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5.11 Soils

This section describes the potential effects of the construction and operation of the Alamitos Energy Center (AEC) on soil resources and is organized as follows: Section 5.11.1 describes the environmental setting, including soil types and their use; Section 5.11.2 presents the environmental analysis of project development; Section 5.11.3 discusses cumulative effects; Section 5.11.4 presents mitigation measures; Section 5.11.5 presents the laws, ordinances, regulations, and standards (LORS) applicable to soils and their use; Section 5.11.6 provides agency contacts for involved agencies; and Section 5.11.7 describes permits required for the project. Section 5.11.8 provides the references used to develop this section.

5.11.1 Setting and Affected Environment

AES Southland Development, LLC (AES-SLD) proposes to construct, own, and operate the AEC—a natural-gas-fired, air-cooled, combined-cycle, electrical generating facility in Long Beach, Los Angeles County, California. The proposed AEC will have a net generating capacity of 1,936 megawatts (MW) and gross generating capacity of 1,995 MW.[1] The AEC will replace and be constructed on the site of the existing Alamitos Generating Station.

The AEC will consist of four 3-on-1 combined-cycle gas turbine power blocks with twelve natural-gas-fired combustion turbine generators, twelve heat recovery steam generators, four steam turbine generators, four air-cooled condensers, and related ancillary equipment. The AEC will use air-cooled condensers for cooling, completely eliminating the existing ocean water once-through-cooling system. The AEC will use potable water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing Alamitos Generating Station has historically used. This water will be supplied through existing onsite potable water lines.

The AEC will interconnect to the existing Southern California Edison 230-kilovolt switchyard adjacent to the north side of the property. Natural gas will be supplied to the AEC via the existing offsite 30-inch-diameter pipeline owned and operated by Southern California Gas Company that currently serves the Alamitos Generating Station. Existing water treatment facilities, emergency services, and administration and maintenance buildings will be reused for the AEC. The AEC will require relocation of the natural gas metering facilities and construction of a new natural gas compressor building within the existing Alamitos Generating Station site footprint. Stormwater will be discharged to two retention basins and then ultimately to the San Gabriel River via existing stormwater outfalls.

The AEC will include a new 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system and will eliminate the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. The project may also require upgrading approximately 4,000 feet of the existing offsite LBWD sewer line downstream of the first point of interconnection, therefore, this possible offsite improvement to the LBWD system is also analyzed in this AFC. The total length of the new pipeline (1,000 feet) and the upgraded pipeline (4,000 feet) is approximately 5,000 feet.

To provide fast-starting and stopping, flexible generating resources, the AEC will be configured and deployed as a multi-stage generating (MSG) facility. The MSG configuration will allow the AEC to generate power across a wide and flexible operating range. The AEC can serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates (30 percent per minute when operating above minimum gas turbine turndown capacity). As California's intermittent renewable energy portfolio continues to grow, operating in either load following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an

[1] Referenced to site ambient average temperature conditions of 65.3 degrees Fahrenheit (°F) dry bulb and 62.7°F wet bulb temperature without evaporative cooler operation.

increased importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate of the MSG configuration employed at the AEC.

By using proven combined-cycle technology, the AEC can also run as a baseload facility, if needed, providing greater reliability to meet resource adequacy needs for the southern California electrical system. As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability. The AEC will be able to provide system stability by providing reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By being in the load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable.

The AEC's combustion turbines and associated equipment will include the use of best available control technology to limit emissions of criteria pollutants and hazardous air pollutants. By being able to deliver flexible operating characteristics across a wide range of generating capacity, at a relatively consistent and superior heat rate, the AEC will help lower the overall greenhouse gas emissions resulting from electrical generation in southern California and allow for smoother integration of intermittent renewable resources.

Existing Alamitos Generating Station Units 1–6 are currently in operation. All six operating units and retired Unit 7 will be demolished as part of the proposed project. Construction and demolition activities at the project site are anticipated to last 139 months, from first quarter 2016 until third quarter 2027. The project will commence with the demolition of retired Unit 7 and other ancillary structures to make room for the construction of AEC Blocks 1 and 2. The demolition of Unit 7 will commence in the first quarter of 2016. The construction of Block 1 is scheduled to commence in the third quarter of 2016 and construction of Block 2 is scheduled to commence in the fourth quarter of 2016. The demolition of existing Units 5 and 6 will make space for the construction of AEC Block 3. AEC Block 3 construction is scheduled to commence in the first quarter of 2020 and will be completed in the second quarter of 2022. The demolition of existing Units 3 and 4 will make space for the construction of AEC Block 4. AEC Block 4 construction is scheduled to commence in the second quarter of 2023 and will be completed in the fourth quarter of 2025. The demolition of remaining existing units is scheduled to commence in the third quarter of 2025.

Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site. The adjacent 10-acre laydown area will be shared with another project being developed by the Applicant (Huntington Beach Energy Project [HBEP] 12-AFC-02). Due to the timing for commencement of construction for these two projects, the adjacent laydown area will already be in use for equipment storage before AEC construction begins.

The AEC is located on alluvial soils that were overlain by construction fill during construction of the Alamitos Generating Station. This fill was graded to a nearly level condition prior to construction. Fill at the site was characterized as generally consisting of loose to medium dense, sandy silt and fine-grained sand with silt and clay, reaching to a depth of 6 to 9 feet (Ninyo & Moore, 2011). The fill is underlain by alluvial soils. It is expected that these fill soils were compacted during construction of the Alamitos Generating Station to provide a suitable surface for construction.

Natural Resources Conservation Service (NRCS) soils information was used as a baseline for the determination of soil erosion potential because of the variability of fill at the project site. While site-specific Soil Survey Geographic (SSURGO) Database data were not available for this area of Los Angeles County, a description of the native soils in the project area was developed using the online U.S. General Soil Map for California (STATSGO2; NRCS, 2006). Although STATSGO2 general soil map information is most often used for evaluations on a regional scale, it was used in this evaluation because it was the best-available NRCS soils information for the AEC site.

A single soil association was mapped for the entire project area, as shown in Figure 5.11-1: the s1026–Urban Land-Sorrento-Hanford Association. Soil characteristics for this association, which could be potentially affected by AEC construction activities, are summarized in Table 5.11-1. Because the STATSGO2 database did not contain tabular data for the AEC area, soil characteristics were developed primarily from the online official series description for the Sorrento and Hanford series (Soil Survey Staff, 2013).

Table 5.11-1 summarizes depth, texture, drainage, permeability, water runoff, and items related to revegetation potential. Soil conditions in the project area may differ from what is described because of variables such as previous grading, excavations, and fill during construction of the existing facilities on the site.

TABLE 5.11-1
Soil Mapping Unit Description and Characteristics

Map Unit	Description	
Project Site – US General Soil Map for California		
s1026	**Urban Land-Sorrento-Hanford Association:**	
	This soil unit underlies the entire AEC site, offsite process water/sanitary wastewater pipeline, and the surrounding areas	
	Urban Land:	
	Given the heavily developed nature of the AEC, offsite sewer line, and the surrounding area, it is expected that local soil conditions are primarily “Urban Land.” Urban land is not associated with specific soil characteristics due to the developed nature and high variability from imported fill and historical mixing with local soil materials.	
	Sorrento series:	
	Formation:	Formed in alluvium from sedimentary rocks; located on alluvial fans and stabilized floodplains
	Typical profile:	Heavy loam over sandy loam and loamy fine sand
	Shrink-swell capacity:	Moderate
	Depth and drainage:	Very deep (>60 inches); well drained
	Permeability:	Moderate to moderately slow
	Runoff:	Negligible to medium
	Taxonomic class:	Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls
	Hanford series:	
	Formation:	Formed in moderately coarse textured alluvium derived from granite; located on stream bottoms, floodplains, and alluvial fans
	Typical profile:	Fine sandy loam over fine sandy loam and sandy loam
	Shrink-swell capacity:	Negligible
	Depth and drainage:	Very deep (>60 inches); well drained
	Permeability:	Moderately rapid
	Runoff:	Negligible to low
	Taxonomic class:	Coarse loamy, mixed, superactive, nonacid, thermic Typic Xerorthents

Note: Soil characteristics are based on soil mapping descriptions provided in the online Official Soil Series Descriptions (Soil Survey Staff, 2013) and the online U.S. General Soil Map for California (STATSGO2; NRCS, 2006).

5.11.1.1 Agricultural Use

Based on a review of land use designations, windshield surveys in the surrounding areas, and recent aerial photography, no agricultural production occurs within 1 mile of the AEC site.[2] According to the Phase 1 ESA (EMS, 2013), at least a portion of the property may have been in agriculture prior to the site being developed as a power generating facility in the 1950s. Since that time, the area has been zoned and developed for industrial, commercial, and urban residential uses.

2 A small section of land designated as Unique Farmland occurs within the study area located approximately 0.6 mile northeast of the site within the city of Seal Beach. This Unique Farmland is a community garden managed by the City’s Community Services Department within the Edison Park & Gardens with plots available to residents of Seal Beach.

Undeveloped areas occur immediately to the west and south of the AEC site; however, they are also zoned for non-agricultural uses and would likely to be unsuitable for commercial crop production. The area to the west and southwest of the AEC contains the Los Cerritos Wetlands. The Los Cerritos Wetlands are generally undeveloped, although infrastructure for oil extraction exists (gravel roads and oil derricks). Given the current and historical land uses, the AEC site and the undeveloped areas near the AEC site are likely unsuitable for commercial crop production.

5.11.1.2 Wetlands

Based on the previously developed nature of the AEC area, no wetlands or waters of the U.S. are present within the AEC site. Areas south and west of the AEC site are within the Los Cerritos Wetland Complex; this area is the focus of restoration work. Wetland features are further discussed in Section 5.2, Biological Resources.

5.11.1.3 Soil Mapping Units

Table 5.11-1 describes the properties of the soil mapping units that are found in the project vicinity. As shown in Figure 5.11-1, the entire region is mapped as Urban Land-Sorrento-Hanford association (s1026). These soils formed on floodplains and alluvial fans, and consist of fine sandy loam or heavy loam over sandy loam (Soil Survey Staff, 2013).

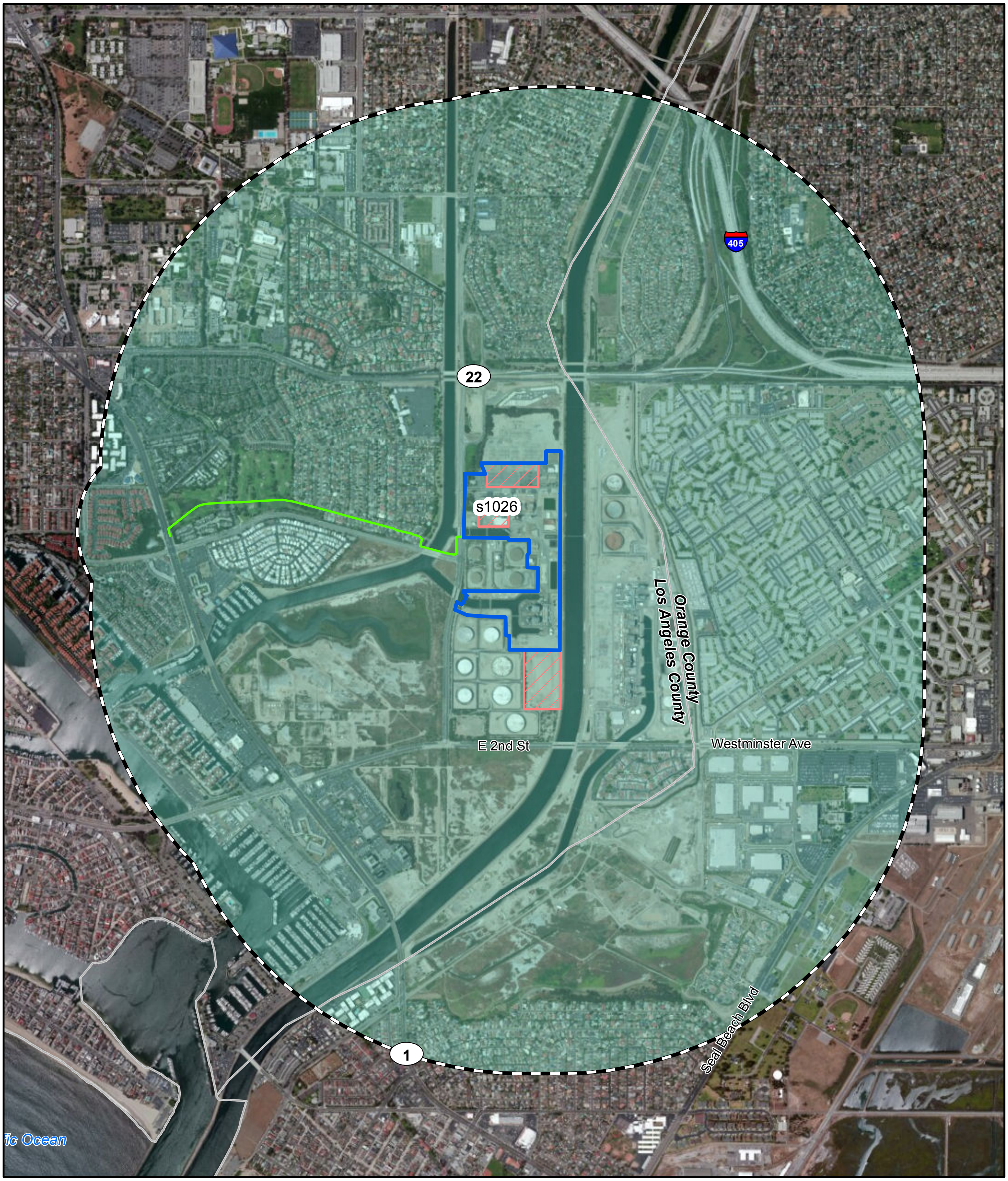
5.11.1.4 Potential for Soil Loss and Erosion

The following factors affect potential soil loss: steep slopes, lack of vegetation, and erodible soils composed of large proportions of silt and fine sands. The AEC site has been previously developed and was graded to a nearly level condition to facilitate that development. The soil at the site was compacted during prior development and due to industrial use at the site. Newly disturbed soils will be compacted to withstand most erosion-inducing rainfall. Any erosion from the site will drain internally (and settle in the onsite retention basins). The negligible slopes at the project site are not expected to result in an increase in soil loss.

In general, the soils at the project site are characterized as fill are underlain by alluvial deposits (Ninyo & Moore, 2011). The fill was characterized as generally consisting of loose to medium dense, sandy silt and fine-grained sand with silt and clay to a depth of 6 to 9 feet below ground surface (Ninyo & Moore, 2011). Construction fill is commonly used to achieve an adequate degree of compaction beneath buildings and other facilities when local materials cannot provide suitable bearing properties. Sandy soils tend to have poor cohesion and are more susceptible to erosion from surface runoff than soils containing higher proportions of clay (Ninyo & Moore, 2011). However, given the nearly level topography, low runoff potential, and highly developed nature of this area, erosion risk on the site is relatively low. Without best management practices, uncovered or excavated soils within the AEC site would have a relatively high potential for wind erosion if fill materials contain a significant proportion of fine-grained sands.

5.11.1.5 Other Significant Soil Characteristics

Corrosive Soils—Preliminary geotechnical laboratory testing of limited soils samples indicated that the site contains soils that are corrosive to concrete and metals (Ninyo & Moore, 2011). Corrosive soil conditions may cause premature deterioration to underground structures, foundations, and pipelines. Consistent with industry standards and practices, specific measures to reduce the potential effects of corrosive soils such as epoxy and metallic protective coatings, the use of alternative (corrosion resistant) materials, and selection of the appropriate type of cement and water/cement ratio will be incorporated into the design of the project. Specific measures to reduce the potential effects of corrosive soils would be developed in the detailed design phase.



Legend

Property Boundary

Process/Sanitary Wastewater Pipeline

County Boundary

s1026 - Urban Land-Sorrento-Hanford

Source: U.S. Department of Agriculture, Natural Resources Conservation Service, 2006

0 1,000 2,000 Feet

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FIGURE 5.11-1
Soil Types Within Project Area
Alamitos Energy Center
Long Beach, California

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Expansive Soils—Preliminary geotechnical investigations indicated that the site is underlain by sandy silt and fine-grained sand with silt and clay. These soils are considered to be low to moderately expansive. A site-specific investigation into soil expansiveness at the locations of facility improvements will be conducted during the design phase of the project to account for the potential effects of expansive soils (Ninyo & Moore, 2011). Typical mitigation measures to deal with expansive soils include removal of near-surface expansive soils and replacement with low-expansive material during construction, or designing project improvements to resist the effects of expansive soils.

Soil Contamination—As discussed in more detail in Section 5.15, Waste Management, according to the *Phase I Environmental Site Assessment for the Alamitos Electrical Power Plant* (EMS, 2013), there are areas of potential soil contamination on the site resulting from historical agricultural land use, above- and below-ground storage tanks, historical and current chemical use on the site. Consistent with the California Energy Commission's (CEC) practices for other approved projects, the potential for recognizing and dealing with contaminated soils and groundwater will be addressed in a contingency plan post-certification. This contingency plan will describe potential soil contamination hazards onsite (locations, expected concentrations, monitoring, and testing requirements) and provide guidance for soil handling during intrusive activities if contamination is discovered. The contingency plan will provide guidelines for monitoring soil disturbance and removal activities taking place within suspected contamination areas and will contain recommendations for health and safety requirements to protect workers at the site.

5.11.2 Environmental Analysis

The following sections describe the potential environmental effects on soils during project construction, demolition, and operation.

5.11.2.1 Significance Criteria

Appendix G of the California Environmental Quality Act (CEQA) is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to make a determination as to whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects, but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of potential effects on soils, Appendix G, asks, in part, whether the project would:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use? (Appendix G, Section II(a).)
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use? (Appendix G, Section II(e).)
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means? (Appendix G, Section IV(c).)
- Result in substantial soil erosion or the loss of topsoil? (Appendix G, Section VI(b).)
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (International Code Council, 1997), creating substantial risks to life or property. (Appendix G, Section VI(d).)

The following sections describe the anticipated environmental impacts on agricultural production and soils during project construction and operation.

5.11.2.2 Farmland Conversion

The AEC site is not located on or near any farmland and is not located within or near any areas zoned for agricultural use or areas having a Williamson Act contract. The project will not result in the conversion of any agricultural land to a non-agricultural use. Similarly, the AEC project will not involve other changes in the existing environment that due to their location or nature could result in conversion of farmland to non-agricultural use or conversion of forest land to non-forest use.

5.11.2.3 Jurisdictional Wetlands

Based on the previously developed nature of the AEC area, there are no wetlands or waters of the U.S. present within the AEC site. Therefore, the project will not directly affect wetlands that could be regulated as wetlands or waters of the U.S. or State. The regulatory status of wetland issues, if applicable, is discussed in Section 5.2, Biological Resources.

5.11.2.4 Soil Erosion during Construction and Demolition

Potential impacts on soil resources during AEC demolition and construction can include increased soil erosion, sediment transport, and soil compaction. Soil erosion causes the loss of topsoil and can increase the sediment load in surface water bodies near the construction site. The magnitude, extent, and duration of construction/demolition-related impacts depend on the erodibility of the soil; the proximity of the construction activity to the receiving water; and the construction methods, duration, and season.

Because conditions that could lead to excessive soil erosion via water are not present at the AEC site, relatively little soil erosion from rain events is expected during the construction and demolition periods. Additionally, best management practices (BMP) will be implemented during AEC construction and demolition in accordance with a site-specific Stormwater Pollution Prevention Plan (SWPPP) that will be prepared to comply with the National Pollutant Discharge Elimination System general construction stormwater permit required under the Clean Water Act (CWA) for all construction projects over one acre in size. The CEC also requires project owners to develop and implement a drainage, erosion, and sediment control plan (DESCP) to reduce the impact of runoff from the construction site. Monitoring will involve inspections to ensure that the BMPs described in the SWPPP/DESCP are properly implemented and effective. Therefore, impacts from soil erosion via water during construction and demolition activities are expected to be less than significant.

The sandy loam and loamy soils of the Urban Land–Sorrento-Hanford Association could potentially have a high wind erosion potential, as could the sandy silt and fine-grained sand fill materials, especially if no BMPs are utilized to minimize it. Wind erosion potential would be highest when very fine sandy materials are left exposed; however, the presence of compacted fill would be expected to reduce the overall potential for wind erosion in these soils. As described previously, BMPs will be implemented to minimize the amount of soil loss due to erosion. Estimates of erosion by water and wind are provided in the following sections.

5.11.2.4.1 Water Erosion

An estimate of soil loss by water erosion during AEC construction and demolition activities is provided in Table 5.11-2. Detailed calculations and assumptions for the soil loss estimates are provided in Appendix 5.11A. This estimate was developed using the Revised Universal Soil Loss Equation (RUSLE2) program using the following assumptions:

- The project site is approximately 63 acres and includes 8 acres of onsite paved laydown area and approximately 10 acres of paved or graveled offsite laydown immediately adjacent to the southern boundary of the AEC. The project site includes 17.2 acres of existing facility equipment for the Alamitos Generating Station.

- Construction and demolition activities at the project site are anticipated to last 139 months, from first quarter 2016 until third quarter 2027. The project will commence with the demolition of retired Unit 7 and other ancillary structures to make room for the construction of AEC Blocks 1 and 2. The demolition of Unit 7 will commence in the first quarter of 2016. The construction of Block 1 is scheduled to commence in the third quarter of 2016 and construction of Block 2 is scheduled to commence in the fourth quarter of 2016. The demolition of existing Units 5 and 6 will make space for the construction of AEC Block 3. AEC Block 3 construction is scheduled to commence in the first quarter of 2020 and will be completed in the second quarter of 2022. The demolition of existing Units 3 and 4 will make space for the construction of AEC Block 4. AEC Block 4 construction is scheduled to commence in the second quarter of 2023 and will be completed in the fourth quarter of 2025. The demolition of remaining existing units is scheduled to commence in the third quarter of 2025.
- It is assumed that, on average, approximately 20 percent of the affected area may be exposed during the demolition period.
- AEC construction will take place after site grading. Construction will occur in stages, and is estimated to take 93 months to complete. It is assumed that, on average, approximately 50 percent of the affected area may be exposed during the construction period.
- Two laydown areas have been identified onsite, one on the north side of the property, and the second around the existing maintenance building to the south, for a total of 8 acres. Both areas are currently paved and will not be graded or disturbed during demolition or construction.
- One offsite laydown area has been identified adjacent to the southern boundary of the AEC site. The adjacent 10-acre laydown area will be shared with another project being developed by the Applicant (Huntington Beach Energy Project [HBEP] 12-AFC-02). Due to the timing for commencement of construction for these two projects, the adjacent laydown area will already be in use for equipment storage before AEC construction begins, and will be previously graded and graveled prior to AEC construction. No grading or additional soil disturbance will occur at the offsite laydown area during AEC activities.
- Estimates of soil loss (in tons) were made using the Hanford sandy loam profile as a template. The Hanford sandy loam was chosen because of the two named soil units within the s1026 association, the Hanford sandy loam had a more conservative estimate of soil erosion than the Sorrento clay loam, and is similar to the reported texture of the fill material that comprises the top 6 to 9 feet of soils throughout most if not all of the site. Estimates of soil loss from these soils were obtained using information for the Hanford sandy loam map unit in the Soil Survey of Orange County and Western Riverside County (NRCS, 2005)
- RUSLE2 rainfall erosivity conditions were estimated for the AEC site using the site-specific rainfall estimate for the 2-year, 6-hour storm from online National Weather Service data (NOAA, 2011).
- A 100-foot slope length was assumed for all soil units. The median of each soil unit slope class was used for the RUSLE2 calculations. For this project, an average slope of 0.5 percent was assumed.

Soil losses are estimated using the following RUSLE2 conditions:

- **Construction and demolition** soil losses were approximated using Management as “bare ground, smooth surface”; Contouring: Rows up and down hill; Diversion/terracing: None; and Strips and Barriers: None.
- **Active grading** soil losses were approximated using Management as “bare ground, rough surface”; Contouring: Rows up and down hill; Diversion/terracing: None; and Strips and Barriers: None.

- **Construction** soil losses with implementation of construction BMPs was approximated using Management as "Silt fence"; Contouring: Perfect contouring, no row grade; Diversion/terracing: None; and Strips and Barriers: two silt fences, one at end of slope.
- A **'No Project'** soil loss estimate was also approximated using Management as "Dense grass – not harvested"; Contouring: Rows up and down hill; Diversion/terracing: None; and Strips and Barriers: None.

TABLE 5.11-2
Estimated Soil Loss During Construction/Demolition from Water Erosion

			Estimates Using the Revised Universal Soil Loss Equation		
Feature (acreage)	**Activity**	**Duration (months)**	**Soil Loss (tons) without BMPs**	**Soil Loss (tons) with BMPs**	**Soil Loss (tons/yr) No Project**
Alamitos Generating Station Demolition (17.2 acres total)	Demolition				
	Units 1 & 2	24	0.89	0.03	0.003
	Units 3 & 4	24	1.9	0.05	0.006
	Units 5 & 6	24	1.7	0.05	0.005
	Unit 7	8	0.36	0.01	0.003
	Total Demolition	**80**	**4.9**	**0.14**	**0.017**
AEC Construction (24.1 acres total)	Grading (all areas)	6	20.5	0.14	0.118
	Construction				
	Power Blocks 1 & 2	33	14.4	0.41	0.063
	Power Block 3	30	5.3	0.15	0.026
	Power Block 4	30	5.9	0.17	0.029
	Total Construction	**93**	**25.7**	**0.73**	**0.118**
Offsite Process/Sanitary Wastewater Pipeline (8.0 acres for construction, 0.46 acres for trench)	Grading	2	0.13	0.02	0.002
	Construction	4	1.08	0.03	—
Project Soil Loss Estimates	All activities listed above	139	52.2	1.05	0.26

Notes:

Soil losses (tons/acre/year) are estimated using RUSLE2 software available online at http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Program.htm.

- The soil characteristics were estimated using RUSLE2 soil characteristics for the Hanford sandy loam, which had a more conservative estimate of erosion-potential than Sorrento.
- Soil loss (R-factors) was estimated using 2-year, 6-hour point precipitation frequency amount for the AEC site. Online at http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca].
- Estimates of actual soil losses use the RUSLE2 soil loss multiplied by the duration and the affected area. The No Project Alternative estimate does not have a specific duration so loss is given as tons/year.

With the implementation of appropriate BMPs required under the National Pollutant Discharge Elimination System (NPDES) permit, SWPPP, and DESCP and as described in Section 5.11.4, the total estimated project soil loss of 1.05 ton is considered to be a minimal amount and would not constitute a significant impact. It also should be recognized that the estimate of accelerated soil loss by water is very conservative (that is, tends to overestimate soil loss) because it assumes only a single BMP (silt fencing), whereas the SWPPP will include multiple soil erosion and sediment control measures, including utilization of existing retention basins.

5.11.2.4.2 Wind Erosion

The potential for wind erosion of surface material was estimated by calculating the total suspended particulates (TSP) that could be emitted as a result of grading and the wind erosion of exposed soil. The total site area and grading duration were multiplied by emission factors to estimate the TSP matter emitted from the site. Fugitive dust from site grading was calculated using the default particulate matter less than 10 microns in equivalent diameter (PM_{10}) emission factor used in URBEMIS2002 (Jones and Stokes Associates, 2003) and the ratio of 0.5 fugitive TSP to PM_{10} published by the South Coast Air Quality Management District (SCAQMD, 1993). Fugitive dust resulting from the wind erosion of exposed soil was calculated using the emission factor in AP-42 (U.S. Environmental Protection Agency, 1995).

Table 5.11-3 summarizes the TSP emission estimates for the project site from grading and the wind erosion of exposed soil during the grading and construction phases. Without mitigation, the maximum predicted wind erosion from the project site is estimated at 30.94 tons over the course of AEC construction and the Alamitos Generating Station demolition. This estimate; however, is reduced to approximately 10.83 tons by implementing basic mitigation measures such as water application (see Section 5.11.4). These estimates are conservative because they make use of emission rates for a generalized soil rather than site-specific soil properties. With implementation of BMPs and mitigation measures described in Section 5.11.4, the amount of wind erosion should be significantly less than estimated amounts; therefore, the expected impacts of soil erosion from wind are considered to be less than significant.

TABLE 5.11-3
Estimated Soil Loss from Grading and Wind Erosion

Emission Source	Acreage	Duration (months)	Unmitigated TSP (tons)	Mitigated TSP (tons)
Grading Dust:				
Alamitos Generating Station Demolition	3.4	0	0.000	0.000
AES Construction	12.0	6	15.90	5.56
Offsite Process and Sanitary Wastewater Pipeline	0.5	2	0.20	0.07
Wind Blown Dust:				
Alamitos Generating Station Demolition	3.4	80	2.28	0.80
AES Construction	12.0	93	12.06	4.22
Offsite Process and Sanitary Wastewater Pipeline	4.0	4	0.51	0.18
Total		**60**	**30.94**	**10.83**

Note: Assumptions for these calculations are provided in Appendix 5.11A.

5.11.2.5 Expansive Soils

Soils at the AEC site were found to be predominantly composed of sandy silt and fine-grained sand with silt and clay. These soils are considered to be low to moderately expansive (Ninyo & Moore, 2011). Consistent with the CEC's practices for other approved projects, the site-specific potential for expansive soils and site-specific recommendations addressing such soils at the AEC will be developed post-certification and incorporated into the project's detailed design phase. With the information presented in this AFC, the site-specific geotechnical evaluation during detailed design and the design recommendations for expansive soils, the presence of expansive soils is not expected to create a substantial risk to life or property. For this reason, the potential for an adverse impact related to expansive soils is considered to be less-than-significant.

5.11.2.6 Erosion of or Exposure to Contaminated Soil Materials during Construction and Operation

Certain areas of the AEC site have been identified as having the potential for soil contamination based on previous activities and spills. Consistent with the CEC's practices for other approved projects, a contingency plan to recognize and manage contaminated soil will be developed during detailed design to provide guidelines for activities that may result in contact with or disturbance of the soil. The types of activities that will be covered by the contingency plan include:

- Soil excavation activities that require a grading permit
- Soil removal or relocation activities if the volume of soil removed or relocated will be greater than 50 cubic yards
- Soil removal activities where soils will be transported offsite

Possible contaminants at the site include agricultural chemicals, oil, gas, jet fuel, metals, volatile organic compounds (VOC), 1,4-dioxane, polychlorinated biphenyl, and asbestos.

Additional site requirements will be outlined in the contingency plan and may include requiring health and safety training and certifications (such as Hazardous Waste Operations and Emergency Response Standards or HAZWOPER) for onsite workers. It may also require other risk mitigations such as additional site security and access restrictions, dust control, personal protective equipment requirements, air monitoring, decontamination procedures, soil transport requirements, and others.

Significant excavation activities are not expected during demolition of the existing Alamitos Generating Station because subsurface facilities are expected to be abandoned in place. Therefore, mitigation measures implemented during construction will be sufficient to protect workers and the public from exposure to potentially contaminated soil.

AEC operation will have no effects on soils; therefore, impacts related to exposure to contaminated soils during project operation are less than significant.

5.11.2.7 Compaction during Construction

Construction of the AEC will result in soil compaction during the construction of foundations and paved roadway and parking areas. Soil compaction increases soil density by reducing soil pore space. Compaction also reduces the ability of the soil to absorb precipitation and transmit gases for respiration of soil microfauna. Soil compaction can result in increased runoff, erosion, and sedimentation. The incorporation of BMPs, in accordance with the SWPPP/DESCP guidelines, during AEC construction will reduce the adverse impacts due to soil compaction to a less-than-significant level.

The AEC will be constructed in a previously developed industrial area that was previously compacted as part of its historical development. Because the AEC site will be repaved or otherwise protected during and after construction, the overall anticipated effects of compaction during construction are considered to be less than significant.

5.11.2.8 Effects of Emissions on Soil-Vegetation Systems

Air emissions from the combustion turbine exhaust stacks include but are not limited to nitrogen oxides (NO_x), and particulates (PM_{10}). Nitrogen oxide gases (NO and NO_2) convert to nitrate particulates in a form that is suitable for uptake by most plants and could promote plant growth and primary productivity. The majority of the area surrounding the AEC is urban or industrial land; the addition of small amounts of nitrogen to these areas would be insignificant. Within the more vegetated residential areas, the addition of small amounts of nitrogen would be insignificant within the context of existing ambient air quality, fertilizers, herbicides, and pesticides likely used by homeowners.

Therefore, with shutdown of the existing Alamitos Generating Station and the use of inherently low sulfur natural gas, best combustion practices, emission controls, and monitoring, which will be incorporated into the AEC design and are described in detail in Section 5.1, Air Quality, impacts from AEC operating emissions of NO_x, sulfur dioxide, carbon monoxide, VOCs, and particulates (PM_{10}, and $PM_{2.5}$) will be less than significant. Additional discussion regarding potential nitrogen deposition is provided in Section 5.2, Biological Resources.

5.11.2.9 Spoils Disposal and Fill Procurement

Onsite cut and fill are anticipated to be balanced during construction. Disposal of soil spoils are expected to be minimal, and will be disposed of appropriately. It is anticipated that any required fill will come from the project site; however, as needed, any imported fill will be purchased and transported from commercial suppliers in the local project vicinity.

5.11.3 Cumulative Effects

A cumulative impact refers to a proposed project's incremental effect considered together with other closely related past, present, and reasonably foreseeable future projects, whose impacts may compound or increase the incremental effect of the proposed project (Public Resources Code §21083; 14 California Code of Regulations §15064(h), 15065(c), 15130, and 15355). Section 15355 of the CEQA Guidelines defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Subsection b of Section 15355 states, in part, that "The cumulative impact *from several projects* is the change in the environment which results from *the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects*." (Emphasis added.) Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an Environmental Impact Report is required to discuss cumulative impacts when the project's incremental effect is "cumulatively considerable." Section 15065(a)(3) then defines "cumulatively considerable" as meaning "that the incremental effects of an individual project are significant when viewed in connection with the effects of *other* closely related past projects, the effects of *other* current projects and the effects of probable *future* projects." (Emphasis added.) The soil conditions associated with the AEC site are reported to have only a slight water erosion hazard. Given the previous industrial development of the soils in the project area, construction fills are already expected to be relatively compact and stable. Furthermore, by applying construction BMPs that are typically required as part of the permitting process, it is expected that the effect on soils of the combined demolition and construction activities will be minimal.

During AEC operation, periodic maintenance activities will not result in ground disturbance, therefore, soil impacts associated with AEC operation will be negligible and less than significant.

As previously described, the AEC will have no effect on agriculture because no agricultural uses occur nearby. The AEC's effects on soil erosion, sedimentation, and compaction will also be minor to negligible, and are not considered to be significant, particularly with the application of onsite BMPs. The AEC site and surrounding area are already developed for urban and industrial uses. Further development is not expected to contribute significantly to soil loss and erosion. Therefore, the potential for cumulative impacts of the AEC combined with other projects would be low.

5.11.4 Mitigation Measures

Erosion control BMPs developed in accordance with the SWPPP/DESCP will be used to minimize erosion at the site during AEC construction and demolition activities. These erosion-control measures are required to maintain water quality, protect property from erosion damage, and prevent accelerated soil erosion or dust generation that destroys soil productivity and soil capacity. Typically, these measures include mulching, physical stabilization, dust suppression, berms, ditches, and sediment barriers. Water erosion and sedimentation will be mitigated through the use of surface protections and sediment barriers, and wind erosion potential will be reduced significantly by keeping soil moist or by covering and/or hydroseeding soil stockpiles. Upon completion of AEC construction and demolition activities, land surfaces will be permanently stabilized. The AEC site will be paved or covered with structures or pervious ground cover (for example, gravel or landscape). Therefore, with implementation of appropriate BMPs, soil erosion losses resulting from AEC construction and demolition activities are expected to be less than significant.

5.11.4.1 Temporary Erosion Control Measures

Erosion control BMPs will be implemented during construction in accordance with the SWPPP required by the State's General Construction Permit for all construction projects over 1 acre in size which discharge to the nation's waters. Additionally, the CEC typically requires that project owners develop and implement a DESCP to reduce the impact of runoff from the construction site. To facilitate compliance-related activities, the project owner should be given the option to combine the DESCP with the SWPPP into a single document.

Temporary erosion control measures required for the SWPPP and DESCP will be implemented before construction begins, and will be evaluated and maintained during AEC construction. These measures typically include but are not limited to: revegetation, mulching, physical stabilization, dust suppression, berms, ditches, and sediment barriers. These measures will be removed from the site at the completion of the project.

Sediment barriers, which slow runoff and trap sediment, will be incorporated as discussed below. Sediment barriers include straw bales, sand bags, straw wattles, and silt fences. These features are generally placed below disturbed areas, at the base of exposed slopes, and along streets and property lines below the disturbed area. Sediment barriers are often placed around sensitive areas to prevent contamination by sediment-laden water near areas such as wetlands, creeks, or storm drains.

The AEC will be constructed on relatively level ground; therefore, it is not considered necessary to place sediment barriers around the entire project boundary. However, barriers may be placed in locations where offsite drainage could occur to prevent sediment from leaving the site. If used, sediment barriers will be properly installed (staked and keyed), then removed or used as mulch after construction. Runoff detention basins, drainage diversions, and other large-scale sediment traps are likely not necessary because of the AEC site's small size, level topography, and surrounding paved areas. Sediment barriers will be installed around the base of soil stockpiles, and stockpiles will be stabilized and covered.

During project-related construction and demolition activities, dust erosion control measures will be implemented to minimize the wind-blown loss of soil from the site. Water of a quality equal to or better than existing surface runoff will be sprayed on the soil in construction areas to control dust prior to completion of permanent control measures.

Mitigation measures, such as watering exposed surfaces, are used to reduce PM_{10} emissions during construction activities. The PM_{10} reduction efficiencies are taken from the SCAQMD CEQA Handbook (1993) and were used to estimate the effectiveness of the mitigation measures. Table 5.11-4 summarizes the mitigation measures and PM_{10} reduction efficiencies.

TABLE 5.11-4
Mitigation Measures for Fugitive Dust Emissions

Mitigation Measure	PM_{10} Emission Reduction Efficiency (%)
Water active sites at least twice daily	34–68
Enclose, cover, water twice daily, or apply non-toxic soil binders, according to manufacturer's specifications, to exposed piles (gravel, sand, dirt) with 5 percent or greater silt content	30–74

Source: SCAQMD CEQA Handbook, Table 11-4 (1993)

5.11.4.2 Permanent Erosion Control Measures

Permanent erosion-control measures on the AEC site will include gravel, paving, landscaping, and drainage systems.

5.11.4.3 Geotechnical Soil Investigation

A preliminary geotechnical soil investigation was conducted to evaluate the engineering characteristics of project site soils and determine remedial measures to address impacts related to soil properties. Recommendations provided in the geotechnical report will be followed on a site-specific basis in detailed design to mitigate potential impacts related to compressible, expansive, and corrosive soils. The preliminary geotechnical report is provided in Appendix 5.4A. A final geotechnical investigation will be conducted to support final design.

5.11.5 Laws, Ordinances, Regulations, and Standards

Federal, state, county, and local LORS applicable to soils are discussed below and summarized in Table 5.11-5. LORS specifically applicable to soil contamination are discussed in Section 5.5, Hazardous Materials Management.

TABLE 5.11-5
Laws, Ordinances, Regulations, and Standards for Soils

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
Federal Water Pollution Control Act of 1972, Clean Water Act of 1977 (including 1977 amendments)	Regulates stormwater and non-storm water discharges from construction and industrial activities	Regional Water Quality Control Board (RWQCB), Los Angeles Region (4) and State Water Resources Control Board (SWRCB).	Section 5.11.5.1.1
Natural Resources Conservation Service (1983), *National Engineering Handbook*, Sections 2 and 3	Standards for soil conservation	Natural Resources Conservation Service	Section 5.11.5.1.2
State			
Porter-Cologne Water Quality Control Act	Regulates discharges to waste to state waters and to land	RWQCB, Los Angeles Region (4) and SWRCB.	Section 5.11.5.2.1
Table 18-1-B of the Uniform Building Code (International Code Council, 1997)	Sets standards for defining expansive soils	CEC	Section 5.11.5.2.2
Local			
City of Long Beach Municipal Code Title 18, Chapter 18.40.010, Adoption	Adopts and incorporates by reference all applicable provisions of the 2010 Edition of the California Building Code,	City of Long Beach Department of Development Services	Section 5.11.5.3.1
City of Long Beach Municipal Code Title 18, Chapter 18.0**4,** Permits	Requirements for building permits, grading permits, demolition permits	City of Long Beach Department of Development Services	Section 5.11.5.3.1
City of Long Beach Municipal Code Title 18, Chapter 18.61, NPDES and Standard Urban Storm Water Mitigation Plan (SUSMP) Regulations	Provide regulations and requirements of the NPDES permit issued to the City of Long Beach, and the subsequent requirements of the SUSMP, mandated by the California RWQCB, Los Angeles region.	City of Long Beach Department of Development Services	Section 5.11.5.3.1

5.11.5.1 Federal LORS

5.11.5.1.1 Federal Clean Water Act

The 1972 Amendments to the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act, establish requirements for discharges of stormwater or wastewater from any point source that would affect the beneficial uses of waters of the United States. Section 402 of the CWA effectively prohibits discharges of stormwater from construction sites unless the discharge is in compliance with an NPDES permit. The SWRCB is the permitting authority in California and has adopted a statewide general permit for stormwater discharges associated with construction activity (General Construction Permit; SWRCB, 2009) that applies to most projects resulting in one or more acres of soil disturbance. The proposed project is within the San Gabriel River watershed and would result in disturbance of more than one acre of soil. Therefore, the project would need to be covered under the General Construction Permit and develop and implement a site-specific SWPPP to meet permit requirements. Requirements are described in greater detail in Section 5.15, Water Resources.

5.11.5.1.2 U.S. Department of Agriculture Engineering Standards

Sections 2 and 3 of the U.S. Department of Agriculture, NRCS National Engineering Handbook (NRCS, 1983) provides standards for soil conservation during planning, design, and construction activities. Adherence to these standards during AEC construction will reduce soil erosion from grading and construction activities.

5.11.5.2 State LORS

5.11.5.2.1 California Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (California Water Code, Division 7) provides for overall regulation under state law of water quality affecting all state waters, including both surface waters and groundwater. Under the Porter-Cologne Water Quality Control Act, the SWRCB has the ultimate authority over water quality policy, and nine RWQCB oversee water quality on a day-to-day basis at the local/regional level. The Los Angeles RWQCB controls surface water discharges in the AEC area, and the project would need to meet water quality standards that are identified in the Water Quality Control Plan (Basin Plan) for this region.

5.11.5.2.2 Uniform Building Code

Table 18-1-B of the Uniform Building Code (International Code Council, 1997) defines the criteria for expansive soils. Building code regulations and enforcement have been adopted and incorporated into the City of Long Beach Municipal Code (LBMC). The project would be subject to the requirements of the LBMC.

5.11.5.3 Local LORS

The City of Long Beach Municipal Code includes requirements for grading permits, including exceptions (Ch. 18.04), and outlines the documents required to accompany a permit application (Ch. 18.05).

The City of Long Beach Municipal Code (Ch. 18.61) notes that any construction activity that will disturb more than one acre of soil is subject to the General Construction Activities Stormwater Permit, approved by the SWRCB (5-7.216) (also referred to as the Construction General Permit). Construction plans for sites with more than 1 acre of soil disturbance are required to include construction activity BMPs and erosion and sediment control BMPs. In addition, a SWPPP is required to be submitted to the City, and shall include appropriate construction site BMPs. Sites with more than 5 acres of soil require a SWPPP to be submitted to the City and the RWQCB.

5.11.6 Agencies and Agency Contacts

Applicable permits and agency contacts for soils are listed in Table 5.11-6.

TABLE 5.11-6
Permits and Agency Contacts for Soils

Issue	Agency	Agency Contact
Grading Permit	City of Long Beach Department of Development Services	Truong Huynh, Engineering Officer Building and Safety Bureau City of Long Beach Development Services (562) 570-6921 Truong.Huynh@longbeach.gov
National Pollution Discharge Elimination System Construction Activities Stormwater General Permit	Los Angeles RWQCB	Not Applicable (submit Notice of Intent online using Stormwater Multiple Application and Report Tracking System [SMARTS])

5.11.7 Permits and Permit Schedule

The CEC has exclusive jurisdiction to issue local permits as necessary, including an equivalent to a local grading permit. Therefore, no soil-related permits beyond the CEC license are required. Stormwater-related permits, i.e., the NPDES permit, are evaluated in other sections of this document (See Section 5.15, Water Resources).

5.11.8 References

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