4.9 Surface/Groundwater Quality

This section describes environmental and regulatory settings related to surface and groundwater quality in the proposed Project area; identifies surface and groundwater quality impacts of the proposed Project and cumulative impacts from this and other projects in the region; and recommends mitigation measures to reduce those impacts. This section draws from the Applicant’s Groundwater Source Supply Study prepared by Fugro Consultants, Inc. (March 2012), Preliminary Hydrology Report, East Cat Canyon Redevelopment Project, prepared by TJCross Engineers (Revised September 2014), Stormwater Pollution and Prevention Plan prepared by TJ Cross (September 2014), Jurisdictional Determination Report, East Cat Canyon Redevelopment Project, prepared by Padre Associates (July 2016), and the Soil Beneficial Re-Use Plan for East Cat Canyon Redevelopment Project, prepared by Padre Associates (August 2014) as peer-reviewed by Aspen Environmental Group for this EIR. These technical studies are provided in full in Appendix L of this EIR. Section 4.9.4 and Appendix C of this EIR includes the Applicant Avoidance and Minimization Measures. Alternatives to the proposed Project are discussed in Section 5.0.

4.9.1 Environmental Setting

4.9.1.1 Topography and Climate

Topography in the proposed Project area is dominated by north-south trending ridges with elevations ranging from approximately 480 to 1,100 feet above mean sea level (MSL). Terrain consists primarily of low, rolling hills and sloping table land intersected by stream channels in canyons roughly 100 to 600 feet below the adjacent hill summits. Cat Canyon Creek is the principal stream of the area, which is intermittent and flows to the north toward the community of Sisquoc. Other drainages along Long Canyon and Olivera Canyon flow north to the Sisquoc River valley. Mild winters and cool summers, with seasonal rainfall occurring mainly in winter, characterize the climate. At nearby Santa Maria, summer maximum temperatures range from 70 to 87 degrees Fahrenheit, with winter minimums averaging around 40 degrees. Precipitation in the area as measured at the Sisquoc Fire Station No. 23 (elevation of +420 feet MSL) averages about 15 inches per year. Almost 95 percent of the rainfall occurs between the months of November through April. Soils in the area are relatively thin, heavily developed with clay residuals, and of poor permeability. As such, the area is not considered a groundwater recharge area. Very limited agricultural development occurs in Cat Canyon with the valley floors locally being used for the dry farming of hay and grain (Fugro, 2012a).

The Aera East Cat Canyon Oil Field and gas pipeline are located in the uplands of the Santa Maria Groundwater Basin along the south boundary of the watershed that form the recharge areas of the main groundwater basin to the north. The project area drains northward to the alluvial valley along the Sisquoc River and the broad Santa Maria plain.

4.9.1.2 Watersheds and Surface Waters

The proposed Project area is within the Santa Maria River and San Antonio Creek watersheds of the Central California Coastal Hydrologic Area. Both watersheds drain to the Pacific Ocean roughly 25 miles downstream by way of the Santa Maria River, and 15 miles downstream by way of San Antonio Creek. The proposed Project, including the 115kV power line, and nearly all the proposed natural gas pipeline, are located within the Santa Maria River Watershed. The proposed Project site drains generally northward to the Sisquoc River and ultimately the Santa Maria River. A small portion of the proposed natural gas pipeline (roughly 1,800 feet at the southwestern terminus) is within the San Antonio Creek Watershed, draining southward to San Antonio Creek. The watercourses within the proposed Project boundary are all
ephemeral, activated with water flow by rainfall, and dry during most of the year. The drainage ways are generally in a natural condition, lined with vegetation, except at road crossings, which may have an asphaltic emulsion. Road crossings use culverts to pass flows beneath the roadway surfaces.

Primary drainageways within the proposed Project include Long Canyon, Olivera Canyon, and three unnamed drainageways, all running generally south to north (Figure 4.9-1). Cat Canyon Creek enters the property at two short intervals along the southern proposed Project boundary. Roughly half of the proposed Project site, including two unnamed tributaries, drains into Cat Canyon Creek, which drains to the Sisquoc River, which joins the Santa Maria River approximately two miles downstream of the Project area. The rest of the site, including Long Canyon and Olivera Canyon, drains directly to the Sisquoc River. The proposed natural gas pipeline crosses Cat Canyon Creek, three tributaries of Cat Canyon Creek, three tributaries of Bradley Canyon Creek, Quail Canyon Creek, Orcutt Creek, Graciosa Canyon Creek, and two tributaries to Graciosa Canyon Creek. Except for Cat Canyon Creek, the drainageways crossed by the pipeline drain to the Santa Maria River. Although past oil developments have cleared parts of the land for well pads, access roads, and ancillary facilities, most of the watershed area is in a natural condition.

The Applicant’s consultant, TJ Cross, prepared a drainage report (Appendix L, TJCross, 2017) that determined 100-year, 50-year, 25-year and 10-year peak discharges for 25 drainage concentration points within the proposed Project site. Watershed areas for these drainage concentration points ranged from 247 acres to 6,998 acres, with 100-year discharges ranging from 255 cubic feet per second (cfs) to 3,242 cfs based on existing conditions. The largest watershed area studied was Cat Canyon. The onsite drainageways included Olivera Canyon, Long Canyon, and three unnamed blueline streams. Figure 4.9-1 shows the location of the onsite and Cat Canyon watersheds evaluated in the drainage study. Table 4.9-1 gives the maximum peak discharges for the watersheds shown in Figure 4.9-1.

<table>
<thead>
<tr>
<th>Watercourse</th>
<th>100-Year Peak</th>
<th>50-Year Peak</th>
<th>25-Year Peak</th>
<th>10-Year Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unnamed Blue Line #1 and #2</td>
<td>706.7</td>
<td>576.4</td>
<td>442.2</td>
<td>309.0</td>
</tr>
<tr>
<td>Unnamed Blue Line #3</td>
<td>255.0</td>
<td>208.9</td>
<td>160.0</td>
<td>111.9</td>
</tr>
<tr>
<td>Long Canyon</td>
<td>741.5</td>
<td>605.3</td>
<td>463.7</td>
<td>320.1</td>
</tr>
<tr>
<td>Olivera Canyon</td>
<td>1,236.3</td>
<td>1,005.3</td>
<td>763.7</td>
<td>518.2</td>
</tr>
<tr>
<td>Cat Canyon</td>
<td>3,242.3</td>
<td>2,598.1</td>
<td>1,970.3</td>
<td>1,308.2</td>
</tr>
</tbody>
</table>

Source: TJ Cross, 2014.
See Figure 4.9-1 for watershed locations. All discharges are at the downstream point of the watersheds shown in Figure 4.9-1. Intermediate discharges at other concentration points are listed in Appendix L.

**Floodplains.** Figure 4.9-1 shows 100-year flood areas (depicted as flood hazard areas on the figure) mapped by the Federal Emergency Management Agency (FEMA) (FEMA, 2015). Cat Canyon Creek has been mapped as an approximate zone (Zone A), with floodplain width about the same as the width of the valley (600 to 900 feet). None of the other drainage ways have been mapped by FEMA, although each would have a floodplain of undetermined width. The natural watercourses within the proposed Project area all have the potential to produce a flood hazard.

**Water Quality.** The proposed Project area is within the jurisdiction of the Central Coast Regional Water Quality Control Board (RWQCB). The RWQCB assesses surface water quality and prepares a list of waters (the 303(d) list of water quality limited segments) considered to be impaired. Impairment may result from both point-source and non-point source pollutants.
None of the watercourses within the proposed Project site are listed by the RWQCB as impaired under Section 303(d) of the Clean Water Act (SWRCB, 2015a), described further in Section 4.9.2. The proposed pipeline crosses Bradley Canyon Creek and tributaries, which are impaired for ammonia, fecal coliform, low dissolved oxygen, nitrate, turbidity, pH, and unknown toxicity. San Antonio Creek downstream of the terminus of the pipeline is impaired for ammonia, boron, chloride, chlorpyrifos, E. coli, fecal coliform, low dissolved oxygen, nitrogen, nitrate, and sodium. Orcutt Creek about 4.5 miles downstream of the pipeline crossing is impaired for ammonia, boron, chloride, chlorpyrifos, DDT, diazinon, dieldrin, electrical conductivity, fecal coliform, nitrate, sediment toxicity, sodium, water temperature, turbidity, and unknown toxicity (SWRCB, 2015a). The Santa Maria River at a point about 2 miles downstream of the oil development portion of the proposed Project is impaired for chloride, chlorpyrifos, DDT, Dieldrin, Endrin, E. coli, fecal coliform, nitrate, sediment toxicity, sodium, toxaphene, turbidity, and unknown toxicity (SWRCB, 2015a). There are no known oil seeps on the proposed Project oil field site (DOGGR, 1987).

The RWQCB has developed a basin plan designating water quality standards and beneficial uses of surface waters (RWQCB, 2011). Relevant beneficial uses are mainly those associated with direct human use of the water, recreation, and habitat for fish and wildlife. There are no designated beneficial uses for Cat Canyon and the other minor drainage ways on the proposed Project site. However, the site and pipeline drainageways are tributary to the Sisquoc River, Santa Maria River, Orcutt Creek, and San Antonio Creek, for which the beneficial uses listed in Table 4.9-2 have been identified.

### Table 4.9-2. Beneficial Uses of Waterbodies Downstream of the Proposed Project Area

<table>
<thead>
<tr>
<th>Beneficial Use*</th>
<th>Santa Maria River</th>
<th>Sisquoc River</th>
<th>San Antonio Creek</th>
<th>Orcutt Creek</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUN</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>AGR</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>IND</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GWR</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>REC1</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>REC2</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>WILD</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>COLD</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>WARM</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>MIGR</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>SPWN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RARE</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>EST</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRESH</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>COMM</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

*Municipal and Domestic Supply (MUN); Agricultural Supply (AGR); Industrial Service Supply (IND); Ground Water Recharge (GWR); Water Contact Recreation (REC1); Non-contact Water Recreation (REC2); Wildlife Habitat (WILD); Cold Freshwater Habitat (COLD); Preservation of Rare and Endangered Species (RARE), Estuarine Habitat (EST); Warm Freshwater Habitat (WARM); Migration of Aquatic Organisms (MIGR); Freshwater Replenishment (FRSH); Spawning, Reproduction, and/or Early Development (SPWN); Commercial and Sport Fishing (COMM).

Various areas throughout the proposed Project site, referred to as legacy fill areas, are known to contain pre-existing petroleum hydrocarbon-containing soils. These areas are remnants from historical oil and gas operations within East Cat Canyon (see Figure 2-17).
4.9.1.3 Groundwater

The proposed Project overlays the Santa Maria Groundwater Basin (see Figure 4.9-2). The Santa Maria Groundwater Basin deposits are composed of the Careaga Sand and Paso Robles formation at depth, in turn overlain by the Orcutt formation, Quaternary alluvium, and river channel, dune sand, and terrace deposits at the surface (Worts, 1951). Fresh groundwater occurs in the Careaga sandstone and the Paso Robles Formation.

- The Careaga Sand measures about 200 feet thick in the Aera East Cat Canyon Oil Field (Dibblee, 1994) and is identified as being the lowermost fresh water-bearing formation in the basin, approximately 700 feet deep (DWR, 2003a). The Careaga Sand is mainly composed of white to yellowish-brown, loosely-consolidated, massive, fossiliferous, medium- to fine-grained sand with some silt and is predominantly of marine origin (Worts, 1951). The Careaga sandstone is subdivided into the lower fine grained Cebada member and the upper Graciosa member comprised of coarse grained sandstone and thin gravel beds. The lower Cebada member of the Careaga formation is generally not a groundwater source due to the fine-grained character. The upper member does support low yield groundwater well production of non-potable water (Fugro, 2012a).

- The Paso Robles Formation overlies the Careaga Sand and comprises the greatest thickness of the alluvial deposits in the Basin (about 2,000 feet near Orcutt), but is only 150 feet thick in hillside areas near the Aera East Cat Canyon Oil Field. The Paso Robles Formation is highly variable in color and texture, generally composed of yellow, blue, brown, grey, or white lenticular beds of: boulders and coarse to fine gravel and clay; medium to fine sand and clay; gravel and sand; silt; and clay (Worts, 1951). The Paso Robles formation is primarily fluvial deposits. The overlying Paso Robles Formation is generally thick (>500 feet) in the East Cat Canyon area although typically only the lower portion is saturated and capable of supporting groundwater supply wells (Fugro, 2012a). Consequently, the geologic units above the Paso Robles Formation (terrace deposits) are also unsaturated.

- The Orcutt formation and older alluvium overlay the Paso Robles Formation and are relatively thin (less than 100 feet) deposits capping the ridge at the north end of the proposed Project area, and are non-water-bearing (Dibblee, 1994).

Below the Careaga Sand is the deeper, non-water-bearing consolidated rock formations include the Tertiary-aged Foxen Mudstone, Sisquoc Formation and Monterey Shale, and the Jurassic/Cretaceous-aged Franciscan Complex (Worts, 1951). These intervening low-permeability soils provide a barrier between the deeper oil producing zones and groundwater zone. The underlying older bedrock of the Sisquoc (2,300 to 2,900 feet deep) and Monterey/Brooks Sands (approximately 3,000 feet deep) Formations are known as oil reservoirs and do not contain fresh (potable) groundwater (Fugro, 2012a). The non-potable water from these formations contains salts, sediment, hydrocarbons, naturally occurring radioactive material (NORM), and total dissolved solids (TDS) > 1,000mg/L.

Testing of the existing water supply well (McCrosky-WS12) in Long Canyon revealed a static water level of 250 feet below ground level, sustained pumping capacity of about 125 gpm, and a specific capacity of less than 1 gpm/ft (Fugro, 2012b). The well is reportedly 700 feet deep and taps aquifers within the Paso Robles Formation (Fugro, 2012b). Fugro (2012b) concludes that McCrosky-WS12 well is in poor condition and that reliable groundwater supplies might require replacement wells drilled to depths of 750 feet in the northern part of the Aera East Cat Canyon Oil Field that could produce up to 250 gpm each. The water quality is hard with total dissolved solids concentration of 900 mg/L and high iron concentrations (1.3 mg/L).
Figure 4.9-2

Groundwater Basins

- ERG West Cat Canyon Project
- Aera East Cat Canyon Project
- PetroRock UCCB Project
- Stream; Braided Stream
- Stream Intermittent
- Santa Maria Groundwater Basin
- Other Nearby Groundwater Basins

Scale in Miles

0 2.5 5

Santa Maria River
Cuyama River
Santa Ynez River
Seaview River
The Santa Maria Groundwater Basin has been experiencing declines in water levels, and is closely monitored for both water level and water quality. Since 2005, as a requirement of the Santa Maria Valley Groundwater Basin litigation, the Santa Maria Groundwater Basin was adjudicated and an extensive water level monitoring program has been implemented by the Santa Maria Valley Management Area (SMVMA, 2015). Deep and shallow aquifer monitoring wells are located near Sisquoc and the overall basin conditions during 2014 reflect continued decline in water level of about 20 feet from 2010 to 2014 in the deep aquifer near Sisquoc. In 2014, groundwater was approximately 150 feet below ground level in the deep aquifer at Sisquoc and generally only a few feet deep in the shallow aquifer along Sisquoc River, but as deep as 220 feet at Cat Canyon Road and Palmer Road (SMVMA, 2015). The most recent Groundwater Basins Status Report (October 14, 2014) published by the County Water Agency notes that the Santa Maria Groundwater Basin “is managed and not believed to be in a state of overdraft” (SBC Water Agency, 2014).

**Cat Canyon Groundwater Depth:** As described above, the State Designated West Cat Canyon Oil Field is underlain by the Santa Maria Groundwater Basin. Groundwater levels are monitored in accordance with the Santa Maria Valley Management Area (SMVMA) which implemented a stipulation in 2008 that groundwater conditions must be monitored on an annual basis. Groundwater depths within Cat Canyon range from 66.5 to 559.7 feet below ground surface (bgs) with an average depth of 234 feet (SCS Tracer, 2017).

**Water Use and Supply.** Local water supplies derive mainly from groundwater and imported water from the State Water Project (City of Santa Maria, 2015, Los Alamos Community Services District, 2011, Golden State Water Company, 2015a). The City of Santa Maria uses some imported State Water, but the closer communities of Sisquoc and Los Alamos rely entirely on groundwater. Approximate water use for the region, as indicated by combined reported use of the City of Santa Maria and the communities of Sisquoc, Lake Marie, Nipomo, Orcutt and Los Alamos, is approximately 24,000 acre-feet per year (Golden State Water Company, 2015b, City of Santa Maria, 2011, Los Alamos Community Services District, 2011).

Water supplies within the State of California, including the proposed Project area, have been severely constrained in recent years due to an ongoing drought. In September 2015, the proposed Project area was classified as exceptional drought status (NDMC, 2015). In April 2017, all of Santa Barbara County was classified as moderate drought status (NDMC, 2017). The severity and duration of the drought resulted in the Governor of California ordering mandatory water restrictions statewide (GSC, 2015).

### 4.9.2 Regulatory Setting

Surface and groundwater resources are managed and regulated by federal, state and local regulations covering water quality, flooding, streambed alteration, and water management. Several regulations governing oil and gas activities also cover surface and groundwater.

#### 4.9.2.1 Federal Regulations

**Clean Water Act (CWA) (33 USC Section 1251 et seq.).** Formerly the Federal Water Pollution Control Act of 1972, the CWA was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the United States. The CWA requires states to set standards to protect, maintain, and restore water quality through the regulation of point source and certain non-point source discharges to surface water. Discharges are regulated by the National Pollutant Discharge Elimination System (NPDES) permit process (CWA Section 402). NPDES permitting authority is delegated to, and administered by, the California State Water Resources Control Board (SWRCB) and its nine regional water quality control boards (RWQCBs). The proposed Project area is under the jurisdiction of the Central Coast RWQCB.
Discharges from point sources are covered under the Industrial General Permit administered by the RWQCB. Discharges from construction activity are covered under the California General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit). Both are described further below under State Regulations.

Section 401 of the CWA requires that any activity that may result in a discharge into waters of the U.S. be certified by the RWQCB. This certification ensures that the proposed activity not violate State and/or federal water quality standards.

Section 404 of the CWA authorizes the U.S. Army Corps of Engineers to regulate the discharge of dredged or fill material to the waters of the U.S. and adjacent wetlands. Discharges to waters of the U.S. must be avoided where possible, and minimized and mitigated where avoidance is not possible. Permits are issued by the Corps of Engineers.

Section 303(d) of the Clean Water Act requires states to assess surface water quality and prepare a list of waters (the 303(d) list of water quality limited segments) considered to be impaired by not meeting water quality standards and not supporting their beneficial uses. Impairment may result from point-source pollutants or non-point source pollutants. The SWRCB, through its nine regional boards, assesses water quality and establishes Total Maximum Daily Load (TMDL) programs for streams, lakes and coastal waters that do not meet water quality standards.

**National Flood Insurance Act/Flood Disaster Protection Act.** The National Flood Insurance Act of 1968 made flood insurance available for the first time. The Flood Disaster Protection Act of 1973 made the purchase of flood insurance mandatory for the protection of property located in Special Flood Hazard Areas. These laws led to mapping of regulatory floodplains (special flood hazard areas) by the Federal Emergency Management Agency (FEMA), and to local management of floodplain areas according to federal guidelines which include prohibiting or restricting development in flood hazard zones. Local management of flood areas is described further under Local Regulations below. Special flood hazard areas are designated floodplains mapped by using hydrologic and hydraulic analysis or approximate methods. These maps show the 100-year floodplain and other flood hazard areas.

**Safe Drinking Water Act (SDWA).** The SDWA protects drinking water and its sources (rivers, lakes, reservoirs, springs, and groundwater). Under the SDWA, the EPA sets national health-based standards for drinking water and works with states and water suppliers to implement those standards. Private wells that supply fewer than 25 people are not regulated by the SDWA (EPA, 2015a). The EPA regulates waste disposal of flowback fluids and sometimes the injection of fracturing fluids when associated with injection of diesel fuels as authorized by the SDWA and CWA. Protection of underground sources of drinking water is focused in the Underground Injection Control (UIC) program, which regulates the subsurface injection of fluid. Exclusions to UIC authority (SDWA Section 1421(d)) include:

- The underground injection of natural gas for purposes of storage, and
- The underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities (EPA, 2015b).

Consequently, hydraulic fracturing is excluded from the SDWA unless diesel fuel is injected, in which case, an authorization through the applicable UIC program is needed. States have the option of requesting regulatory primacy for Class II wells under the SDWA (EPA, 2015a). Class II injection wells are oil and gas wells that inject fluids for enhanced recovery or wastewater disposal. In California, the State regulates the UIC program as discussed in more detail in EIR Section 4.9.2.2.
Federal 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.

4.9.2.2 California State Regulations

California Streambed Alteration Agreement. Sections 1600–1616 of the California Fish and Game Code require that any entity that proposes an activity that will substantially divert or obstruct the natural flow of any river, stream or lake, substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake, or deposit material where it may pass into any river, stream, or lake, must notify the California Department of Fish and Wildlife (CDFW). If the CDFW determines the alteration may adversely affect fish and wildlife resources, a Lake or Streambed Alteration Agreement (LSAA) will be prepared. The LSAA includes conditions necessary to protect those resources. The Agreement applies to any stream including ephemeral streams and desert washes.

California Porter Cologne Water Quality Control Act. The Porter Cologne Water Quality Control Act of 1967, Water Code Section 13000 et seq., requires the SWRCB to adopt water quality criteria to protect State waters. Each RWQCB has developed a Water Quality Control Plan (Basin Plan) specifying water quality objectives, beneficial uses, numerical standards of pollution concentrations, and implementation procedures for Waters of the State. Waters of the State is defined by the Porter Cologne Water Quality Control Act as “any surface water or groundwater, including saline waters, within the boundaries of the State.” General objectives of the Basin Plans state that all waters (of the State) shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in, human, plant, animal, or aquatic life. The Basin Plans are intended to protect designated beneficial uses of waters, avoid altering the sediment discharge rate of surface waters, and avoid introducing toxic pollutants to the water resource. The Porter Cologne Water Quality Control Act requires anyone proposing to discharge waste that could affect the quality of the waters of the State to report the waste discharge to the appropriate RWQCB.

Clean Water Act. SWRCB Storm Water Program Construction General Permit (General Construction Storm Water Permit). The Construction General Permit, required by the federal CWA, regulates storm water runoff from construction sites of one acre or more in size. The Construction General Permit is a statewide, standing permit. Qualifying construction activities, which would include oil well projects where total disturbance is one acre or greater, must obtain coverage under the permit by filing a Notice of Intent with the Regional Water Quality Control Board, and development of and compliance with a Storm Water Pollution Prevention Plan (SWPPP) describing Best Management Practices (BMPs) the discharger will use to protect storm water runoff. The SWPPP must contain a visual monitoring program, a chemical monitoring program for “non-visible” pollutants to be implemented if there is a failure of BMPs, and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list (described below) for sediment.
The General Permit prohibits the discharge of pollutants other than storm water and non-storm water discharges authorized by the General Permit or another NPDES permit, and prohibits all discharges which contain a hazardous substance in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4 (pursuant to Section 311 of the Clean Water Act), unless a separate NPDES Permit has been issued to regulate those discharges. In addition, the General Permit incorporates discharge prohibitions contained in water quality control plans, as implemented by the nine Regional Water Boards. Discharges to Areas of Special Biological Significance are prohibited unless covered by an exception that the State Water Board has approved. Authorized non-storm water discharges must be infeasible to eliminate; comply with BMPs as described in the SWPPP; filter or treat, using appropriate technology, all dewatering discharges from sedimentation basins; meet the established numeric action levels for pH and turbidity; and, not cause or contribute to a violation of water quality standards. Discharges to storm water that cause or threaten to cause pollution, contamination, or nuisance are prohibited. Pollutant controls must utilize best available technology economically achievable (BAT) for toxic pollutants and non-conventional pollutants and best conventional pollutant control technology (BCT) for conventional pollutants.

BAT and BCT are defined in the Clean Water Act. Specific BAT and BCT pollution controls and BMPs may include runoff control, soil stabilization, sediment control, proper stream crossing techniques, waste management, spill prevention and control, and a wide variety of other measures depending on the site and situation.

**SWRCB Industrial Storm Water General Permit.** The Industrial Storm Water General Permit regulates discharges to surface waters associated industrial activities including those associated with the oil and gas industry. The General Industrial Permit requires the implementation of management measures that will achieve the performance standard of best available technology economically achievable (BAT) and best conventional pollutant control technology (BCT). The General Industrial Permit also requires the development of a Storm Water Pollution Prevention Plan (SWPPP) and a monitoring plan. Through the SWPPP, sources of pollutants are to be identified and the means to manage the sources to reduce storm water pollution are described.

BMPs may include, but not be limited to, spill and overflow protection, storm water control, covering of fueling areas, proper clean-up methods, spill prevention, preventative maintenance on equipment, inspections, and training. Specific best management practices will vary by situation and site. Guidance on the use of BMPs is available from the SWRCB.

**Underground Injection Control (UIC) Program for Class II Wells.** In California, the Department of Conservation’s Division of Oil, Gas, and Geothermal Resources (DOGGR) regulates oil and gas wells that inject fluids (Class II injection wells) through its UIC Program. DOGGR adopted underground injection regulations (PRC, Section 3013) on April 20, 2015 on a temporary basis by emergency rulemaking to cease, as of October 1, 2015, underground injection into aquifers that are not hydrocarbon producing zones and contain less than 3,000 ppm total dissolved solids (TDS). Injection into non-hydrocarbon producing aquifers with groundwater containing between 3,000 and 10,000 ppm TDS was to cease by February 15, 2017, if a portion of the aquifer is a hydrocarbon producing zone and contains groundwater with less than 10,000 ppm TDS injection was to cease on February 15, 2017. Underground injection includes water flood, steam, and cyclic steam for the purposes of enhanced oil recovery and waste fluid disposal.

The program is monitored and audited by the EPA under the Safe Water Drinking Act (SDWA). Under agreement between the EPA and DOGGR, aquifers may be designated as “exempt” for the purposes of the UIC program, which allows variances from standard water quality protection measures. To be considered exempt, the aquifer must meet the following criteria which are set forth in 40 CFR 146.4:
1. The aquifer does not currently serve as a source of drinking water; and

2. The aquifer cannot now and will not in the future serve as a source of drinking water because:
   a. It is mineral, hydrocarbon, or geothermal energy producing.
   b. It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical.
   c. It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption.

Cat Canyon Oil Field has been under continuous production since the early 1900’s and contains numerous existing oil and gas operations. In anticipation of multiple requests for aquifer exemptions and/or extensions of existing exemptions under the UIC Program, DOGGR requested a single geologically integrated exemption application for the entirety of the Cat Canyon Oil Field; Aera, as well as ERG, PetroRock and BE Conway Energy have jointly applied for such an exemption. The application is currently being processed by DOGGR and the State Water Resources Control Board (SWRCB), and includes an extensive geological and hydrological review of Cat Canyon in addition to comprehensive well data. DOGGR and the SWRCB may exempt planned injection from the requirements of the UIC Program under certain circumstances as noted above. In response to the joint Cat Canyon UIC exemption request, the SWRCB provided initial feedback (SWRCB, 2018), essentially confirming that the UIC exemption request has met the required criteria, including:

- As required by PRC § 3131(a)(1) and 40 CFR § 146.4(a), the proposed exempted area does not currently serve as a source of drinking water.

- Consistent with 40 CFR § 146.4(b)(1), the proposed exempted area will not in the future serve as a source of drinking water because it is, or is expected to be, capable of commercial hydrocarbon production.

- In addition, as per PRC § 3131(a)(2), the injected fluids are not expected to affect the quality of water that is, or may reasonably be, used for any beneficial use

   (1) because the groundwater within the proposed exempted area contains petroleum hydrocarbons and constituents such as boron and total dissolved solids at concentrations that limit its suitability for agricultural, domestic, and other beneficial uses,

   (2) because of the availability of higher quality groundwater in shallower geologic zones, and

   (3) because the injected fluids are expected to remain in the proposed exempted area. Water analyses from the Cat Canyon Oil Field indicate groundwater in the Sisquoc and Monterey Formations contains concentrations of total dissolved solids between 6,333 and 22,007 milligrams per liter.

Once the application has completed internal review, notice for public comment will be provided prior to the EPA’s Record of Decision.

**California Public Resources Code (PRC) Section 3160.** PRC Section 3160 required an independent scientific study on well stimulation treatments, including, but not limited to, hydraulic fracturing and acid well stimulation treatments by the Secretary of the Natural Resources Agency, by January 1, 2015. The Natural Resources Agency commissioned the California Council on Science and Technology (CCST) to conduct an independent scientific assessment of well stimulation treatments, including hydraulic fracturing in California (CCST, 2015). The Study evaluated all aspects and effects of well stimulation treatments, including, but not limited to, the well stimulation treatment, additive and water transportation to and from the well site, mixing and handling of the well stimulation treatment fluids and additives onsite, the use and potential for use of nontoxic additives and the use or reuse of treated or produced water in well stimulation
treatment fluids, and flowback fluids and the handling, treatment, and disposal of flowback fluids and other materials, if any, generated by the treatment. Specifically, the potential for the use of recycled water in well stimulation treatments, including appropriate water quality requirements and available treatment technologies, were evaluated.

Further, the Natural Resources Agency adopted rules and regulations (PRC Section 3106 and Section 3160) specific to well stimulation treatments, in consultation with the Department of Toxic Substances Control, the State Air Resources Board, the State Water Resources Control Board, the Department of Resources Recycling and Recovery, and any local air districts and regional water quality control boards in areas where well stimulation treatments, including acid well stimulation treatments and hydraulic fracturing treatments, may occur.

As required by PRC Section 3160, prior to performing a well stimulation treatment on a well (including steam injection or flooding), the operator shall apply for a permit to perform a well stimulation treatment. The information provided in the well stimulation treatment permit application shall include, but is not limited to, the following: well identification number and location, estimates of water to be recycled, anticipated source of the water to be used, and groundwater monitoring plan.

**Sustainable Groundwater Management Act.** The Sustainable Groundwater Management Act (SGMA) was signed into law in 2014, and went into effect on January 1, 2015. SGMA provides a framework for the sustainable management of groundwater supplies by local agencies and provides tools, authority, and a timeline for local agencies during the 20-year implementation period. SGMA requires sustainable management of the County’s basins that are designated as medium- or high-priority by the State DWR. In Santa Barbara County, these basins include the Cuyama Valley, San Antonio Creek Valley, Santa Ynez River Valley, Goleta Valley, and Santa Maria Groundwater Basins. However, basins that have undergone the legal process of adjudication, including the Santa Maria Groundwater Basin, are exempt from preparation of Groundwater Sustainability Plans under SGMA (Water Code § 10720.8(a)(18)). (Young, 2017).

### 4.9.2.3 Local Regulations

The proposed Project is located within Santa Barbara County, which has regulations related to floodplain development and oil and gas development. Floodplain regulations require that any construction or other development within the floodplain obtain a development permit that ensures the development is adequately protected against flooding, and does not adversely affect other property. Chapter 35.5 (**Land Use and Development Code**) and Chapter 25 (**Petroleum Code**) of the Santa Barbara Code of Ordinances regulate oil and gas facilities. Oil and gas regulations include permitting and performance requirements intended to reduce environmental degradation including those related to surface waters, contamination, flooding and erosion. Specific relevant regulations relevant to surface water include requirements for a pollution control plan (spill prevention, control and countermeasure plan), erosion control, storage requirements, prevention of surface water contamination, and remediation. Chapter 14 (**County Grading Ordinance**) regulates grading, excavation, filling, stockpiling of material and reclamation of land in unincorporated areas. These activities require a permit if they exceed certain thresholds. The County Grading Ordinance also addresses the compliance with NPDES storm water regulations for construction activities by requiring preparation and implementation of Storm Water Pollution Prevention Plan (SWPPPs) for any grading in excess of 50 cubic yards.

**Santa Barbara County – County Ordinance 3937.** The County Grading Ordinance regulates grading, excavation, filling, stockpiling of material and reclamation of land in unincorporated areas. These activities require a permit if they exceed certain thresholds. The Ordinance addresses the County’s compliance with
NPDES storm water regulations for construction activities by requiring preparation and implementation of Storm Water Pollution Prevention Plan (SWPPPs) for any grading in excess of 50 cubic yards.

### 4.9.3 Environmental Thresholds

The County’s Environmental Thresholds and Guidelines Manual provides the following CEQA thresholds of significance for surface and groundwater (Santa Barbara County, 2015):

1. Is located within an urbanized area of the County and the project construction or redevelopment individually or as a part of a larger common plan of development or sale would disturb one (1) or more acres of land;

2. Increases the amount of impervious surfaces on a site by 25% or more;

3. Results in channelization or relocation of a natural drainage channel;

4. Results in removal or reduction of riparian vegetation or other vegetation (excluding non-native vegetation removed for restoration projects) from the buffer zone of any streams, creeks or wetlands;

5. Is an industrial facility that falls under one or more of categories of industrial activity regulated under the NPDES Phase I industrial storm water regulations (facilities with effluent limitation; manufacturing; mineral, metal, oil and gas, hazardous waste, treatment or disposal facilities; landfills; recycling facilities; steam electric plants; transportation facilities; treatment works; and light industrial activity);

6. Discharges pollutants that exceed the water quality standards set forth in the applicable NPDES permit, the Regional Water Quality Control Board’s (RWQCB) Basin Plan or otherwise impairs the beneficial uses of a receiving water body;

7. Results in a discharge of pollutants into an “impaired” water body that has been designated as such by the State Water Resources Control Board or the RWQCB under Section 303 (d) of the Federal Water Pollution Prevention and Control Act (i.e., the Clean Water Act); or

8. Results in a discharge of pollutants of concern to a receiving water body, as identified by the Central Coast RWQCB.

In addition, regulations regarding wastewater treatment are governed by regulations inclusive of the RWQCB’s Basin Plan Prohibitions, the California Plumbing Code, the County Code Septic System Ordinance (Article II of Chapter 29, 29-6 through 29-14), and Administrative Practices of Environmental Health Services. This section describes criteria for evaluating the significance of Project-related activities or incidents that may result in impacts to water resources. In general, the persistence, extent, and amplitude of an impact dictate its significance. Although the thresholds of significance for water quality impacts are based on quantitative limits promulgated in existing standards, guidelines, and permits, interpretation of unacceptable changes in water or sediment conditions often requires some judgment. For example, standards contained in a permit may be outdated, or the discharge may be causing previously unrecognized water quality impacts.

With respect to groundwater supply, the County of Santa Barbara established specific thresholds of significance for groundwater basins identified as overdrafted based on an estimation of the basin’s remaining life of available water storage. New consumptive water use (total consumptive demand adjusted for recharge minus discontinued historic use) of a project that exceeds the threshold for that particular basin is deemed a significant adverse environmental impact. Historically, the County applied thresholds of significance for the Santa Maria Groundwater Basin of 25 acre-feet per year and 23 acre-feet per year for the San Antonio Groundwater Basin (County of Santa Barbara, Planning and Development 2008a). How-
ever, the Santa Maria Groundwater Basin was adjudicated after these thresholds were established and is not currently subject to the 25 AFY threshold. The most recent Groundwater Basins Status Report (October 14, 2014) published by the County Water Agency notes that the Santa Maria Groundwater Basin “is managed and not believed to be in a state of overdraft.” (SBC Water Agency, 2014)

Regarding groundwater quality, oil field produced water or wastewater, and resultant brine from treatment of produced water for steam would likely contain hydrocarbons; therefore, have the potential to impact groundwater quality if failure of oil production wells release oil or produced water into the groundwater producing zone through horizontal or upward migration. In addition, surface spills and leaks at the drilling site or storage areas could percolate into the groundwater producing zone.

Projects which are located outside of the “urbanized areas” may also have a project-specific storm water quality impact. Storm water impacts are evaluated on a project-by-project basis for a determination of significance. Issues which should be considered include:

1. The size of the development;
2. Location (proximity to sensitive waterbodies, location on hillsides, etc.);
3. The timing and duration of the construction activity
4. The nature and extent of directly connected impervious areas;
5. The extent to which the natural runoff patterns are altered;
6. Disturbance to riparian corridors or other native vegetation on or off-site
7. The type of storm water pollutants expected; and
8. The extent to which water quality best management practices are included in the project design.

### 4.9.4 Environmental Impacts and Mitigation Measures

This section addresses potential impacts to surface and groundwater resources during the construction and operational phases of the proposed Project. The proposed new oil wells and supporting infrastructure would be within the existing State-designated Cat Canyon Oil Field, and the proposed Project would not change the historic use of the oil field. The 14-mile natural gas pipeline would extend beyond the oil field, but would be located primarily within existing road beds and shoulders, and would be underground so impacts would occur primarily during the temporary construction phase. The 0.3 mile power line would require the construction of 10 towers, but once constructed, only periodic maintenance would be required, so power line impacts would also occur primarily during the temporary construction phase.

Impacts from the proposed Project are assessed for the construction phase, routine operations, and accidental spills. Construction activities include grading, well drilling, appurtenant structure construction, and associated activities. Routine operations include cyclic steaming, oil production and transport (via truck and inner-field pipelines), and routine maintenance, including well workovers. Spills are accidental, unanticipated release of oil, produced water, or other hazardous materials.

Applicant proposed Avoidance and Minimization Measures (AMMs) are provided in Appendix C. Table 4.9-3 lists the AMMs specific to surface and groundwater quality. As noted within the text of some AMMs, the AMMs are proposed to ensure that noted regulatory requirements are fulfilled.
Table 4.9-3. Applicant Proposed Avoidance and Minimization Measures Related to Surface/ Groundwater Quality

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| WATER-1 | Spill Prevention, Control, and Countermeasures Plan and Storm Water Pollution Prevention Plan. The Project will comply with approved facilities-approved Spill Prevention, Control, and Countermeasures Plan, and the Project-specific construction Storm Water Pollution Prevention Plan, including:  
  a. All fueling of vehicles and heavy equipment will occur in designated areas. Designated areas will include spill containment devices (e.g., drain pans) and absorbent materials to clean up spills;  
  b. Vehicles and equipment will be maintained properly to prevent leakage of hydrocarbons and other fluids. Vehicle engine maintenance will occur in designated areas, which will include spill containment devices and absorbent materials to clean up spills;  
  c. Any accidental spill of hydrocarbons or other fluids that may occur at the work site will be cleaned immediately. Spill containment devices and absorbent materials will be maintained on the work site for this purpose. The Governor’s Office of Emergency Services will be notified immediately in the event of a reportable quantity accidental spill to ensure proper notification, clean up, and disposal of waste;  
  d. Waste and debris generated during construction will be stored in designated waste collection areas and containers away from drainage features, and will be disposed of regularly;  
  e. Convenient, portable sanitary/septic facilities will be provided during construction activities. These facilities will be well maintained and serviced, and wastes will be treated and disposed of in accordance with state and local requirements;  
  f. Storm water pollution prevention best management practices will be used around the construction area perimeters during construction and around any construction operations that could potentially generate storm water pollution, according to the project specific construction storm water best management practice plan, or surface water quality management plan, as required;  
  g. Runoff will be conveyed to prevent erosion from slopes and channels and directed to Project detention basins; and  
  h. Disturbed slopes will be re-vegetated with appropriate native or drought tolerant vegetation.  
A Storm Water Pollution Prevention Plan will be implemented for all applicable Project activities. Erosion and sediment controls (e.g., silt fences, straw wattles, mulching, and hydroseeding) will be installed properly and maintained regularly. Other Best Management Practices will also be implemented as necessary and/or as required by Project permits. |
| WATER-2 | Channel Crossings. Permanent channel crossings will be stabilized and energy dissipaters such as rip rap will be used at the outlet of storm drains, culverts or channels that enter unlined channels to minimize erosion potential. |
| WATER-3 | DOGGR Permits. The Project will produce non-potable water from the relatively high salinity hydrocarbon-bearing upper Sisquoc formation sands as a water source for steam production and then re-inject that water back into the formation following separation from other produced fluids. Aera Energy LLC will coordinate with the California Division of Oil, Gas, and Geothermal Resources Underground Injection Control program to obtain any required permits for that activity. |

4.9.4.1 Oil Field Development & Operation

4.9.4.1.1 Accidental Release: Surface and Groundwater

Impact SGW-1: A rupture or leak from oil production facilities, pipelines, or transport trucks has the potential to result in a substantial adverse effect on surface or groundwater quality.

Oil and produced water spills, and associated contaminated stormwater runoff, could affect on and/or offsite surface waters and groundwater, depending on the location and size of the spill. Unanticipated direct effects to jurisdictional surface water resources (e.g., drainages) and groundwater both in and outside of the development footprint could occur during the operation phase in the event of an accidental oil, produced water, or other hazardous material spill from Project transport trucks, pipelines, or oil pro-
duction facilities. Potential spills could result from seismic events, mechanical failure, structural failure, corrosion, or human error during operations. Spills and cleanup activities would potentially result in impacts to surface water resources, including sensitive CTS and CRLF breeding habitat (ponds). Small leaks or spills, which are contained and remediated quickly, may have minor or negligible impacts to hydrological resources (see Impact SGW-2 below). In contrast, large pipeline spills could spread into jurisdictional waterways, including sensitive habitats (i.e., ephemeral drainages and agricultural ponds which contain sensitive species habitat) and would substantially degrade their value, with potential long-term impacts to surface and groundwater quality.

The volume, location, seasonal timing, and type of any potential spill would influence the severity of impacts to hydrological resources. Spills affecting dry waterways would be easier to contain than those within flowing waterways where a spill could flow into ephemeral drainages and subsequently into the Sisquoc River, especially under flood conditions. Spills and associated contaminated storm water runoff reaching jurisdictional waterway(s) could have significant and widespread impacts to water quality. In addition, further damage can occur to waterways during cleanup operations, especially if techniques such as raking, shoveling, and bulldozing are employed.

Impacts to surface and/or groundwater resources from an oil or other hazardous material spill (including seep/surface expression) associated with the proposed Project would be significant, should they occur. To-date there has been no evidence of oil seeps and/or surface expressions within the Cat Canyon Oil Field. Oil seeps and surface expressions are discussed in Section 4.6.1.6. Applicant-Avoidance and Minimization Measures (AMM) HAZ-4, HAZ-6, HAZ-7 and WATER-1 require an emergency response plan, spill contingency plan, spill prevention and countermeasure plan, and a SWPPP. Mitigation Measure (MM) BIO-1 requires development and implementation of an Emergency Response Action Plan to mitigate impacts in the event of an oil or other hazardous materials spill (including any seeps or surface expressions). The Plan would include specific measures to avoid impacts during spill response and cleanup operations, including provisions for containment and cleanup for the entire extent of the spill site. The Plan would also include low-impact techniques for clean-up operations designed to minimize further damage to waterways. Implementation of this measure would reduce impacts from oil or other hazardous materials spills. However, the potential remains for a catastrophic spill and the associated substantial environmental effects of the spill and its clean-up. Even with implementation of AMMs and MM BIO-1, this impact remains significant and unavoidable (Class I).

4.9.4.1.2 Construction and Routine Operations: Surface Water

| Impact SGW-2: The proposed Project construction and routine operations have the potential to violate water quality standards or waste discharge requirements, or otherwise degrade water quality. |

Water quality impacts could be significant if they would introduce pollutants sufficient to violate waste discharge requirements outlined in the RWQCB Regional Basin Plan, damage beneficial uses, introduce pollutants into designated impaired (303(d)) water bodies or otherwise degrade water quality of surface waters. Water quality could be adversely affected through:

- Introduction of diesel fuel, gasoline, lubrication oil, hydraulic fluids, anti-freeze, transmission fluid, lubricating grease, trash and other items during construction of new wells.

- Spills during on-site refueling and equipment maintenance activities, ruptures or leaks from defective or poorly maintained equipment, spills of chemicals used in the drilling process, well blowouts, or improper disposal and containment of drilling mud during drilling of new wells.
Flooding or drainage across well pads and equipment leading to the transport of contaminants from the well pad to the stream channel.

Rupture of pipelines buried beneath watercourses due to flood scour.

Construction of new wells and ancillary facilities would involve the use of heavy equipment to build new well pads, access roads, and pipelines, and to clear and grade. Disturbance of soil during construction has the potential to reduce surface water quality through the introduction of disturbed sediments into local streams or other water bodies. Sediments could be deposited directly into streams by construction, or be subsequently washed in by runoff from the disturbed areas. Sediment-related water quality impacts would be mitigated to less than significant through the application of regulatory requirements and mitigation measures described above for Impact SGW-1, as well as MM SGW-1, Erosion and Sediment Control Plan.

Accidental spills or disposal of potentially harmful materials used during construction and routine operations could occur as a result of on-site refueling and equipment maintenance activities, leaks from defective or poorly maintained equipment, or other construction-related activities. Examples of potential construction and routine operation related pollutants include diesel fuel, gasoline, lubrication oil, hydraulic fluids, anti-freeze, transmission fluid, lubricating grease, drilling mud, and trash. Pollutants could reach surface waters directly, be transported by runoff into a water body, or enter surface water through flooding of the well site. Beneficial uses of surface waters that could be affected are those listed in Table 4.9-2.

Well production activities have the potential for contamination of surface water, mainly through ongoing maintenance activities, with similar effects as construction, and through spills of oil, produced water and other fluids used in the operations process. An approximate indication of expected future spills can be derived from reported spills in the past. Spills are reported to the California Office of Emergency Services (OES) and County of Santa Barbara Petroleum Office. From 1993 to 2014, about 7,833 spills were reported in oil fields statewide. About 12 percent of these were reported as in or potentially affecting inland surface waters (DOGGR, 2015a). Oil field spills reported to OES averaged roughly 39 barrels, with a median of about six barrels. Roughly 95 percent of these spills had been contained at the time of reporting. Assuming 48,400 oil wells statewide (DOGGR, 2015b), the past spill rate is roughly one spill per year for every 130 oil wells. Based on the statewide spill rate, the proposed Project, with 296 new wells, would be expected to have about 2.3 spills per year, or approximately 23 spills over a 10-year period, with a total spilled volume approximately 90 barrels per year (assuming average spill of 39 barrels, 2.3 spills per year). If not contained quickly, these spills could result in water quality impacts to downstream beneficial uses. However, as most of the proposed wells would be in upland areas, most spills would be in these upland areas, away from surface waters.

Generally, cyclic steam injection has the potential to result in seeps/surface expression of oil and/or produced water, or degradation of groundwater quality by oil or cyclic steam operations in oil fields with certain geological features. However, there is no evidence of oil seeps resulting from the historic or recent (1980s) steam injection in the Cat Canyon Oil Field (SCS, 2015; County of Santa Barbara Petroleum Office, 2016; DOGGR, 2016). Steam injection in this oil field occurs at depths of 2,300 to 2,900 feet, above which the intervening low-permeability soils act as a barrier to oil and produced water migrating to the ground surface (see Section 4.6.1.6 for seep potential resulting from the proposed Project). Given the subsurface barrier between oil producing zones and groundwater, and no historic evidence of seeps, it is unlikely that the proposed Project would result in a seep or surface expression of oil from cyclic steam injection. However, should seeps or surface expressions occur, impacts to surface water resources would be similar to those described for oil spills.
Federal, State and local regulations, described in Section 4.9.2, protect surface water beneficial uses by requiring a wide range of pollution-prevention Best Management Practices that include, but are not limited to:

- Development of and compliance with Stormwater Pollution Prevention Plans for all construction and operations.
- Development of and compliance with a Spill Prevention, Control, and Countermeasure Plan for operations as well as for oil storage and transportation.
- Blowout prevention and control.
- Development of and compliance with a water management plan.
- Tank construction and leak detection requirements.
- Fluid, product and waste storage, secondary containment, and disposal requirements.
- Testing, inspection and maintenance requirements.
- Notification, containment and clean-up requirements for accidental spills.
- Wellsite restoration requirements.
- RWQCB mitigation requirements in the event of unauthorized contamination of surface waters. Mitigation may be in addition to any containment and clean-up requirements that may apply.
- Section 25-37 of the County of Santa Barbara Petroleum Ordinance requires that oil spills or wastes be prevented from entering stream courses or adjacent property by the construction of dams, levees, ditches or other structures.

These existing surface water protections have been effective in the past in preventing and mitigating adverse impacts, as indicated by the absence of statewide surface water impairments attributed to oil field activities (DOGGR, 2015a). For instance, according to OES spill records described above, more than 94 percent of the statewide oil field-related spills that could potentially affect surface waters during the years 2009 to 2014 were contained at the time OES received the report. All spills are required by federal, State and local law to be cleaned up according to established standards.

None of the proposed oil wells, either on existing pads or proposed pads, drain directly to drainages listed as impaired under Section 303(d) of the Clean Water Act. The nearest downstream impaired water is the Santa Maria River two miles downstream of the proposed Project as described in Section 4.9.1.2.

The existing regulations require operators to take numerous, and a wide variety of, measures to prevent contamination of surface waters, as well as providing a mechanism for oversight of these measures, including development and design of site-specific controls, monitoring requirements, material handling and transportation controls, spill prevention and clean-up procedures, disclosures, follow-up, and mitigation. Performance standards use the best available technology economically achievable and best conventional pollutant control technology as required by the EPA. California water quality regulations, in particular the California Porter Cologne Water Quality Control Act, the General Construction Storm Water Permit, and the Industrial Storm Water General Permit, are intended to ensure that surface water quality meets the established standards described in the Basin Plan.

In addition to existing regulations, the Applicant proposes several Avoidance and Minimization Measures (AMMs) intended to reduce water quality impacts (Appendix C). These include:
4.9 SURFACE/GROUNDWATER QUALITY

- AMM HAZ-4: Emergency Response Plan;
- AMM HAZ-5: Operational Hazardous Materials Management/Transportation (Business) Plan;
- AMM HAZ-6: Spill Contingency Plan;
- AMM HAZ-7: Spill Prevention, Control, & Countermeasures Plan;
- AMM WATER-1: Spill Prevention, Control, and Countermeasures Plan and Storm Water Pollution Prevention Plan.

The Applicant proposes that post-construction surface drainage follow existing onsite drainage patterns, be directed to the north as surface flow through storm water conveyance systems, and discharge at points located at the proposed Project site boundary, as outlined within the proposed Project’s Storm Water Pollution Prevention Plan. Any spills on the site would be contained within process system walls/berms around equipment as well as site walls/berms around the central processing facility. Process walls/berms would be designed to contain at least 110 percent of the largest vessel, plus the precipitation generated by a 100-year storm event.

Appropriate safety programs that would comply with existing regulations would be developed and implemented, and include preparation of a Hazardous Materials Business Plan (AMM HAZ-5); a Spill Prevention, Control, & Countermeasures Plan (AMMs HAZ-7 and WATER-1); a worker’s safety program; the Aera Construction Safety Handbook; an emergency response plan (AMM HAZ-4); a plant safety program; facility standard operating).

The Emergency Response Plan (ERP) would be specifically tailored to the construction and operational portions of the proposed Project. The proposed Project ERP would include crisis management and business resumption planning to provide for the safety of workers and the public, as well as the protection of the environment and property in the event of a major event. The intention of the ERP is to initiate measures in advance to reduce potential dangers, impacts, and losses related to potential events associated with oil and gas operations. The plan would define what would constitute an event, the appropriate organizational response team, and the location of the company emergency operations center from which management will make response decisions.

The onsite manager, or supervisor, or his/her designated representative or “person in charge” would be responsible for notifications to 911, the Santa Barbara County Hazardous Materials Unit, State Office of Emergency Services, all personnel working at the facility at the time and the nearby community in the event of a hazardous materials release/emergency shut-down. A minor event may be dealt with by the onsite cleanup crew; onsite personnel who have been trained in spill cleanup. A major event may require the assistance of offsite personnel or a cleanup contractor. To prevent potential incidents, all responsible practices will be taken to stop or limit the release of hazardous materials or waste, including measures such as stopping operations, collecting or containing released materials, and removing or isolating containers. These operation practices would, in most cases, avoid violating water quality standards and therefore reduce Impact SGW-3 to less than significant.

Some of the legacy fill areas, which are known to contain pre-existing petroleum hydrocarbon-containing soils, will be disturbed during construction. A soil beneficial re-use plan is proposed (Appendix L). According to this plan, these areas will be excavated, processed, and placed throughout the proposed Project site as road sub-base, road base, and/or final road surfaces associated with the planned oil field re-development activities. BMPs to be used during excavating and processing of this material would include erosion control measures, clearing and proper disposal of vegetation on the sites, dust control and mon-
itoring, and sampling. The material would be processed in accordance with County of Santa Barbara and Regional Water Quality Control Board requirements.

Although existing regulations (see Section 4.9.2) and Applicant-proposed AMMs provide sufficient protection to prevent significant impacts in most cases, some impacts may occur as a result of flooding which could be difficult to clean and remediate during a flood event. Although no portion of the oil field is within a mapped floodway, several of the proposed well pads, particularly along tributaries to Long Canyon, are located in low areas that could be subject to localized flooding. Implementation of MM SGW-2 (Flood Protection Plan) would ensure that well pads within areas subject to 100-year flood event are protected from flooding which could lead to water quality contamination, and that pipeline crossings are protected against scour. Further, MM BIO-1 requires development and implementation of an Emergency Response Action Plan to mitigate impacts in the event of an oil or other hazardous materials spill. With MM's SGW-1, SGW-2, and BIO-1 in place, surface water quality impacts due to construction and routine operations are considered less than significant (Class II).

**MM SGW-1 Erosion and Sediment Control Plan.** Erosion and sediment control measures shall be implemented as part of the proposed Project. A Construction Storm Water Pollution Prevention Plan (CSWPPP), Industrial Storm Water Pollution Prevention Plan (ISWPPP), Storm Water Management Plan (SWMP) and/or an Erosion and Sediment Control Plan (ESCP) shall be submitted to P&D for review and approval. For the purposes of fulfilling this measure, a single Plan may be used to cover all relevant proposed Project activities. The Plan shall address onsite drainage patterns and shall include best and site-appropriate erosion control measures for construction and long-term operation of the well facility and associated access, pipeline, and transmission infrastructure. Erosion and sediment control measures shall include the measures identified in the approved Emergency Response Action Plan, specifically mitigation measures (MM) BIO-1f, BIO-1g, and BIO-1h, and Best Management Practices (BMPs) designed to stabilize the site, protect natural watercourses/creeks, prevent erosion, convey storm water runoff to existing drainage systems keeping contaminants and sediments onsite. Such BMPs may include slope breaks, sediment barriers, constructed non-erodible local drainage courses, waterbars, revegetation, and other measures as appropriate for the site. The Plan shall address long-term maintenance and operation of erosion-control features, and the site shall be subject to inspections and regular reporting to the County of Santa Barbara on a schedule deemed appropriate by the County. Inspections shall verify that: no disturbed sediment from the site reaches surface waters; and that no induced gully or rill formation and no induced bank erosion would occur. The CSWPPP or ESCP shall be a part of the Grading Plan submittal to P&D. The Plan shall be designed to address erosion, sediment and pollution control during all phases of development (excluding decommissioning) of the site until all disturbed areas are permanently stabilized.

**PLAN REQUIREMENTS and TIMING:** The Grading Plan and SWPPP (Construction and Industrial), SWMP, and/or ESCP shall be submitted to P&D for review and approval to issuance of the Zoning Clearance. The SWPPP/ESCP requirements shall be implemented prior to the commencement of grading and throughout the year. The ESCP/SWMP requirements shall be implemented between November 1st and April 15th of each year, except that pollution control measures shall be implemented year-round.

**MONITORING:** P&D staff shall perform site inspections throughout the construction phase and during operations as needed to ensure compliance.
Flood Protection Plan. Prior to issuance of the Zoning Clearance from Santa Barbara County, the Applicant shall submit a Flood Protection Plan to the County for review and approval. Wells, equipment, materials, and wastes shall be protected from flooding and flood-related erosion during drilling and operation through the use of measures appropriate for the site and anticipated flood conditions and risk as determined by a registered civil engineer with expertise in flood protection and analysis. Protection shall apply to wells located within known designated flood hazard areas, as well as to wells adjacent to defined watercourses outside of mapped flood hazard areas. Flood protective measures may include, but are not necessarily limited to: drilling in the dry season, flood forecasting and contingency plans, elevation of well pad and containment features to above the 100-year flood level, scour protection for pipelines that cross watercourses (such as adequate burial depth), and flood proofing of equipment and containment features that, if flooded, could introduce pollutants to the water.

PLAN REQUIREMENTS and TIMING: The Flood Control Plan shall be submitted to P&D for review and approval prior to issuance of the Zoning Clearance. The Flood Control Plan requirements shall be implemented in the proposed Project design and during construction.

MONITORING: P&D staff shall perform site inspections throughout the construction phase and during operations as needed to ensure compliance.

Impact SGW-3: The proposed Project would place within a watercourse or flood hazard area structures which would impede or redirect flood flows, or otherwise alter the existing drainage pattern of the site or area, including through land disturbance or the alteration of the course of a stream or river, in a manner which would result in erosion, siltation, or mudflow.

Erosion and siltation impacts could occur primarily through ground disturbance associated with construction or restoration of 72 oil and gas well pads, 296 wells, 9 miles of access roads, processing facilities, field systems, fresh water system, support infrastructure, natural gas pipeline, and electrical power interconnection.

The majority of the Project site is located within Zone X, or within an area that has a 1 percent or less annual chance of flood, as mapped by the Federal Emergency Management Agency. Areas in the western part of the proposed Project site immediately adjacent to Cat Canyon Creek would located within flood Zone A, indicating an area at risk from 100-year or greater flood events (Aera, 2016).

Construction would disturb existing soils that would then be exposed to erosion or transport off site and into surface waters, or, in the case of construction in or near streams and floodplains, cause flow encroachments and alterations that could increase the potential or frequency of in-stream erosion which, in addition to causing siltation of waterways, could damage adjacent property or habitat. Erosion effects would be variable depending on terrain, with higher erosive potential in areas of steep terrain. Erosion could be an ongoing chronic problem on unprotected well pads and access roads after construction. The pipeline will be underground and will offer no obstruction to flow. However, the effect on erosion and siltation caused by the construction of new oil and gas wells, as well as new ground disturbance at existing well pads and excavation for the pipeline, could be substantial and is potentially significant.

Compliance with the California Construction General Permit requires development of a Stormwater Pollution Prevention Plan, which would involve implementation of Best Management Practices to control erosion associated with ground disturbance during construction. The proposed Project has a Stormwater Pollution Prevention Plan (Appendix L) which includes plans and BMPs for erosion control and sediment control, including detention basins which would collect any sediment generated from the site during oper-
ations and comply with Santa Barbara County General Plan requirements. In addition, the Applicant proposes WATER-2 (Appendix C) which would require that permanent channel crossings be stabilized and energy dissipaters used at the outlet of culverts. After completion of oil production activities, the site would be restored to a condition in conformance with State and County ordinances to reduce the potential for long-term erosion.

Implementation of the BMPs and other requirements of an approved SWPPP would reduce the potential construction-related soil and erosion impacts of the proposed Project to less than significant. MM SGW-1 (Erosion and Sediment Control Plan) and Applicant-proposed AMM WATER-2 would address the issue of long-term erosion, and ensure the use of best management practices for erosion control during operation of the oil wells. MM SGW-1 requires that no sediment from the site reach surface waters in excess of the existing conditions, no induced gully or rill formation, and no induced bank erosion. With the implementation of MM SGW-1, and these performance standards, Impact SGW-3, erosion and siltation, would be less than significant (Class II).

**Impact SGW-4:** The proposed Project would increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site, create or contribute to runoff water which would exceed the capacity of existing or planned stormwater drainage systems, divert or obstruct flow in a manner that would induce or exacerbate flooding, or otherwise contribute to flood-related damage, on- or off-site.

Induced flooding effects due to increased surface runoff could occur through the development of new impervious areas, or clearing and grading for new well pads, equipment areas, and access roads that would increase the rate of runoff from the site. Total grading would be 14 percent of the proposed Project’s total area (305 acres of the 2,112 acre proposed Project site). New impervious areas would be a small fraction of that, and would be less than the County of Santa Barbara threshold of 25 percent of the proposed Project site (528 acres).

Based on the hydrology report (Appendix L) the proposed Project has the potential to increase peak flow rates on Unnamed Blue Line #1 and #2 by 88.10 cfs. For Unnamed Blue Line #3 and Olivera Canyon there would be no increase, since no development is planned within either watershed. For Long Canyon the 100-year property boundary discharge would increase by 84.6 cfs, and for Cat Canyon the 100-year property boundary discharge would increase by 150.8 cubic feet per second (See Figure 4.9-1 for the locations of these drainages. Table 4.9-1 gives the existing-conditions discharges).

Drainage concentration points exiting the property will remain in the same locations as existing conditions as indicated in Appendix L. There would therefore be no diversion or obstruction of flow that would exacerbate flooding. The proposed Project will include 16 detention basins which will be designed to mitigate increased flow rates according to Santa Barbara Flood Control and Water Conservation District standards for the 100-year discharge resulting from a 100-year storm event. With these basins in place, the overall effect on runoff volumes and peaks is expected to be negligible. The proposed Project would not be in an urbanized area, would not increase impervious surfaces by 25%, would not result in the channelization or relocation of a natural channel, and temporarily disturbed areas would be revegetated following construction. Impact SGW-4, increased flood potential, is therefore considered less than significant, with implementation of MMs SGW-1 and SGW-2 (Class II).
4.9.4.1.3 Construction and Routine Operations: Groundwater

Impact SGW-5: The proposed Project cyclic steam or steam flooding injected under pressure to enhance oil recovery in oil-bearing formations or injection of produced water/brine could adversely affect groundwater quality.

Aera proposes to use the oil field wastewater or “produced water” to generate steam for injection, as well as non-potable water from production wells in the Sisquoc formation (approximately 2,000 deep). This produced water contains salts, sediment, hydrocarbons, and naturally occurring radioactive material (NORM). As proposed, prior to conversion to steam, the produced water would be cleaned and treated in the Water Cleaning Plant, to generate “filtered” water that would be converted to steam by the generators, and the steam would be transported to various wells via steam pipelines and manifolds for injection. The steam would be injected into the Brooks reservoir from which oil would be produced. Oil field wastewater or “brine” and excess produced water would be disposed of into disposal wells into the Sisquoc formation (approximately 2,000 deep).

Contamination of the potable Santa Maria groundwater basin by oil and produced water/brine may pose risks to human health and environmental quality if fresh groundwater becomes contaminated. The proposed Project could contaminate groundwater during construction and routine operations via the following mechanisms (see Impact SGW-1 for discussion of groundwater impacts due to accidental spills):

- Cyclic steam or steam flooding is injected under pressure to approximately 3,000 feet below ground surface to the oil-bearing Brooks sand formation (see Figure 2-16). An impact could occur if there is a failure of the injection well casing and cement sheath resulting in the upward or horizontal migration of the stimulation fluid (processed produced water) into fresh groundwater resources.

- Disposal well failure could release produced water and/or brine from the Water Cleaning Plan Plant into the groundwater.

- Failure of oil production wells could release oil or produced water into the groundwater producing zone through horizontal or upward migration, during either drilling or operations.

- Failure of the produced water wells into the Sisquoc formation could release produce water into the groundwater producing zone through horizontal or upward migration.

- Surface spills and leaks at the drilling site or storage areas can percolate to groundwater, or to a subsurface path along damaged oil well casings or cement seals or natural subsurface pathways such as fractures or faults into the groundwater producing zone.

- Chemicals used for acidizing could enter the fresh water aquifer.

Under the proposed Project, up to 141 oil production and 107 steam injection wells will be completed within the Brooks sand formation (approximate depth of 3,000 feet) (see Figure 2-16). An additional 24 observation wells would be used to monitor steam movement within the Brooks sand formation. To supply water for steam operations, seven non-potable produced water supply wells will be completed in the upper Sisquoc Formation at depths of approximately 2,000 feet. Brine waste generated from cleaning/filtering the produced water would be reinjected into the Sisquoc formation using 14 injection wells. The 14 injection wells would also be used to inject excess produced water resulting from oil production (well operations produce oil, water, and gas; produced gas would be cleaned/filtered and used for the steam generators).

Figure 4.9-3 illustrates the multiple-step process used to drill a well as required by DOGGR. Once completed, the well steel tubing through the fresh water aquifer is encased within two additional layers of steel casing and two layers of cement; thereby, providing multiple barrier protection. Further, the Foxen
Wells are drilled and constructed to isolate fluid inside the wells from the fresh water zones outside. Here are the key steps:

**Step 1:** The well is drilled to just below the base of fresh water aquifer and steel surface casing is cemented in place. The casing isolates the shallow fresh water outside the well before drilling continues into the deeper layers containing salty water and oil.

**Step 2:** With the fresh water layer protected by steel casing and cement, drilling continues into the deeper layers containing salty water and oil. Drilling continues to the total depth (TD) of the well.

**Step 3:** Production Casing is set from surface to the top of the producing zone. A screen (or slotted liner) is placed from the bottom of the production casing to the TD of the well and the production casing/screen interface is sealed. The screen will allow oil to flow from the reservoir into the well.

**Step 4:** A pump is placed in the well, attached to a long steel tube (tubing). The mixture of oil and salty water that flows into the well is pumped upwards through the tubing. Fresh water zones outside of the well are protected from well fluids by the tubing, production casing, and surface casing: more than 1” of solid steel and 4½” of cement.

**Source:** Aera, 2018.
mudstone, which is comprised of 400 to 700 feet of confining shale, mudstone and siltstone, forms the local caprock and hydraulically separates the deeper petroleum-bearing rock (Brooks and Sisquoc sands) from the overlying fresh water-bearing aquifers (see Figure 2-16). These low permeability Foxen mudstone formation provide a barrier that should prevent oil, injected fluids (produced water and brine waster), and steam from rising to shallower groundwater.

All well stimulation activities require a formal permit application to DOGGR that includes a radial analysis to ensure the geologic and hydraulic isolation of the oil and gas injection zone from nearby groundwater resources. All new steam and production wells would be constructed in accordance with DOGGR UIC program requirements for sealing within fresh groundwater aquifers extending below the base of fresh groundwater (see AMM WATER-3 and MM SGW-3a). Well casings, tubing, and cement seals are required to be pressure tested at 125% of the maximum surface pressure prior to injection in accordance with DOGGR requirements. Pressure monitoring of the well annulus, tubing and casing during injection would also comply with DOGGR requirements. Steam injection events for a well may begin only after DOGGR approval of the initial injection pressure monitoring report. Failure to achieve and maintain the required pressure thresholds requires corrective action before injection or the immediate shut-in of the well during injection, as well as notification of DOGGR and the RWQCB. DOGGR requirements and permitting for the non-potable water wells (supply and disposal) would also be coordinated through the DOGGR UIC Program.

During operations, the owner/Applicant is required to monitor the well casing, tubing, and annular space of each well for pressure changes during injection operations. The results are required to be submitted to DOGGR for review and approval.

Fresh non-potable groundwater supply wells for the proposed Project are anticipated to be 600 to 700 feet deep. At these depths, percolation of surface spills into the groundwater zone is unlikely, as demonstrated by the June 2014 groundwater quality testing of three water wells within the West Cat Canyon Oil Field, which concluded contaminants typically associated with oil field operations were not present within the freshwater aquifer (SCS Tracer, 2017).

Acidizing of wells to removal accumulated scale is expected to occur a few times over the 30 + year life of each production well and more frequently for injection wells due to higher scaling and mineral build-up associated with high fluid temperatures. The common acid employed is a 5% to 7% concentration of hydrochloric acid (HCl) in water. This is effective in removing calcium and magnesium carbonate deposits from the well screen and the reservoir rock pore spaces. An iron chelator, typically citric acid, may also be added to prevent the formation of iron precipitate, which can clog the reservoir pores during acidizing. The required acids are not stored onsite, instead are transported to the site when needed in USDOT approved equipment and containers, properly labeled, and follow approved routes to the work site. To acidize a well, acid is pumped down through tubing inside the casing of the well at low pressures. As previously noted, within the freshwater zone, the well tubing is encased in multiple layers of steel and cement providing multiple barrier protection. When the acid reaches the well screen, it flows through the screen and into the pore spaces of the reservoir rocks near the well. The acid dissolves the minerals that have been deposited in the reservoir pore space and in the well screen, helping reservoir fluids flow into the well. Following the acid treatment after the acid has interacted with base elements inside the well it becomes chemically neutral.

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1 ERG’s West Cat Canyon leases contain approximately 185 active or idle non-thermal wells, and approximately 314 active or idle thermal oil wells using cyclic steaming and/or steam flood operations to enhance production which are located within the boundaries of the proposed Project site.
Implementation of existing State and local requirements, Applicant AMM WATER-3, and MM SGW-3 would reduce proposed Project-related impacts to groundwater quality to less than significant (Class II).

**MM SGW-3 Locate Abandoned Wells and Verify Abandonment Seals.** The Owner/Applicant shall complete the Area of Review (AOR) study initiated in 2017, based on initial review of DOGGR records, wherein six wells did not have clear abandonment records (Aera, 2017). One well (Victory 17) requires abandonment and five wells (Field Fee 1, 2, 6, 6A, and Victory 3) need additional evaluation due to missing data. Depending on the results of the evaluation DOGGR may require that existing wells in the injection area of influence be repaired, plugged, and abandoned or re-abandoned. If necessary, additional well abandonment to install cement seals in compliance with DOGGR regulations and across all protected groundwater zones shall be implemented.

**PLAN REQUIREMENTS and TIMING:** Upon abandonment or re-abandonment, if necessary, and no later than 120 days prior to steam injection the Owner/Applicant shall submit the results of research and seal integrity verification of abandoned wells to P&D and DOGGR for review and approval.

**MONITORING:** P&D shall verify that the research results and seal verifications have been submitted as required.

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**Impact SGW-6: Potential for the proposed Project’s fresh water usage to exceed the threshold of significance for the Santa Maria Groundwater Basin.**

The Aera East Cat Canyon Oil Field is located within the Santa Maria Groundwater Basin. Current groundwater use at the proposed Project site is limited to the McCrosky WS-12 well for cattle grazing. Groundwater demand for the stock tank is estimated at 0.32 acre-feet per year (Aera, 2016).

Fresh groundwater would be needed during construction and routine operations, including but not limited to the following purposes: dust control, grading, compaction, well drilling, fire protection, lavatories, showers, equipment cleaning, and minor landscape irrigation. Water conservation measures would be used where practicable to reduce fresh groundwater use. As shown in Table 4.9-4, fresh groundwater consumption throughout the duration of the proposed Project (construction plus operations) would range between 16 and 21 acre-feet per year, plus an additional 4 acre-feet per year for oak tree replacement watering during the first few years. No fresh water would be used to generate steam for the proposed Project.

<table>
<thead>
<tr>
<th>Use</th>
<th>Minimum (acre-feet per year)</th>
<th>Maximum (acre-feet per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff Water Use (restrooms, showers, kitchen)</td>
<td>2.2</td>
<td>4.5</td>
</tr>
<tr>
<td>Landscape Irrigation</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td>Fire Water System Testing/Flushing</td>
<td>0.52</td>
<td>0.52</td>
</tr>
<tr>
<td>On-site Dust Control/Hydro-seeding</td>
<td>13.4</td>
<td>13.4</td>
</tr>
<tr>
<td>Well Drilling</td>
<td>0</td>
<td>2.30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16.32</strong></td>
<td><strong>20.92</strong></td>
</tr>
<tr>
<td>Oak Tree Irrigation (for first 3 to 5 years)</td>
<td>3.58</td>
<td>3.58</td>
</tr>
</tbody>
</table>

Source: Aera 2016.

1 - Assumes 40 employees.
2 - Assumes approximately 250 barrels (7,875 gallons) of water per well. The peak year will involve the drilling of 95 wells.
3 - Total does not include 0.32 acre-feet per year for ongoing cattle grazing operations. Water use for cattle grazing is not anticipated to change under the proposed Project.
Water for both construction and operations domestic purposes would be sourced from the existing onsite source well (McCroskey-WS12), which currently draws water from the Careaga and the Paso Robles Formations within the Santa Maria Groundwater Basin, as well as one or two other freshwater wells. As discussed in Section 2.5.10, the proposed Project would be designed to have additional fresh water supply to cover infrequent or contingent demand, for instance, during water well maintenance, water tank filling, or firefighting. Accordingly, the existing and proposed groundwater well(s), up to three, would be completed to deliver 50 gallons per minute each or 150 gallons per minute total (up to 0.66 acre-feet per day) to supply the extra contingent volume only if and when it is needed.

An assessment of hydrogeologic conditions and water use within the Santa Maria Valley Management Area (SMVMA) is conducted on an annual basis. The most recent report was released in 2018 and provided data for 2017 water demands in the SMVMA (Luhdorff, 2018). This report found water demand for the SMVMA to be 122,650 acre-feet (AF) for 2017, 90 percent of which (111,125AF) was met by pumping groundwater from the Santa Maria Ground Water Basin. Groundwater supplied 100 percent of the agricultural demand (103,150 AF) and 41 percent of the municipal demand (19,500 AF), which included the Nipomo Mesa Management Area transfer.

The historical total water demand within the SMVMA increased from 80,000AF in the 1950’s to about 150,000AF in the 1990’s and continues to fluctuate between 100,000 and 150,000AF per year. 2017 demand was comparable to the last 15 years, which has ranged between 90,000 and 135,000AF per year. The primary uses of water in the SMVMA are for agricultural irrigation and for domestic and related municipal uses. The proposed Project, including installation of the natural gas pipeline, would use between 16 and 21 AF of fresh groundwater per year, plus an additional 4 acre-feet per year for oak tree replacement watering during the first few years. At a maximum consumption rate of 24.5 AF per year, the proposed Project is projected to use 0.020% of the current municipal and agricultural water demand for the SMVMA and less than 0.022% of the total current groundwater use for the SMVMA (municipal, agricultural and other).

Additionally, as discussed in Section 4.9.1.3, the most recent Groundwater Basins Status Report (October 14, 2014) published by the County Water Agency notes that the Santa Maria Groundwater Basin “is managed and not believed to be in a state of overdraft”. Therefore, this impact is considered less than significant (Class III).

### 4.9.4.2 Power Line Construction and Operation

**Surface Water**

- **Impact SGW-1:** A rupture or leak from oil production facilities, pipelines, or transport trucks has the potential to result in a substantial adverse effect on surface or groundwater quality.

  This impact addresses leaks from oil production facilities, pipelines, or transport trucks, and does not apply to the power line.

- **Impact SGW-2:** The proposed Project construction and routine operations have the potential to violate water quality standards or waste discharge requirements, or otherwise degrade water quality.

  Water quality impacts for the construction of the power line are similar to those of the oil field. There is a potential for the introduction of diesel fuel, gasoline, lubrication oil, hydraulic fluids, anti-freeze, transmission fluid, lubricating grease, trash and other items to surface waters during construction of the power line. Disturbance of soil during construction has the potential to reduce surface water quality through the
introduction of disturbed sediments into Cat Canyon, which would be crossed by the power line. Sediments could be deposited directly into Cat Canyon by construction, or be subsequently washed in by runoff from the disturbed areas. These impacts would be primarily controlled by compliance with existing regulations, adherence to the proposed SWPPP, and MM SGW-1 (Erosion-Control Plan).

During operations the power line will require little routine maintenance and little opportunity for contamination of surface waters. Leaks of fluids could occur from electrical transformers and these would be addressed through regulatory requirements to prevent and respond to hazardous materials accidental leaks and spills.

Due to regulatory requirements, Applicant-proposed AMM WATER-1, and MM SGW-1, surface water quality impacts due to construction and routine operations of the power line (Impact SGW-2) are considered less than significant (Class II).

**Impact SGW-3**: The proposed Project would place within a watercourse or flood hazard area structures which would impede or redirect flood flows, or otherwise alter the existing drainage pattern of the site or area, including through land disturbance or the alteration of the course of a stream or river, in a manner which would result in erosion, siltation, or mudflow.

The power line will include transmission towers consisting of tubular steel poles that may be placed within the floodplain of Cat Canyon. However, these poles, being less than 6 feet in diameter, will offer little obstruction to flow and will not be capable of substantially redirecting flows or altering drainage patterns. Some local scour could occur around the poles during a flood, which could locally disturb sediments, but this is expected to be a minor impact due to the small area affected. With the implementation of MM SGW-1 (Erosion and Sediment Control Plan), Impact SGW-3 would be less than significant for the power line (Class II).

**Impact SGW-4**: The proposed Project would increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site, create or contribute to runoff water which would exceed the capacity of existing or planned stormwater drainage systems, divert or obstruct flow in a manner that would induce or exacerbate flooding, or otherwise contribute to flood-related damage, on- or off-site.

The power line poles, being less than 6 feet in diameter, will offer negligible increase in impervious area and will not be capable of substantially increasing discharges or exacerbating flooding. With the implementation of MMs SGW-1 (Erosion and Sediment Control Plan) and SGW-2 (Flood Protection Plan), Impact SGW-4 would be less than significant for the power line (Class II).

**Groundwater**

**Impact SGW-5**: The proposed Project cyclic steam or steam flooding injected under pressure to enhance oil recovery in oil-bearing formations or injection of produced water/brine could adversely affect groundwater quality.

Construction of the 115-kV power line could result in groundwater contamination if construction-related spills of hazardous chemicals (fuel, oil, solvents) are not cleaned up quickly and allowed to percolate into the underlying aquifers. **Implementation of regulatory requirements to prevent and respond to accidental leaks and spills of hazardous chemicals, would reduce Impact SGW-5 to less than significant for power line construction.** No groundwater impacts would occur as a result of power line operations.
The proposed 115 kV power line is located within the Santa Maria Groundwater Basin. During construction, potable groundwater would only be utilized for dust abatement and compaction purposes, and fire prevention, if necessary. Daily fresh water usage during pole installation is anticipated to be very small (less than 500 gallons). The annual use is included in the proposed Project totals discussed in the Oil Field Redevelopment (Section 4.9.4.1) and is analyzed under Impact SGW-6 in Section 4.9.4.1.3 Construction and Routine Operations: Groundwater. At a maximum consumption rate of 24.5 AF per year, the proposed project is projected to use less than 2% of the current municipal and agricultural water demand for the SMVMA and less than 5% of the current groundwater use for the SMVMA.

Additionally, as discussed in Section 4.9.1.3, the most recent Groundwater Basins Status Report (October 14, 2014) published by the County Water Agency notes that the Santa Maria Groundwater Basin “is managed and not believed to be in a state of overdraft”. Therefore, Impact SGW-6 is considered less than significant (Class III).

4.9.4.3 Natural Gas Pipeline Construction and Operation

Surface Water

<table>
<thead>
<tr>
<th>Impact SGW-1: A rupture or leak from oil production facilities, pipelines, or transport trucks has the potential to result in a substantial adverse effect on surface or groundwater quality.</th>
</tr>
</thead>
</table>

This impact addresses leaks from oil production facilities, pipelines, or transport trucks, and does not apply to the natural gas pipeline.

<table>
<thead>
<tr>
<th>Impact SGW-2: The proposed Project construction and routine operations have the potential to violate water quality standards or waste discharge requirements, or otherwise degrade water quality.</th>
</tr>
</thead>
</table>

Water quality impacts for the construction of the natural gas pipeline are similar to those of the oil field. There is a potential for the introduction of diesel fuel, gasoline, lubrication oil, hydraulic fluids, anti-freeze, transmission fluid, lubricating grease, trash and other items to surface waters during construction of the pipeline. Disturbance of soil during construction has the potential to reduce surface water quality through the introduction of disturbed sediments into Cat Canyon, three tributaries to Cat Canyon, three tributaries of Bradley Canyon Creek, Quail Canyon Creek, Orcutt Creek, Graciosa Canyon Creek, and two tributaries to Graciosa Canyon Creek, which would be crossed by the pipeline. The Bradley Canyon tributaries at the crossing locations are currently impaired (Section 4.9.1.2) as are several downstream watercourses. Sediments could be deposited directly into these watercourses by construction, or be subsequently washed in by runoff from the disturbed areas. Directional drilling, slick bore, and jack-and-bore techniques for portions of the pipeline could result in the introduction of drilling slurry (bentonite drilling lubricant) to the stream through spills and release through fractures in the earth (frac-out). Drilling slurry would be subject to the requirements of the California Water Quality Control Board Central Coast Region Resolution No. R3-2014-0041 (General Waiver for Specific Types of Discharges - September 25, 2014).

Trench dewatering would be required if groundwater infiltrates the natural gas pipeline trench. If groundwater is encountered, it would be pumped into a temporary holding tank, such as a Baker tank, for analysis prior to being discharged in accordance with federal, State, and local regulations. Once permitted by the Regional Water Quality Control Board through the National Pollutant Discharge Elimination System (NPDES) permit process, potential discharge locations may include using the trench water as a means for...
dust control, fire prevention, and/or discharging the trench water overland in a well-vegetated area. All trench water would be discharged in a manner that controls the rate of discharge and minimizes erosion in accordance with applicable permits, Best Management Practices, and the proposed Project’s Stormwater Pollution Prevention Plan (SWPPP). The disposal of water from dewatering would be subject to waste discharge requirements (for instance State Water Resources Control Board Water Quality Order No. 2003-0003 Statewide General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality).

Up to 150,000 gallons of water would be required to test the natural gas pipeline. The actual volume of water would be dependent on the number of test sections and the sequence of the test. The natural gas pipeline would likely be divided into two to three test segments. Once the test has been completed on the first segment, the water would be transferred into the second segment of pipe. Once the second segment (or third if three segments are used) test has been completed, the water used would be analytically tested and discharged, as approved by the Regional Water Quality Control Board and landowners. All hydrostatic testing water would be discharged in a manner to minimize erosion and in accordance with all applicable permits and RWQCB waste discharge requirements.

SoCal Gas typically hydrostatic tests new natural gas pipelines using fresh water from nearby sources, such as a municipal water district supply (e.g. fire hydrants, etc.). Compatible municipal tertiary reclaimed water could also be used if a sufficient nearby source is available.

During operations the pipeline will require little routine maintenance and have little opportunity for contamination of surface waters. There could be a potential for rupture of the pipeline due to flood scour at stream crossings, potentially resulting in contamination from released natural gas. This potential would be controlled by compliance with MM SGW-2 (Flood Protection Plan).

Due to regulatory requirements and MM SGW-2, surface water quality impacts (Impact SGW-2) due to construction and routine operations of the natural gas pipeline are considered less than significant (Class II).

**Impact SGW-3:** The proposed Project would place within a watercourse or flood hazard area structures which would impede or redirect flood flows, or otherwise alter the existing drainage pattern of the site or area, including through land disturbance or the alteration of the course of a stream or river, in a manner which would result in erosion, siltation, or mudflow.

The natural gas pipeline will be constructed below ground with the ground surface restored to pre-construction conditions. There will be no potential for obstruction of flood flows except potentially during construction should flows be diverted by temporary mounds of earth. This impact is unlikely and compliance with the SWPPP and MM SGW-1 (Erosion and Sediment Control Plan) would ensure that Impact SGW-3 would be less than significant for the Natural Gas Pipeline (Class II).

**Impact SGW-4:** The proposed Project would increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site, create or contribute to runoff water which would exceed the capacity of existing or planned stormwater drainage systems, divert or obstruct flow in a manner that would induce or exacerbate flooding, or otherwise contribute to flood-related damage, on- or off-site.

The pipeline, being underground, will offer negligible increase in impervious area and no obstruction to flow and will not be capable of substantially increasing discharges or exacerbating flooding. With the
implementation of regulatory requirements for a SWPPP, Impact SGW-4 would be less than significant for the pipeline (Class II).

**Groundwater**

**Impact SGW-5**: The proposed Project cyclic steam or steam flooding injected under pressure to enhance oil recovery in oil-bearing formations or injection of produced water/brine could adversely affect groundwater quality.

Construction of the natural gas pipeline could result in groundwater contamination if construction-related spills of hazardous chemicals (fuel, oil, solvents) are not cleaned up quickly and allowed to percolate into the underlying aquifers. Implementation of regulatory requirements to prevent and respond to accidental leaks and spills of hazardous chemicals, would reduce Impact SGW-5 to less than significant for pipeline construction. No groundwater impacts would occur as a result of pipeline operations.

**Impact SGW-6**: Potential for the proposed Project’s fresh water usage to exceed the threshold of significance for the Santa Maria Groundwater Basin.

The proposed natural gas pipeline will be installed below the ground surface with a minimal soil cover of 5 feet (see Figures 2-20 and 2-21); however, pipeline installed via horizontal directional drill will be deeper (see Figures 2-21 and 2-22). The pipeline corridor is underlain by the Santa Maria Groundwater Basin, which is approximately 66.5 to 559.7 feet below ground surface (bgs) with an average depth of 234 feet (SCS Tracer, 2017) depending on location. During construction, groundwater would only be utilized for dust abatement and compaction purposes, and fire suppression if necessary. Daily fresh water usage during pipeline construction is forecasted at less than 500 gallons per day and additional 150,000 gallons of water would be required for hydrostatic testing. The total annual freshwater usage related to the pipeline construction is included in the proposed Project usage (Section 4.9.4.1) and is analyzed under Impact SGW-6 in Section 4.9.4.1.3 Construction and Routine Operations: Groundwater. At a consumption rate of 25 AF per year, the proposed project is projected to use less than 2% of the current municipal and agricultural water demand for the SMVMA and less than 5% of the current groundwater use for the SMVMA.

Additionally, as discussed in Section 4.9.1.3, the most recent Groundwater Basins Status Report (October 14, 2014) published by the County Water Agency notes that the Santa Maria Groundwater Basin “is managed and not believed to be in a state of overdraft”. Therefore, **Impact SGW-6 is considered less than significant (Class III)**.

### 4.9.5 Cumulative Effects

Cumulative projects are shown in Figure 3-1 and described in Section 3. If all cumulative projects are built, and including the East Cat Canyon Redevelopment Plan, there would be up to 760 new or enhanced oil wells, 15 steam generators, and 20.2 miles of natural gas pipeline constructed in the vicinity, in addition to those of the proposed Project (many would not be within the Cat Canyon Creek watershed), with the majority being enhanced recovery similar to the proposed Project. There would also be a variety of other projects (Table 3-2).

Two of the cumulative projects, ERG West Cat Canyon Revitalization Plan Project and PetroRock UCCB, are oil development projects similar to the proposed Project and are wholly or partially in the Cat Canyon Creek watershed. Four of the cumulative projects (Numbers 8, 15, 33 and 41 in Figure 3-1) drain to San Antonio Creek. Two of these (Numbers 8 and 15 in Figure 3-1) are oil and gas development projects. The rest of the cumulative projects drain to the Santa Maria River downstream of West Cat Canyon Creek.
Accidental Spills (Impact SGW-1). Cumulative oil enhancement and corresponding oil transport would result in a significant and unavoidable impact associated with an accidental oil, produced water, or other hazardous material spill. As discussed under Impact SGW-1, accidental spills and associated contaminated stormwater runoff, could affect onsite and/or offsite surface waters and groundwater, depending on the location and size of the spill. Unanticipated direct effects to jurisdictional surface water resources (e.g., drainages) and groundwater both in and outside of the development footprint could occur during the operations phase in the event of an accidental oil, produced water, or other hazardous material spill from proposed Project transport trucks, pipelines, or oil production facilities. Potential spills could result from seismic events, mechanical failure, structural failure, corrosion, or human error during operations. Spills and cleanup activities would potentially result in impacts to surface water resources, including sensitive CTS and CRLF breeding habitat (ponds). Even with the implementation of Mitigation Measure BIO-1, Emergency Response Plan, this cumulative impact is considered significant and unavoidable and the proposed Project’s contribution to this impact would be substantial.

Potential surface and groundwater cumulative impacts due to construction and routine operations include the following:

Water Quality Impacts (Impact SGW-2) are as described for the proposed Project, with an increased potential for impact due to the cumulatively higher development scenario and the larger land area disturbed.

Water quality could be adversely affected through:

- Introduction of diesel fuel, gasoline, lubrication oil, hydraulic fluids, anti-freeze, transmission fluid, lubricating grease, trash and other items during construction of new wells, buildings, roads and other infrastructure.
- Spills during on-site refueling and equipment maintenance activities, leaks from defective or poorly maintained equipment, spills of chemicals used in the construction or drilling process, blowouts, or improper disposal and containment of drilling mud during drilling of new wells.
- Spills of oil or produced water during the oil extraction and transmission process.
- Flooding or drainage across well pads and equipment leading to the transport of contaminants from the well pad to the stream channel.
- Rupture of pipelines buried beneath watercourses due to flood scour.

Construction of new wells, buildings and ancillary facilities will involve the use of heavy equipment to clear and grade. Disturbance of soil during construction has the potential to reduce surface water quality through the introduction of disturbed sediments into local streams or other water bodies. Sediments could be deposited directly into streams by construction, or be subsequently washed in by runoff from the disturbed areas.

Accidental spills or disposal of potentially harmful materials used during construction could occur because of on-site refueling and equipment maintenance activities, leaks from defective or poorly maintained equipment, or other construction-related activities. Examples of potential construction-related pollutants include diesel fuel, gasoline, lubrication oil, hydraulic fluids, anti-freeze, transmission fluid, lubricating grease, drilling mud, and trash. Pollutants could reach surface waters directly, be transported by runoff into a water body, or enter surface water through flooding of the well site. Beneficial uses of surface waters could be affected.
Well production activities have the potential for contamination of surface water, mainly through ongoing maintenance activities, with similar effects as construction, and through spills of oil, produced water and other fluids used in the operations process. Assuming one spill per year for every 130 oil wells, and including the proposed Project wells, approximately 6 spills per year could be expected, with a total spilled volume approximately 234 barrels per year. The proposed Project would contribute about 40 percent of that. These spills could induce water quality impacts to downstream beneficial uses. As most of the proposed wells are in upland areas, most spills would be in upland areas away from surface waters within developed well, equipment, and storage pads which include secondary containment.

Downstream water bodies and beneficial uses that could be cumulatively affected are the same as listed in Table 4.9-2.

Some of the proposed cumulative projects drain to Bradley Canyon Creek, Orcutt Creek, Green Valley Creek, or to the Santa Maria River, all of which are listed by the RWQCB as impaired.

Federal, State and local regulations protect surface water beneficial uses by requiring pollution-prevention Best Management Practices that have been effective in the past in preventing and mitigating adverse impacts. Further, the proposed Project includes substantial measures to reduce the impact on water quality (See Impact SGW-3 in Section 4.9.4). Therefore, the cumulative contribution of the proposed Project to area-wide surface water impacts would not be cumulatively considerable with implementation of required mitigation.

Erosion and siltation impacts (Impact SGW-3) would be similar to those for the proposed Project, with a higher potential for impact due to the construction of 760 new oil wells (including 296 for the proposed Project) as well as other development, including housing, as described in Table 3-2. Erosion and siltation impacts could occur primarily through ground disturbance associated with construction of up to 760 new oil and gas well pads, access roads, and other new infrastructure. Construction would disturb existing soils that would then be exposed to erosion or transport off site and into surface waters, or, in the case of construction in or near streams and floodplains, cause flow encroachments and alterations that could increase the potential or frequency of in-stream erosion which, in addition to causing siltation of waterways, could damage adjacent property or habitat. Erosion effects would be variable depending on terrain, with higher erosive potential in areas of steep terrain. Erosion could be an ongoing chronic problem on unprotected well pads and access roads after construction. The effect on erosion and siltation caused by the construction of new oil and gas wells and other infrastructure, as well as new ground disturbance at existing well pads could be substantial and is potentially significant.

Several of the new wells, particularly for the ERG West Cat Canyon Revitalization Plan Project, could be in flood hazard zones. Compliance with the California Construction General Permit, which would be required for the cumulative projects, would reduce the cumulative construction-related soil and erosion impact of Impact SGW-1 to less than significant.

The cumulative projects, depending on final mitigation, could contribute to long-term sedimentation impacts. This issue is addressed in the Santa Barbara County General Plan Land Use Element, which requires sediment basins, stabilization of cut and fill areas, prevention of erosion in drainage devices, retention of water runoff, and other grading requirements intended to reduce erosion. For the proposed Project, the required SWPPP, which includes plans and BMPs for erosion control and sediment control, including detention basins (also proposed for the ERG West Cat Canyon Revitalization Plan Project) addresses the issue of long-term erosion. Therefore, the proposed Project, with implementation of regulatory requirements and MM SGW-1, will not significantly contribute to cumulative erosion and siltation impacts.
Flooding impacts (Impact SGW-4) Induced flooding effects could occur through the development of new impervious areas, or clearing and grading for new well pads, equipment areas, paving, new buildings, and access roads that would increase the rate of runoff from the site. New well pads, access roads, other paved areas, and new building construction will locally increase runoff potential, but the overall effect on runoff volumes and peaks is expected to be minor and less than significant, particularly with Santa Barbara Requirements for minimizing impacts from increased runoff and not contributing to flood hazards. New impervious areas will be widely scattered and minor and, as is the case with the proposed Project, be a relatively small percentage of the overall watershed generating flood peaks. Given this relatively small area of new development, county requirements and the lack of substantial new impervious areas in comparison to the overall watershed area, the effect on downstream flooding and the capacity of downstream drainage systems should not be significant.

Some well pads in the and their associated infrastructure ERG West Cat Canyon Revitalization Plan Project may be in flood hazard areas or areas of local flooding, but the wells and other equipment that may be on the pads are not generally subject to high damage if flooded. Local flood diversions are possible, but these would be minor due to the small obstructions offered by the well equipment, and entirely confined within property owned and operated by the applicants. There is a potential for portions of pipelines buried beneath watercourses to be exposed by scour during flood flows, possibly leading to rupture of the pipeline and contamination of surface waters. Only one of the other cumulative projects, a housing development (#37 in Figure 3-1) may be in or near a floodplain. Compliance with Santa Barbara County regulations would reduce any potential flood impacts at that site.

Several of the cumulative projects are in an urbanized area and may locally increase impervious surfaces by 25%. County land use policies require retention of water runoff and that new development not contribute to flood hazards.

Groundwater Quality (Impact SGW-5). Within the Cat Canyon Oil Field, cyclic steam (steam flooding) is injected under pressure to a depth ranging from 2,300 to 3,000 bgs to enhance oil recovery in oil-bearing formations. Although the steam is injected in the deeper oil-bearing formations, an impact could occur if upward migration of the steam reaches the overlying fresh groundwater resources which in Cat Canyon occur at depths ranging from 66.5 to 559.7 feet below ground surface (bgs), 234 feet bgs average.

As proposed, the cumulative Cat Canyon Projects would use oil field wastewater or “produced water” to generate steam for injection. This produced water contains salts, sediment, hydrocarbons, and naturally occurring radioactive material (NORM). As proposed, prior to conversion to steam, the produced water would be treated to generate “filtered” water that would be converted to steam by the generators, and the steam would be transported to various wells via steam pipelines and manifolds for injection. The resultant wastewater or “brine” would be disposed of into disposal wells. Excess produced water not used for steam would also continue to be disposed of into existing disposal wells. Contamination by oil and produced water/brine could occur if failure of oil producing, steam injection, and/or disposal wells results in fluid migration into the groundwater zone.

Drilling and operation of 760 new wells within Cat Canyon could impact groundwater quality. All new wells are required to be constructed in accordance with DOGGR requirements for sealing within fresh groundwater aquifers extending below the base of fresh groundwater (see Figure 4.9-3). In addition, as with the proposed Project site, subsurface soil conditions between the deeper oil producing zones and shallower groundwater have the characteristics (confining shale, mudstone, siltstone, and/or sandstone) to minimize or possibly prohibit upward migration.
Produced oil, water, and gas could also migrate horizontally and vertically in the event well casings and cement seals are compromised. All well stimulation activities require a formal permit application to DOGGR that includes a radial analysis to ensure the geologic and hydraulic isolation of the oil and gas injection zone from nearby groundwater resources. Well casings, tubing, and cement seals shall be pressure tested at 125% of the maximum surface pressure prior to injection in accordance with DOGGR requirements. Pressure monitoring of the well annulus, tubing and casing during injection shall also comply with DOGGR requirements. Failure to achieve and maintain the required pressure thresholds will require corrective action before injection or the immediate shut-in of the well during injection, as well as notification of DOGGR and the RWQCB. Disposal wells that would be used for disposal of remaining produced water (not to be used for steam injection) and brine resulting from water filtration are also regulated by DOGGR through its UIC program. Acidizing occurs within the well tubing which is protected by multiple layers of steel and cement within the fresh water aquifer; once in the oil producing zone, the acid eventually neutralizes.

DOGGR regulatory requirements and Applicant-proposed AMM WATER-3 and MM SGW-3 would reduce the proposed Project’s contribution to cumulative impacts to groundwater quality to less than significant (Class II).

**Groundwater Usage (Impact SGW-6).** Cumulative groundwater usage for construction and operations for the proposed ERG, Aera, and PetroRock projects would be sourced from wells within the Santa Maria Groundwater Basin. Groundwater would be used for dust abatement (construction and operations) and domestic needs (restrooms and landscaping) during operations. Aera, being the largest of the three Cat Canyon projects, estimates maximum groundwater usage during operations, including well drilling of 24.5 acre-feet per year (see Table 4.9-5), resulting in 0.020% of the current municipal and agricultural water demand for the SMVMA. Therefore, if groundwater usage for all three Cat Canyon projects was the worst-case scenario of 25 acre-feet per year per project, Cat Canyon demand would be 0.060% of current municipal and agricultural water demand for the SMVMA. Since the Santa Maria Groundwater Basin is adjudicated and given the demand of Cat Canyon with respect to Santa Maria Groundwater Basin usage, cumulative groundwater usage is expected to remain less than significant (Class III), including the proposed Project’s contribution.

### 4.9.6 Mitigation Monitoring Program

<table>
<thead>
<tr>
<th>MM No.</th>
<th>MM Title</th>
<th>Monitoring/Reporting Action</th>
<th>Timing &amp; Method of Verification</th>
<th>Agency or County Responsibilities</th>
<th>Applicant Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGW-1</td>
<td>Erosion and Sediment Control Plan.</td>
<td>Develop and implement Erosion and Sediment Control plan.</td>
<td>Prior to, during and post-construction</td>
<td>County reviews and approves Plan, conducts site inspections, and reviews inspection reports to assure compliance with the Plan. County may require modifications or remedial action depending on the results of inspections.</td>
<td>Submit Erosion and Sediment Control Plan to County P&amp;D for review prior to issuance of Zoning Clearance. Implement Plan, including required inspections and reporting to the County on a schedule to be developed with P&amp;D. Perform regular maintenance and implement remedial actions as necessary.</td>
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</table>
## Table 4.9-5. Mitigation Monitoring and Reporting Plan

<table>
<thead>
<tr>
<th>MM No.</th>
<th>MM Title</th>
<th>Monitoring/Reporting Action</th>
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<th>Applicant Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGW-2</td>
<td>Flood Protection Plan.</td>
<td>Develop and implement Flood Protection Plan.</td>
<td>Prior to, during, and post-construction</td>
<td>County reviews and approves Flood Protection Plan. County reviews inspection reports to assure compliance with the Plan. County may require modifications or remedial action depending on the results of inspections.</td>
<td>Submit a Flood Protection Plan to the County for review prior to issuance of Zoning Clearance. Plan requirements shall be implemented in proposed Project design and during construction, including required inspections and reporting to the County on a schedule to be developed with the County. Perform regular maintenance and implement remedial actions as necessary.</td>
</tr>
<tr>
<td>SGW-3</td>
<td>Locate Abandoned Wells and Verify Abandonment Seals.</td>
<td>Records search to locate abandoned wells and verify seal integrity.</td>
<td>Prior to steam injection</td>
<td>County and DOGGR to review and approve results of research and seal integrity verification.</td>
<td>Develop and implement a review of seal integrity of all abandoned wells in West Cat Canyon Oil Field. Submit the results of research and seal integrity verification of abandoned wells to the County and DOGGR at least 60 days prior to steam injection.</td>
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</tbody>
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