incentives to avoid the unnecessary consumption of energy. One example of a program is the Green Power program, a component of the Green LA program, administered by Los Angeles Department of Water and Power (LADWP). Green power is electricity produced in an environmentally friendly manner, such as the sun, wind, and water, which are pollution free and natural. The Green Power for a Green LA program offers its customers voluntary access to green power. LADWP's residential Green Power program enables its customers to choose 100% renewable energy with 20% coming from new sources. Development is within expected growth levels and there is no reason to expect that the project will result in wasteful or unnecessary consumption of energy. This impact would be less than significant.

d) Would the project require or result in the construction of new sources of energy supplies or additional energy infrastructure capacity?

Development of the PDR and MDR lots would likely result in the construction of approximately 80 housing units. Because the lots are located in established residential communities, existing infrastructure would be available to the serve new development. Any modifications or improvements to existing energy infrastructure required to accommodate the project would be determined in consultation with the LADWP and SCG and would be subject to current installation charges. This impact would be less than significant. According to the Department of Water and Power, electricity is currently available to the surrounding residential properties, and the infrastructure for delivering electric power to the SCG lots is already in place. Existing electrical service capacity would be sufficient to accommodate development of the properties proposed for sale.

e) Would the project comply with adopted energy efficiency standards?

Efficiency measures outlined in California's 1998 Title 24 Building Energy Efficiency Standards could be implemented. Energy conservation measures will be the responsibility of the developers, owners and occupants of the MDR and PDR lots. There is no reason to expect that the project would not comply with adopted energy efficiency standards. This impact would be less than significant.

VII. GEOLOGY AND SOILS

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
VII. GEOLOGY AND SOILS—Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				

Issues (and Supporting Information Sources):		*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
i)	Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to Division of Mines and Geology Special Publication 42)	☐	☐	☒	☐
ii)	Strong seismic ground shaking?	☒	☐	☐	☐
iii)	Seismic-related ground failure, including liquefaction?	☐	☒	☐	☐
iv)	Landslides?	☐	☐	☒	☐
b)	Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c)	Be located on geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☒	☐	☐
d)	Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☒	☐	☐
e)	Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒
f)	Would underlying geology produce preferential pathways for trapped subsurface gases to migrate to the surface resulting in adverse conditions and substantial risk to future residents and customers of commercial establishments?	☒	☐	☐	☐

SUMMARY

The proposed project presents potentially significant geology-related impacts, some of which can be mitigated while others need additional study. Of significance are the effects on ground shaking to future residents and how the potential ground shaking would impact the integrity of the deep gas reservoir. Additionally, the underlying geology and its ability to promote upward vertical migration of gases from beneath the site is uncertain and may be considered a significant impact. An EIR will be prepared to consider these impacts in further detail.

IMPACTS ANALYSIS

Please see Appendix E for additional information of the geology and soils conditions in the PDR.

SALE AND DEVELOPMENT OF THE PLAYA DEL REY AND MARINA DEL REY LOTS

This impact analysis considers impacts related to the geologic and seismic hazards that could be affected by or affect the reasonably foreseeable future development of the 36 lots and PDRGSF area. Development of the site would attract more people to the project area thereby exposing more people to hazards related to seismicity and unstable soil and slope conditions. The proposed development can affect geology by reducing natural slope stability through construction grading or could lead to additional erosion and soil loss due to construction activities.

a.i) Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?

The closest active fault, the Newport-Inglewood fault, is located about six miles east of the proposed project site. No portion of the proposed project site is within an Earthquake Fault Hazard Zone delineated by the Alquist-Priolo Earthquake Fault Zoning Act. This means that the occurrences of fault rupture would be considerably less at the project site than areas adjacent to fault rupture zones (See Appendix E, *Geology and Soils Background Information*). As discussed in Appendix E, the low angle Elysian Park Thrust fault lies at least 8,000 to 10,000 feet beneath the storage zone and 14 miles from the project site. Geologist refers to this type of fault as a "blind thrust" because displacement on such a fault does not generate a surface expression of fault displacement known as surface fault rupture. However, there is a component inherent in thrust faulting that could trigger faulting on other potentially active, or active, faults in the immediate region.

The project site is located in a seismically active region of California and large earthquakes could occur during the life of the project. Development of the lots and subsequent long-term occupancy could expose an increased number of people and structures to the risks of injury and property loss caused by earthquakes. However, considering the proposed project location away from an active fault trace capable of surface displacement, the risk of damage or injury directly related to surface fault rupture is low and the impact is less than significant.

a.ii) Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?

The numerous active earthquake faults within 50 miles of the project area will continue to subject the southwestern Los Angeles Basin and the project area to strong seismic shaking during large earthquakes. Earthquakes are unavoidable and will occur throughout the useful life of the project. Earthquakes in the region could generate long duration ground shaking capable of causing injury and severe structural damage. The potential for activity on a blind thrust is possible and if it were to occur, the ground motion could be higher than

some buildings could tolerate. Earthquakes that generate strong ground shaking could trigger movement on other nearby fault zones.

The impact of the seismic motion to the former oil reservoir and PDRGSF area is uncertain considering that sudden changes in the underlying geology, such as bedrock fractures, could develop preferential gas migration to the surface, especially through unabandoned, abandoned, or unknown well casings. Historical information indicates that earthquakes can damage gas wells. Strong ground shaking can also damage exiting and abandoned oil and gas wells causing a conduit to open for gas to escape to the surface.

Future development of the 36 lots would require earthwork and geotechnical studies to assure adequate protection against seismic shaking. All construction would incorporate the 1997 Uniform Building Code that requires that all structural designs account for site-specific earthquake ground motion. Given the uncertainty surrounding the potential adverse effects of a major earthquake on the geology underlying the project site and the potential for upward migration of gases, this would be a potentially significant impact that will be considered and analyzed further in the EIR.

a.iii) Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?

Young dune sand and lagoon sediments underlie the MDR area over a shallow, tidally influenced groundwater table. This area is located in an area delineated by the State of California as a Seismic Hazard Zone for liquefaction. Liquefaction hazard at the PDR sites is low due to the location and underlying geology. The materials in this area, namely saturated sands and coarse grain lagoon sediments could fail and liquefy during a major earthquake. Areas within a designated Seismic Hazard Zone must undergo prescribed evaluation and mitigation prior to development. Given that a potential liquefaction hazard could directly impact the MDR development and that under most cases, liquefaction hazards can be mitigated, this would be considered less than significant once appropriate mitigation is implemented. This impact will be considered and analyzed further in the EIR.

a.iv) Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?

Slope failure can occur when construction grading, such as hillside cuts, alter natural slopes and reduce their stability. There are no significant slope stability concerns areas associated with the sale of the lots, however, slope stability may be an issue for some sites if they are eventually developed. Lots in Clusters 10, 11 and 12 contain slopes and could be susceptible to slope instability. The remaining lots are on relatively level ground. New construction will require geotechnical surveys that will recommend measures to prevent slope failure that could occur with or without a severe seismic shaking event. This is required for adjacent residential developments. Proper geotechnical investigations and analysis using standard geotechnical and geologic techniques specified in the Uniform

Building Code would reduce the potential for slope failures and ensure impacts are less than significant. Code-required measures are not considered mitigation.

b) Would the project result in substantial soil erosion or the loss of topsoil?

The shallow (within a few feet of the ground surface) soil, alluvium, and bedrock formations underlying the project will have varying susceptibility to soil erosion due to their unconsolidated nature and/or level of compaction. Running water and steep slopes are the primary components that trigger erosion of unprotected soil surfaces. The development of the properties in the southern portion of the project area will result in minor erosion-related impacts because this area is relatively flat and level. In the northeastern hilly areas, there is a potential for severe erosion if construction is concentrated on unprotected surfaces (i.e. bare surface soil).

The City and County of Los Angeles require site grading and earthmoving projects to comply with the Department of Public requirements and the procedures outlined in the County Hydrology Manual to avoid erosion and loss of topsoil. These requirements and procedures include the development of Best Management Practices to reduce erosion and sedimentation. As discussed in Appendix G, *Hydrology and Water Quality Background Information*, the NPDES permitting program, as implemented by the State of California, addresses measures to reduce sedimentation and erosion in storm water discharges for construction activities. Examples of protection measures include diversion dikes, silt fences, sediment traps or sediment basins, and mulching. Compliance with local grading codes, the NPDES process, and required runoff controls for construction, such as Best Management Practices, will minimize soil erosion in susceptible areas to less than significant.

c) Would the project be located on geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Liquefaction is discussed in (a.iii) above. Landslides are discussed in (a.iv), above. There is some limited potential for slope instability in natural slopes that could fail due to static or earthquake-induced forces. In other areas, development requiring new cut slopes, road building, grading of terraces could reduce the overall stability of natural slopes leading to slope failure. Slope failure is only a potential on lots within Clusters 10, 11, and 12. In addition, soil in the project area may be moderately to highly expansive and certain alluvial soils may be porous and subject to consolidation under building loads. Standard geotechnical design standards and practices, as contained in the 1997 Uniform Building Code, would compensate for adverse slope stability and soil conditions. Implementation of standard engineering practices and application of the 1997 UBC would reduce to less than significant impacts related to existing weak or collapsible soils or slope instability conditions caused by development. Ground subsidence that causes large areas of the ground surface to settle beyond what a building can tolerate is not anticipated under this

proposed project. These potential impacts would be less than significant with mitigation and will be evaluated further in the EIR.

d) Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?

See c) above. There may be portions of the development area that could contain expansive soils. Adverse effects due to expansive soils, such as those that could damage a building foundation or road, can be overcome by adequate investigation and engineering design. For this reason, expansive soils would be less than significant assuming properly implemented mitigation. The EIR will evaluate this issue further.

e) Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

New development would be required to tie into the municipal sewer and therefore would not require septic systems. Therefore, there would be no impact.

f) Would underlying geology produce preferential pathways for trapped subsurface gases to migrate to the surface resulting in adverse conditions and substantial risk to future residents and customers of commercial establishments?

The information presented in Appendix F *(Geology and Soils Background Information*) and Appendix G (*Hazards and Hazardous Materials Background Information*) provides information and data regarding the possibility of subsurface gas leakage from several different sources.[5] Subsurface gas can reach the surface through man-made conduits such as existing wells or through natural pathways caused by the underlying geology.

Man-made structures that could potentially transmit subsurface gas include old, oil and gas wells that were abandoned prior to DOGGR regulations, undocumented gas monitoring wells, dry holes, water extraction and monitoring wells, and oil and gas wells recently abandoned under DOGGR permit regulations. Once penetrated, a poorly constructed or abandoned well can serve as a conduit for upward migration of natural gas. Such conduits can develop as old wells deteriorate (over the 70 years); even when proper construction and abandonment methods have been applied. One potential pathway for gas migration is through the materials (construction debris, telephone poles) that were used to abandon wells and dry holes during the development and operation of the Playa Del Rey Oilfield in the 1930s and 1940s. Gas can also migrate to the surface through concrete seals and

5 The three types of gas that may exist within the geological and soil units underlying the project area are processed natural gas (or piped gas), biogenic (or swamp) gas, and thermogenic (field) gas. Biogenic gas is primarily methane with carbon dioxide and sulfide gases resulting from decomposition of organic material in former lagoon deposits or other sources. Thermogenic gas is generated at depth, when increased temperatures and pressures alter organic material. It includes a broad range of gas components (methane, propane, butane, ethane, etc.). In contrast, processed natural gas is primarily methane remaining from thermogenic gas after most of the heavier gas components are removed (usually less than 0.1% heavy thermogenic hydrocarbons).

around casings of existing gas wells due to inadequate or deteriorating concrete seals, casing corrosion, fluctuating gas pressures and high temperatures. Once a well is abandoned, the casing is blocked making it impossible to determine well integrity by intrusion. Air and soil gas sampling are reliable methods to determine the integrity of an abandoned well. DOGGR has established guidelines for well abandonment, which includes development restrictions for areas where test data shows abandoned wells may be leaking, i.e. methane is detected in air samples.

Natural subsurface geology can contribute to upward gas migration through faults, permeable alluvial deposits, fault planes, structural discontinuities (fractures and joints) and aquifers. Earthquakes from the various southern California faults in the project vicinity can damage well seals or casings at depths generating new preferential pathways that lead to gas leakage. Gas from shallow sources can also migrate through younger geologic sediments that have permeable horizons and zones. However, in general, geologic pathways are relatively compacted in the shallow and storage zones because fractures, faults, and spaces between individual grains are reduced due to the weight of the overburden rock materials. Previous geologic studies conducted by SCG, DOGGR, the U.S. Geological Survey (USGS), and the California Geological Survey (CGS) indicate that faults are present in the PDRGSF area. However, the information and reports do not present conclusive evidence that active faults (those that have been active in the last 11,000 years) capable of surface rupture pass through the project vicinity. The Compton "Blind Trust" fault passes beneath the site but at depths greater than 20,000 feet. Blind thrust faults, although not expected to cause surface rupture, could cause ground shaking capable of causing well damage. No faults are reported to cut through the Storage Zone. The Charnock fault is considered potentially active (documented activity in the past 1.6 million years) and crosses the northeastern edge of the PDRGSF. Other smaller faults and fracture systems are inferred in various units of the Storage Zone within the Playa del Rey Field.

SCG reported incidents and the ETI (2000) soil gas survey results suggest the possible presence of migration pathways from the gas storage reservoir to the ground surface. This indicates that migration pathways may also be present elsewhere in the area of influence of the PDRGSF. Those pathways of greatest immediate concern are man-made: abandoned wells, which provide conduits for rapid vertical migration of gas to the surface. Natural (geologic) pathways may also transmit gas, but more slowly with the possibility of creating more regional surface gas problems.

Potential adverse project impacts are associated with exposure of people and structures to accumulation of subsurface soil gas in residential areas as a result of the proposed development. Although this potential currently exists, proposed development may expose more people and property to soil gas leakage if it were to occur through man-made structures, existing geologic structure, or as a result of a seismic event. A field study is currently underway to collect additional data on the potential of subsurface gas leakage. This is a potentially significant impact and will be considered and analyzed further in the EIR