4.8 Hydrology and Water Resources

This section addresses the potential Whittier Main Oil Field Project (Project) impacts on water quality standards; groundwater supplies and quality; erosion and siltation; existing drainage runoff; existing stormwater facilities; 100-year flood hazard limits in relation to existing structures; 100-year flood limits resulting from new structures; the exposure of people or structures to risk of loss, injury, or death from flooding; and the risk of inundation from mudflows. For each subtopic, existing conditions, thresholds of significance, impacts, and mitigation measures are addressed.

The drilling and testing activities would result in surface disturbances across the Project Site, potentially impacting surface water quality, groundwater quality, and hydrologic characteristics of the site. Any re-contouring of the site can impact water flow and tributary characteristics. In addition, introduction of oil and water to the surface from the wells, along with the separation and truck loading operations, have the potential to significantly impact surface water and groundwater quality. Groundwater quality impacts could occur as a result of oil spills and/or wastewater injection. The Project would also require domestic water use and adequate fire flows, which have the potential to impact existing water facilities (see Section 4.13, Public Services and Utilities). Potential impacts due to the completed development are analyzed within this section.

4.8.1 Environmental Setting

4.8.1.1 Topography and Drainage

The Whittier Main Oil Field is located in the Puente Hills, a northwest-southeast-trending series of hills, along the northeast perimeter of the Los Angeles Coastal Plain (Figures 4.8-1 and 4.8-2). These hills, which reach a maximum height of 1,800 feet above mean sea level, consist of moderate to steep canyons and gullies with intervening ridges. The topography of the Puente Hills, within the Whittier Main Oil Field, has been locally modified by creation of numerous oil field service roads and relatively flat well-drilling pads. Steep cut slopes, with gradients up to approximately ¾:1 (horizontal to vertical) to near-vertical, are present along many of the roads and on the perimeter of apparently old well pads. Natural slopes are locally eroded with steep-sided gullies.

The Project Site, comprised of the proposed consolidated drilling site, is located along the base of a moderate- to steeply-sloping, southwest facing hillside. Much of the Project Area topography has been altered extensively by past grading. Roadways, both paved and unpaved, traverse most of the area, including those cut into hillsides and traversing canyons. Level building pads have been excavated into the hillsides and occupy much of the flat-lying alluvial canyon bottom areas. Portions of the slopes have been over-steepened as a result of prior grading operations. Cut slopes are abundant and exposed along the roadways. Fill areas are also present (Heathcote Geotechnical 2011). Surface runoff occurs primarily as sheetflow across the graded areas, from which runoff is directed into gullies and drainage ditches.

Several intermittent streams, as defined by the U.S. Geological Survey, are present in the Project area (Figure 4.8-1). La Canada Verde Creek traverses the base of the canyon immediately downslope of the Project Site. This creek is approximately 75 feet from the Project Site, at the closest point. The proposed sewer extension would traverse and then trend parallel and immediately northwest of this creek. In addition, Arroyo Pescadero Creek traverses the proposed access road and pipeline route, which extends from the proposed drilling site to the Preserve boundary. In-ground culverts and/or Arizona crossings allow roadways to traverse the stream beds. Neither of these creeks is included as a 100-year flood zone on maps prepared by the Federal Emergency Management Agency (2011).

From the Preserve boundary to the proposed oil and gas pipeline tie-ins, the pipeline route follows an existing paved roadway, along which the topography is initially gently to moderately sloping, becoming relatively flat in the southern portions of the alignment (Figure 4.8-1). The upper, northern portion of the pipeline route follows a ridge with intermittent streams located on either side of the ridge. Unnamed streams trend parallel to the pipeline route, both to the west and the east, at a distance of approximately 200 and 300 feet, respectively, at the closest points. In addition, Arroyo San Miguel Creek runs along the east side of the roadway, approximately 500 feet at the closest point. Along the southern portion of the proposed pipeline route, Leffingwell Creek traverses the roadway along which the pipeline would be installed.

The drainages and creeks of the Puente Hills are part of the San Gabriel River Watershed. In an effort to protect the adjacent communities from storm flows and debris, the Los Angeles County Public Works Flood Control Division maintains numerous catch basin and detention basin systems within and surrounding the area.

4.8.1.2 Groundwater

The Project Site is underlain at the surface by artificial fill, up to 10 feet thick, Pleistocene older alluvium, up to 25 feet thick, and the Pliocene Fernando Formation. Geotechnical borings drilled to a depth of 60 feet in 2009 and 2010 did not encounter groundwater (Heathcote Geotechnical 2011). Other than creek areas, where localized perched groundwater may be present, historical groundwater is deeper than 100 feet beneath the Project Site (California Division of Mines and Geology 1998).

On a regional scale, the Project Site is located along the northeast perimeter of the Central Groundwater Basin, which comprises approximately the northeast half of the Coastal Plain of Los Angeles County (Figure 4.8-2). More specifically, the Project Site is located on the La Habra Piedmont Slope of the Puente Hills, within the Whittier Area of the Central Groundwater Basin. This groundwater basin is bound on the north, east, and west by emergent, less permeable rocks of the Elysian, Repetto, Merced, Puente, Signal, Dominquez, Rosecrans, Baldwin, and Hollywood hills. To the southeast, Coyote Creek denotes the boundary between the Central Basin and basins of Orange County (California Department of Water Resources 1961).

The Whittier Area of the Central Basin extends from the Puente Hills south and southwest to the axis of the Santa Fe Springs-Coyote Hills uplift (Figure 4.8-1). The known fresh water-bearing sediments in the Whittier Area, extending to a depth of about 1,000 feet (800 feet below sea

level) beneath the alluvial basin floor, include Holocene alluvium and the Pleistocene Lakewood and San Pedro formations. Water-bearing units within these formations include the Gaspur, Artesia, Gage, Hollydale, Jefferson, Lynwood, Silverado, and Sunnyside aquifers. The Pliocene and Miocene sediments below these aquifers generally contain saline water in this area, but may locally contain fresh water (California Department of Water Resources 1961).

There are no domestic or industrial water supply wells located in the vicinity of the Project Site. The closest well (Los Angeles County well No. 1654K) is located approximately 2.5 miles southwest of the Project Site, at an elevation of 141 feet above mean sea level. Groundwater in this well, which was drilled in 1958, was measured in 1998 at a historic high elevation of 122 feet (depth of 19 feet). This groundwater elevation corresponds to a minimum depth to groundwater of approximately 330 feet at the topographically lowest point of the Project Site boundary, which is approximately 450 feet above mean sea level (Los Angeles County Department of Public Works 2007). The shallow depth to groundwater of well No. 1654K, which is located within the alluvial filled, Whittier Area basin, is typical of groundwater depths in that area (California Division of Mines and Geology 1998).

4.8.1.3 Water Quality

The California Regional Water Quality Control Board (RWQCB) adopted a revised Water Quality Control Plan for the Los Angeles Region, in June 1994. The plan contains beneficial uses and water quality objectives for groundwater in the West Coast, Santa Monica, and Central groundwater basins. Beneficial uses include municipal, agricultural, industrial service, and process supply (California Regional Water Quality Control Board 1994). The Project Area is traversed by La Canada Verde and Arroyo Pescadero creeks. These creeks merge and then empty into Leffingwell Creek west of the proposed pipeline route. None of these creeks are considered an impaired water body or waterway segment, as defined under Section 303(d) of the Federal Clean Water Act (California Regional Water Quality Control Board 2008).

Figure 4.8-1 Topography and Drainage of the Whittier Main Oil Field Development Project

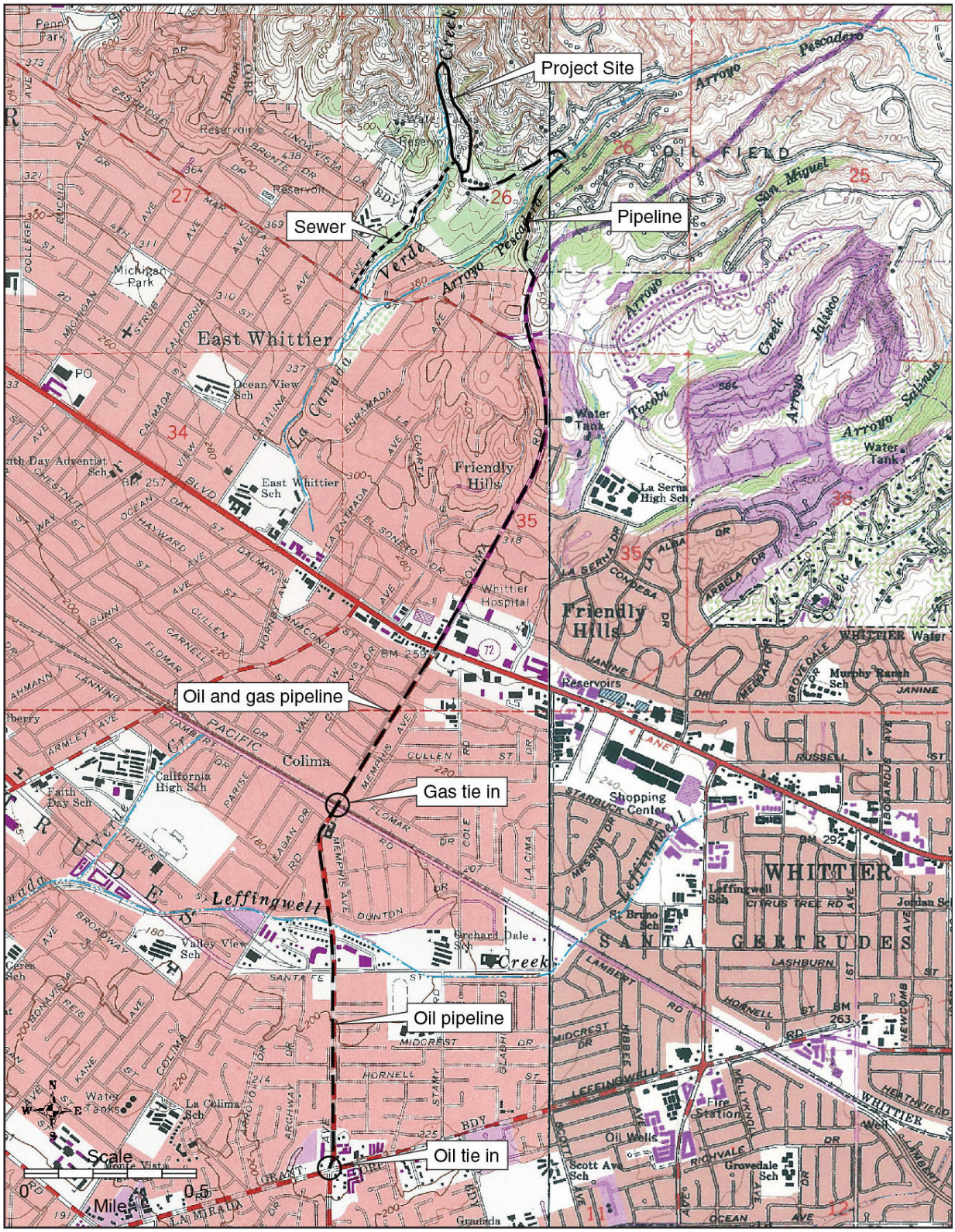
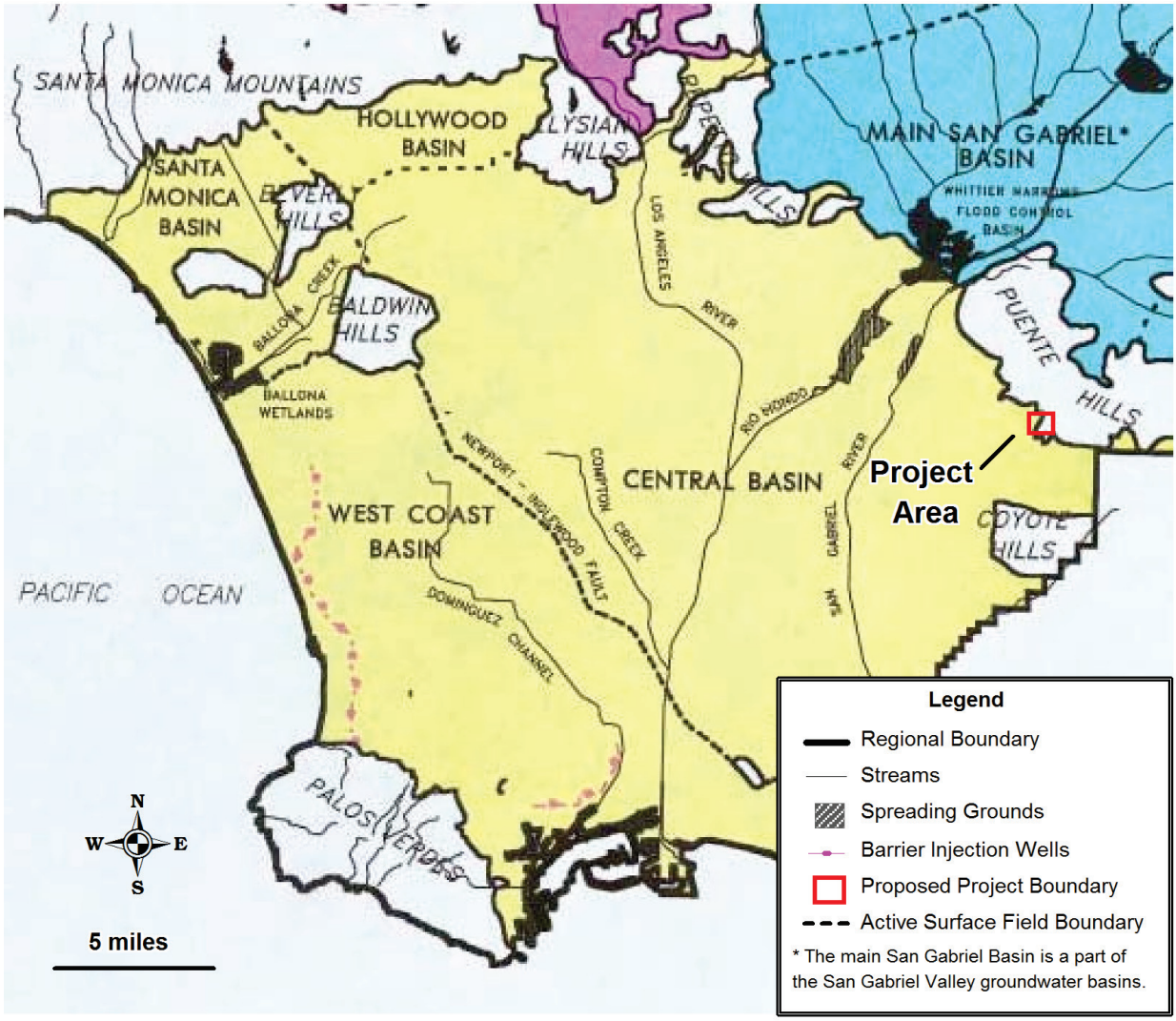


Figure 4.8-2 Los Angeles Coastal Groundwater Basins



Source: RWQCB 1994

4.8.2 Regulatory Setting

4.8.2.1 Federal Policies and Regulations

Safe Drinking Water Act of 1974

The Safe Drinking Water Act of 1974 (SDWA) was implemented by the Environmental Protection Agency (EPA) and is the primary federal regulation controlling drinking water quality in every public water system in the United States. The SDWA authorizes the EPA to establish and enforce guidelines for drinking water to protect against both naturally occurring and manmade contaminants.

The SDWA was originally implemented in 1974 with significant amendments in 1986 and 1996. The SDWA originally set standards for the treatment of individual constituents, including pesticides, trihalomethanes, arsenic, selenium, radionuclides, nitrates, toxic metals, bacteria, viruses, and pathogens. The amendments to the SDWA made some significant changes, most of which resulted in more stringent protection of drinking water sources. The amended SDWA also greatly enhanced the existing law by implementing operator training, funding for water system improvements, and public information as important components of safe drinking water.

The Clean Water Act

The Clean Water Act of 1972 (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulates quality standards for surface waters. Under the CWA, the EPA has implemented many pollution control standards for industries, as well as water quality standards for all contaminants in surface waters. The CWA made it unlawful to discharge any pollutant from a point source into navigable waters, unless a National Pollutant Discharge Elimination System (NPDES) permit is obtained from the EPA. Each NPDES permit specifies effluent limitations for particular pollutants, as well as monitoring and reporting requirements for the proposed discharge. Permit issuance, receipt of monitoring data submitted by permittees, compliance monitoring, and enforcement are the primary responsibilities of states.

Oil Pollution Act

The Oil Pollution Act of 1990 established a single uniform Federal system of liability and compensation for damages caused by oil spills in U.S. navigable waters. The Act requires removal of spilled oil and establishes a national system of planning for and responding to oil spill incidents. It includes provisions to:

- Improve oil-spill prevention, preparedness, and response capability;
- Establish limitations on liabilities for damages resulting from oil pollution;
- Provide funding for natural resource damage assessments;
- Implement a fund for the payment of compensation for such damages; and
- Establish an oil pollution research and development program.

Total Maximum Daily Loads

Total Maximum Daily Loads fall under Section 303 of the Federal Clean Water Act. Impaired water bodies require reducing the pollutant discharge to a level that the water body can assimilate. The reduction could decrease wastewater and stormwater pollutant discharges to levels lower than required by an NPDES permit (see above), in order to meet the Total Maximum Daily Load. States develop Total Maximum Daily Loads to determine how to reduce pollution from point sources and non-point sources, so that the pollutant loads stay below the maximum specified in the Total Maximum Daily Load. States are required to prioritize waters/watersheds for Total Maximum Daily Load development, compile this information in a list, and submit the list to the U.S. EPA for review and approval. The list is known as the 303(d) list of impaired waters (California Regional Water Quality Control Board 2008).

Federal Emergency Management Agency Flood Zones

The Federal Emergency Management Agency (FEMA) has delineated both the special hazard flood areas and risk premium flood zones applicable to individual communities. The Flood Insurance Rate Maps (FIRM) help private citizens and insurance companies locate properties in flood risk areas, aid lending institutions when making loans, and administer floodplain management regulations to mitigate flood damage.

4.8.2.2 State Policies and Regulations

State Water Resources Control Board

The State Water Resources Control Board (SWRCB) and its nine Regional Water Quality Control Boards s are the principal state agencies with primary responsibility for the coordination and control of water quality. The SWRCB enforces the water quality standards set forth in the CWA for the State of California on behalf of the federal EPA. Most SWRCB objectives are based on the California Code of Regulations, Title 22 State Drinking Water Standards. The City of Whittier lies within Region 4, the Los Angeles Regional Water Quality Control Board.

The State Water Resources Control Board has elected to adopt a statewide General Permit, serving as an NPDES permit, in compliance with CWQ section 402, to regulate discharge. The General Permit Order 2009-0009-DWQ regulates discharges of pollutants associated with storm water runoff from construction sites. The general permit authorizes discharges of storm water associated with the construction activity so long as the dischargers comply with all the requirements and provisions in the permit.

The Porter-Cologne Water Quality Control Act

Since 1973, the California State Water Resources Control Board and its nine Regional Water Quality Control Boards have been delegated the responsibility for administering permitted discharge into the waters of California. The Porter-Cologne Water Quality Act provided a comprehensive water-quality management system for the protection of California waters and regulated the discharge of oil into navigable waters by imposing civil penalties and damages for negligent or intentional oil spills. Under this act, “any person discharging waste, or proposing to

discharge waste, within any region that could affect the quality of the waters of the state" must file a report of the discharge with the appropriate Regional Water Quality Control Board. Pursuant to the act, the regional board may then prescribe "waste discharge requirements" that add conditions related to control of the discharge. Porter-Cologne defines "waste" broadly, and the term has been applied to a diverse array of materials, including non-point source pollution. When regulating discharges that are included in the Federal Clean Water Act, the State essentially treats waste discharge requirements and NPDES as a single permitting vehicle. In April 1991, the State Water Resources Control Board and other State environmental agencies were incorporated into the California Environmental Protection Agency.

The Porter-Cologne Water Quality Act is the primary State regulation addressing water quality and waste discharges on land. Permitted discharges must be in compliance with the regional Basin Plan that was developed by the Los Angeles Regional Water Quality Control Board for Region 4, which includes Los Angeles County and the Project Area. Each Regional Board implements the Basin Plan to ensure that projects consider regional beneficial uses, water quality objectives, and water quality problems.

The Los Angeles Regional Water Quality Control Board regulates urban runoff discharges under the NPDES permit regulations. NPDES permitting requirements cover runoff discharged from point, e.g., industrial outfall discharges, and nonpoint, e.g., stormwater runoff, sources. The Los Angeles Regional Water Quality Control Board implements the NPDES program by issuing construction and industrial discharge permits.

Best Management Practices are required as part of a SWPPP. The EPA defines Best Management Practices as "schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of Waters of the United States. Best Managements Practices include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage" (40 CFR 122.2).

Proposed California Toxics Rule

Water quality criteria for priority toxic pollutants for California inland surface waters, enclosed bays, and estuaries were adopted. These federally promulgated criteria, together with State-adopted designated uses, create water quality standards for California inland waters. This rule satisfies Clean Water Act requirements and fills the need for water quality standards for priority toxic pollutants to protect public health and the environment. The State Water Resources Control Board adopted the "Policy for implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California" in 2000.

Disposal of Oil Field Waste (CAC, Title 23, Chapter 3, Subchapter 15, Articles 3 and 5)

Oil field waste materials, including but not limited to drilling muds, oily wastes, and brines, generally contain toxic substances and materials that could significantly impair the quality of usable waters and generally constitute Group I wastes. Such waste, which is ordinarily deposited at Class I or Class II-1 disposal sites, may be disposed by other means if such operations do not unreasonably affect water quality because of the type of waste and disposal operation, or an operation is in compliance with ordinances or regulations of other governmental agencies which

adequately protect water quality. In 1980, Congress added section 1425 to the Safe Drinking Water Act, which controls underground injection of waste, giving the States the authority to demonstrate that they maintain an effective program to prevent underground injection which endangers drinking water sources. The California Regional Water Quality Control Board, Los Angeles Region, authorize such disposal options.

Safe Drinking Water and Toxic Enforcement Act

The Safe Drinking Water and Toxic Enforcement Act provides two ways to administratively list chemicals known to the state to cause cancer or reproductive toxicity. A chemical can be listed if a body considered to be authoritative by the state's qualified experts, such as the EPA or Food and Drug Administration, formally identifies the chemical as causing cancer or reproductive toxicity A chemical can also be listed if a state or federal agency has formally required labeling or identifying that chemical as causing cancer or reproductive toxicity. The criteria for the listing these chemicals are outlined in 22 CCR section 12902.

Groundwater Management Act

The Groundwater Management Act, commonly referred to as Assembly Bill (AB) 3030, is designed to provide local public agencies with increased management authority over groundwater resources. Groundwater is a valuable natural resource within California, and AB 3030 ensures safe production and quality by encouraging local agencies to work cooperatively to manage groundwater resources within their jurisdictions (Water Code Section 10750).

4.8.2.3 Local Policies and Regulations

Standard Urban Stormwater Mitigation Plan

The Standard Urban Stormwater Mitigation Plan is part of the Development Planning Program of the NPDES, Phase I, Stormwater Permit for the County of Los Angeles. The Standard Urban Stormwater Mitigation Plan applies to development and redevelopment projects within the County that fall within specific categories. The County of Los Angeles has developed a Standard Urban Stormwater Mitigation Plan manual that includes the permitting and inspection process for projects required to meet Standard Urban Stormwater Mitigation Plan regulations. The objective of the Standard Urban Stormwater Mitigation Plan is to effectively prohibit non-stormwater discharges and reduce the discharge of pollutants from stormwater conveyance systems to the Maximum Extent Practicable statutory standard. Standard Urban Stormwater Mitigation Plan defines hydrology standards for designing volumetric and flow rate-based Best Management Practices (LACDPW 2006).

County of Los Angeles Flood Control Act

After a disastrous regional flood took a heavy toll on lives and property, the state legislature adopted the County of Los Angeles Flood Control Act in 1915. The Act established the Los Angeles Flood Control District and empowered it to provide flood protection, water conservation, recreation, and aesthetic enhancement within its boundaries. In August of 2000, the Watershed Management Division became the planning and policy arm of the Flood Control

District. Overall, the district encompasses more than 3,000 square miles, 85 cities, and approximately 2.1 million land parcels. It includes a vast majority of drainage infrastructure within incorporated and unincorporated areas in every watershed including 500 miles of open channels, 2,800 miles of underground storm drains, and an estimated 120,000 catch basins.

The flood control district regulates hydrologic and hydraulic design of drainage structures within its boundaries through its 1982 Hydraulic Design Manual. In conjunction with the Watershed Management Strategic Plan, the public works division provides criteria and planning procedures for floodplains, waterways, channels, and closed conduits within the County of Los Angeles.

City of Whittier

The City of Whittier is the current owner of the Whittier Main Oil Field. The Community Development Department is charged with the administration of the ordinances and policies relating to land use and development within the City, along with enforcing building standards for the purpose of safeguarding public health and safety. In addition, the City Public Works Department has responsibility for some of the flood control measures in the region and regulates engineering standards and required permits.

4.8.3 Significance Criteria

As defined in CEQA Appendix G, the Environmental Checklist Form, hydrology and water resource impacts would be significant if the proposed Project would:

- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the groundwater table level, ultimately affecting the production rate of existing nearby wells;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on or offsite;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or substantially increase the rate of runoff in a manner that would result in flooding on or offsite;
- Create, contribute, or alter hydrologic characteristics of the area producing runoff that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality;
- Place structures within a 100-year flood hazard area, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or flood hazard delineation;
- Place structures that would impede or redirect flood flows within a 100-year flood hazard area;

- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam; or
- Cause an inundation by a seiche, tsunami, or mudflow.

4.8.4 Project Impacts and Mitigation Measures

The proposed Project would create impervious surfaces, by adding paved access roads and drilling equipment foundations, which would potentially alter drainage patterns. . Any increase in runoff could be mitigated onsite to avoid any adverse impacts to downstream storm drain facilities. The proposed Project would not place any structures within 100-year flood hazard boundaries. New grading and construction could potentially result in adverse impacts to surface water quality. In addition, producing, storing, processing, and transporting crude oil would introduce potential for spills and leaks that could impact surface water and groundwater quality..

Impact #	Impact Description	Phase	Residual Impact
WR.1	Site grading and drainage improvements would alter existing drainage patterns and increase impervious surfaces, which could increase surface runoff, cause flooding, and adversely impact water quality.	Drilling and Testing, Design and Construction, Operations and Maintenance	Less Than Significant With Mitigation

Access road improvements, well pads, storage tank foundations, processing facilities, and other similar improvements would increase impervious area within the Project Site. Approximately 12.2 acres would be disturbed during construction of the facilities, with 6.9 acres remaining disturbed and mostly paved during operations. In addition, 8.9 acres would be disturbed during construction for road improvements, temporary construction staging areas, and parking areas, with 3.8 acres remaining as paved roadways during operations. The addition of asphalt and concrete paving within the Project Site boundaries would alter the runoff coefficients and increase overall storm runoff from the site. An increased storm runoff value could alter storm flow paths and increase storm flow velocities, which could ultimately overwhelm downstream storm drains. In addition, increased runoff intensities could result in increased erosion, sediment transport, and pollutant transport, causing alterations in adjacent stream flow pH, water temperature, turbidity, nutrients, organic compounds, and suspended sediment. In addition, the Project would include construction of steep cut slopes and sloped paved roads, which would further increase the impacts of the increased storm flows. As a result, impacts are considered potentially significant but mitigable, with implementation of the following measures:

Mitigation Measures

WR-1a A registered civil engineer experienced in drainage shall prepare a hydrologic study, using the corresponding hydraulic calculations for interception, conveyance, and discharge of runoff. Based on these studies, the engineer shall prepare a drainage plan in accordance with City and County requirements.

WR-1b A registered civil engineer experienced in drainage shall design and implement onsite detention facilities to reduce runoff to existing levels. Onsite detention ponds would attenuate the runoff intensity, such that an excessive peak flow would not occur during high intensity storms and there would be no increase in runoff intensity over existing conditions. The project engineer shall conduct an onsite hydrologic study to determine the approximate increase in storm runoff to accurately scale any onsite detention facilities.

Detention System Design

Onsite detention facilities have the potential to create habitats for mosquito breeding. Any onsite detention facilities shall be designed as a 'dry system' in accordance with the California Department of Public Health. A dry system requires that the facility be designed to discharge all captured water within 4 days. The design slope shall be adequate and properly compacted to prevent standing water and a low flow channel shall be incorporated to direct low flows to the system outlet. The basin shall also provide access for maintenance and inspection.

All catch basins and drainage facilities, including grass swales and bio-retention facilities shall also be designed to prevent standing water.

An operation and maintenance plan shall be incorporated to remove vegetation, sediment, and debris accumulation biannually with an inspection at the beginning of the wet season. Waste from maintenance shall be disposed of according to local and state regulations.

Onsite detention facilities shall be inspected quarterly for burrowing vector damage. Vector control measures shall be incorporated and maintained to prevent damage to the detention facility.

Onsite detention facilities shall be surrounded by 6-foot fencing and provided access with a gate and access road per Los Angeles County standards.

Discharge systems from onsite detention facilities shall be capable of discharging water from the basin while preventing a discharge of oil from the surface of the basin using a weir or subsurface discharge type design to prevent oil discharges from the basin in the event the basin reaches capacity and there is a crude oil spill.

WR-1c Impervious surfaces shall be minimized to prevent pollutant runoff. Gravel roads and parking areas would allow infiltration of stormwater and limit downstream runoff.

WR-1d Structural Best Management Practices shall be used to mitigate the increased pollutant runoff. Directing runoff from impervious area to grass swales, bio-swales,

or detention ponds would aid in filtering out suspended solids and potential contaminants. Grassbio swales shall not be planted with invasive species.

WR-1e *Pollution control products, such as catch basins with basket inserts, shall be used to catch trash and debris along with filtering elements such as silt fences, straw wattles and absorbent sponges within catch basins. Filter technology may be used to catch sediment, debris, oil, and pollutants.*

WR-1f *Permanent water quality testing, drainage device, and erosion control maintenance shall be implemented.*

WR-1g *A Storm Water Pollution Prevention Plan manager shall oversee and monitor construction Best Management Practices and stormwater management programs, in accordance with the State General Construction Permit and the Los Angeles Regional Water Quality Control Board.*

Residual Impacts

Mitigation measures WR-1a through WR-1g would reduce hydrology impacts associated with an increase in impervious areas to less than significant with mitigation, as impervious surfaces would be minimized and increased runoff would be controlled.

Impact #	Impact Description	Phase	Residual Impact
WR.2	Site grading and drainage improvements would alter existing drainage patterns at the Project Site, which could increase erosion and impact water quality on- or off-site.	Drilling and Testing, Design and Construction, Operations and Maintenance	Less Than Significant With Mitigation

The Drilling and Testing Phase would include clearing and grubbing operations, access road improvements, and test well pad construction. The Design and Construction Phase would include full-scale grading and earthmoving, including construction of the paved access roads, both to the north and the south, grading the drilling pads, gas plant area, oil processing site, and truck loading area. Excavations would also be necessary to construct the proposed well cellars.

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 off-site. Cut slopes up to 65 feet high would be created along the eastern perimeter of the site. In addition to the grading operations, oil and gas pipelines and underground utilities, including water, gas, and electricity, would be installed under the existing and new access roads. A sewer is also proposed to extend from the southwest portion of the Project Site, beneath La Canada Verde Creek, and then extend southward, adjacent and parallel to the creek, until reaching a sewer tie-in on Catalina Avenue. Pipeline and sewer construction would necessitate temporary stockpiling of excavated soil adjacent to the trench.

These grading and construction activities would temporarily increase the amount of suspended solids in surface flows derived from the site during storm events, due to sheet erosion of exposed soil, thus potentially resulting in significant water quality impacts to La Canada Verde and Arroyo Pescadero creeks. Such impacts would be mitigable with implementation of the following measures:

Mitigation Measures

WR-2a During construction operations, the Applicant shall implement stormwater management protection measures and wet weather measures. These measures would include temporary and permanent Best Management Practices to reduce the potential for erosion and sediment transport. Conventional measures typically recommended by the State Water Resource Board and the California Department of Transportation include the following:

Implement permanent erosion and sediment control measures:

- *Limit grading, clearing, and grubbing to preserve existing vegetation;*
- *Use mulches and hydroseed to protect exposed soils;*
- *Use geotextiles and mats to stabilize soils;*
- *Use drainage swales and dissipation devices; and*
- *Use erosion control measures outlined in the California Stormwater Quality Association Best Management Practice Handbook.*

Implement temporary Best Management Practice mitigation measures:

- *Use silt fences, sandbags, and straw wattles;*
- *Use temporary sediment basins and check dams; and*
- *Use temporary Best Management Practices outlined in the California Stormwater Quality Association Best Management Practice Handbook.*

Implement tracking control Best Management Practices to reduce tracking sediment offsite.

- *Use stabilized construction entrance and exit with steel shakers;*
- *Use tire wash areas; and*
- *Use tracking control Best Management Practices outlined in the California Stormwater Quality Association Best Management Practice Handbook.*

WR-2b The Applicant shall implement a Storm Water Pollution Prevention Plan using Best Management Practices and monitor and maintain stormwater pollution control facilities identified in the Storm Water Pollution Prevention Plan, in a manner consistent with the provisions of the Federal Water Pollution Control Act (National Pollutant Discharge Elimination System Program).

Residual Impacts

Construction-related pollution control mitigation measures WR-2a and WR-2b, in addition to mitigation measures WR-1a through WR-1g, would mitigate the potential water quality impacts to less than significant with mitigation.

Impact #	Impact Description	Phase	Residual Impact
WR.3	New grading and construction, potential soil remediation, and/or drilling operations could degrade surface water quality.	Drilling and Testing, Design and Construction, Operations and Maintenance	Less Than Significant With Mitigation

New well pad, road, pipeline, and related infrastructure construction activities could result in degradation of local drainages and creeks, including nearby La Canada Verde, Arroyo Pescadero, Arroyo San Miguel, and Leffingwell creeks, as well as two other nearby unnamed creeks. Potential construction related contaminants include solid and sanitary wastes, phosphorous, nitrogen, pesticides, oil and grease, concrete washout, construction chemicals, and construction debris. Similarly, operations could result in an incidental release of oil, oil-based mud, generator fuel, or maintenance related hazardous materials, which could introduce such substances to surface soils and waters.

An aerial photo suggests that previous owners used the proposed truck loading area as tank and equipment areas (see Figure 4.3-1 in Section 4.3, Safety, Risk of Upset, and Hazardous Materials). Therefore, excavation and construction at the Project Site could encounter contaminated soils, which could be mobilized such that adjacent creek waters are adversely affected. Potential soil remediation activities (e.g., excavation, on-site biofarming [i.e., bioremediation], and/or off-site disposal of contaminated soil) could also result in incidental spills of petroleum products from excavation and grading equipment. Such contaminants would potentially impair surface water runoff.

The drilling operations would require approximately 4,500 gallons of water per day from a fire hydrant installed near the drill site. The drilling rig and associated equipment would be routinely exposed to water and small quantities of mud or petroleum-based substances, which could be spilled directly onto the surrounding ground surface. In addition, the proposed well cellars would be recessed below the ground surface. Incidental oil leakage or spills of oil-based substances could seep into the underlying groundwater and significantly impact water quality.

However, a pollution pan would be installed under the rig floor to contain and collect any oil-based drilling mud that may spill on the rig floor. The mud would be captured and contained in the catch pan and then returned to the active mud pit system by a cellar pump. 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 rig installation. In the event that a leak should occur in the

mud handling system, the leak would be contained directly around the rig and flow toward the well cellar. Rainwater accumulations within the bermed area around the rig would similarly flow into the well cellar, before being pumped into the active mud pit 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 area and allowed to percolate into the ground. No stormwater would be allowed to drain from the Project Site into the surrounding area. 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 tool, to be used in the event of an oil spill.

In addition to these Applicant-proposed spill prevention and containment measures, the following measures would further reduce potential spill impacts.

Mitigation Measures

WR-3a The proposed well cellar shall be lined with an impermeable membrane to prevent groundwater from flowing into the cellar and to prevent oil-based substances from seeping into groundwater supplies. All drilling muds storage shall be contained within Baker-type enclosed tanks.

WR-3b An 18-inch berm shall be placed around the entire drilling rig to capture any spilled fluids.

WR-3c Personnel at the site shall be trained in equipment use and containment and cleanup of an oil spill. Dry cleanup methods, such as absorbents, shall be used on paved and impermeable surfaces. Spills in dirt areas shall be immediately contained with an earthen dike and the contaminated soil shall be dug up and discarded in accordance with local and state regulations.

WR-3d Oil spills shall be contained and cleaned according to measures outlined in the California Stormwater Quality Association Best Management Practice Handbook.

WR-3e An approved response manual and Oil Spill Contingency Plan shall be implemented to outline response actions in the event of a spill, including a spill response trailer, equipment, and personnel training.

Residual Impacts

Implementing mitigation measures WR-3a through WR-3e would reduce the severity of operation-related spill impacts to less than significant with mitigation.

Impact #	Impact Description	Phase	Residual Impact
WR.4	A rupture or leak during oil drilling operations, from pipelines, or other infrastructure could substantially degrade surface water and groundwater quality	Drilling and Testing, Operations and Maintenance	Significant and Unavoidable

Up to 60 wells would be drilled at the Project Site, from three separate well cellars. The wells would be used for oil and gas production and water injection. The produced oil and gas would be separated into gas, oil, and water streams. The oil would be processed to remove any remaining water and then the dry oil would be temporarily stored in tanks and shipped via pipeline or trucks to local Los Angeles area refineries. The produced water would be sent to injection wells, where the water would be injected back into the producing formation. The produced gas would be sent to the existing gas plant, where water and gas liquids would be removed.

Proposed drilling and oil processing operations could result in oil spills due to geologic hazards, mechanical failure, structural failure, corrosion, or human error during any of the steps outlined above. Among other geologic hazards, the Whittier Fault underlies portions of the Whittier Oil Field (see Section 4.4, Geological Resources). An active segment of the fault trends approximately 1,500 feet north of the Project Site and 1,500 feet northeast of the proposed pipeline alignment, at the closest point. The most likely spills from the facility would involve crude oil and/or produced water. Such spills could potentially result in water quality impacts to creeks and shallow groundwater. Small leaks or spills, which are contained and remediated quickly, may have minor or negligible impacts to water resources. In contrast, large spills, such as those that could be produced from a tank rupture at the processing facility, well blow-out, or pipeline rupture, could spread to surface waters and/or groundwater and may substantially degrade water quality, with potential long-term impacts to beneficial water uses and biological resources.

La Canada Verde Creek is located immediately adjacent to the Project Site and several other creeks are present along the proposed pipeline route (Figure 4.8-1). Although some of the more toxic components of oil, e.g., volatile organic compounds, would be lost rapidly due to aeration, i.e., volatilization, spills and associated contaminated stormwater runoff reaching any of these waterways could have significant, and widespread impacts to water quality and consequently, sensitive biological resources. Similarly, spills could result in significant, long-term contamination of groundwater in alluvial soils located these creeks, as these soils are generally unconsolidated and permeable and perched groundwater occurs at relatively shallow depths. Therefore, the impacts could be considered potentially significant.

According to the Safety, Risk of Upset, and Hazardous Materials Section (Section 4.3), under worst-case conditions, maximum estimated spill volumes would be from a catastrophic failure of one of the largest crude oil tanks that have a capacity for approximately 11,000 barrels. The tank area 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 would be walled or bermed for spill containment. Although secondary containment would be present surrounding the storage tanks, the worst case scenario would involve a full release of the tank's contents as a result of severe seismically induced ground shaking and associated ground failure. The frequency of a release of crude oil from proposed storage/pumping areas, beyond proposed containment, would be once about every 1,029,469 years.

A worst-case scenario for pipeline rupture would be a rupture at the tie-in along Leffingwell Avenue, which could result in complete draining of the pipeline, or approximately 3,700 barrels, back to the Preserve boundary. A release of crude oil from piping/equipment outside of containment areas within the Preserve, due to rupture or leak, is once every 12 years, but this probability does not necessarily represent large spills.

The potential for rupture of the wellhead area during drilling is once every 33 years. Blow-out prevention systems are proposed to be used during the drilling operations to prevent uncontrolled release of reservoir fluids and shut off the flow to prevent spills and releases of materials that could cause fires and explosions. The safety systems are composed of a stack, actuation systems, a choke manifold, kill systems, and other equipment. Such systems would be placed on each wellhead during drilling and removed after the well is established. In addition, impacts would be reduced with implementation of the following measures:

Mitigation Measures

WR-4a *The City of Whittier and other appropriate agencies shall inspect facility conditions at the Project Site on a yearly basis. Inspections shall also occur after earthquake induced land movement or upon periods of large rainfall in order to verify no leak or rupture risks have developed.*

WR-4b *The Applicant shall properly maintain the associated crude oil pipelines, storage tanks and processing facilities within and outside the Preserve, including smart-pigging according to State of California Office of the State Fire Marshal requirements and the standards outlined by the Department of Oil, Gas and Geothermal Resources, and the Regional Water Quality Control Board. Pipeline, tank and processing inspections,including walking the pipelines, shall occur at least daily.*

WR-4c *The Applicant shall install a leak detection system for crude pipelines in the Preserve and the Colima Road pipeline. The system shall include pressure and flow meters, flow balancing, supervisor control and data acquisition system, and a computer alarm system in the event of a suspected leak. Temperature, pressure, and flow shall be monitored at each pipeline entry and exit. If any variable deviates by more than 10 percent of the normal operating range, the system shall trigger both audible and visual alarms. Flow balancing shall be conducted every 5 minutes, 1 hour, 24 hours, and 48 hours with the accuracy defined once the system is established and tested.*

Residual Impacts

No additional feasible measures beyond the proposed blow-out prevention system and the above mitigation measures are available. The residual impact to water quality would be significant and unavoidable.

Impact #	Impact Description	Phase	Residual Impact
WR.5	Reinjection of produced water could potentially impair water quality of aquifers within the Whittier Area of the Central Groundwater Basin.	Operations and Maintenance	Less than Significant

Background on Disposal Wells

Up to eight injection wells have been proposed for disposal of produced water, which is mainly salty water trapped in the reservoir rock and brought up along with oil or gas during production. This water can contain minor amounts of chemicals added downhole during production. In addition, produced waters exist under high pressures and temperatures and usually contain oil and metals; therefore, the water must be treated prior to being discharged. Produced water can contain high concentrations of salts, metals, hydrocarbon and organic compounds, sulfur, treatment and workover chemicals, dissolved gases (particularly carbon dioxide), bacteria and other living organisms, dispersed solid particles, scales, and other pollutants. However, the particular concentrations of these components vary greatly among different oil fields. This salt water can be very damaging if it is discharged into surface water. Instead, all states require that this brine be injected into formations similar to those from which it was extracted (Produced Water Society 2006; U.S. EPA 2006).

Approximately 65 percent of the produced water generated in the United States is injected back into the producing formation, 30 percent is injected into designated deep saline formations, and five percent is discharged to surface waters. Over two billion gallons of brine are injected daily into injection wells in the United States. Produced water salinity in the United States generally varies from 100 milligrams/liter (mg/l) to 400,000 mg/l. Seawater has a salinity of 35,000 mg/l. Produced water generally increases as oil and gas is depleted from any given well (Produced Water Society 2006; U.S. EPA 2006).

The U.S. EPA classifies oil and gas injection wells as Class II wells. There are approximately 167,000 oil and gas injection wells in the United States and 25,000 such wells in California, most of which are used for the secondary recovery of oil, as the injection of the brine can have the effect of enhancing production of oil and gas from the formations. However, some injection wells are used solely as a disposal well for excess production fluids. Class II wells must adhere to strict construction and conversion standards. A Class II well that follows EPA Federal standards is built very much the same as Class I well, which can be used to dispose of hazardous waste. The California Division of Oil and Gas and Geothermal Resources (DOGGR) regulates oil field waste disposal in injection wells.

Potential Water Quality Impacts

All of the injection wells will be drilled from the Project Site. The exact vertical and lateral configuration of these slant wells is undetermined; however, none of the wells will be drilled through the Pleistocene aquifers of the Lakewood and San Pedro formations, which comprise the primary aquifers of the Whittier Area of the Central Groundwater Basin. However, these wells may pass through fresh water deposits of the Pliocene Fernando Formation, creating potential water quality impacts as a result of well leakage and/or migration of wastewater from the point of injection upward through the formation, as a result of frac-outs, which are uncontrolled releases of produced water from the formation.

The current mechanism that is creating a stratigraphic and/or structural trap for oil accumulation within the Miocene Puente Formation (the target oil producing formation) would similarly prevent upward migration of injected wastewater into the overlying aquifers. In addition, all of the produced water would be injected back into the reservoir at a depth of approximately 4,000 to 6,000 feet. Reservoir pressures at a depth of 5,000 feet are approximately 2,250 pounds per square inch (psi). The applicant has proposed to re-inject produced water at a rate of 1,000 psi. This substantially reduced injection pressure (from original reservoir pressures) would prevent additional stress on the formation that might result in frac-outs into overlying Puente Formation strata and/or the overlying Pliocene Fernando Formation, which separates the oil-bearing, Miocene Puente Formation from the Pleistocene aquifers of the Lakewood and San Pedro formations.

In addition, injection of produced water at a depth of 4,000 to 6,000 feet is a minimum of 3,000 feet below the effective base of fresh water in the Whittier Area, as the known fresh water-bearing sediments extend to a depth of about 1,000 feet from the alluvial basin floor of the Whittier Area of the Central Groundwater Basin, or about 800 feet below sea level. There are no domestic or industrial water supply wells located in the vicinity of the Project Site. The closest well (Los Angeles County well No. 1654K) is located approximately 2.5 miles southwest of the Project Site, thus further minimizing the potential for impairment of beneficial groundwater as a result of produced water injection.

The injection wells would be designed to meet all of the rules and regulations of the California DOGGR. All of the injection wells would have steel casing that would be cemented in place. All of the produced water would be injected through injection tubing that would run down through the steel casing. The tubing would be placed in the well to a point just above the perforations, located at the zone of water injection, and a packer is used near the bottom of the tubing to seal it against the casing. The packer prevents water from entering the space between the tubing and casing when water is injected down the tubing. Several tests are typically run to ensure that the well is operating properly and that the injected fluids are confined to the intended injection zone (DOGGR 2007).

All injection wells are monitored by the DOGGR to ensure that the wells are operating properly and have mechanical integrity. Monitoring includes reviewing operational data and running tests like mechanical integrity tests (i.e., spinner, temperature, and pressure tests and tracer surveys). In addition, most well sites are inspected annually by the DOGGR (DOGGR 2007).

Operators of Class II injection well must file for a permit with the DOGGR. Before a permit is issued, the proposed injection project would be studied by DOGGR engineers and reviewed by the California Regional Water Quality Control Board, Central Coast Region. DOGGR engineers would evaluate the geologic and engineering information, solicit public comments, and hold a public hearing, if necessary. Injection project permits include many conditions, such as approved injection zones, allowable injection pressures, and testing requirements (DOGGR 2007).

In California, Class II injection wells have proved to be an environmentally safe method of disposal of produced water. A peer review conducted by a national organization, the Ground

Water Protection Council, determined that the DOGGR has a program that effectively protects underground sources of drinking water (DOGGR 2007).

In summary, proposed injection wells may potentially pass through and beneath fresh water-bearing sediments within the Whittier Area of the Central Groundwater Basin. Produced water would be treated for excessive solids content prior to reinjection; however, the produced water would be highly saline and could potentially impair groundwater quality in the unlikely event that an injection well leaks in the area near the groundwater. Given that 1) the injection wells would have to meet the DOGGR rules and regulations regarding design and operation; 2) the existing mechanism that is creating the oil trap would prevent upward migration of produced water into overlying water-bearing sediments; 3) and the produced water and other drilling wastes would be injected back into the reservoir approximately 3,000 feet below the effective base of fresh water, at pressures substantially below existing reservoir pressures, the impacts of injection on groundwater would be considered adverse but not significant.

Mitigation Measures

As impacts on groundwater quality would be adverse but not significant, no produced water injection related mitigation measures are required.

Residual Impact

The residual impact would be less than significant.

Impact #	Impact Description	Project Phase	Residual Impact
WR.6	Drilling and production operations would not substantially deplete groundwater supplies such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level.	Drilling and Testing, Design and Construction, Operations and Maintenance	Less than Significant

Approximately 2,000 gallons per day of water would be required for clearing and grading operations during the approximate four-week Drilling and Testing Phase and the six-month Design and Construction Phase. Following earth-moving activities, water would be used for concrete curing, hydro testing pipes, and general construction activities. It is anticipated that an average of 1,000 gallons of water would be required each month to finish construction of the well pad and facilities. Subsequently, approximately 0.4 acre-feet (130,000 gallons) of water would be consumed while drilling each well, for a total of up to 60 wells. On a daily basis, approximately 4,500 gallons per day would be required.

Water would be obtained from the City of Whittier via its existing hydrant at the entry gate at Catalina Avenue. The City has indicated that there is sufficient water available for this increased water demand, associated with oil drilling operations at the Project Site. As indicated in Section 4.13, Public Services and Utilities, the water demand associated with this Project would be minor compared to the overall water demand in the area. The Project would not require a new off-site water supply or new or expanded water entitlements. Therefore, there would be no impact on

groundwater supplies such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level.

Mitigation Measure

There are no impacts associated with groundwater supply and no mitigation is required; however, the following mitigation measures are recommended.

WR-6a *Where feasible, the City of Whittier shall supply reclaimed water during construction and well drilling operations, to reduce water supply impacts.*

WR-6b *Where feasible, the Applicant shall implement water conservation measures during construction and well drilling operations, to reduce water supply impacts.*

Residual Impacts

No residual impacts would occur.

4.8.5 Other Issue Area Mitigation Measure Impacts

Mitigation measures proposed for other issues areas could increase impacts to hydrology and water resources if they are implemented. This section discusses those potential mitigation measure impacts.

None of the mitigation measures proposed for other issue areas would change the impacts discussed in this section. Therefore, the mitigation measures would not result in additional significant impacts, and additional analysis or mitigation is not required.

4.8.6 Cumulative Impacts and Mitigation Measures

The region of influence for surface water quality-related impacts would be limited to those cumulative projects located within the same watershed. Since the Project Site is located within the Preserve, the Matrix development would be the sole project in the watershed. In general, with the implementation of mitigation measures WR-1 through WR-4, the impacts due to the Project can be mitigated to less than significant levels, however, because of the severity of impacts associated with the increased potential for an accidental oil spill or blow out, no matter how low, the Project would be a potentially significant adverse contribution to cumulative water quality impacts. Note that the Matrix La Habra Heights Project; a proposed oil development project located to the south of the Preserve in La Habra Heights, is also not located within the same watershed.

4.8.7 Mitigation Monitoring Plan

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
WR-1a A registered civil engineer experienced in drainage shall prepare a hydrologic study, using the corresponding hydraulic calculations for interception, conveyance, and discharge of runoff. Based on these studies, the engineer shall prepare a drainage plan in accordance with City and County requirements.	Prepare a hydrology study drainage plans.	The City of Whittier shall review and approve studies.	Prior to issuance of permit	City of Whittier
WR-1b A registered civil engineer experienced in drainage shall design and implement onsite detention facilities to reduce runoff to existing levels. Onsite detention ponds would attenuate the runoff intensity, such that an excessive peak flow would not occur during high intensity storms and there would be no increase in runoff intensity over existing conditions. The project engineer shall conduct an onsite hydrologic study to determine the approximate increase in storm runoff to accurately scale any onsite detention facilities. Detention System Design Onsite detention facilities have the potential to create habitats for mosquito breeding. Any onsite detention facilities shall be designed as a 'dry system' in accordance with the California Department of Public Health. A dry system requires that the facility be designed to discharge all captured water within 4 days. The design slope shall be adequate and properly compacted to prevent standing water and a low flow channel shall be incorporated to direct low flows to the system outlet. The basin shall also provide	Design and implement onsite detention facilities to reduce runoff.	The City of Whittier shall review and approve studies.	Prior to issuance of permit	City of Whittier

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
access for maintenance and inspection. All catch basins and drainage facilities, including grass swales and bio-retention facilities shall also be designed to prevent standing water. An operation and maintenance plan shall be incorporated to remove vegetation, sediment, and debris accumulation biannually with an inspection at the beginning of the wet season. Waste from maintenance shall be disposed of according to local and state regulations. Onsite detention facilities shall be inspected quarterly for burrowing vector damage. Vector control measures shall be incorporated and maintained to prevent damage to the detention facility. Onsite detention facilities shall be surrounded by 6-foot fencing and provided access with a gate and access road per Los Angeles County standards. Discharge systems from onsite detention facilities shall be capable of discharging water from the basin while preventing a discharge of oil from the surface of the basin using a weir or subsurface discharge type design to prevent oil discharges from the basin in the event the basin reaches capacity and there is a crude oil spill.				

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
WR-1c Impervious surfaces shall be minimized to prevent pollutant runoff. Gravel roads and parking areas would allow infiltration of stormwater and limit downstream runoff.	Implement Project specific Storm Water Pollution Prevention Plans, which shall include, but not be limited to, a description of best management practices, best management practice design, spill prevention measures, containment equipment, and monitoring. An independent consultant shall monitor stormwater and submit yearly reports as required by the Regional Water Quality Control Board.	The Regional Water Quality Control Board shall review and approve the Storm Water Pollution Prevention Plans, which shall be submitted as part of the application to the City of Whittier for permits.	Prior to issuance of permit	Regional Water Quality Control Board and City of Whittier
WR-1d Structural Best Management Practices shall be used to mitigate the increased pollutant runoff. Directing runoff from impervious area to grass swales, bio-swales, or detention ponds would aid in filtering out suspended solids and potential contaminants. Grassbio swales shall not be planted with invasive species.	Implement Project specific Storm Water Pollution Prevention Plans, which shall include, but not be limited to, a description of best management practices, best management practice design, spill prevention measures, containment equipment, and monitoring. An independent consultant shall monitor stormwater and submit yearly reports as required by the Regional Water Quality Control Board.	The Regional Water Quality Control Board shall review and approve the Storm Water Pollution Prevention Plans, which shall be submitted as part of the application to the City of Whittier for permits.	Prior to issuance of permit	Regional Water Quality Control Board and City of Whittier

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
WR-1e Pollution control products, such as catch basins with basket inserts, shall be used to catch trash and debris along with filtering elements such as silt fences, straw wattles and absorbent sponges within catch basins. Filter technology may be used to catch sediment, debris, oil, and pollutants.	Implement Project specific Storm Water Pollution Prevention Plans, which shall include, but not be limited to, a description of best management practices, best management practice design, spill prevention measures, containment equipment, and monitoring. An independent consultant shall monitor stormwater and submit yearly reports as required by the Regional Water Quality Control Board.	The Regional Water Quality Control Board shall review and approve the Storm Water Pollution Prevention Plans, which shall be submitted as part of the application to the City of Whittier for permits.	Prior to issuance of permit	Regional Water Quality Control Board and City of Whittier
WR-1f Permanent water quality testing, drainage device, and erosion control maintenance shall be implemented.	Implement Project specific Storm Water Pollution Prevention Plans, which shall include, but not be limited to, a description of best management practices, best management practice design, spill prevention measures, containment equipment, and monitoring. An independent consultant shall monitor stormwater and submit yearly reports as required by the Regional Water Quality Control Board.	The Regional Water Quality Control Board shall review and approve the Storm Water Pollution Prevention Plans, which shall be submitted as part of the application to the City of Whittier for permits.	Prior to issuance of permit	Regional Water Quality Control Board and City of Whittier

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
WR-1g A Storm Water Pollution Prevention Plan manager shall oversee and monitor construction Best Management Practices and stormwater management programs, in accordance with the State General Construction Permit and the Los Angeles Regional Water Quality Control Board.	Implement Project specific Storm Water Pollution Prevention Plans, which shall include, but not be limited to, a description of best management practices, best management practice design, spill prevention measures, containment equipment, and monitoring. An independent consultant shall monitor stormwater and submit yearly reports as required by the Regional Water Quality Control Board..	The Regional Water Quality Control Board shall review and approve the Storm Water Pollution Prevention Plans, which shall be submitted as part of the application to the City of Whittier for permits.	Prior to issuance of permit	Regional Water Quality Control Board and City of Whittier
WR-2a During construction operations, the Applicant shall implement stormwater management protection measures and wet weather measures. These measures would include temporary and permanent Best Management Practices to reduce the potential for erosion and sediment transport. Conventional measures typically recommended by the State Water Resource Board and the California Department of Transportation include the following: Implement permanent erosion and sediment control measures: - Limit grading, clearing, and grubbing to preserve existing vegetation; - Use mulches and hydroseed to protect exposed soils; - Use geotextiles and mats to stabilize soils; - Use drainage swales and dissipation devices; and - Use erosion control measures	Implement Project specific Storm Water Pollution Prevention Plans, which shall include, but not be limited to, a description of best management practices, best management practice design, spill prevention measures, containment equipment, and monitoring. An independent consultant shall monitor stormwater and submit yearly reports as required by the Regional Water Quality Control Board.	The Regional Water Quality Control Board shall review and approve the Storm Water Pollution Prevention Plans, which shall be submitted as part of the application to the City of Whittier for permits.	Prior to issuance of permit	Regional Water Quality Control Board and City of Whittier

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
outlined in the California Stormwater Quality Association Best Management Practice Handbook. Implement temporary Best Management Practice mitigation measures: - Use silt fences, sandbags, and straw wattles; - Use temporary sediment basins and check dams; and - Use temporary Best Management Practices outlined in the California Stormwater Quality Association Best Management Practice Handbook. Implement tracking control Best Management Practices to reduce tracking sediment offsite. - Use stabilized construction entrance and exit with steel shakers; - Use tire wash areas; and - Use tracking control Best Management Practices outlined in the California Stormwater Quality Association Best Management Practice Handbook.				
WR-2b The Applicant shall implement a Storm Water Pollution Prevention Plan using Best Management Practices and monitor and maintain stormwater pollution control facilities identified in the Storm Water Pollution Prevention Plan, in a manner consistent with the provisions of the Federal Water Pollution Control Act (National Pollutant Discharge Elimination System Program).	Implement Project specific Storm Water Pollution Prevention Plans, which shall include, but not be limited to, a description of best management practices, best management practice design, spill prevention measures, containment equipment, and monitoring. An independent consultant shall monitor stormwater and submit yearly reports as required by the Regional Water Quality Control	The Regional Water Quality Control Board shall review and approve the Storm Water Pollution Prevention Plans, which shall be submitted as part of the application to the City of Whittier for permits.	Prior to issuance of permit	Regional Water Quality Control Board and City of Whittier

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
	Board..			
WR-3a The proposed well cellar shall be lined with an impermeable membrane to prevent groundwater from flowing into the cellar and to prevent oil-based substances from seeping into groundwater supplies. All drilling muds storage shall be contained within Baker-type enclosed tanks.	Implement Project specific Storm Water Pollution Prevention Plans, which shall include, but not be limited to, a description of best management practices, best management practice design, spill prevention measures, containment equipment, and monitoring. An independent consultant shall monitor stormwater and submit yearly reports as required by the Regional Water Quality Control Board.	The Regional Water Quality Control Board shall review and approve the Storm Water Pollution Prevention Plans, which shall be submitted as part of the application to the City of Whittier for permits.	Prior to issuance of permit	Regional Water Quality Control Board and City of Whittier

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
WR-3b An 18-inch berm shall be placed around the entire drilling rig to capture any spilled fluids.	Implement Project specific Storm Water Pollution Prevention Plans, which shall include, but not be limited to, a description of best management practices, best management practice design, spill prevention measures, containment equipment, and monitoring. An independent consultant shall monitor stormwater and submit yearly reports as required by the Regional Water Quality Control Board.	The Regional Water Quality Control Board shall review and approve the Storm Water Pollution Prevention Plans, which shall be submitted as part of the application to the City of Whittier for permits.	Prior to issuance of permit	Regional Water Quality Control Board and City of Whittier
WR-3c Personnel at the site shall be trained in equipment use and containment and cleanup of an oil spill. Dry cleanup methods, such as absorbents, shall be used on paved and impermeable surfaces. Spills in dirt areas shall be immediately contained with an earthen dike and the contaminated soil shall be dug up and discarded in accordance with local and state regulations.	Implement Project specific Storm Water Pollution Prevention Plans, which shall include, but not be limited to, a description of best management practices, best management practice design, spill prevention measures, containment equipment, and monitoring. An independent consultant shall monitor stormwater and submit yearly reports as required by the Regional Water Quality Control Board.	The Regional Water Quality Control Board shall review and approve the Storm Water Pollution Prevention Plans, which shall be submitted as part of the application to the City of Whittier for permits.	Prior to issuance of permit	Regional Water Quality Control Board and City of Whittier

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
WR-3d Oil spills shall be contained and cleaned according to measures outlined in the California Stormwater Quality Association Best Management Practice Handbook.	Implement Project specific Storm Water Pollution Prevention Plans, which shall include, but not be limited to, a description of best management practices, best management practice design, spill prevention measures, containment equipment, and monitoring. An independent consultant shall monitor stormwater and submit yearly reports as required by the Regional Water Quality Control Board.	The Regional Water Quality Control Board shall review and approve the Storm Water Pollution Prevention Plans, which shall be submitted as part of the application to the City of Whittier for permits.	Prior to issuance of permit	Regional Water Quality Control Board and City of Whittier
WR-3e An approved response manual and Oil Spill Contingency Plan shall be implemented to outline response actions in the event of a spill, including a spill response trailer, equipment, and personnel training.	Implement a response manual and Oil Spill Contingency Plan.	Onsite verification and site review	Prior to issuance of permit	City of Whittier
WR-4a The City of Whittier and other appropriate agencies shall inspect facility conditions at the Project Site on a yearly basis. Inspections shall also occur after earthquake induced land movement or upon periods of large rainfall in order to verify no leak or rupture risks have developed.	Implement Project specific Storm Water Pollution Prevention Plans, which shall include, but not be limited to, a description of best management practices, best management practice design, spill prevention measures, containment equipment, and monitoring. An independent consultant shall monitor stormwater and submit yearly reports as	The Regional Water Quality Control Board shall review and approve the Storm Water Pollution Prevention Plans, which shall be submitted as part of the application to the City of Whittier for permits.	Prior to issuance of permit	Regional Water Quality Control Board and City of Whittier

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
	required by the Regional Water Quality Control Board.			
WR-4b The Applicant shall properly maintain the associated crude oil pipelines, storage tanks and processing facilities within and outside the Preserve, including smart-pigging according to State of California Office of the State Fire Marshal requirements and the standards outlined by the Department of Oil, Gas and Geothermal Resources, and the Regional Water Quality Control Board. Pipeline, tank and processing inspections,including walking the pipelines shall occur at least daily.	Implement Project specific Storm Water Pollution Prevention Plans, which shall include, but not be limited to, a description of best management practices, best management practice design, spill prevention measures, containment equipment, and monitoring. An independent consultant shall monitor stormwater and submit yearly reports as required by the Regional Water Quality Control Board.	The Regional Water Quality Control Board shall review and approve the Storm Water Pollution Prevention Plans, which shall be submitted as part of the application to the City of Whittier for permits.	Prior to issuance of permit	Regional Water Quality Control Board and City of Whittier
WR-4c The Applicant shall install a leak detection system for crude pipelines in the Preserve and the Colima Road pipeline. The system shall include pressure and flow meters, flow balancing, supervisor control and data acquisition system, and a computer alarm system in the event of a suspected leak. Temperature, pressure, and flow shall be monitored at each pipeline entry and exit. If any variable deviates by more than 10 percent of the normal operating range, the system shall trigger both audible and visual	Implement Project specific Storm Water Pollution Prevention Plans, which shall include, but not be limited to, a description of best management practices, best management practice design, spill prevention measures, containment equipment, and monitoring. An independent consultant shall monitor stormwater and submit yearly reports as	The Regional Water Quality Control Board shall review and approve the Storm Water Pollution Prevention Plans, which shall be submitted as part of the application to the City of Whittier for permits.	Prior to issuance of permit	Regional Water Quality Control Board and City of Whittier

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
alarms. Flow balancing shall be conducted every 5 minutes, 1 hour, 24 hours, and 48 hours with the accuracy defined once the system is established and tested.	required by the Regional Water Quality Control Board.			
Note: There are no impacts associated with groundwater supply and no mitigation is required; however, the following two mitigation measures are recommended. WR-6a Where feasible, the City of Whittier shall supply reclaimed water during construction and well drilling operations, to reduce water supply impacts.	Provide details for supplying reclaimed water.	Construction design plans	Prior to constructi on	City of Whittier
WR-6b Where feasible, the Applicant shall implement water conservation measures during construction and well drilling operations, to reduce water supply impacts.	Provide details for water conservation measures.	Inspection of construction design plans	Prior to constructi on	City of Whittier