 as a condition of approval for the operation of the Puente Hills Landfill. Figure 2-5 shows the Preserve boundary. The purpose of the Habitat Authority is to acquire, restore, and maintain open space in the Puente Hills as permanent protection for the native habitat with special consideration given to the community of Hacienda Heights (RMP 2007).

Solid-waste disposal fees from the Puente Hills Landfill provide the primary funding for the Habitat Authority. This funding will continue through the remaining life of the landfill, currently scheduled to close in November 2013. The Puente Hills Landfill is owned by the County of Los Angeles and is managed by the Sanitation District of the Los Angeles County Solid Waste Management Department. The Oil and Gas Lease between the City of Whittier and Matrix provides for continuing funding for the Habitat Authority with annual administrative fees and mitigation fees upon issuance and acceptance of a CUP. A successful Project would provide a stable source of funding for the Habitat Authority for as long as the wells produce oil and gas.

The Habitat Authority's first acquisition was 517 acres in Powder Canyon, La Habra Heights, in May 1996. Later that year the Authority acquired 63 acres in Hacienda Heights. The Habitat Authority currently owns 1,881 acres in Hacienda Heights, La Habra Heights, and Whittier, acquired through 27 land transactions ranging from less than 1 acre to more than 950 acres. Other member agencies on the Authority's Board of Directors own the remaining 1,988 acres. The Habitat Authority contractually manages the lands owned by the City of Whittier, including the Project Site.

Figure 2-5 Puente Hills Landfill Native Habitat Preserve



Source: RMP 2007

Currently, activity at the Whittier Main Oil Field is limited to Preserve operations and activities, which consist of restoration and management of natural areas, and management of educational and recreational facilities. Visitors and hikers currently access the Preserve from the parking area along Colima Road. An outdoor seating area and restroom facilities are located at the top of the loop trail and a Ranger Residence is located just inside the Preserve, near the Catalina Avenue entrance to the Preserve.

2.3 Proposed Project Phases

The proposed Project would involve three distinct development phases. The first phase, the Drilling and Testing Phase, would involve drilling up to three test wells at the Project Site and assessing the quality and quantity of oil and natural gas produced. Assuming successful testing, the second phase, the Design and Construction Phase, would involve construction of well cellars, the installation of gas and oil processing equipment, and crude transportation facilities.

The third phase, the Operations and Maintenance Phase, would involve drilling the remaining wells (for a total of up to 60 wells; three test wells drilled during the test phase and the remaining 57 wells drilled during the Operations and Maintenance phase), as well as the operation and maintenance of the gas and oil facilities and the wells, which would include well workovers and occasional well re-drilling.

As proposed, the fully developed Project would consist of a single pad with wells, an oil processing plant, a gas plant, and an oil-truck loading facility all located on an approximately 6.9 acre site (Project Site) within the 1,290-acre City-owned Whittier Main Oil Field (see Figure 2-6). Figure 2-7 shows the location of equipment within the Project Site Pad . Figure 2-8 shows the North Access Road, which would provide access to the Project Site. A crude oil sales pipeline and a natural gas sales pipeline would be installed underneath existing Preserve roads (the Loop Trail Road) between the Project Site and Colima Road. This crude oil and gas pipeline would continue south under Colima Road to transport crude oil and natural gas to markets (see Figure 2-9). Table 2-2 summarizes Project design parameters.

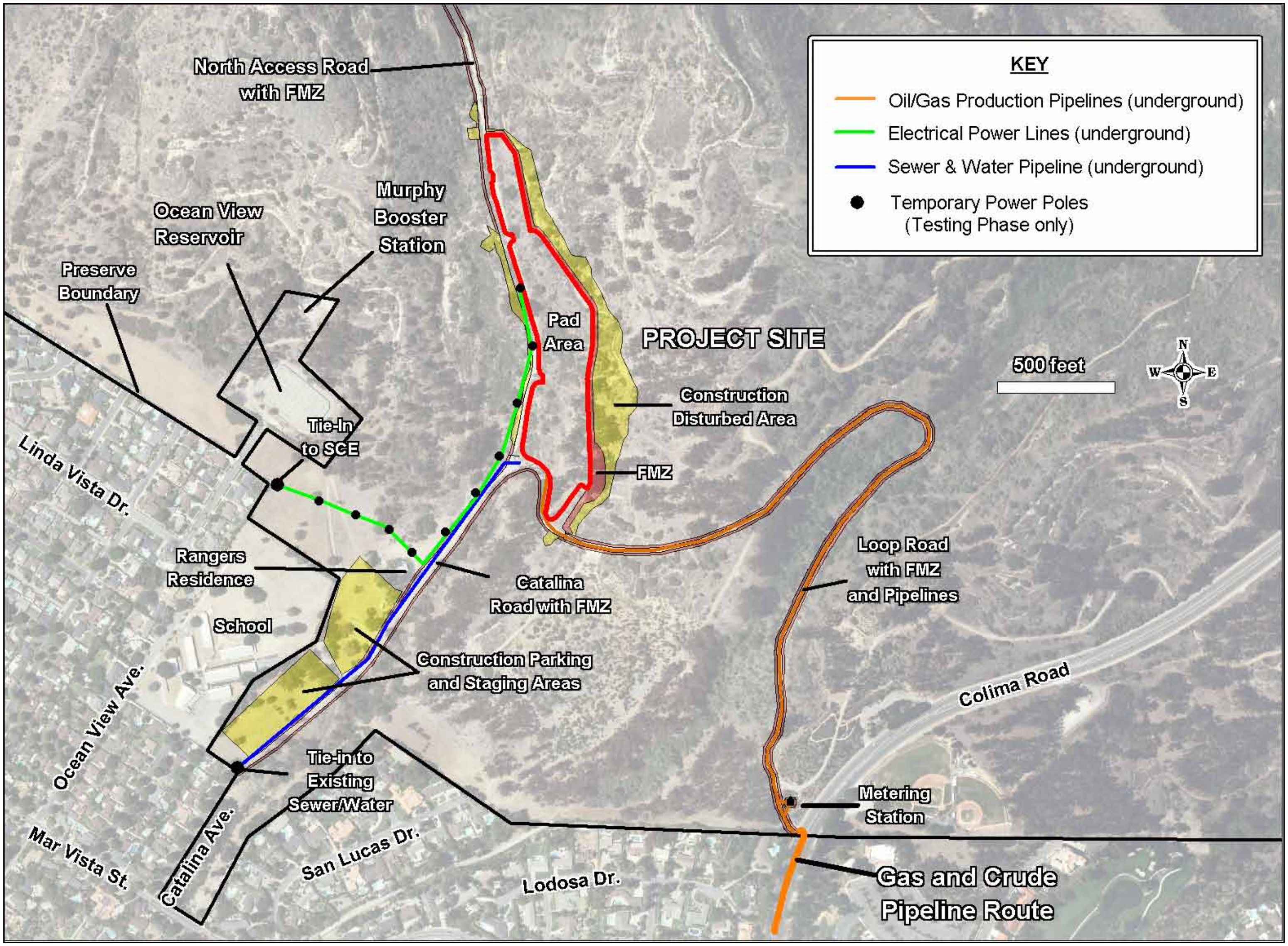
Table 2-2 Proposed Project Design Parameters

Parameter	Value
Crude oil production	Up to 10,000 bpd
Natural gas production	Up to 6 million cubic feet per day
Produced water injection	Up to 7,200 bpd
Maximum number of wells	60
Number of production wells	Up to 52: all at the Project Site
Number of injection wells	Up to 8, all at the Project Site
NGL production	Up to70 bpd, mixed with crude oil
Pipeline length and tie-in, gas	1.8 miles, Colima Road to Lambert
Pipeline length and tie-in, crude	2.8 miles, Colima Road to La Mirada to Leffingwell Avenue
Water use, during construction	2,000 gallons per day during grading and earthmoving Up to 10,000 gallons per day during pipeline installation 1,000 gallons per month during facility construction
Water use, during drilling	Up to 4,500 gallons per day
Water use, during operations and maintenance	Up to 1,300 gallons per day
Electrical use, operations	3,700 kW peak, 2,500 kW average
Well workovers	Up to 52 per year
Well re-drills, peak	Up to 3 per year

Notes: bpd = barrels per day; kW = kilowatts; estimated peak values and maximums shown

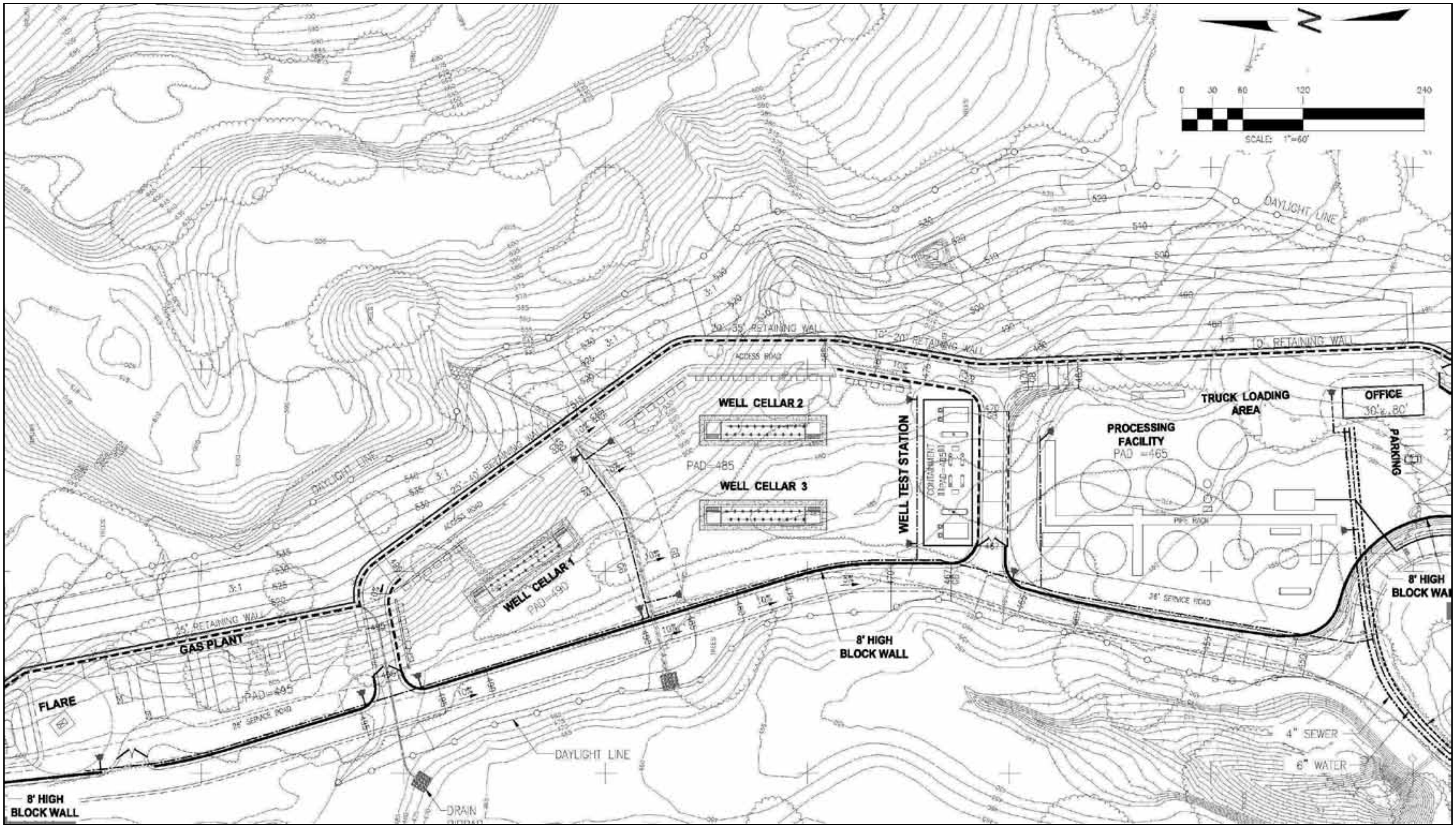
The Project Site would contain the oil and gas drilling and processing facilities on the single pad including a well area, a gas plant area and an oil plant area that will consist of well cellars, well test stations, liquid and gas separating equipment, a truck loading facility, an oil processing facility, and a gas plant (see Figure 2-7 and Appendix A). The total permanent area required for the pad would be approximately 6.9 acres (see Table 2-3) with an additional 6.5 acres of roadways, most of which are currently present. The County of Los Angeles Fire Department (LACoFD) may require a fuel modification zone (FMZ). An FMZ is a strip of land where combustible native or ornamental vegetation is modified or partially or totally replaced with drought-tolerant, low-fuel-volume plants to reduce fire risk around the facility. The Fire Department has stated that it would require FMZ of 20 feet for facility pads, 10 feet for roads and 100 feet for the office building. The FMZ would encompass an additional 6.9 acres along roadways and around the pads. Up to 8.5 additional acres may be temporarily disturbed for construction and grading the site (see Appendix A) including areas disturbed for parking and staging of construction equipment. These 8.5 acres would be revegetated after construction is completed. The total impacted area associated with pads, roads, FMZ, and construction-related temporarily disturbed areas would be 30.6 acres (9.0 of these acres are designated as previously disturbed by the Habitat Authority).

Figure 2-6 Proposed Project Site



Source: Matrix Application and subsequent submittals. See Appendix A for detailed drawings.

Figure 2-7 Project Site Pad Equipment Arrangement



Source: Matrix Application and subsequent submittals. See Appendix A for detailed drawings and North Access Road drawings.

Figure 2-8 North Access Road and Penn Street

Figure 2-9 Pipeline Route

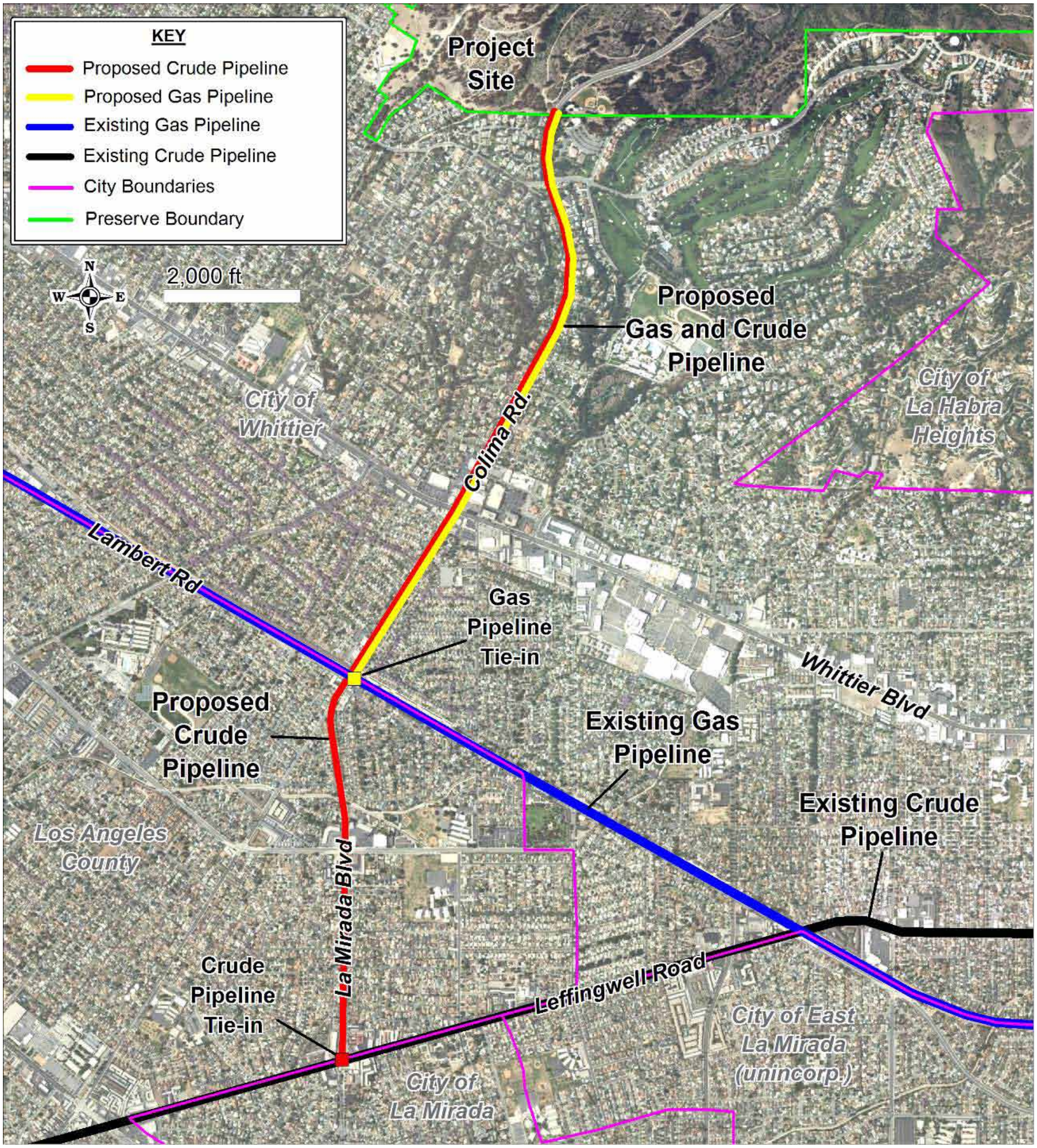


Table 2-3 Project Disturbed and Facility Areas

Location	Permanent Facility Area (acres)	Permanent Fuel Modification Area (acres)[1]	Construction Temporary Disturbed Area (acres)[2]
Pad Area[4]	6.9	1.1	3.7
Road Areas[4]	6.5	4.0	0.7
Parking and Staging Area	-	-	4.1
Secondary Fire Access (Loop Trail Road)[3,4]	1.7	1.7	-
Total	**15.2**	**6.9**	**8.5**

Notes: Numbers may not add exactly due to rounding. All pipelines would be within existing or proposed roadways. Road Areas include the North Access Road (currently dirt) and Catalina Road within the Preserve (currently paved).
1. Surrounding pad area by 20 feet and 100 feet from the office building (see Appendix A)
2. In addition to facility area and fuel mod area and includes grading and areas disturbed associated with construction activities
3. If required by the Fire Department
4. Includes previously disturbed areas and roadways. Previously disturbed areas include 9.01 acres of existing roads and other areas designated by the Habitat Authority as previously disturbed. Assumes 20 feet around all North Access Road retaining walls associated with construction temporary disturbed areas. See section 4.2 tables for more details on impacted areas.
The Pad Area permanent facility acres represent the pad area within the fence line that would be developed to support the proposed facilities.
Source: Matrix detailed drawings in Appendix A and Habitat Authority Vegetative Designations

Roads, pipelines, and utility poles would also be constructed. Electrical and pipeline interconnections would be made to the Southern California Edison (SCE) grid and the City of Whittier Sewer and Water District systems.

During the Drilling and Testing Phase and the Design and Construction Phase, Matrix proposes to transport crude oil in 10,000-gallon capacity tanker trucks through Catalina Avenue until the permanent sales oil pipeline is constructed.

During operations, Matrix proposes two methods for transporting the marketable crude oil. One method would be via the Truck Loading Facility inside the Project Site area, where the oil would be loaded onto oil tanker trucks and transported via the North Access Road to a nearby receiving terminal and then transferred into the Crimson California Pipeline System. Oil would be transported by this method during rare periods when the pipeline system is shut down.

The second oil transportation method would transfer the marketable crude oil by pipeline from the Project Site to the existing Crimson California Pipeline System. This would involve building the oil sales pipeline from the Project Site under existing roadways through the Preserve to Colima Road and then constructing a 2.8-mile pipeline connecting to a tie-in point at Leffingwell Road and La Mirada Boulevard. The existing Crimson California Pipeline System would transport the crude to one or more refineries in Long Beach or Wilmington, California. The 2.8-mile pipeline would be constructed at the same time and in the same trench as the natural gas sales line, which would follow the same route to tie into the SCGC line at the intersection of

Colima and Lambert Roads. Oil transportation via pipeline would occur for the duration of the project except for brief and rare periods when the pipeline or refinery are temporarily shut down for maintenance, in which case oil would be temporarily transported via truck.

The new natural gas pipeline would be built simultaneously and next to the oil pipeline from the Project Site under existing roadways through the Preserve to Colima Road. From Colima Road, the gas pipeline would follow the oil pipeline to the SCGC line interconnection at Lambert Road (see Figure 2-9). In addition, during the Design and Construction Phase, a natural gas pipeline would be constructed aboveground next to the North Access Road from the Project Site to the landfill to be connected to the City of Whittier pipeline system into which some of the natural gas could be delivered.

Table 2-4 shows the distance between proposed Project components to sensitive receptors, including residences, trails, and the Ocean View School buildings and playground.

Table 2-4 Distance from Proposed Project Components to Sensitive Receptors (feet)

Project Component Location	Ocean View Residences	School Buildings	School Playground	San Lucas Drive Residences	Public Trails
Well Pad	1,460	1,920	1,540	1,950	630
Processing Pad Oil Plant	1,060	1,360	940	1,290	350
Processing-Pad Gas Plant	1,200	1,620	1,230	1,670	720

Source: Matrix Application and subsequent submittals and GIS analysis

2.3.1 Site Access

During the Drilling and Testing Phase, all access to the Project Site would be through the Catalina Avenue Preserve gate located at the north end of Catalina Avenue. Access to Catalina Avenue would be from Mar Vista Street. Truck routes would most likely travel along Mar Vista Street to Colima Road, equally dispersing north and south along Colima Road, where they would travel north on Colima Road to Highway 60 or south to Whittier Boulevard to Interstate 605.

After initial testing, access to the Project would be from both Catalina Avenue and Penn Street through the landfill property and through the Preserve to the Project Site (the North Access Road). Vehicles with two axles under 3 tons would access the Project Site through Catalina Avenue (generally, automobiles and pickups). Vehicles with more than two axles or over 3 tons (generally trucks), or vehicles towing trailers, would use the Penn Street entrance and the North Access Road to access the Project Site.

Truck routes would most likely follow Penn Street to Painter Avenue, travel north on Painter Avenue to Hadley Street, and then west on Hadley Street to Whittier Avenue and the subsequent the destination (such as east on Whittier Avenue to Interstate 605).

The total length of the North Access Road from the north end of the Project Site to Penn Street would be 2.5 miles, with approximately 1.2 miles within the Preserve and 1.3 miles within the

Landfill. This roadway would be aligned, stabilized, and widened to safely accept vehicles. Approximately 15,000 ft^3 of cut and fill would be moved.

Approximately 1,800 feet of Catalina Avenue within the Preserve would be improved and widened according to LACoFD requirements. In addition, approximately 2,000 feet of existing asphalt road roadway within the Preserve immediately adjacent to the Project Site would be re-aligned, widened, and improved and an additional 220 feet of new roadway within the Preserve immediately adjacent to the Project Site would also be constructed (see detailed drawings of the North Access Road in Appendix A).

Approximately 6.5 acres would be impacted by the North Access Road and Catalina Avenue within the Preserve, including the existing roadways, and approximately 2.2 acres would be new disturbance.

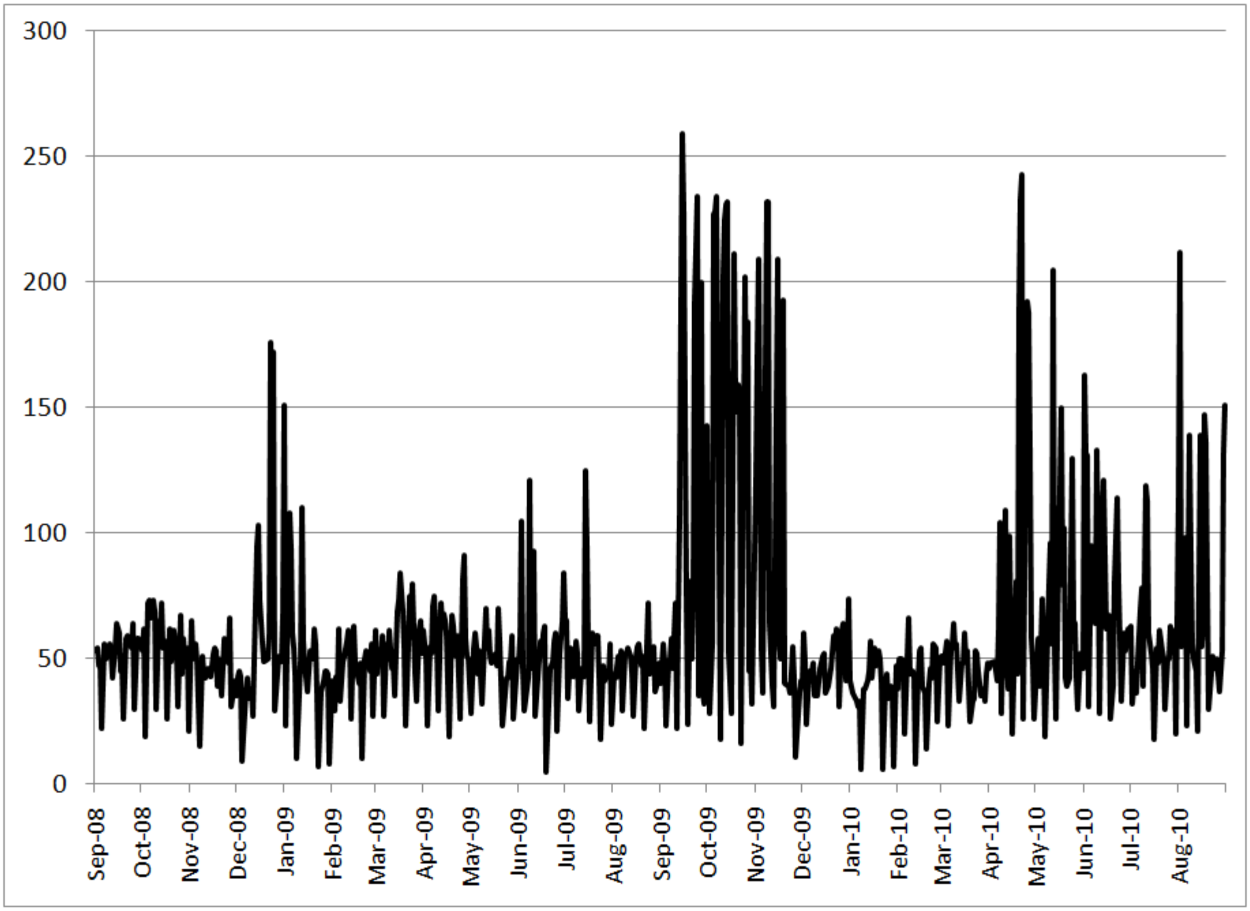
In addition, the Loop Trail Road (4,100 feet) may need to be widened to 20 feet according to Fire Department requirements for a secondary access route to the facility from Colima Road. This would impact approximately 1.7 acres, including the existing roadway, with approximately 0.3 acres newly disturbed.

Current operations along Penn Street include trucks visiting the landfill and traffic associated with residences, Whittier College, and William Penn Park. Some through travels Penn Street due to the connection with Mar Vista Street via Ocean Avenue. The landfill has a permit with the California Department of Resources Recycling and Recovery, the California agency responsible for regulating landfills in California. The landfill permit limits access to a maximum of 350 cubic yards of landfill material per day, but does not specify a specific limit on vehicle trips. From September 2008 through August 2010, daily vehicle visits to the landfill have been as high as 259 trips per day when the landfill received fill dirt from various construction projects (see Figure 2-10). Average truck trips (not including days the landfill is closed) for the Landfill over this time period were 62 visits per day.

Recently, dirt from the Whittier Area Community Church Project was transported to the landfill, on average approximately 11 trucks trips per hour for 3 months, with a reported peak of 17 truck trips per hour.

The Habitat Authority estimates that six one-way truck trips per week currently occur along the North Access Road within the Preserve for maintenance functions.

Figure 2-10 Savage Canyon Landfill Vehicle Visits per Day - 2008 to 2010



Source: City of Whittier, data for 9/16/2008 through 9/15/2010

2.3.2 Drilling and Testing Phase 1

The initial step of the Project would be the Drilling and Testing Phase to determine the potential productivity and economic viability of the Project. During this phase, up to three test wells would be drilled from the Project Site to vertical depths between 1,000 and 10,000 feet. These wells would utilize horizontal drilling technology, which enables the wells to be drilled long distances laterally, such that the bottom-hole locations may be several thousand feet from the surface locations of each well.

Catalina Avenue would provide the only access to the site during the Drilling and Testing Phase; Mar Vista Street and other area roadways would provide access to Catalina Avenue. Table 2.5 provides detailed information on vehicle and truck trips needed for this phase of the Project. Parking and staging would take place within the Preserve immediately inside the Catalina Avenue gate and at the Project Site (see Appendix A).

Prior to the start of the Drilling and Testing Phase, a portion of the Project Site would be cleared and leveled to accommodate the drilling equipment, which includes the drilling rig, temporary liquid storage tanks, pumps, gas handling equipment, and pipe racks. All clearing equipment would be delivered to the Project Site by trucks designed to transport such equipment. Clearing the site would require approximately 10 people operating earth-moving and support equipment for 10 hours per day, 5 days per week, for up to 4 weeks. Clearing would include removing brush and obstructions from an area smaller than the area to be potentially disturbed during the Design and Construction Phase site grading. Cleared brush and debris would be transported to and disposed of at the landfill. Any excess soil from the leveling process would be stockpiled, after which it would be utilized or transported offsite as part of the Construction Phase.

Catalina Avenue within the Preserve would also be improved during this phase to provide access for emergency firefighting equipment. Utility crews would also install water and electricity to the Project Site, necessary precursors to drilling activities. Water would be obtained from the City of Whittier via its existing hydrant at the entry gate at Catalina Avenue. Matrix would use temporary aboveground piping to pipe the water from the existing hydrant to the drill site. During the Drilling and Testing Phase, SCE would provide a temporary service meter and poles would be temporarily installed to distribute power to the well site as needed. Poles, approximately 30 feet high and spaced approximately every 200 feet, would connect to the SCE service at the north end of Ocean View Avenue (see Figure 2-6).

After the Project Site is sufficiently prepared, the drilling rig and associated equipment would be brought to the site and assembled. During set-up, tear-down, and drilling operations, it is estimated that an average of 20 workers would be participating in the work. Each well is estimated to take up to 30 days to drill. While drilling continues, temporary oil, water, and gas handling equipment, such as tanks, vessels, pumps, and compressors, would be installed on the site. The three test wells would be drilled one after another, utilizing the same rig and support equipment, which would remain on the property for approximately 90 days. When the last well is completed, the rig and associated equipment would be moved off the property while monitoring and sampling of the test wells continues.

Continuous monitoring would be performed 24 hours per day, for up to 120 days. Up to five workers (e.g., pumpers, pipefitters, electricians), working 10 hour shifts, would be present during the testing. In addition, tanker trucks would transport the produced liquid (oil and water) offsite up to six times per day during daylight hours only.

Drilling the test wells would require a large drilling rig that would drill 24 hours per day, seven days per week, until planned depths and bottom-hole locations are reached. Matrix plans to use Kenai Drilling rig #14 or 15, or a rig of similar capabilities, which would be approximately 125 feet tall, including the rig mast and substructure. It is anticipated that non-road portable diesel-fueled generators certified by the California Air Resources Board would power the drilling rig and other necessary equipment. The surface equipment would be screened from view and appropriate temporary fencing and soundproofing would be installed.

Approximately 0.4 acre-feet (130,000 gallons) of water would be consumed while drilling each well. During the Drilling and Testing Phase, a temporary fire hydrant would be installed to provide water for fire protection. The existing fire hydrant on Catalina Avenue would provide water for drilling and fire protection. If sufficient pressure is not available, booster pumps would be installed. As a byproduct of drilling operations, a liquid slurry of drilling "mud" would be collected onsite within Baker-type enclosed tanks or bermed basins that are protected by impermeable membranes. Approximately 1,800 barrels of this mud would be collected for each well drilled. Most of the drilling mud would be reused on subsequent wells and properly disposed offsite at an appropriate landfill after the third well is complete.

During the Drilling and Testing Phase, a 15-foot tall noise blanket would be installed around the perimeter of the drill site to minimize noise and shield views into the Project Site. Additional soundproofing would be installed on the drilling rig as necessary. Any additional wells drilled before construction is completed would be similarly shielded and soundproofed.

Once test well drilling is complete, the wells would be lined with steel casing from top to bottom, wellheads would be installed, and all the drilling equipment would be removed. A down-hole pump would be installed on each productive well to pump oil and water to the surface for testing. Volumes of liquids would be measured and samples taken to determine composition. These liquids would be temporarily stored in onsite tanks and then transported offsite by trucks. The natural gas produced would also be measured and tested and would be clean-burned or "flared" adjacent to the wells. The flare would be installed after the initial test wells are drilled and would be removed after the permanent facilities are constructed. Flare volume would be up to 250 cubic feet per minute, and emissions would be in compliance with SCAQMD regulations and limitations.

The information obtained from the test wells would provide valuable data that would enable Matrix to determine the economic viability of the Project. If deemed economic, the information would also be used to determine the quantity and depths of wells required to maximize oil and gas recovery and to optimize the capacity of oil processing, gas plant, and oil loading facilities.

If the Project delineation and exploratory phases do not produce the level of production that Matrix deems economically viable, then the installed equipment would be decommissioned. Decommissioning would involve removing all remaining temporary test equipment and the drilling equipment. The number of truck trips and associated level of effort would be approximately equal to those required to install the equipment.

Decommissioning would include abandonment of wells according to DOGGR requirements. Matrix, under its lease with the City, is required to restore the site to its original condition, including remediating contamination, regrading, and revegetation. Section 2.3.3, Operations and Maintenance Phase, provides additional information regarding drilling practices.

2.3.2.1 Drilling and Testing Phase Personnel and Equipment Requirements

During test drilling, drilling equipment would be initially delivered to the site, would remain at the site until the end of drilling, and then would be removed from the site. In addition, for the initial site clearing, three 70-foot flatbed trailers would deliver the site-clearing and grading equipment to the Project Site, which would be the staging area for construction. In addition, one 4,000-gallon water truck and one dump truck would be driven to the site. All site clearing activities would be performed consecutively; therefore, this equipment would only be delivered and removed once.

Oil and water brought to the surface would be briefly stored in temporary tanks and removed daily by 58-foot tanker trucks. Temporary tanks, approximately 12 feet tall by 40 feet long, would hold up to 500 barrels of liquids. Up to six truck trips per day would remove both crude oil and water; these truck trips would occur only during daylight hours.

Approximately ten workers would drive to and from the site daily in conventional vehicles during the clearing phase. This includes survey crews driving standard survey pickup trucks.

During the drilling phase up to 20 workers would drive to the site daily in conventional vehicles. On average, two to five workers (e.g., pumpers, pipefitters, electricians), working 8-hour shifts would be present during testing.

Table 2-5 lists the vehicles used during the test drilling of each well. Table 2-6 lists construction equipment required for clearing the well pads.

Table 2-5 Test and Drilling Phase: Equipment Delivery Trips

Type of Equipment	Total Vehicle Trips	Maximum Total Vehicle Trips per Day	Vehicle Length
Equipment Delivered Only at the Beginning Of Drilling, Then Removed After 90 Days			
Drill Rig & Support Equipment	30	15	70 feet
Transports	25	5	65 feet
Equipment Visiting the Drilling Site on a Regular Basis			
Flat-Bed Trailers	75	5	70 feet
Cement Truck	18	1	70 feet
Total	**148**	**26***	**-**

* Only the initial and final day of drilling activity.

Table 2-6 Test and Drilling Phase: Equipment Requirements for Site Clearing

Type of Equipment	Fuel Type	Horsepower	Quantity	Hours per Day
Grader	Diesel	250	1	6
Bulldozer	Diesel	400	1	6
Water Truck	Diesel	300	1	6

Source: Matrix Application Data Request #1

2.3.2.2 Drilling and Testing Phase Schedule

Earth-moving and grading activities would take up to 4 weeks. Each test well would take up to 30 days to set up, drill, and then take down and move the drill rig and drilling equipment. If all three test wells are drilled, this would take approximately 90 days.

Each of the three test wells would be monitored for as many as 120 days after the wells have been drilled and completed.

2.3.3 Design and Construction Phase

If the Project Drilling and Testing Phase yields the quality and level of production that Matrix deems economically viable, then the Project would proceed to the Design and Construction Phase.

During the Design and Construction Phase, the following activities would be performed:

- Stabilize, upgrade, and pave the existing North Access Road and improve Catalina Avenue within the Preserve;
- Construct oil and natural gas processing facilities;
- Construct natural gas and crude oil sales pipelines; and
- Construct well cellars and associated equipment.

All roads used within the Preserve would be paved during the Design and Construction Phase.

Matrix plans to provide sufficient well cellar and supporting oil and gas processing capacity to process maximum production volumes of 10,000 barrels of crude oil and 6 million cubic feet of natural gas per day.

2.3.3.1 Stabilize, Upgrade, and Pave Existing North Access Road and Catalina Ave

To accommodate large construction equipment, heavy trucks, future drilling rigs and equipment, oil transport trucks, and other vehicles with more than two axles, or over 3 tons or pulling a full-size trailer, the existing North Access Road would be stabilized, upgraded, and paved during the Design and Construction Phase. Stabilization, upgrading and other construction work would be required to make the existing North Access Road safe and usable for larger vehicles. This would alleviate the need for such traffic to enter the Preserve via Catalina Avenue. Catalina Ave within the Preserve would also be paved. All vehicles with two axles and without trailers would use the Catalina Avenue entrance.

Stabilization and upgrading the North Access Road would require approximately 5,000 cubic yards of cut and fill and would permanently disturb approximately 2.5 acres, including 0.2 acres for widening and stabilization that currently are not part of the roadway. An additional 0.5 acres would be disturbed during construction and would subsequently be revegetated.

2.3.3.2 Site Construction

The Project Site would contain well test stations, up to three well cellars, and associated liquid and gas separating equipment at the well area. In addition, the Project Site would contain the oil processing facility and gas plant. Approximately 6.9 acres would be required for the well pad, oil and natural gas production and processing facilities, and truck loading facility (see Figure 2-6) with an additional 3.7 acres temporarily disturbed due to construction and 1.1 acres permanently disturbed due to FMZ. During grading and earth-moving activities, a temporary 12,000-gallon elevated water tank would be provided and located onsite. This water would be used for dust suppression and to moisten soil during compaction. It is anticipated that earth-moving activities would last approximately 6 months and that the water tank would be refilled from the temporary piped water connection up to five times during a month, for an average water usage of 2,000 gallons per day (gpd).

After the earth-moving activities conclude, water would only be used for concrete curing, hydro testing pipes, and general construction activities. During this period, it is anticipated that an average of 1,000 gallons of water would be used each month during the well pad and facilities construction.

At the Project Site up to three well cellars would be constructed on the well area encompassing approximately 3.2 acres. Each well cellar would be approximately 12 feet wide and 8 feet deep, with metal stairs at each end and covered with expanded metal grating for safety. The distance between wells would be approximately 8 feet; accordingly, the maximum number of wells accommodated would determine the length of each cellar. Matrix estimates they may require up to 60 wells with a maximum of 20 wells in each cellar. Drilling subsequent wells would involve the same activities as those during the Drilling and Testing Phase.

The liquid pumped to the surface would be an emulsion of oil, gas, and water. Up to six well test stations would be constructed to separate the emulsion and measure the respective quantities of oil and water produced by each well (see Figure 2-11). The well test stations would be composed of one or more vessels, for handling liquids, along with piping and valves from each well, which would allow the production from each well to be routed separately through the well test station where individual well production data could be compiled. The liquids would then be pumped to the oil processing facility. Produced gas would be collected and piped to the gas plant, also constructed at the Project Site.

All wastewater generated during construction would be stored onsite within bermed basins, protected by impermeable membranes. This wastewater would include water from washing down trucks, equipment, and concrete construction pads. These temporary basins would store all wastewater and vacuum trucks would periodically collect and haul it away from the site.

Grading the Project Site would include cut and fill. It is anticipated that approximately 180,000 cubic yards of soil would be cut and approximately 31,000 cubic yards of soil would be used as fill, resulting in approximately 149,000 cubic yards being transported offsite. The soil would be tested for contamination and, if none is found, the clean soil would be transported by dump trucks to the Savage Canyon Landfill within the city limits of Whittier, less than 2 miles from the Project Site. If the Savage Canyon Landfill does not require additional soil, then the excavated soil would be trucked to another location for sale or disposal.

Each dump truck would carry 16 cubic yards of soil. This soil would be exported during the 6 months of earth moving activities.

Any contaminated soil would be shipped to the Kettleman Hill Class I landfill facility for treatment and ultimate disposal near Kettleman City, California.

2.3.3.3 Utilities Construction

A permanent water supply pipeline would be constructed and buried under the existing road from the fire hydrant on Catalina Avenue to the Project Site.

Electrical power would be routed via buried lines to the Project Site from the electrical meter provided by SCE at the end of Ocean View Ave. Matrix would construct a new 4-inch cast iron sewer pipeline from the new facility office within the Project Site to the sewer connection on Catalina Avenue at the entrance to the Whittier Main Oil Field. The sewer pipeline would service restrooms at the Project Site offices. The office would be 30 feet by 80 feet and would contain two restrooms (see Appendix A).

The Project Site would have a comprehensive fire protection system as required by the LACoFD. Fire hydrants and automated alarm systems would be installed.

The access roads from Catalina Avenue and the Loop Trail Road from Colima Road would continue to be the emergency entrances and emergency site access would be designed in accordance with LACoFD requirements (see Figure 2-6).

2.3.3.4 Natural Gas and Crude Oil Pipeline Construction

The crude oil and natural gas sales pipelines would be built under existing Preserve roads from the Project Site to Colima Road. A small SCGC meter building (20 by 30 feet) would be constructed near the pipeline before the pipeline enters Colima Road. The pipeline installed along the Loop Trail Road would not require any maintenance, except driving the route to visually inspect for leaks. Since the pipelines would transport processed natural gas and crude oil, no traps or valves would be located along the pipeline route between the Project Pad and the Colima Road metering station. The pipelines would be entirely underground between the Project Pad and the Colima Road metering station .

Figure 2-11 Representative Equipment Pictures

Oil Well Test Station Example

Ground Level Flare Example

From the point where the natural gas and crude oil pipelines enter Colima Road, the pipelines would be built to connect the proposed Project Site to the existing high-pressure natural gas pipeline that runs underneath Lambert Road and to the crude oil pipeline that presently runs under Leffingwell Road. The new crude oil pipeline would operate at approximately 100 pounds per square inch, gauge (psig) of pressure and the new natural gas line would operate at approximately 500 psig of pressure. The pipelines would be installed together in the same trench along Colima Road south to Lambert Road. The crude pipeline would then continue south along Colima Road and La Mirada Boulevard to Leffingwell Road.

The natural gas pipeline would tie in to the existing SCGC transmission and distribution pipeline system that extends throughout Southern California. Of the estimated 500 miles of transmission pipelines in Los Angeles County, the pipeline that runs along Lambert Road is the closest to the Project Site. This system serves the natural gas system that supplies natural gas to residences, business, and industry throughout the area.

The crude oil pipeline would tie in to the existing crude oil pipeline system owned and operated by Crimson California Pipeline Company, headquartered in Long Beach. This system collects crude oil from several production locations (wells and processing in Brea, Montebello, and Santa Fe Springs) and supplies the crude oil to area refineries for the eventual production of gasoline, diesel fuel, and jet fuel.

The entire natural gas pipeline route would be within the City of Whittier (the city boundary runs along Lambert Road) and entirely underneath existing streets (see Figure 2-9).

The crude oil pipeline would cross into the unincorporated area of Los Angeles County, south of Lambert Road, between the City of Whittier and the City of La Mirada.

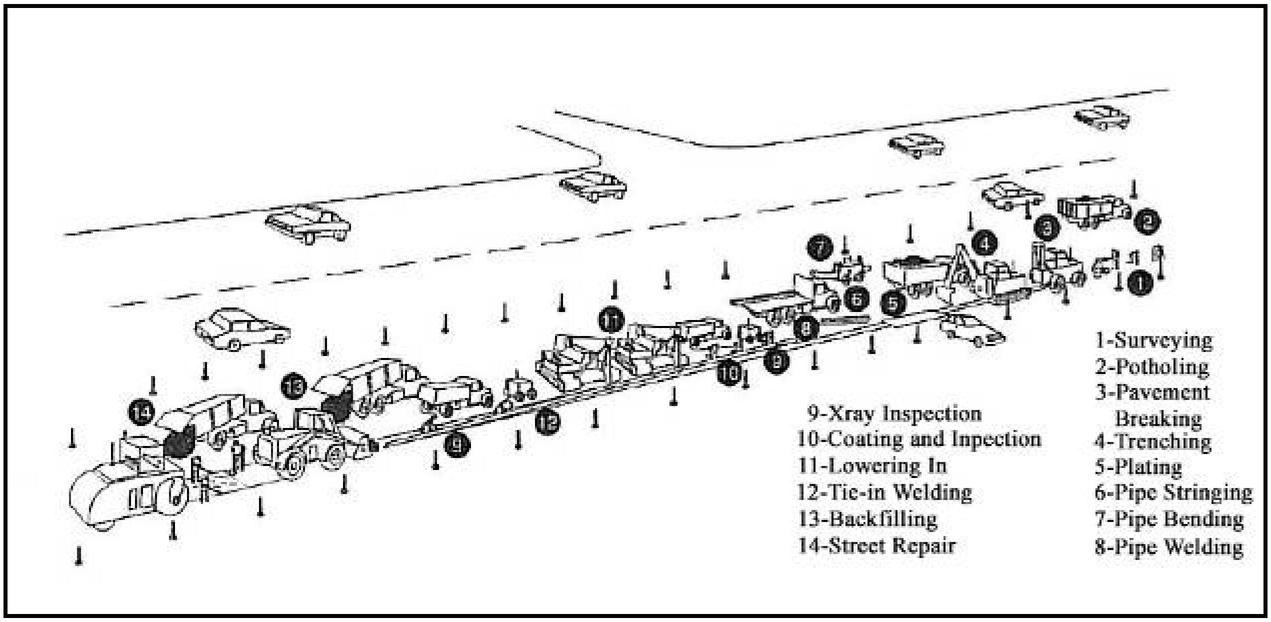
From the Colima Road entrance the proposed natural gas pipeline would be 6 inches in diameter and be approximately 1.8 miles in length. The proposed crude oil pipeline would be 8 inches in diameter and approximately 2.8 miles in total length. The gas pipeline would be built to SCGC specifications and the crude oil pipeline would be manufactured in accordance with API specification 5L. The crude oil pipeline coating would be fusion-bond epoxy with polyethylene outer wrap tape covering the epoxy. SCGC would specify the gas pipeline corrosion protection. Landowners and tenants adjacent to the rights-of-way would be notified in advance of construction in their area. A Traffic Plan would be prepared and construction would occur as approved by the local jurisdictional agency. Temporary alternative vehicle and pedestrian access would be established. It is anticipated that pipeline construction would take 6 to 9 months.

A construction spread is anticipated to accomplish most aspects of pipeline construction along the alignment route. A construction spread is a group of construction equipment that would move along the pipeline route, sequentially removing asphalt roadway, trenching, laying pipe, filling, re-paving and cleaning up. Figure 2-12 shows a typical construction spread.

A pipeline construction spread of several units would be organized to proceed with the work in the following order:

- Pre-construction activity;
- Asphalt removal and ditching;
- Pipe handling;
- Pipe coating;
- Pipe lowering, backfilling, and street repair;
- Pipe testing and inspection; and
- Metering, pigging, and odorant station installation.

Figure 2-12 Typical Pipeline Construction Spread



Note: All activities may not occur simultaneously.

Pre-Construction Activity

The right-of-way for the pipelines would include roads or land in existing paved streets. Approval to construct and operate a pipeline would be obtained, or authorized, by franchise agreements or permits from the agency with jurisdiction over the streets along the proposed route and from affected property owners. After a right-of-way is obtained and the Project is permitted, typical conditions of approval require that landowners, permittees, and business owners along the right-of-way be notified in advance of construction activities that could affect their business or operations. Tenants would be notified in person ahead of construction. Notification would also be made by various means, including signs at road crossings prior to construction.

Emergency response providers near the proposed route would be notified prior to construction of construction locations, road closure schedules, and potential alternate routes. Directly affected businesses and residents would be given ample notice and information to plan alternative ingress and egress routes. Signage would be provided to direct motorists to alternate routes. Contractors would work with local police and traffic engineers to plan appropriate access alternatives for temporary street closures and traffic disruptions. Traffic control requirements from Caltrans, the County, and the City would be followed.

Underground Service Alert would notify service providers of construction to avoid conflicts with existing utilities and disruptions of service to utility customers. Since construction would occur almost exclusively within paved streets, extensive grading is not proposed. Preparation for in-street work would include breaking and removing pavement with concrete saws, pavement breakers, and jack hammers where necessary. Dump trucks would haul the broken debris to approved landfill sites or to a crusher plant.

Asphalt Removal and Ditching

Once traffic control measures are in place, ditching operations would begin. Typically, a 6-foot deep and 24-inch wide ditch (single pipe) or 36-inch wide ditch (double pipes) would be excavated (varying depths, depending on the conditions encountered). The total construction would be a maximum of 50 feet at a time. Backhoes and track hoes would excavate the ditch. However, hand digging would be necessary to locate buried utilities, such as other pipelines, cables, water mains, and sewers.

Fugitive dust emissions at the construction site during earthmoving operations would be controlled by water trucks equipped with fine-spray nozzles. Approximately 10,000 gallons per day of water would be used for dust suppression.

Spoils from cuts, including cuts in streets, would be saved for backfill or would be removed and the ditch would be backfilled with slurry material as approved by the local jurisdictional agency. An effort would be made to minimize the amount of excess material. Materials unsuitable for backfill and not economically useful for other purposes would be disposed of in available landfills according to local and county guidelines.

When used for backfill, spoils from the trenches would be hauled to previously disturbed sites, determined by the construction contractor.

Pipe Handling

Special trucks handling large spools of gas piping and pipe-stringing trucks would transport the pipe in 40- to 80-foot lengths from the shipment point or storage yard to the pipeline installation point. Where sufficient room exists, trucks would carry the pipe along the roadway and sideboom tractors would unload the joints of pipe from the stringing trucks and lay them end to end beside the ditch-line for future line-up and welding.

A portable bending machine would bend the pipe to fit the ditch contour both vertically and horizontally. Construction right-of-way conditions could occasionally require pipe bends that could not be accomplished in the field. In these cases, manufactured or shop-made bends would be used and pipe would be bent prior to the application of coating.

While laying the pipe, line-up clamps would hold the pipe sections in position until 50 percent of the first welding pass is completed. Following the line-up crew, the welding crew would apply the remaining weld passes to bring the thickness of the weld to more than the thickness of the pipe by approximately 0.0625 inch. All pipeline welds would be inspected with x-rays.

Pipe Coating

Protecting the pipe from moisture and air helps prevent corrosion, thereby preventing cracks, breaks, and leaks in the pipe. The pipeline would be coated externally with fusion-bond epoxy and covered with polyethylene outer wrap tape. Pipeline coating would be applied at the mill before delivery to the construction site. However, field coating would be necessary on all field weld joints to provide a continuous coating along the pipeline. After the pipe has been welded and x-ray inspected, either heat-shrink polyethylene sleeves or polyethylene tape and tape primer would be applied.

Pipe Lowering, Backfilling, and Street Repair

The pipe would be lifted and lowered into the ditch by two side-boom tractors spaced so that the weight of unsupported pipe would not cause mechanical damage. Cradles with rubber rollers or padded slings would allow the tractors to lower the pipe without damage as they travel along the ditch line. Additional welds could be required whenever the ditch line is obstructed by other utilities crossing the pipe ditch. These welds would typically be made in the ditch at the final elevation. In addition to normal welding and weld inspection, each weld would require pipe handling for line-up, cutting to exact length, coating, and backfilling.

Backfill material would be obtained from the ditch spoils or would be imported, according to local agency requirements depending on soil properties. Spoils would be screened as the material is returned to the ditch using standard construction screening equipment. The sides of the pipe would be covered with a maximum of 6 inches of native fill, free of rocks, and then covered on top with a minimum of 12 inches of fill, free of rocks or a slurry would be used. This zone is referred to as the pipeline “padding and shading.” In certain areas where abrasive soils might damage the pipe coating, clean sand, earth backfill or slurry would pad the pipeline. Any required padding material would be obtained from local commercial sources. The backfill in the remainder of the trench above the padding would be native material excavated during trenching, or a slurry as required by local agencies.

The area would be repaved if it was previously paved in existing streets. In areas where the pipeline would be in previously unpaved areas, the backfill would include topsoil preserved from the excavation for revegetation where needed. At the time of backfilling, a colored warning tape would be buried approximately 18 inches above the pipeline to indicate the presence of a buried pipeline to third-party excavators. The backfilled earth would be compacted using a roller or hydraulic tamper. The trench would be filled with slurry where required by local regulations.

The slurry would be purchased from a local slurry plant and transported to the site. Steel plates would cover any open trench at the end of each workday.

Pipe Testing and Inspection

All field welding would be performed by qualified welders that meet the Applicant's specifications and in accordance with all applicable ordinances, rules, and regulations, including API 1104, the Standard for Welding Pipe Lines and Related Facilities, and the rules and regulations of the U.S. Department of Transportation found in the Code of Federal Regulations.

All welds would be visually and x-ray inspected. All rejected welds would be repaired or replaced as necessary and x-rayed again. The x-ray reports and a record of the location of welds would be maintained for the life of the pipeline.

In addition to standard mill testing of all pipe and fittings, hydrostatic testing would be performed after construction and prior to startup. Federal regulations mandate hydrostatic testing of new, cathodically protected pipelines prior to placing the line into operation. This test involves filling a test section of the pipe line with fresh water and increasing pressure to a predetermined level. Such tests are designed to prove that the pipe, fittings, and weld sections would maintain mechanical integrity under pressure without failure or leakage.

Cathodic protection controls the corrosion of a metal surface by making it work as a cathode of an electrochemical cell. This is achieved by placing the cell in contact with the metal surface and another more easily corroded metal to act as the anode of the electrochemical cell. The cathodic protection system consists of power sources called rectifiers, buried anodes, and test stations along the pipeline.

Metering and Pigging Station Installation

A gas-metering station would be required for the gas pipeline at a location where the pipeline enters Colima Road to measure and record gas volumes and provide custody transfer of the gas to SCGC. The metering station would require an approximate 30 by 20 foot building (see Figure 2-6 and Appendix A drawings). In addition, a pigging station would be installed at the Project Site, as required by SCGC for the gas pipeline and by Crimson Pipeline Company for the crude oil pipeline, to send and receive maintenance pigs into and from the pipelines to clean or inspect the pipeline.

2.3.3.5 Natural Gas and Crude Oil Processing Plants

The natural gas plant at the Project Site would be approximately 1.0 acres in area. All produced gas from the wells, tanks and vessels would be sent to the gas plant via pipeline for removal of liquids and impurities. The gas plant would have compressors, pumps, vessels, tanks, an odorizing system, a fire protection system, an automatic emergency shutdown system, and an emergency flare. Sales quality natural gas would be sold directly to SCGC via a connecting pipeline from the Project Site to the nearest SCGC connection at Colima and Lambert Roads.

The oil processing facility would also be located at the Project Site and would be approximately 2.7 acres in area. This facility would include tanks and vessels for oil and water separation, air compressors for control purposes, pumps for moving oil and water, tanks for temporary storage of oil and water, and supporting vessels, controls, and metering equipment. All vessels, tanks, and critical equipment would be surrounded by berms or containment walls to contain any spills. The oil processing facility would separate water and solids from the oil, then the oil would be temporarily stored in tanks prior to shipment. The separated water would be accumulated in tanks, filtered, and then pumped back into subsurface oil-producing sands with high-pressure injection pumps. Each injection well would be lined with steel casing until the well reaches the prescribed injection depth, which would be significantly below the water aquifer. Trucks would transport solids offsite to appropriate landfills.

Construction of the natural gas and oil processing facilities would involve the following activities:

- Grading and earthwork;
- Cement pad construction;
- Vessel and tank construction and location; and
- Piping, electrical, control, and equipment installation.

The subsequent sections (particularly sections 2.3.3.8 and 2.3.3.9) discuss the details of the personnel and equipment requirements and the schedule. Table 2-3 lists the grading areas.

2.3.3.6 Construction and Drilling Waste

Both drilling and construction activities would generate waste. The following subsections describe the different types of waste that could be generated by the Project during the different phases and the planned disposal methods.

Construction Waste

During the grading process, branches and leaves that are encountered would be collected, shredded, and turned into mulch. If desired, the mulch material would be taken to a location within the Preserve designated by the Habitat Authority or otherwise disposed of offsite.

Wet concrete for pads, vaults, and foundations would be trucked to the site. Once the concrete is used, the truck shoots and concrete pumps would be washed down at the site. The concrete and water slurry would be collected in lined berms for the water to evaporate. The residue concrete would be periodically collected and shipped offsite for proper disposal.

As part of the construction process, pallets, cardboard boxes, papers, plastics, banding materials, scrap steel, scrap aluminum, scrap wire, and rubbish would be collected. Recyclable waste would be recycled at an appropriate facility and other waste would be disposed in a landfill. It is estimated that up to 80 tons of this material would be recycled or disposed of during the approximately 30-month construction phase.

Portable construction toilets would be provided for domestic waste.

Drilling Waste

Materials used in the drilling process would come packaged in paper bags, cardboard boxes, plastic containers, and on wooden pallets. Recyclable materials (e.g., empty containers, pallets, bags) would be taken to an offsite recycling center. Remaining trash would be stored in conventional trash bins and, when full, disposed of in a landfill. Matrix estimates that one 40-cubic yard container of such trash would be generated and disposed of for each well drilled.

Drill cuttings from each well would contain soil, sand, crushed rocks, gravel, and other non-hazardous materials. Matrix estimates that approximately 660 cubic yards of this material would be generated during drilling of each well. This material would be properly disposed of in an appropriate landfill.

2.3.3.7 Design and Construction Phase Hazardous Materials

During the grading operations, earth-moving equipment would be refueled daily by service trucks carrying diesel fuel and lubricating oil. This service would be provided in the late afternoon while the equipment is idle.

During construction, service trucks would maintain and refuel machinery and equipment daily, delivering diesel fuel, gasoline, oils, and lubricants in the late afternoon. Welding and cutting gasses such as acetylene, oxygen, and argon would be stored in secured cylinders. Solvents would be stored in 55-gallon drums and paint would be stored in 5-gallon containers.

2.3.3.8 Design and Construction Phase Personnel and Equipment Requirements

Table 2-7 lists the equipment required for grading and earthwork, construction of well cellars, the truck loading facility, and the oil and gas processing facilities. Equipment installed at the facilities includes vessels, tanks for storing and processing the oil and gas, pumps, compressors, controls, electrical and mechanical systems.

In addition, during this period an average of 40 workers would drive to the job site in standard vehicles 5 days per week.

Natural Gas and Crude Oil Pipelines, Personnel, and Equipment Requirements

During the facility construction phase, the natural gas and crude oil pipelines would be built under existing Preserve roads to Colima Road and south along Colima Road to tie in to a SCGC transmission pipeline on Lambert Road and to an existing crude oil pipeline along Leffingwell Road. The same crew that constructs the Project Site would also construct the pipelines within the Preserve from the Project Site to Colima Road along the Loop Trail Road (see Figure 2-6). No additional personal or equipment would be required. For pipeline construction from Colima Road to Lambert Road and then to Leffingwell Road, a crew of approximately 15 equipment operators, pipe fitters, welders, laborers, and others would drive to the pipeline location each day. Two trenchers, two backhoes, two to four dump trucks, two 1-ton welding trucks, two pipe fitter trucks, and other trucks carrying materials would be used to construct the pipeline.

Table 2-7 Equipment Requirements for Grading, Earthwork and Facility Construction

Name	Fuel Type	Horsepower	Quantity	Hours per Day[a]
Grading				
Grader[b]	Diesel	250	1	6
Bulldozer[b]	Diesel	400	1	6
Scraper[b]	Diesel	700	1	6
Backhoe[b]	Diesel	108	1	5
Loader[b]	Diesel	350	2	8
Water Truck[b]	Diesel	300	1	6
Dump Truck	Diesel	250	5	8
Roller[b]	Diesel	120	1	4
Tamper[b]	Diesel	120	1	4
Facility Construction				
Crane[b]	Diesel	120	2	6
Welding Machines[b]	Diesel	45	4	7
Forklift/Reach All[b]	Diesel	120	4	6
Backhoe[b]	Diesel	108	1	4
Manlift[b]	Diesel	120	1	6
Air Compressor Truck[b]	Diesel	-	1	6
Concrete Truck	Diesel	300	2	2
Water Truck[b]	Diesel	300	1	4
Dump Truck	Diesel	250	1	4
Flatbed Truck	Diesel	250	1	6
Paver	Diesel	-	1	6
Welder Trucks[b]	Diesel	-	10	6
Vacuum Trucks	Diesel	-	1	6
Work Trucks	Diesel	-	3	6
Pickup Trucks	Gasoline	250	3	4

a. Hours per day is during peak construction periods only and is not representative of the entire construction interval and all equipment would not be operating concurrently.
b. This equipment would be delivered to the site once at the beginning of the phase, then removed at the end of the phase. The remaining equipment would make multiple trips to the site from offsite locations.
Source: Matrix Application Data Request #1

2.3.3.9 Design and Construction Phase Schedule

The design and construction of the natural gas and oil processing plant facilities would take approximately 2 years. Final grading of the Project Site would take up to 6 months. It would take an additional 3 to 4 months to complete well cellars and equipment foundations. Table 2-8 shows the schedule for construction of the Project with the exception of the wells.

Table 2-8 Natural Gas and Oil Processing Plants Construction Schedule

Activity	Duration (weeks)
Grading and Earthwork	24
Foundations and Retaining walls	16
Vessels and tanks construction/installation	32
Piping	32
Electrical	24
Preparation and painting	8
Instrumentation and controls	8
Start up and commissioning	12

Note: Several activities would occur concurrently with one another.

Construction of the oil and gas pipelines and stabilization of the North Access Road would take up to nine months, concurrent with the construction of the natural gas and oil processing plant facilities.

Figure 2-13 shows the schedule for the project phasing, along with the use of transportation routes and activities.

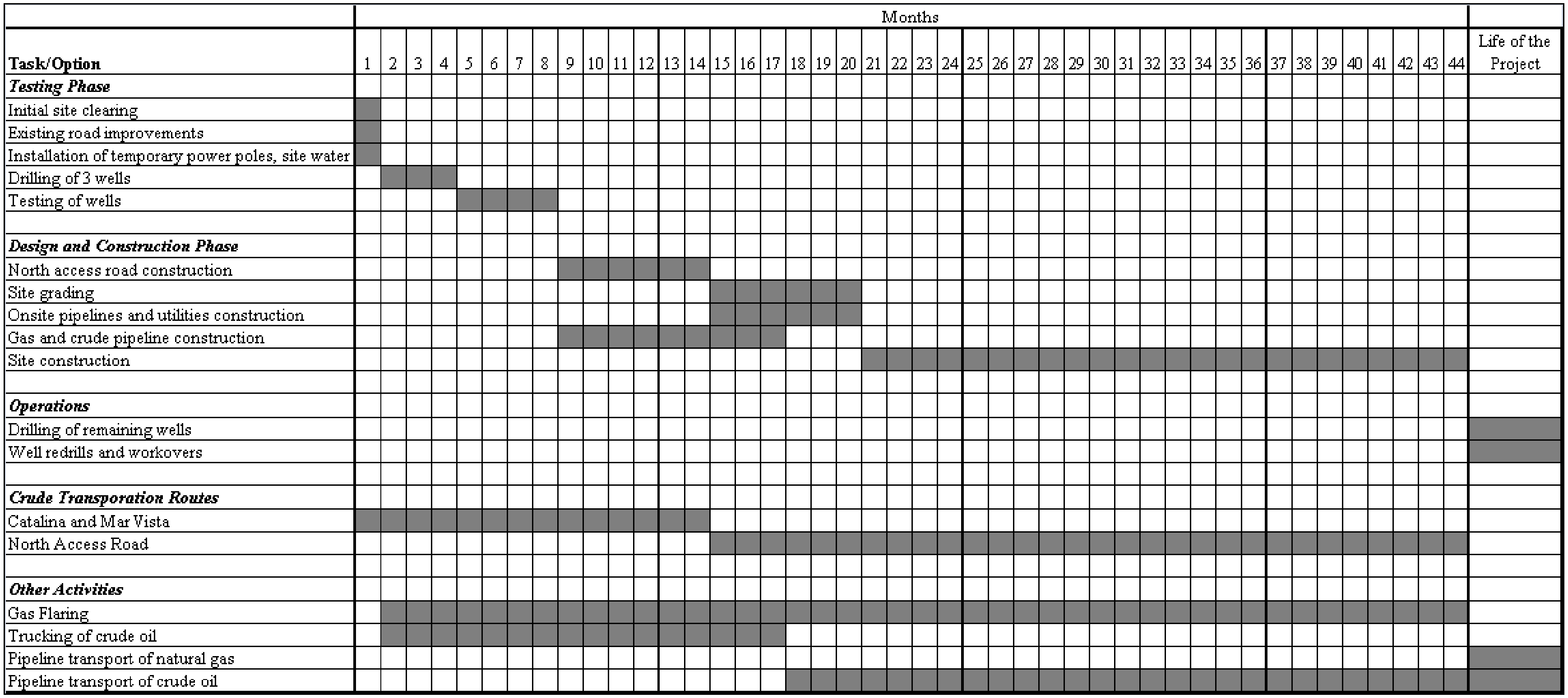
2.3.4 Operations and Maintenance Phase

The Operations and Maintenance Phase of the Project would consist of drilling the remaining wells (57 wells) and operating and maintaining the oil processing, natural gas processing, and oil loading facilities. All facilities would be physically located at the Project Site within the Whittier Main Oil Field (see Figure 2-6).

2.3.4.1 Drilling Activities

Drilling up to 57 additional wells would take up to 30 days per well, including drilling rig set-up, tear-down, and drilling operations. This would total up to 5 years of drilling if done continuously. Up to eight of the 57 wells would be injection wells for injecting produced water back into the reservoirs. Well drilling during the operations and maintenance phase might be extended to drilling fewer wells per year depending on the quality and quantity of crude oil produced as well as market conditions.

Figure 2-13 Project Schedule



Production and injection wells would be drilled with a single drilling rig. The production wells would utilize down-hole electric pumps to move the production fluids to the surface since the reservoir is not anticipated to have enough remaining pressure for sufficient free flow of fluids to the surface. Injection wells would inject the produced water back into the oil producing formations from which the water originally came. As many as eight injection wells would also be drilled at the Project Site.

Drilling a well involves several distinct steps. Once the drilling derrick and structure are erected and secured, the drilling process begins. The first step is to drill a shallow, large-diameter hole and install a “conductor pipe” with a flange containing diverter valves welded on top. The conductor would be installed with a large bit auger. The diverter valves allow any subsequent flow of fluids into the wellbore (well hole) to be diverted and controlled. Then a drill bit with a slightly smaller diameter than the conductor diameter is placed into the conductor hole and drilling begins. The beginning of drilling the well is referred to as “spudding” the well.

In order to drill downwards through soil and rock, the drill bit requires rotation and downward force, which is provided by the weight of thick-walled pipe screwed on top of the drill bit. A single, 30-foot long drill pipe for a larger diameter drill bit weighs approximately three tons. As the drill bit drills deeper, more drill pipe is placed on top, thereby increasing the downward force.

The drill bit turns clockwise as the weight of the drill pipe column forces it downward. The rotary table on the drill rig floor produces the turning; the table then grips the drill pipe with teeth and turns it, obtaining power from the drill motors.

As the drill bit turns and descends deeper, it generates rock cuttings. These must be removed from the wellbore by pumping fluids, or “mud,” down the hollow drill pipe, out of the holes at the bottom of the drill bit, and then back up the space between the wall of the hole and the drill pipe, which is referred to as the “annulus.” The mud equipment at the surface separates the mud from the cuttings and re-uses the mud. Cuttings are analyzed and then hauled offsite.

Once the wellbore is drilled to a predetermined depth, the drill pipe is pulled out of the hole and the hole is “cased.” The installation of wellbore casing is an integral part of drilling a well. Well casing is steel pipe that is placed down a wellbore to stabilize the hole and prevent the entry of unwanted fluids, rock cuttings, or sand into the wellbore or the exit of mud or fluids out of the wellbore. Casing also protects shallow freshwater reservoirs from any potential interference from fluids from deeper oil and water formations.

Once casing is placed in the hole to the given depth, cement is forced down the middle of the casing and out the bottom, then back up the outside of the casing until the annulus is full of cement. Right behind the cement is mud, separated by a rubber “plug,” which wipes the cement from the insides of the casing. When the plug reaches the bottom, it stops and allows the driller to know when the cement has reached the bottom of the wellbore. The cement is then allowed to dry which bonds the outside of the casing to the wellbore sides.

At this point, a second, smaller diameter drill bit is placed into the wellbore and the well is drilled deeper. This process continues as needed, with subsequently smaller drill bits and smaller diameter casing placed into the wellbore and cemented, until the target depth is reached. At this point, the lower casing is "perforated" with holes to allow production fluids to flow into the wellbore and smaller diameter steel tubing is placed down the well through the wellbore. Production fluids are pumped from the bottom of the well through the production tubing to the surface.

Matrix plans to follow the approach currently utilized at the West Whittier field operation, which uses alternate methods of perforating well casing into an oil/gas zone or the use of a slotted liner across an oil/gas zone. The second method utilizes a tube with slots or holes as a liner, which allows fluids to enter the wellbore from the selected formation. "Fracturing" methods are rarely utilized in the Los Angeles Basin, since it consists mostly of very soft oil-saturated formations; Matrix has no plans to utilize fracturing in its proposed Whittier Main Field operations.

Several tests are performed at various stages during drilling, including pressure tests to insure that the cement is solid and will hold needed pressure, and well logs and core samples, which aid engineers in the drilling program and well design.

Figure 2-14 shows typical drilling rigs, used for well drilling, and workover rigs. The drilling rig would utilize diesel-powered electric generators.

Water consumption during drilling would be approximately 130,000 gallons of water per well drilled, for an average water use of 4,500 gpd on an average of 30 days per well. A fire hydrant near the drill site would be installed during the Design and Construction Phase.

During drilling operations, the liquid slurry of drilling "mud" would be collected onsite within Baker-type enclosed tanks or bermed basins that are protected by an impermeable membrane. Much of the mud would be reused for drilling subsequent wells and the remainder would be collected and disposed offsite.

Table 2-9 lists additional equipment necessary during drilling. The equipment shown is representative for a typical drilling operation of the type expected; the exact equipment list and layout may vary depending on the specific well.

Mud Handling Program

Two basic mud systems are anticipated for the proposed Project: a fresh-water and clay-based system and a low-toxicity mineral oil system. Both are approved by the U.S. Environmental Protection Agency.

During drilling, cuttings and drilling fluid wastes would be processed by a chemically enhanced de-watering system and an onsite solidification process. The waste generated onsite would be transported in plastic lined bins (solidified solids) and vacuum trucks (liquid) and taken to an approved disposal site.

A mud handling system would be used for drilling the wells with the mineral-oil-based mud. Liquid oil, calcium chloride, water, and the associated additives would be combined at a mud mixing plant in Bakersfield, California. The mixed-oil-based drilling fluids would be pumped into vacuum trucks and transported to the drilling rig site. The drilling fluid would then be pumped from the vacuum trucks into the drilling rig mud system.

Prior to moving the oil-based fluid to the drilling rig, water-based drilling fluids would be emptied from the impermeable mud “pits,” which would be cleaned. After the pits are cleaned, the fresh water used on the drilling rig would be disconnected. The “pollution pan” placed under the rig floor at the beginning of the drilling operation, and used throughout the drilling of the well, would be inspected. The drill-pipe and mud-catch pans on the rig floor would also be inspected, as well as the mud buckets. This equipment would contain and collect any oil-based mud that may be on any of the equipment since it is used on the well.

Any additional oil-based mud required would be made to specification and vacuum trucked to the well site. The mud would be pumped into the pit system. When drilling is completed, the oil-based drilling mud would be pumped into vacuum trucks and transported back to Bakersfield for recycling. The rig and mud pits would be cleaned and the wash fluid hauled to an approved disposal site.

Figure 2-14 Maintenance Workover Rigs and Well Drilling Rigs

Maintenance Workover Rig

Well Drilling Rig

Drilling Site Spill Containment

The pollution pan installed under the rig floor would contain and collect any oil-based drilling mud that may spill on the rig floor. The catch pans installed under the drill pipe would collect any oil-based drilling mud left on the inside or outside of the drill pipe. The wash water would be disconnected once the oil-based drilling mud is in use and the rig floor would be cleaned with rubber squeegees. During routine drilling operations, some oil-based mud may be spilled on the rig floor. This would be captured and contained in the pollution pan and returned to the active mud pit system. The drilling pad would be constructed to allow any fluids spilled directly around the rig to flow into the well cellar. In addition, a 6-inch berm, lined with an impermeable membrane, would be placed around the entire drilling rig after it was installed. In the event that a leak should occur in the mud handling system, it would be contained directly around the rig and would drain into the cellar. A cellar pump would then pump the fluid out of the cellar and back into the active mud pit system.

Table 2-9 Other Drilling Equipment

Description	Size
Mud Pump 1	20 ft L x 7 ft W
Mud Pump 2	20 ft L x 7 ft W
Active Mud Tank	39 ft L x 10 ft W x 9 ft H
Mud Dock and Storage	15 ft L x 8 ft W x 10 ft H
Reserve Mud Pit	42ft L x 10 ft W x 9 ft H
Top Drive Control House	12 ft L x 8 ft W x 8 ft H
SCR House	26 ft L x 9 ft W x 10 ft H
Generator/Radiator/Cable Tray	21 ft L x 9 ft W x 8 ft H
Gel Storage Tank (1,000 cubic feet)	10 ft L x 10 ft W x 13 ft H
Barite Storage Tank (1,000 cubic feet)	10 ft L x 10 ft W x 13 ft H
Cutting Conveyor	22 ft L x 2 ft W x 2 ft H
Cuttings Box 1	8 ft L x 5 ft W
Cuttings Box 2	8 ft L x 5 ft W
Mud Logging Unit	15 ft L x 10 ft W
Shaker 1	11 ft L x 5 ft W
Shaker 2	11 ft L x 5 ft W
Mud Cleaner	11 ft L x 5 ft W

Notes: ft = feet; L = length; W = width; H = height

Rainwater and accumulated runoff within the bermed area around the rig would flow into the well cellar and be pumped into the active mud pit system as well.

As an extra precaution, a spill trailer at the drilling site would be equipped with absorbent material, small spill booms to contain and direct flow, plastic sheets, personal protective equipment, and rakes, shovels, and hand tools. This equipment is designed for use in the unlikely event of an oil spill.

Blowout Prevention Equipment

Rarely, a “blowout” can occur when unexpected high pressure and fluid flow levels at the wellhead cause a release of oil and gas from the well. Blowout prevention (BOP) systems are safety systems used during drilling operations in oil and gas fields to prevent the uncontrolled release of reservoir fluids and to immediately shut off the flow. BOP systems are composed of a stack, actuation systems, a choke manifold, stop systems, and other equipment. A BOP system would be placed on each wellhead during drilling and removed after the well was cased off and stabilized. Wellhead pressures (pressure at the wellhead where the BOP is situated) would be a maximum of 2,500 psig. Since the remaining pressure in the oil reservoir is anticipated to be relatively low after decades of oil production, Matrix considers the possibility of a blowout to be remote.

Hydrogen Sulfide Contingency Planning

The status of the field in terms of hydrogen sulfide (H_2S) in the natural gas and oil is uncertain at this time, although it is expected that the composition of the gas would be similar to the adjacent reservoirs at Honolulu Terrace and Sycamore Canyon, which are both devoid of any significant levels of H_2S. An H2S Exposure Contingency Plan would be developed to address issues such as safety equipment, personnel responsibilities, first aid, and evacuation.

Hydrogen sulfide is a colorless, toxic, flammable gas with a characteristic foul odor of rotten eggs. Gas that contains hydrogen sulfide is called “sour” gas. DOGGR publication M10 requires special precautions for well-drilling operations that could expect to encounter gas with hydrogen sulfide concentrations above 20 parts per million (ppm).

Hydrogen sulfide can also rarely be dissolved in the crude oil and be liberated into the vapor space of storage tanks at significantly higher concentrations than the crude oil, according to DOGGR publication M10.

In the event that natural gas intended for production is found to be sour, or hydrogen sulfide levels in the gas are greater than 20 ppm or a crude oil hydrogen sulfide concentration, which could produce vapors above 100 ppm, the well would immediately be shut in. Should this occur, the Project would be modified, including all necessary permits, to handle H_2S sour gas. If this were not practical, the Project could be abandoned. Because of the lack of H_2S gas at nearby fields, permanent H_2S gas detection is not proposed as part of the Project.

Temporary H_2S detection equipment would be included as part of a contingency plan associated with drilling. H_2S detection equipment would monitor the drilling rig environment during the drilling of the test wells, but it would be removed after the test wells are installed, assuming that the same formations would be penetrated. This temporary equipment would include H_2S monitors on the drilling rig and breathing air packs at the rig and in the safety trailer.

Noise Abatement

Noise reduction mitigation incorporated into the operational phase of the Project includes using wood timbers and sleepers on pipe racks and at the pipe V-door ramp to minimize metal-to-metal contact. In addition, wood timbers would also be used on the rig floor and on the pipe racks to minimize metal-to-metal contact. The use of hydraulic tongs, as proposed by the Project, rather than chain or pneumatic tongs, would also minimize metal-to-metal contact. Sound levels from other equipment (e.g., pumps, compressors, generators, winches, auxiliary engines) would also be mitigated as necessary (e.g., enclosure, vibration reducing mounts, mufflers). The drilling area would be surrounded by a 15-foot tall sound barrier and additional soundproofing would be installed on the drilling rig as necessary.

Diesel-powered electric generators would power the drilling rig and most of the associated drilling equipment. The crane and well-logging unit would operate approximately 20 percent of the time, both during the day and the night, depending on the drilling requirements. The well-logging unit, cementing equipment, coil-tubing unit, and slickline engines are truck-mounted and operate from the main truck engines. The well-logging unit contains the surface hardware necessary to make well measurements; the cementing equipment used to pump cement down the well; the coil-tubing unit used to run tubing down the well hole, and the slickline, a thin cable used to control and retrieve well-hole equipment. Various types of soundproofing and insulation will be utilized on this equipment as necessary.

Lighting and Shielding

The lighting for a mast and derrick generally consists of two light strings (i.e., two of the four corners of the mast have lights). Safety guidelines specify “luminance” for different safe working conditions.

For a rig, the guidelines include:

- Derrick: 30 foot candles (a unit of lighting);
- Rig Floor: 70 to 100 foot candles; and
- Pipe Racks: 50 foot candles.

Derrick light fixtures would typically be approximately 12 feet apart on the two corners of the mast holding the lights. The derrick light fixtures would be recessed and shielded to reduce glare and disturbances to residents and animal life.

The top of the derrick would have a red beacon light for airline identification. High intensity mercury arc lighting would be used on the rig floor and pointed at the specific work area. These lights would be inside the rig floor area and would be shielded from the outside as necessary.

Odor Abatement

Dust from cement, barite, and other mud chemicals would be controlled with dust filters and ventilation. Use of volatile materials onsite (e.g., paints, solvents) would be minimized. The

Applicant indicates that water-based mud would have no appreciable odor and that the oil-based mud under consideration would have no appreciable odor beyond the drill site.

Drilling Materials

Table 2-10 lists the materials that would be used during drilling operations. The amounts listed are the estimated quantities consumed per well drilled. These materials are packaged by the manufacturer for shipping and would be delivered to the job site by conventional delivery or flatbed trucks. Only trained personnel would handle these materials.

All of the products listed in Table 2-10 are generically listed on the California Department of Health Services-approved Drilling Mud Additives List. In these concentrations, the drilling fluid is categorized as a non-hazardous material.

Table 2-10 Drilling Materials Usage

Name	Material	Container	Amount per Well
Gel	Wyoming Bentonite	100-pound sack	525 sacks
DMA	Sodium Polyacrylate	50-pound sack	82 sacks
Benex	Anionic Acrylamide	2-pound sack	75 sacks
GEOZan	Xanthan Gum	25-pound sack	40 sacks
Omniopol	Sodium Polyacrylate	Liquid	380 gallons
CFR	Fatty Acid	Liquid	600 gallons
Bicarb	Sodium Bicarbonate	50-pound sack	40 sacks
Citric Acid	Citric Acid	50-pound sack	11 sacks
Walnut	Walnut Hulls	50-pound sack	48 sacks

In addition, diesel fuel, lubricating oils, and cleaning solvents would be stored and used during the drilling operations. Table 2-11 lists the estimated quantities that would be consumed per well during drilling.

Table 2-11 Drilling Diesel and Oils Materials Usage

Name	Consumption	Storage
Diesel Fuel	1,200 gallons per day	12,500-gallon fuel tank
Lubricating Oils	10 gallons per day	52-gallon drums
Miscellaneous Oils & Solvents	Varies	5-gallon drums & 1-gallon containers

2.3.4.2 Operations

Once constructed, the Project would be operated and maintained as an oil and gas field, designed to current oil field technology standards, including automated alarms and shut downs for abnormal conditions. Operations would be designed to utilize automated equipment for emergency shutdowns of major equipment and system malfunctions, as well as for earthquakes, fires, and other natural disasters. Oil field operators would be present 24 hours per day, seven days per week to monitor activity and check for safety and security of operations.

Water use during operations would be associated with personnel, landscaping, and general cleaning. Monthly water use is estimated at 39,000 gallons, or 1,300 gpd.

All produced water re-injected into the ground would be pumped into one of the several oil-producing sands below the fresh water aquifer. Water separated from oil would be injected into oil sands between 1,000 and 10,000 feet deep. Steel casing, cemented in place, would insure that produced water could not permeate the shallower groundwater aquifer.

At peak projected production rates, it is anticipated that eight water-injection wells at the Project Site would inject a maximum of 7,200 bpd of produced water into deep zones.

Upon construction completion, a permanent masonry block or concrete wall would be constructed surrounding the entire site. Native plants would be planted outside the wall for decoration and screening. Subsequent wells would be drilled within the Project Site, and additional soundproofing and shielding would be provided as necessary.

The Operations phase would include appropriate shielded lighting at night, and around-the-clock security cameras would survey the perimeter and the interior of the site.

Gas Plant Operations

Incoming produced gas from the wells, tanks and vessels would be received at the gas plant via one or more pipelines that enters the plant. The maximum design flow rate would be 6 million standard cubic feet per day. The incoming pressure of the gas would be approximately 55 psig. The gas would be received through a liquid slug catcher and intake scrubbers that would capture any liquid condensate that may be present. Figure 2-15 is a simplified process flow diagram of the proposed operations.

Downstream of the intake scrubbers, the gas would be compressed during first stage compression to approximately 150 psig prior to entering the gas sweetening plant, which removes any trace H_2S or CO_2 from the gas stream, if necessary. Tests at nearby operating wells indicate that less than 1 ppm of hydrogen sulfide is present in the gas (see Table 2-1).

If small levels of H_2S are encountered, the gas plant would be able to remove it to “sweeten” the natural gas to the levels required by SCGC. In the gas sweetening process, the gas would pass through a pair of heat exchangers and then flow through gas sweetening towers, which remove H_2S and CO_2 compounds and residual sulfur elements. A pump would circulate the gas sweetening solution (Amine), which is the primary method for removing the sulfur compounds.

The gas stream outgoing from the sweetening towers would be routed to a water wash tower, where the gas sweetening solution would be recovered, and the gas would then be directed through a filter and separator for final liquid separation.

At this point, the natural gas would be compressed again to approximately 500 psig in the second-stage compression system. The gas would then be ready for dehydration, or the removal of water vapors. A conventional glycol system would remove any water from the gas. Gas would be routed to a glycol contactor tower that would initially dehydrate the gas. Downstream of this gas tower, the gas would be routed through a glycol separator, and then through a heat exchanger that would provide for some cooling of the gas prior to entering the gas chiller and associated low temperature separator. The chiller would provide low temperature separation (LTS) of the gas stream, which would chill the incoming gas and remove natural gas liquids (NGL) from the gas stream. Non-flammable refrigerant would be the working refrigerant of the LTS plant.

After second stage compression, dehydration, and LTS, the gas would enter the pipeline for connection to the natural gas pipeline installed along existing Preserve roads and on to Colima Road to connect to the existing natural gas pipeline along Lambert Road.

Vapors would be recovered throughout the plant in a near-atmospheric-pressure vapor header. The vapors would be compressed to 55 psig using a vapor recovery compressor. This gas would then be mixed with the gas coming from producing wells and would go back through the gas plant with the produced gas.

The gas plant would separate NGL from the gas stream and mix these into the crude oil for transportation to the crude oil pipeline. At the maximum design rate of 10,000 barrels of crude and 6 million standard cubic feet per day of gas per day, the gas plant would yield 50 to 70 bpd of NGL.

A total of approximately 30 pressure relief valves throughout the system would relieve pressure to a header system that is piped to a clean-burning gas flare. The flare would be enclosed in its own housing and inside the walls of the gas plant. Table 2-12 lists the tanks and vessels proposed at the Project Site.

Figure 2-15 Simplified Process Flow Diagram of Gas and Oil Processing Facilities

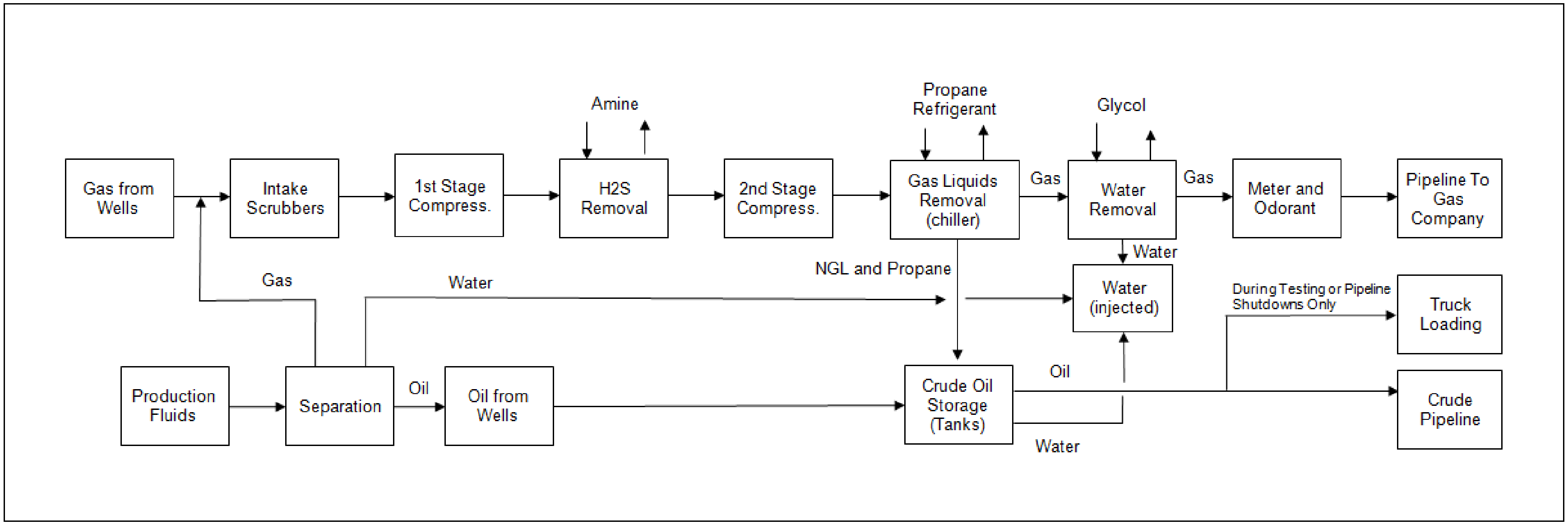


Table 2-12 Tanks and Vessels at the Proposed Project Site

Number of Vessels	Description	Orientation	Size	Working Volume
Well Pad				
Up to 3	Gross Separator	Horizontal	5 ft 0 in X 27 ft 0 in L	1,840 gallon
Up to 6	Automatic Well Test Station	Horizontal	3 ft 0 in X 10 ft 0 in L	280 gallon
Up to 3	Blowcase	Vertical	1 ft 6 in X 3 ft 0 in H	20 gallon
Up to 3	VRU Suction Drum	Vertical	2 ft 6 in X 10 ft 0 in H	80 gallon
Up to 3	VRU Discharge Scrubber	Vertical	1 ft 8 in X 5 ft 0 in H	30 gallon
Oil Plant				
1	Walnut Shell Filter	Vertical	7 ft 0 in X 7 ft 0 in H	2,440 gallon
1	Wash Tank	Vertical	40 ft 0 in X 24 ft 0 in H	5,368 barrels
Up to 3	Shipping Tank (Primary)	Vertical	50 ft 0 in X 40 ft 0 in H	11,184 barrels
1	Reject Tank	Vertical	30 ft 0 in X 24 ft 0 in H	2,416 barrels
1	Clarifier	Vertical	20 ft 0 in X 24 ft 0 in H	1,074 barrels
1	Filtered Water Tank	Vertical	42 ft 0 in X 40 ft 0 in H	7,892 barrels
1	Skim/Drain Tank	Vertical	30 ft 0 in X 24 ft 0 in H	2,416 barrels
1	Free Water Knockout Drum	Horizontal	10 ft 0 in X 36 ft 0 in L	9,450 gallon
1	Induced Gas Flotation Cell	Vertical	6 ft 0 in X 6 ft 0 in H	1,390 gallon
Gas Plant				
1	Inlet Gas Filter	Vertical	1 ft 8 in X 5 ft 0 in H	82 gallon
1	DEA Reboiler	Horizontal	2 ft 6 in X 8 ft 0 in L	200 gallon
1	EG Regenerator	Horizontal	3 ft 6 in X 11 ft 0 in L	400 gallon
1	Absorber	Vertical	3 ft 0 in X 50 ft 0 in H	800 gallon
1	Amine Regenerator	Vertical	3 ft 6 in X 40 ft 0 in H	880 gallon
1	1st Stage Suction Drum	Vertical	3 ft 0 in X 9 ft 0 in H	50 gallon
1	1st Stage Discharge Drum	Vertical	2 ft 6 in X 7 ft 6 in H	30 gallon
1	2nd Stage Suction Drum	Vertical	2 ft 0 in X 6 ft 0 in H	20 gallon
1	2nd Stage Discharge Drum	Vertical	3 ft 0 in X 9 ft 0 in H	50 gallon
1	Flash Tank	Horizontal	3 ft 6 in X 11 ft 0 in L	400 gallon
1	Reflux Accumulator	Vertical	2 ft 0 in X 6 ft 0 in H	70 gallon
1	Cold Separator	Vertical	1 ft 8 in X 5 ft 0 in H	40 gallon
1	3-Phase Separator	Vertical	1 ft 4 in X 5 ft 0 in H	40 gallon
1	Ko Drum	Vertical	1 ft 0 in X 4 ft 0 in H	5 gallon

Oil Processing Plant Operations

A mixture of incoming oil and water from the well site would be received at the oil processing plant. This mixture would pass through a "water knock-out drum" and "wash tanks" to remove any water and the oil would then be stored in one of three oil shipping tanks. Each tank would have a storage capacity of 11,184 barrels, which means they could store slightly more than 3 days of production. NGL from the gas plant would be mixed with this oil, metered through a Lease Automated Custody Transfer (LACT) station, and then shipped by pumps into the crude oil pipeline. An LACT station is a sophisticated meter that measures the quantity of oil and samples any water percentages. The LACT station is also the point in the process where custody (i.e., ownership) of the oil customarily passes from the oil operator to the pipeline company.

Truck Loading Facility

The truck loading facility would be designed to load a single truck at a time. Each truck would be able to load 150 barrels or more, depending on the crude properties. It would take approximately 0.5 hours to position and load a truck. At this rate, a maximum of 24 trucks could be loaded during a 12-hour period. The truck loading facility would only be utilized when the crude oil pipeline is not functioning. This is anticipated to happen very rarely.

Facilities Spill Containment

The tank area within the Oil Processing Plant would be surrounded by a concrete retaining wall sufficient in height to retain 110 percent of the volume of the largest tank. Likewise, all other vessels throughout the facilities will be similarly walled or bermed for spill containment.

Water Treatment and Injection

Water produced by the proposed Project would be cleaned of any contaminants and injected back into the production reservoirs at an estimated pressure of 1,000 psig at a depth of 4,000 to 6,000 feet. Produced water from the oil processing operations would pass through a clarifier and a skim tank and would then be gathered in a filtered water tank with a capacity of 7,892 barrels. The tank would operate at atmospheric pressure.

From the filtered water tank, the water would be pumped directly to the injection stations. Each injection pump would be operated by an electric drive motor. The produced water would then go into the water injection wells. There would be up to eight water injection wells.

All well cellars would be designed to collect stormwater from the surrounding area. From the well cellars, the collected stormwater would be pumped into the oil processing water handling system. Stormwater from all other areas and facilities would be collected in a bermed water detention basin located immediately adjacent to the oil processing plant (see Appendix A) area and allowed to percolate into the ground. The capacity of the stormwater basin would be approximately 3,500 barrels. No stormwater would be allowed to drain from the Project Site into the surrounding area.

Gas Odorant and Metering Operations

Natural gas, used for heating and cooking in homes and as fuel for natural gas vehicles, is a colorless and odorless gas. The gas can be harmful if inhaled. Current law requires that natural gas be odorized before entering the gas distribution system to allow for detection of gas leaks and prevention of hazardous consequences. Typically, the odorants used are sulfur compounds that have the classic "rotten egg" smell. The odorant tetrahydrothiophene would be used.

The gas pipeline would require the delivery of odorant to the Project Site gas plant to odorize the natural gas before introducing it into the natural gas pipeline. Based on 6 million standard cubic feet per day and a 500-gallon odorant tank, there would be a total of two deliveries of odorant per year.

Well Maintenance, Workover, and Re-Drill Operations

Well maintenance and workover operations are periodically necessary to sustain production from the wells. A portable unit conducts routine maintenance, such as replacing gas lift valves or servicing sub-surface safety valves. A portable coiled tubing unit cleans out sand from the wells. A workover rig removes production tubing and/or the downhole pump, if either requires repair or replacement.

A workover rig is also used to set cement isolation plugs or bridge plugs in the wellbore to isolate non-productive intervals of the reservoir. A workover rig can be used to workover, recomplete, abandon, and sidetrack an existing well.

Matrix estimates an average of one workover per year per well, or a maximum of 52 workovers per year if all production wells are drilled and remain in production. Depending upon the level of maintenance required, a workover of a well typically takes between 1 to 7 days. Workover rigs used for these operations typically operate up to 12 hours per day during weekdays. They do not operate at night or on weekends. Well workover rigs are generally truck mounted with up to a 90-foot tall mast (to service a 10,000-foot deep well) with a work platform near the top and an approximately 300-horsepower diesel powered engine.

Well re-drills involve similar operations as the initial drilling of the well with a similar sized drill rig, associated equipment and schedule (24 hours per day). Matrix estimates an average of three well re-drills annually for the life of the proposed Project once full field development is achieved.

Operations Waste

During operations, waste such as pallets, cardboard and paper boxes, paper, and plastics would be taken to an offsite recycling center. Scrap steel, scrap aluminum, and scrap wire would also be collected and recycled at an appropriate facility. Other trash and rubbish would be collected in waste bins and disposed of by a local waste hauler. On average, a 10-cubic yard bin would be disposed of each week.

The office sewer would be connected to the local sanitation district and portable construction toilets would be provided at strategic locations.

At some locations, sand and other solid particles may become trapped in the oil and water emulsion that is brought to the surface by the deep well pumps. These solids would be separated from the oil and water and disposed of offsite at a hazardous waste landfill by a licensed contractor hired by Matrix. The quantities are unknown, but could range up to two truckloads per month.

Periodically, a deep well pump would require repairs. When this occurs, the pump would be brought to the surface, accompanied by several tons of soil and other solids. This material would be hauled to a landfill. It is unknown how often this might occur, but it is estimated as many as four times per year for the entire field.

2.3.4.3 Operation Phase Personnel and Equipment Requirements

As many as 15 to 20 operators and maintenance technicians would drive to the site each day (24-hour period) in standard vehicles. Periodically, 1- and 2-ton delivery trucks would bring parts to the facility site. Welding trucks, cranes, and other maintenance equipment and associated personnel would drive to the site as maintenance activities warrant. One 3,000-gallon vacuum truck would drive to and from the facility three to four times per week. Other equipment, such as well workover rigs and trucks, would drive to and from the job site periodically as maintenance activities require. Any heavy equipment would approach the Project Site via the North Access Road.

Drilling activities would commence after the construction of the well pads and oil and gas processing facilities is completed. Vehicle traffic volumes for subsequent drilling would be the same as for the Drilling and Testing Phase.

2.3.4.4 Vehicle Trips Summary

Tables 2-13 summarizes all round trips associated with the phases of the Project. Appendix A includes more details regarding vehicle trips.

Table 2-13 Proposed Project Vehicle Visits by Phase (round trips)

			All Vehicles - Trucks and Autos/PU		Trucks Only		Autos/PU Only	
Activity	**Duration (Days)**	**Total Trips**	**Peak Day**	**Average Day**	**Peak Day**	**Average Day**	**Peak Day**	**Average Day**
Drilling and Testing Phase								
Pad Clearing/Utilities	25	334	23	13	8	1.4	15	12.0
Drilling	90	2,394	40	27	20	6.6	20	20.0
Testing	120	1,440	12	12	7	7.0	5	5.0
Construction Phase								
North Access Road	120	1,320	30	11.0	20	1.0	10	10.0
Grading, excluding soil export	120	620	6	5.1	1	0.1	5	5.0
Grading, soil export only	120	9,313	78	77.6	78	77.6	0	0.0
Facility Construction	520	26,280	69	50.5	29	10.5	40	40.0
Off Site Pipelines	180	4,165	28	23.1	13	8.1	15	15.0
Operations and Maintenance Phase								
Operations, no drilling	365	8,708	28	23.9	6	1.9	22	21.9

Note: Trips will be to different locations.

2.3.5 Hazardous Materials

All consumed materials, hazardous and non-hazardous, would be transported to the site by trucks; the materials would be in the original manufacturer's packaging or containers. Tanker trucks designed to haul and transfer hazardous liquids would transport materials such as diesel fuel and consumable lubricants. Throughout the Drilling, Construction, and Operations phases of the Project, materials such as WD-40, starting fluids, antifreeze, fire extinguisher chemicals, hand cleaners, silicone, oils, greases, and lubricants would be safely stored and used onsite.

2.3.5.1 Operations Hazardous Materials

During ongoing producing operations, the chemicals listed in Table 2-14 would be stored for usage.

Table 2-14 Operations Hazardous Materials

Chemical Common Name	Trade Name	Container Volume
Scale Dissolver	Techni Solve 1780	55 gallons
Scale Inhibitor	Techni Hib 7621	120 gallons
Emulsion Breaker	Techni Hib 6671	500 gallons
Emulsion Breaker	REB 1322	120 gallons
Glycol	TEG	55 gallons
Corrosion Inhibitor	Techni Hib 3743	120 gallons
Amine	DEA	110 gallons
Methanol	Methanol	55 gallons

These materials would be stored in addition to any drilling materials listed above, which might be use for re-drilling or workovers.

In addition, numerous types of oils used to lubricate moving parts, such as Morlina Oil, hydraulic oils, lube oils, and other similar oils would be stored onsite in 55-gallon or smaller containers. Various paints and cleaning solvents would also be stored onsite in 1- and 5-gallon containers.

2.3.6 Project Life and Decommissioning

The proposed Project would develop the oil and gas resources until they are depleted and developing them is no longer economically viable or until the price of crude oil decreases to a level where production from the field is no longer economically viable. Currently, the amount of crude oil that could be produced from the field is unknown and future crude prices are difficult to assess. At a minimum, the proposed Project could operate for 25 years, which is the lease term approved by the City of Whittier.

If during the Drilling and Testing Phase, the Applicant does not deem the level of production from the Project Site as economically feasible, then decommissioning of the installed equipment would commence. Decommissioning would remove the drilling and temporary testing equipment and would include abandonment of wells according to DOGGR requirements.

At the end of the Project, estimated to last at least 25 years, a separate permit process and environmental review would evaluate decommissioning the entire site when the owner applies to abandon the facility. Since the timing of the decommissioning is unknown and the Applicant has not submitted a detailed decommissioning plan, any assessment of the decommissioning activities would be speculative at this time.