5.11 Soils

This section describes the potential effects of the construction and operation of Mariposa Energy Project (MEP) on soil resources and is organized as follows: Section 5.11.1 describes the affected environment, including soil types and their use; Section 5.11.2 provides an environmental analysis of the 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; Section 5.11.7 describes the required permits; and Section 5.11.8 provides the references used to develop this section.

5.11.1 Affected Environment

MEP is in unincorporated Alameda County, approximately 5.5 miles southeast of the town of Byron, 6.9 miles south of the town of Discovery Bay, and 9.8 miles northwest of the city of Tracy. MEP is located on an approximately 10-acre portion of a 158-acre parcel (known as the Lee Property) south of the Pacific Gas and Electric Company (PG&E) Bethany Compressor Station and 230-kilovolt (kV) Kelso Substation. The proposed power plant site is in the southern portion of the parcel, between two small hills. The site is accessed via Bruns Road. The southern portion of the property, including the project site, contains remnants of a historical wind turbine development that has been mostly removed except for a few foundations and minor debris.

Much of the land in the immediate area of the MEP site is in open space or grazing. Agricultural fields exist in the area, with the closest located approximately 0.7 miles to the east of the project site. Agricultural fields also exist approximately 1.4 miles to the north of the proposed project site, along the proposed water supply line route. These fields have been graded for irrigation and could support production of tomatoes, alfalfa, or some other crop. They were barren during the time of the site visits. Several utility-related facilities are within 1 mile of the MEP site, including the 6.5-MW Byron Power Cogen Plant adjacent to the site on the same parcel, and the PG&E Bethany Compressor Station and 230-kV Kelso Substation directly to the north.

The MEP construction laydown and parking area will be located east of the proposed project site, and will be approximately 5 acres. Two access roads (one to the north and one to the south) will be used to move between the project site and the laydown area. Additionally, the current access road between the project site and Bruns Road will be upgraded. Natural gas and electric transmission interconnections will be less than 0.5 miles from the proposed project site. The new gas line will run approximately 580 feet northeast on the property to the point of interconnection with PG&E's high pressure gas line. The 0.7-mile electrical transmission line connection would run north, across Kelso Road to the Kelso Substation. A small laydown area (0.6 acre) just north of Kelso Road will be used during construction of the electrical transmission line. MEP service water will be provided via a new pipeline connection to the Byron Bethany Irrigation District (BBID) canal placed within and along the east side of Bruns Road. Another laydown area (1.0 acre) near the corner of Bruns Road and Bethany Lane will be utilized during the construction of the new water supply pipeline. A portion of the water line and associated laydown area are located outside

Alameda County, in Contra Costa County. Sanitary discharges will be handled with an onsite septic system; no offsite sanitary sewer line is required.

A description of the soils in the project area (Figure 5.11-1) was developed using the online Soil Survey of Alameda Area, California (USDA-Natural Resources Conservation Service [USDA-NRCS], 2008a) and Soil Survey of Contra Costa County, California (USDA-NRCS, 2008b). Descriptions of the soil mapping units were developed from the soil survey and the online soil series descriptions (Soil Survey Staff, 2009).

Soil map units for the project area are identified on Figure 5.11-1. Soil map unit characteristics for the area potentially affected by MEP construction are summarized in Table 5.11-1. The project area falls within two soil survey areas (i.e., two counties); however, within the project area, the map units shared between the two surveys are identical. The names of both sets of map units are given in Table 5.11-1 for clarity and ease of future comparison. The project area includes the MEP site, linear features (electrical transmission line, natural gas pipeline, water supply pipeline, and access road), and the construction parking and laydown areas. The table summarizes soil depth, texture, drainage, permeability, water runoff, and items related to revegetation potential. Actual soil conditions in the project area could differ from what is described in the generalized soil descriptions because of the potential for local grading in this previously disturbed area.

TABLE 5.11-1
Soil Mapping Unit Descriptions and Characteristics

Map Unit	Description	
AaC	**Altamont clay, 3 to 15 percent slopes:**	
	Portions of the project site, project laydown area and access road, natural gas pipeline, and electrical transmission line cross this soil unit.	
	Parent Material:	Residuum weathered from sandstone and shale
	Typical profile:	0 to 28 inches: clay 25 to 50 inches: clay, silty clay 50 to 54 inches: weathered bedrock
	Shrink-swell capacity:	High
	Depth and drainage:	40 to 60 inches to paralithic bedrock; well drained
	Permeability:	Slow
	Runoff:	Medium to very high
	Farmland Class:	Farmland of Statewide Importance
	Storie Index:	Grade 4, Poor
	Capability class:	3e irrigated, 4e nonirrigated
	Taxonomic class:	Fine, smectitic, thermic Aridic Haploxererts

TABLE 5.11-1
Soil Mapping Unit Descriptions and Characteristics

Map Unit	Description	
LaC	**Linne clay loam, 3 to 15 percent slopes:**	
	A portion of the water supply pipeline crosses this soil unit.	
	Parent Material:	Residuum weathered from sandstone and shale
	Typical profile:	0 to 36 inches: clay loam 36 to 40 inches: weathered bedrock
	Shrink-swell capacity:	Moderate
	Depth and drainage:	20 to 40 inches to paralithic bedrock; well drained
	Permeability:	Moderately slow
	Runoff:	Medium to very rapid
	Farmland Class:	Farmland of Statewide Importance
	Storie Index:	Grade 3, Fair
	Capability class:	3e irrigated; 4e nonirrigated
	Taxonomic class:	Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls
LaD	**Linne clay loam, 15 to 30 percent slopes:**	
	Portions of the water supply pipeline and site access road cross this soil unit.	
	Parent Material:	Residuum weathered from sandstone and shale
	Typical profile:	0 to 36 inches: clay loam 36 to 40 inches: weathered bedrock
	Shrink-swell capacity:	Moderate
	Depth and drainage:	20 to 40 inches to paralithic bedrock; well drained
	Permeability:	Moderately slow
	Runoff:	Medium to very rapid
	Farmland Class:	None
	Storie Index:	Grade 3, Fair
	Capability class:	4e
	Taxonomic class:	Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls
LbDcc	**Linne clay loam, 5 to 15 percent slopes:**	
	A portion of the water supply pipeline crosses this soil unit.	
	Parent Material:	Residuum weathered from calcareous shale and/or sandstone
	Typical profile:	0 to 29 inches: clay loam 29 to 33 inches: weathered bedrock
	Shrink-swell capacity:	Moderate
	Depth and drainage:	20 to 40 inches to paralithic bedrock; well drained
	Permeability:	Moderately slow
	Runoff:	Medium to very rapid
	Farmland Class:	Farmland of Statewide Importance
	Storie Index:	Grade 3, Fair
	Capability class:	3e irrigated; 4e nonirrigated
	Taxonomic class:	Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls

TABLE 5.11-1
Soil Mapping Unit Descriptions and Characteristics

Map Unit	Description
RdB	**Rincon clay loam, 3 to 7 percent slopes:** Most of the project site falls within this soil unit. Parent Material: Alluvium derived from sandstone and shale Typical profile: 0 to 16 inches: clay loam 16 to 52 inches: sandy clay 52 to 60 inches: stratified sandy loam to clay loam Shrink-swell capacity: High Depth and drainage: Very deep; well drained Permeability: Slow Runoff: Slow to rapid Farmland Class: Prime Farmland if irrigated Storie Index: Grade 1, Excellent Capability class: 2e irrigated; 4e nonirrigated Taxonomic class: Fine, smectitic, thermic, Mollic Haploxeralfs
Sa	**San Ysidro loam, 0 to 2 percent slopes:** Portions of the project site, site access road, natural gas pipeline, electrical transmission line, and water supply pipeline cross this soil unit. Parent Material: Alluvium from sedimentary rocks Typical profile: 0 to 16 inches: loam 16 to 34 inches: clay 34 to 60 inches: silty clay loam Shrink-swell capacity: High Depth and drainage: Very deep; moderately well drained Permeability: Very slow Runoff: Slow to medium Farmland Class: None Storie Index: Grade 1, Excellent Capability class: 4s Taxonomic class: Fine, smectitic, thermic, Typic Palexeralfs
Sa/Sccc	**San Ysidro loam, 0 to 2 percent slopes:** Portions of the water supply line and water supply line laydown area fall within this soil unit. Parent Material: Alluvium derived from sedimentary rock Typical profile: 0 to 15 inches: loam 15 to 54 inches: clay 54 to 80 inches: silty clay loam Shrink-swell capacity: High Depth and drainage: Very deep; moderately well drained Permeability: Very slow Runoff: Slow to medium Farmland Class: None Storie Index: Grade 1, Excellent Capability class: 4s Taxonomic class: Fine, smectitic, thermic, Typic Palexeralfs

TABLE 5.11-1
Soil Mapping Unit Descriptions and Characteristics

Map Unit	Description	
Sf/Sfaa	**Solano fine sandy loam, 0 to 2 percent slopes:**	
	Portions of the water supply pipeline, electrical transmission line, and transmission line laydown area fall within this soil unit.	
	Parent Material:	Alluvium derived from sandstone and shale
	Typical profile:	0 to 6 inches: fine sandy loam 6 to 60 inches: clay loam
	Shrink-swell capacity:	Moderate
	Depth and drainage:	Very deep; somewhat poorly drained
	Permeability:	Very slow
	Runoff:	Very slow or slow
	Farmland Class:	None
	Storie Index:	Grade 2, Good
	Capability class:	3w irrigated; 4w nonirrigated
	Taxonomic class:	Fine-loamy, mixed, superactive, thermic Typic Natrixeralfs

Soil descriptions provided above are limited to those soil units that could be affected by MEP. Other soil mapping units, which are well outside of the project area but shown on Figure 5.11-1, include the following: AaD – Altamont clay (15 to 30 percent slopes), ArD – Altamont rocky clay, moderately deep (7 to 30 percent slopes), Bb - Brentwood clay loam (0 to 2 percent slopes), LbEcc - Linne clay loam (15 to 30 percent slopes), RdA – Rincon clay loam (0 to 3 percent slopes), Sh - Solano loam (0 to 2 percent slopes), and W - Water.

5.11.1.1 Agricultural Use

The MEP site is in a part of Alameda County designated for Large Parcel Agriculture by the East County Area Plan (Alameda County, 2000). The MEP site is non-irrigated grazing land, portions of which were previously used for wind power generation. The MEP parcel is currently under a Williamson Act contract.

Agricultural land use within 1 mile of the site consists primarily of dryland pasture, with the closest irrigated crops approximately 0.7 miles east of the project site. Agricultural fields also exist approximately 1.4 miles north of the MEP site, along the water supply pipeline route.

5.11.1.2 Soil Mapping Units

Table 5.11-1 describes the properties of the soil mapping units found in the vicinity of the project site. As indicated, the soil mapping units in the project area vary from finer soils formed in residuum to coarser soils formed in alluvium. The finer soils are generally on residual hills, with the coarser soils formed in the more level areas in between the hills. The soils range from well drained in the upland rolling portions of the project area, to moderately well and somewhat poorly drained in the more level areas of the project area.

The project area soils have been previously disturbed. The project site contains remnants of previous wind turbine development, as well as buried natural gas pipelines that run through the project area (and under the proposed transmission line and water supply pipeline). Because the site and project area have previously been disturbed it is possible that soil conditions may vary slightly from those shown in the USDA-NRCS soil survey due to local grading.

As shown on Figure 5.11-1, most of the project site lies in mapping unit RdB - Rincon clay loam (3 to 7 percent slopes). The remainder of the project site lies in mapping units AaC - Altamont clay (3 to 15 percent slopes), LaD - Linne clay loam (15 to 30 percent slopes), and Sa - San Ysidro loam (0 to 2 percent slopes). The project site laydown area lies completely in mapping unit AaC, as do the access roads connecting the project site to the project site laydown area. The linear features (and associated laydown areas) cross soil map units AaC, LaD, Sa, LaC - Linne clay loam (3 to 15 percent slopes), LbDcc - Linne clay loam (5 to 15 percent slopes), Sccc - San Ysidro (0 to 2 percent slopes), and Sfaa - Solano fine sandy loam (0 to 2 percent slopes).

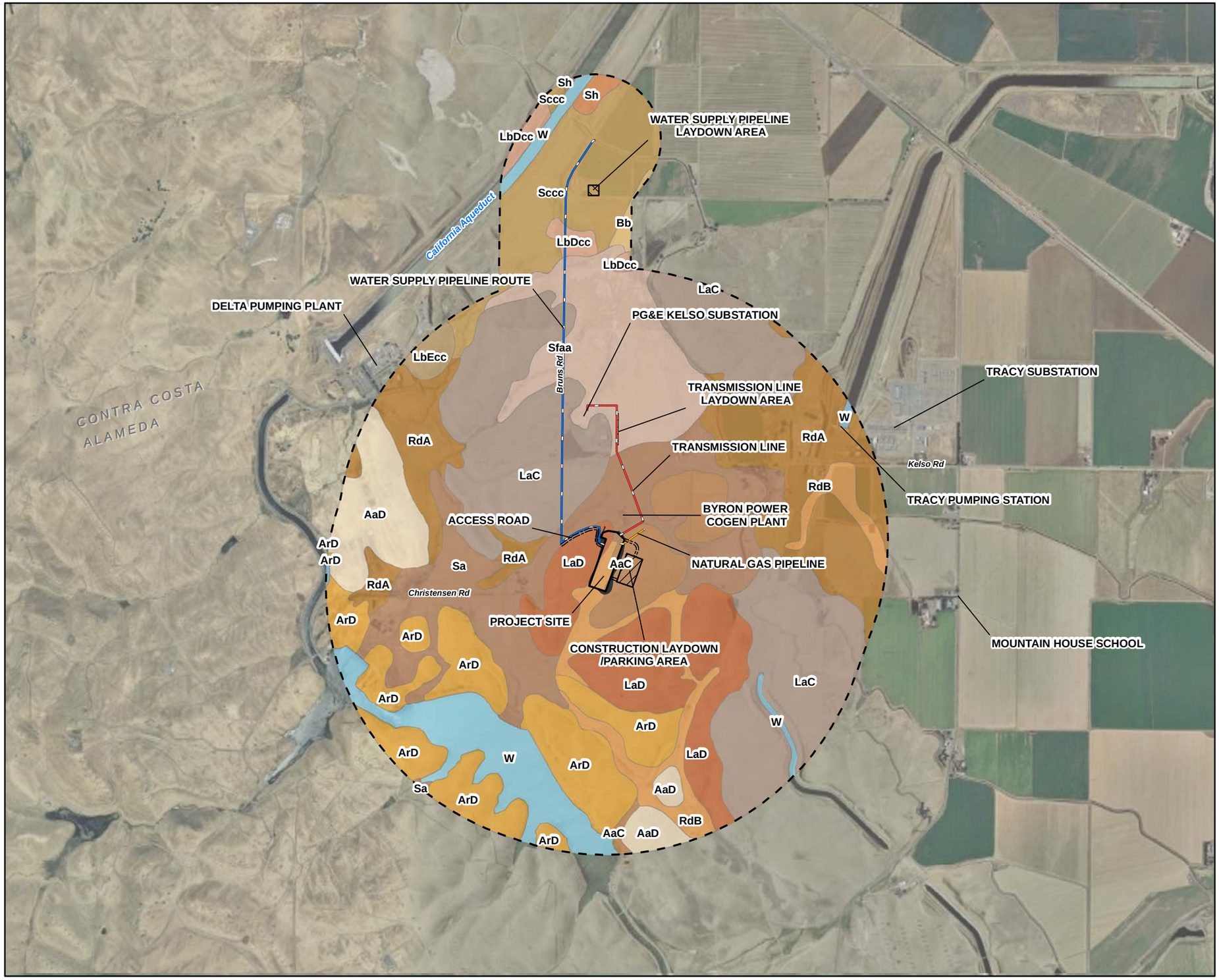
5.11.1.3 Potential for Soil Loss and Erosion

The factors that have the largest effect on soil loss include steep slopes, lack of vegetation, and erodible soils composed of large proportions of fine sands. The soils found in the MEP area are rolling, and range from 0 to 30 percent slopes, according to the soil survey (USDA-NRCS, 2008a, USDA-NRCS, 2008b). The area is vegetated with pasture grasses. Soil textures throughout the project area are medium to fine grained with textures ranging from fine sandy loam to clay (USDA-NRCS, 2008a, USDA-NRCS, 2008b). The erosion potential of these soils will vary based on the wetness of the soil, soil compaction, sizes of soil particles, and other site-specific properties. Because of the sloping nature of the property, soils in the project area are expected to have a high water erosion potential and moderate wind erosion potential for the following reasons:

- Much of the area is sloping; the project site and its associated laydown area are in soil units with 3 to 15 percent slope. Although these units are vegetated, disruption during construction could result in increased erosion.
- The loamy and fine sandy surface materials have the potential to be readily transported by wind.
- Although the site is rolling, very little other development exists nearby to slow ground-level winds. These winds could lead to excessive wind erosion if soils are exposed.

5.11.1.4 Other Significant Soil Characteristics

A significant soil characteristic concerning the project area is the potential for soils with a moderate to high shrink-swell potential. Soil layers containing clay have a potential for shrinkage and swelling that can be a significant engineering consideration. The soil survey indicates that many of the soils in the project area have a moderate to high potential for shrink and swell (Table 5.11-1). Problems that could be caused by soil shrinking and swelling need to be anticipated prior to construction because these soils have the potential to be unsuitable for use as a bearing surface for foundations and pipelines. Additionally, material excavated in these soils may not be suitable for backfilling where subsequent soil movements could adversely affect constructed linear features.



LEGEND

- ACCESS ROAD
- NATURAL GAS PIPELINE ROUTE
- TRANSMISSION LINE ROUTE
- WATER SUPPLY PIPELINE ROUTE
- CONSTRUCTION LAYDOWN/PARKING AREA
- TRANSMISSION LINE LAYDOWN AREA
- WATER SUPPLY PIPELINE LAYDOWN AREA
- PROJECT SITE
- DISTURBED AREA
- BUFFER

SOIL TYPE

- AaC, ALTAMONT CLAY, 3 TO 15 PERCENT SLOPES
- AaD, ALTAMONT CLAY, 15 TO 30 PERCENT SLOPES
- ArD, ALTAMONT ROCKY CLAY, 7 TO 30 PERCENT SLOPES
- Bb, BRENTWOOD CLAY LOAM
- LaC, LINNE CLAY LOAM, 3 TO 15 PERCENT SLOPES
- LaD, LINNE CLAY LOAM, 15 TO 30 PERCENT SLOPES
- LbDcc, LINNE CLAY LOAM, 5 TO 15 PERCENT SLOPES
- LbEcc, LINNE CLAY LOAM, 15 TO 30 PERCENT SLOPES
- RdA, RINCON CLAY LOAM, 0 TO 3 PERCENT SLOPES
- RdB, RINCON CLAY LOAM, 3 TO 7 PERCENT SLOPES
- Sa, SAN YSIDRO LOAM
- Sccc, SAN YSIDRO LOAM
- Sf, SOLANO FINE SANDY LOAM
- Sfaa, SOLANO FINE SANDY LOAM
- Sh, SOLANO LOAM
- W, WATER

Notes:
1. 1 Mile Buffer around Project Site, 1/4 Mile Buffer around all Linears.
2. Source: U.S. Department of Agriculture, Natural resources Conservation Service, Soil Survey Geographic (SSURGO) Database for Contra Costa and Alamenda County, California, 2005.

This map was compiled from various scale source data and maps and is intended for use as only an approximate representation of actual locations.

N

0 1,000 2,000
Feet

FIGURE 5.11-1
SOIL TYPES
MARIPOSA ENERGY PROJECT
ALAMEDA COUNTY, CALIFORNIA

CH2MHILL

SAC\\ZION\SACGIS\PROJ\DIAMOND_376670\MAPFILES\AFC_MAPS\SOILS.MXD MHASKELL 5/8/2009 12:58:06

5.11.2 Environmental Analysis

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

5.11.2.1 Significance Criteria

The potential for impacts on soil resources and their uses (such as agriculture) was evaluated with respect to the criteria described in the Appendix G checklist of the California Environmental Quality Act (CEQA). An impact is considered potentially significant if it would:

- Involve other changes in the existing environment which, because of their location or nature, could result in conversion of farmland to non-agricultural use
- Impact jurisdictional wetlands
- Result in substantial soil erosion
- 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

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

5.11.2.2 Farmland Conversions

The MEP area is used primarily for grazing. The project area is a small portion of a larger, 158-acre parcel located in an area of Alameda County designated for Large Parcel Agriculture (A-100) by the East County Area General Plan. The project will result in the conversion of ten of the 158 acres of non-irrigated grazing land to utility use. The Byron Power Cogen Plant occupies two additional acres of the parcel. The remaining 146 acres will remain as cattle grazing land.

Mariposa Energy proposes mitigation to supply year-round cattle watering capability on the site after construction, along with re-seeding of the 5-acre temporary construction laydown and parking area with grasses designed to improve food supply for the cattle. This mitigation will result in an improved agricultural land use after construction.

Because the project area is not being cultivated, MEP does not result in the conversion of farmland to a non-farmland use. Additionally, the project site is more suitable for grazing than cultivation because of its sloping topography. Although 10 acres of the larger parcel will be removed from grazing production, the use is conditionally permitted and would be compatible with nearby uses. Because of the limited loss of grazing land, proposed improvements to grazing productivity, and lack of a conversion of farmland, impacts on agriculture will be less than significant.

5.11.2.3 Jurisdictional Wetlands

There are several drains that run through the MEP site parcel and associated linear features. The jurisdictional status of these drains has not yet been determined. Field investigations will be completed to determine the regulatory status of these areas, as addressed in Section 5.2, Biological Resources.

5.11.2.4 Soil Erosion during Construction

Construction impacts on soil resources can include increased soil erosion and soil compaction. Soil erosion causes the loss of topsoil and can increase the sediment load in surface receiving waters downstream of the construction site. The magnitude, extent, and duration of construction-related impact depends on the erodibility of the soil; the proximity of the construction activity to the receiving water; and the construction methods, duration, and season.

Conditions that could lead to excessive soil losses are present at the project site and laydown areas so care must be taken to prevent soil erosion. Construction Best Management Practices (BMPs) will be implemented during construction in accordance with the stormwater pollution prevention plan (SWPPP) required for all construction projects larger than 1 acre by the Regional Water Quality Control Board (RWQCB). The California Energy Commission (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. It is assumed that incorporation of the BMPS and the DESCP will control erosion from the site; therefore, impacts from soil erosion are expected to be less than significant. Monitoring will involve inspections to ensure that the BMPs described in the SWPPP/DESCP are properly implemented and effective.

Because of the potential for soil erosion in the MEP area, 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 during construction by water erosion is found in Table 5.11-2. This estimate was developed using the Revised Universal Soil Loss Equation (RUSLE2) program using the following assumptions. Detailed calculations and assumptions for the soil loss estimated are found in Appendix 5.11A.

The following assumptions were used in the model:

- The MEP site is approximately 10 acres. Active soil grading will occur over a 2-month period. Following grading, disturbed soils will be exposed for an additional 12-month construction period, after which most of the site will be paved or occupied by structures. It is assumed that approximately one-tenth of the project site will have bare soil during the construction period.
- Estimates of soil loss (in tons) were made for the site-specific soil mapping unit characteristics available within the RUSLE2 database.
- RUSLE2 rainfall erosivity conditions were estimated for the MEP site coordinates using site-specific rainfall estimates from online National Weather Service data (National Oceanic and Atmospheric Administration Atlas 2) at http://www.nws.noaa.gov/ohd/hdsc/noaaatlas2.htm (verified March 24, 2009).
- 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.

- Only the project site, a portion of the project site laydown areas, and project site access roads will be graded; all other areas will be 100 percent covered, either through natural vegetation or gravelling/paving (yielding negligible runoff).
- Site cut and fill area grading will occur over a 3-month period, and permanent vegetation will be reestablished within 2 months after grading.
- Grading/excavation for the pole holes will be completed within 3 months and the entire installation will be completed within 6 months.
- The natural gas and water supply pipelines will be installed in a 4-foot-wide trench and a 100-foot construction corridor.
- The natural gas pipeline will take 4 months to construct, and it will be another 2 months before permanent cover is established.
- The water supply pipeline will take 4 months to construct, and it will be an additional 2 months before permanent cover is established. Most of the construction will be within Bruns Road.
- An onsite septic system will be constructed; a sanitary sewer line will not be constructed.

Soil losses are estimated using the following RUSLE2 conditions:

- **Construction** soil losses were approximated using Management as "bare ground, smooth surface"; Contouring: None, 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" soil conditions; 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, no row grade; Diversion/terracing: None; and Strips and Barriers: two fences, one at end of RUSLE2 slope.
- A **"No Project"** soil loss estimate also was approximated using Management as "Dense grass – not harvested"; Contouring: Rows up and down hill; Diversion/terracing: None; and Strips and Barriers: None.

With the implementation of appropriate BMPs that will be required under the General Permit, the total project soil loss is estimated to be 0.51 ton. This amount is considered to be minimal and would constitute a less-than-significant impact on soil resources. The estimate of accelerated soil loss by water is very conservative (overestimate of soil loss) because it assumes only a single BMP (silt fencing), whereas a SWPPP will require multiple soil erosion control measures.

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 the South Coast Air Quality Management District (SCAQMD) Project No. 95040, Level 2 Analysis Procedure (Midwest Research Institute, 1996) and the ratio of fugitive TSP to PM_{10} published by the Bay Area Air Quality Management District (BAAQMD) (2005). Fugitive dust resulting from the wind erosion of exposed soil was calculated using the emission factor in AP-42 (U.S. Environmental Protection Agency [EPA], 1995; also in BAAQMD, 2005).

The following assumptions were used in the wind erosion calculations:

- Grading for project site will be completed in a 2-month period, and construction will extend an additional 12 months.
- Approximately one-tenth of the project site will have bare soil exposure during the length of the construction period.
- None of the laydown areas (except a portion of the project site laydown area) will be graded. It is expected that all roadway and laydown areas would be covered (graveled or paved) for all-season use.
- Excavation of transmission line pole holes will take 3 months, followed by a 3-month construction period.
- The transmission poles will have a 4-foot by 4-foot area, for a total permanent impact area of 0.0075 acre.
- The natural gas line and water supply line will be installed in a 4-foot trench with a 100-foot construction corridor.
- The natural gas and water supply trenches will be 100 percent exposed during the excavation period, with permanent vegetation restored after installation.
- The 100-foot construction corridors will remain in natural vegetation, with approximately 10 percent bare soil exposed.
- Grading activities will be limited to the project site and the project site access road.

TABLE 5.11-2
Estimate of Soil Loss by Water Erosion Using Revised Universal Soil Loss Equation (RUSLE2)

			Estimates Using Revised Universal Soil Loss Equation[a]		
Feature (acreage)[b]	**Activity**	**Duration (months)**	**Soil Loss (tons) without BMPs**	**Soil Loss (tons) with BMPs**	**Soil Loss (tons/year) No Project**
Site (9.7 acres estimated)	Grading	2	16.0	0.02	0.300
	Construction	14	5.2	0.15	—
Site Cut and Fill Area (3.59 acres estimated)	Grading	3	13.0	0.17	0.15
	Construction	2	4.1	0.12	
Site Access Road (1.2 acres estimated)	Grading	1	1.8	0.0	0.058
(1.2 acres exposed; will be paved or graveled after grading)	Construction	14	0.0	0.0	—
Site Laydown Area (4.6 acres estimated)	Grading	1	1.5	0.0	0.124
	Construction	14	0.0	0.0	—
Site Laydown Area Access Roads (0.44 acre estimated)	Grading	1	0.3	0.0	0.012
	Construction	14	0.0	0.0	—
Transmission Line (5.15 acres for construction; 0.0020 acre for pole footprints)	Grading	3	0.003	0.010	0.00004
	Construction	6	0.68	0.019	—
Transmission Line Laydown Area (0.6 acre estimated)	Grading	0	0.000	0.000	0.009
	Construction	6	0.000	0.000	—
Water Supply Pipeline (1.38 acres for construction; 0.44 acre for trench)	Grading	6	1.806	0.010	0.0112
	Construction	8	0.458	0.013	—
Water Supply Laydown Area (1.0 acre estimated)	Grading	0	0.000	0.000	0.030
	Construction	8	0.000	0.000	—
Natural Gas Pipeline (0.99 acre for construction; 0.04 acre for trench)	Grading	2	0.05	0.0016	0.00258
	Construction	6	0.17	0.0049	—
Project Soil Loss Estimates	All activities	14	45.16	0.51	0.69

[a]Soil losses (tons/acre/year) are estimated using RUSLE2 software available online (http://fargo.nserl.purdue.edu/rusle2_dataweb/) as the RUSLE2 soil loss times the duration and the affected area. The No Project Alternative estimate does not have a specific duration, so loss is given as tons/year.

- The soil characteristics were estimated using RUSLE2 soil profiles corresponding to the mapped soil unit.
- Soil loss (R-factors) were estimated using 2-year, 6-hour point precipitation frequency amount for the MEP site found at http://www.nws.noaa.gov/ohd/hdsc/noaaatlas2.htm.

[b]Acreages assume a 30-foot corridor for the transmission line and 100-foot corridors for the natural gas and water pipeline construction. Trenches for the natural gas and water pipelines are assumed to be 4 feet wide. The transmission line pole holes each have a 4-foot by 4-foot excavation footprint.

Table 5.11-3 summarizes the mitigated TSP predicted to be emitted from the site from grading and the wind erosion of exposed soil. Without mitigation, the maximum predicted erosion of material from the site is estimated at 1.28 tons over the course of the project construction cycle. This estimate is reduced to approximately 0.45 ton by implementing basic mitigation measures such as water application (see mitigation measures below), which will be identified in the SWPPP. These estimates are conservative because they make use of emission rates for a generalized soil rather than site-specific soil properties. With the implementation of mitigation measures described in Section 5.11.4.1, impacts related to soil erosion from wind will be less than significant.

TABLE 5.11-3
Total Suspended Particulate Emitted from Grading and Wind Erosion with and without Mitigation

Emission Source	Duration (months)	Unmitigated TSP (tons)[a]	Mitigated TSP (tons)[b]
Grading Dust:			
Project Site	2	0.333	0.117
Site Cut and Fill Area	3	0.185	0.065
Project Site Access Road	1	0.020	0.007
Project Site Laydown Area	1	0.040	0.014
Project Site Laydown Area Access Road	1	0.008	0.003
Transmission Line Pole Holes	3	0.00010	0.00004
Transmission Line Laydown Area	0	0.000	0.000
Water Supply Line Trench	6	0.045	0.016
Water Supply Line Laydown Area	0	0.000	0.000
Natural Gas Pipeline Trench	2	0.00137	0.00048
Wind-blown Dust:			
Project Site	12	0.368	0.129
Site Cut and Fill Area	2	0.227	0.080
Project Site Access Road	14	0.000	0.000
Project Site Laydown Area	14	0.000	0.000
Project Site Laydown Area Access Road	14	0.000	0.000
Transmission Line Pole Holes	6	0.00038	0.00013
Transmission Line Laydown Area	6	0.000	0.000
Water Supply Line Corridor	8	0.035	0.012
Water Supply Line Laydown Area	8	0.000	0.000
Natural Gas Pipeline Corridor	6	0.0189	0.0066
Estimated Total		**1.281**	**0.448**

Notes:
All linear feature impacts noted above are for portions outside of the project area footprints.

Sources:
[a]PM_{10} Emission Factor Source: Midwest Research Institute, 1996

[b]PM_{10} to TSP Conversion Factor: BAAQMD, 1999.
SCAQMD, 1993 (Table 11-4 for mitigation efficiency rates (as summarized in Table 8.9-4)

5.11.2.5 Expansive Soils

A significant soil characteristic concerning the project area is the potential for soils with a moderate to high shrink-swell potential. Soil layers containing clay have a potential for shrinkage and swelling that can be a significant engineering consideration. The soil survey indicates that many of the soils in the project area have a moderate to high potential for shrink and swell (Table 5.11-1). Problems that could be caused by soil shrinking and swelling need to be anticipated prior to construction; these soils have the potential to be unsuitable for use as a bearing surface for foundations and pipelines. Additionally, material excavated in these soils may not be suitable for backfilling where subsequent soil movements could adversely affect constructed linear features. Refer to the project geotechnical investigation for an assessment of the shrink-swell capacity of the onsite soils.

5.11.2.6 Compaction during Construction and Operation

MEP construction will result in soil compaction during the construction of foundations and paved roadway and parking areas. Soil compaction will also result from vehicle traffic along temporary access roads and in the equipment staging (laydown) areas. Soil compaction increases soil density by reducing soil pore space. It 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 construction, will result in less-than-significant impacts from soil compaction.

It is expected that only the project site laydown area and its associated access roads, but not other laydown areas or access roads, will require grading before use. It is likely that these areas will be graveled to minimize soil erosion and to allow for wet season use. At the laydown areas, heavy equipment stored onsite will be placed on dunnage to protect it from ground moisture. It is expected that material stored in the laydown area will provide additional protection from soil erosion. Once construction is complete, gravel used in the laydown areas and associated access roads will either be removed from the site or incorporated into the site paving.

MEP will be constructed in an area that has likely experienced previous disturbance from the construction of the adjacent 6.5-MW Byron Power Cogen Plant and the wind turbine project that was previously located onsite. It is expected that limited portions of the MEP area would have experienced prior soil disturbance or compaction. In areas that are designated for permanent road beds, pipelines, and foundation areas for buildings, compactability of the soils will be an important issue for long-term stability of these features. Because most of the permanent MEP structures will be paved or otherwise protected after construction, the overall anticipated effects of compaction during construction are considered to be less than significant.

MEP operation will not result in impacts on the soil from erosion or compaction. Routine vehicle traffic during plant operation will be limited to existing roads, all of which will be paved or covered in gravel. Standard operational activities should not involve any disruption of soil. Therefore, impacts on soil from project operations will be less than significant.

5.11.2.7 Effects of Emissions on Soil-vegetation Systems

Where environments that are highly sensitive to nutrients or salts, such as serpentine habitats, are downwind of a generating facility, there is a concern that emissions, such as oxides of nitrogen from the combustors or drift from the cooling towers, could have an adverse effect on soil-vegetation systems.

The additional nitrogen from MEP air emissions is expected to be negligible when compared to the nitrogen content in fertilizers that are likely already being applied nearby in cultivated fields. Additionally, there are no serpentine habitats in or surrounding the project area. Therefore, it is assumed that the addition of small amounts of nitrogen to the area would result in a less-than-significant impact on soil-vegetation systems. Additionally, MEP does not have cooling towers. Additional discussion regarding nitrogen deposition and impacts on biological resources in the area can be found in Section 5.2, Biological Resources.

5.11.3 Cumulative Effects

A cumulative impact refers to a proposed project's incremental effect 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; California Code of Regulations, title 14, §§ 15064(h), 15065(c), 15130, and 15355).

Additional projects near the MEP site include the following:

- Mountain House community build out
- East Altamont Energy Center
- Green Volts Utility Scale Solar Field, located on Kelso Road, across from the Tracy Substation
- Altamont Motorpark Sports Rezoning
- Midway Power, LLC project
- Jess Ranch Organics Composting Facility, located south of I-580/Grant Line Road

Because the MEP site would not result in significant adverse impacts, impacts from MEP would not likely combine with those from the projects listed above to result in cumulative significant impacts.

As previously described, the project would have minimal effect on agriculture. Agriculture uses along the linear features will be restored to pre-construction condition after construction is complete. The project's expected minor to negligible effects on soil erosion, sedimentation, and compaction are not considered to be significant, particularly with the application of onsite construction BMPs. The MEP site is surrounded by rural land use, with no plans for residential development nearby to the site in the near future. Therefore, the potential for cumulative impacts of MEP combined with other projects will be insignificant.

5.11.4 Mitigation Measures

Construction BMPs, in accordance with the SWPPP and DESCP, will be used to minimize erosion at the site during construction. These erosion-control measures are required to help 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 will be mitigated through the use of sediment barriers, and wind erosion potential will be reduced significantly by keeping soil moist or by covering soil piles with mulch or other wind-protection barriers. These temporary measures will be removed from the site after the completion of construction, and the site will be paved or completely covered with facilities or other types of ground cover (for example, gravel or landscape). Therefore, soil erosion losses after construction are expected to be negligible.

5.11.4.1 Temporary Erosion Control Measures

Temporary erosion control measures will be installed before construction begins, and would be evaluated and maintained during construction. Construction BMPs typically include revegetation, mulching, physical stabilization, dust suppression, berms, ditches, and sediment barriers. These temporary measures would be removed from the site after the completion of construction.

During construction of the project, dust erosion control measures would 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 would be sprayed on the soil in construction areas to control dust prior to completion of permanent control measures.

Sediment barriers slow runoff and trap sediment. Sediment barriers include straw bales, sand bags, straw wattles, and silt fences. They 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.

As the site will be constructed on an uneven (rolling ground surface), barriers will be needed around the entire site perimeter. Barriers should be specifically placed in locations where offsite drainage could occur to prevent sediment from leaving the site. If used, sediment barriers would be properly installed (for example, silt fences properly staked and keyed), then removed or used as mulch after construction. Runoff detention basins, drainage diversions, and other large-scale sediment traps are not considered necessary because of the small site size, level topography, and surrounding paved areas. Any soil stockpiles, including sediment barriers around the base of the stockpiles, would be stabilized and covered.

Mitigation measures, such as watering exposed surfaces, are used to reduce PM_{10} emissions during construction activities. PM_{10} control efficiencies in the SCAQMD CEQA Handbook (1993) were used to estimate the effectiveness of the mitigation measures. Table 5.11-4 summarizes the mitigation measures and PM_{10} reduction efficiencies. Additional fugitive dust mitigation measures are discussed in Section 5.1, Air Quality.

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, 1993 (Table 11-4)

5.11.4.2 Permanent Erosion Control Measures

Permanent erosion control measures on the site may include graveling, paving, installing drainage systems, and revegetation, as appropriate.

5.11.5 Laws, Ordinances, Regulations, and Standards

Federal, state, county, and local LORS applicable to soils are discussed below and summarized in Tables 5.11-5 and 5.11-6.

5.11.5.1 Federal LORS

5.11.5.1.1 Federal Water Pollution Control Act of 1972 and the Clean Water Act of 1977

The Federal Water Pollution Control Act of 1972, commonly referred to as the Clean Water Act (CWA), effectively prohibits point source discharges of pollutants to a water of the United States unless authorized under a National Pollutant Discharge Elimination System (NPDES) permit. The 1987 CWA amendments established a framework for regulating municipal and industrial stormwater discharges under the NPDES program. In 1990, EPA published final regulations that established stormwater permit requirements for specific industrial categories, including construction. The State Water Resources Control Board (SWRCB) is the NPDES permitting authority in California and has adopted a statewide general permit for stormwater discharges associated with construction activity (General Construction Storm Water Permit, or "General Permit") that applies to projects resulting in 1 or more acres of soil disturbance (SWRCB, 1999). The General Permit is currently under revision, and the revised permit is expected to be approved by the SWRCB in 2009. MEP will result in disturbance of more than 1 acre of soil; therefore, the project will require coverage under the General Permit, along with development and implementation of a site-specific SWPPP, which identifies BMPs that are adequate to control erosion and sediment transport from the site. The 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 USDA-NRCS National Engineering Handbook (1983) provide guidance for soil conservation during planning, design, and construction activities. MEP will need to conform to these standards during grading and construction to limit soil erosion.

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) is the state law governing water quality in California, and designates responsibilities to the SWRCB and nine RWQCBs to coordinate and control water quality. As described above, in 1999, the SWRCB adopted a general NPDES permit, in compliance with the CWA, to regulate stormwater discharges from construction sites greater than 1 acre in size. The MEP site lies within the jurisdiction of the Central Valley RWQCB; this RWQCB would ensure that the project complies with the General Construction Permit requirements.

5.11.5.3 Local LORS

5.11.5.3.1 Alameda County

Applicable Alameda County regulations include the General Ordinance Code (LexisNexis Municipal Codes, 2006) and the East County Area Plan (Alameda County, 2000).

The Alameda County General Ordinance Code establishes requirements for grading erosion and sediment control in Title 15 - Buildings and Construction, Chapter 15.36. The ordinance states that, prior to beginning construction, a grading application will have to be submitted to the director of public works, accompanied by at least two copies of the grading plans and a statement of the intended use of the property. Applications are available from the Alameda County Public Works Agency.

The General Ordinance Code also outlines regulations for stormwater management and discharge control, in accordance with the CWA, the state Porter-Cologne Act, and the county NPDES permit, in Title 13 - Stormwater Management and Discharge Control.

5.11.5.3.2 East County Area Plan

The Alameda County East County Area Plan (ECAP) addresses the potential loss of agriculture, preservation of general landscape appearance, preservation of groundwater quality, and preservation of slope stability.

TABLE 5.14-5
Conformity with ECAP

Provision	Conformity
Policy 71: The County shall conserve prime soils (Class I and Class II, as defined by the USDA Natural Resources Conservation Service Land Capability Classification) and Farmland of Statewide Importance and Unique Farmland (as defined by the California Department of Conservation Farmland Mapping and Monitoring Program) outside the Urban Growth Boundary.	The project intersects one Class II soil (RdB), and two soils of statewide importance (LbDcc, AaC). The pockets of RdB and LbDcc soils are small and are surrounded by areas of lesser quality soil, yielding an area not likely to be used for modern agriculture. The area of AaC is where the temporary laydown area will be constructed. This is only a temporary disturbance; the area will be seeded with pasture grasses and returned to production after completion of the project.
Policy 72: The County shall preserve the Mountain House area for intensive agricultural use. “Intensive agricultural use” is defined as high yield agricultural production including vineyards, orchards, and row crops as distinguished from low-intensity agriculture such as cattle and horse grazing.	Although the proposed project area is near the Mountain House area, it is not in an area of intensive agricultural use.

TABLE 5.14-5
Conformity with ECAP

Provision	Conformity
Policy 116: To the maximum extent possible, development shall be located and designed to conform with rather than change natural landforms. The alteration of natural topography, vegetation, and other characteristics by grading, excavating, filling or other development activity shall be minimized. To the extent feasible, access roads shall be consolidated and located where they are least visible from public view points.	Grading required for the project will be consistent with natural landforms and will not substantially alter natural topography or vegetation beyond the construction of the facility on what is currently grazing land. The hills on either side of the project site will not be altered by grading. MEP is consistent with this policy.
Policy 117: The County shall require that where grading is necessary, the off-site visibility of cut and fill slopes and drainage improvements is minimized. Graded slopes shall be designed to simulate natural contours and support vegetation to blend with surrounding undisturbed slopes.	The majority of project grading will occur on the backside of hills, and will be minimally visible from public rights-of-way.
Policy 118: The County shall require that grading avoid areas containing large stands of mature, healthy vegetation, scenic natural formations, or natural watercourses.	Grading will occur in previously disturbed areas, and will not disturb mature vegetation.
Policy 119: The County shall require that access roads be sited and designed to minimize grading.	Minimal road grading will be required for this project. The project will utilize existing access roads in most cases.
Policy 306: The County shall protect surface and groundwater resources by…minimizing sedimentation and erosion through control of grading…	Grading will be completed during the dry time of the year, and all SWPPP required BMPs will be in place to prevent erosion and sedimentation.
Policy 313: The County shall require development in hilly areas to minimize potential erosion and disruption of natural slope stability which could result from grading, vegetation removal, irrigation, and drainage.	Although grading will occur in the hilly project area, SWPPP required BMPs will be remain in place until natural vegetation is reestablished to prevent erosion and disruption of natural slope stability.

5.11.5.3.3 Contra Costa County

Applicable Contra Costa County regulations include the Contra Costa General Plan 2005-2020 (Contra Costa County Community Development Department, 2005), the Contra Costa County Code (LexisNexis, 2008), and the 1010 Drainage Ordinance of Contra Costa County (Contra Costa County, 2009).

Section 8.10 of the Contra Costa General Plan (Soil Resources) establishes soil resource goals, policies, and implementation measures. According to this section, as part of the design review process, erosion control measures will be required for all projects involving grading near waterways on slopes greater than 10 percent. Additionally, the General Plan states that an erosion and sediment control plan should be prepared and submitted to the County Board of Supervisors, where appropriate. Although this document doesn't reference specific permits, it is assumed that these standards will apply to MEP.

Title 7 of the Contra Costa County Code deals with building regulations. Chapter 74-6 of the code deals with permits, drainage, and streets, and includes requirements that may be

applicable to this project including: drainage facility requirements, and requirements for drainage plans. Division 716 of the code deals with grading. Possible exemptions may be allowed for this project; these are outlined in 716-4.206a (underground utilities) and 716-408b (isolated, self-contained area).

Title 8 of the Contra Costa County Code deals with zoning. Article 814-2.10 of the code includes the following restrictions that may be applicable to this project: restricting grading on slopes greater than 26 percent without approval of the director of planning, utilizing the best environmental practices to avoid erosion, ensuring grading has a minimal effect on the environment, and keeping cuts and fills to a minimum.

The 1010 Drainage Ordinance of Contra Costa County regulates work on watercourses and drainage facilities in unincorporated county areas. Any work that involves human-made drainage facilities or natural watercourses may require a drainage permit from the county (Contra Costa County, 2009).

TABLE 5.11-6
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 1987 amendments)	Regulates stormwater discharge from construction and industrial activities	SWRCB and Central Valley RWQCB. EPA may retain jurisdiction at its discretion.	Section 5.11.5.1.1
USDA-NRCS, *National Engineering Handbook*, Sections 2 and 3 (1983)	Standards for soil conservation	NRCS	Section 5.11.5.1.2
State			
Porter-Cologne Water Quality Control Act	Regulates stormwater discharge	SWRCB and Central Valley RWQCB	Section 5.11.5.2.1
Local			
Alameda County			
General Ordinance Code	Standards for grading, erosion and sediment control	Alameda County Public Works Agency	Section 5.11.5.3
East County Area Plan	Standards for preservation of landscape, stormwater quality, slope stability; loss of agricultural land	Alameda County Community Development Agency - Planning	Section 5.11.5.3
Contra Costa County			
General Plan	Standards for erosion control; requirements for erosion and sediment control plans	Contra Costa County Community Development Department, Advance Planning Division	Section 5.11.5.3

TABLE 5.11-6
Laws, Ordinances, Regulations, and Standards for Soils

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
County Code	Requirements for drainage plans and grading slope restrictions	Contra Costa County Conservation and Development, Building Inspection, Code Enforcement	Section 5.11.5.3
1010 Drainage Ordinance	Requirements for drainage construction including drainage permit.	Contra Costa County Public Works, Flood Control	Section 5.11.5.3

5.11.6 Agencies and Agency Contacts

Table 5.11-7 provides agency contact and permit information for soils.

TABLE 5.11-7
Permits and Agency Contacts for Soils

Issue	Agency	Contact
Grading Permit, Alameda County	Alameda County Public Works Agency	Andy Cho Assistant Engineer, Grading Section Development Services Department 399 Elmhurst Street, Room 141 Hayward, CA 94544 510-670-6451 (phone) 510-670-5787 (fax) andyhjc@acpwa.org
Grading Permit, Contra Costa County	Contra Costa County Department of Conservation and Development	Gary Faria Grading Inspector, Building Inspection 651 Pine St Martinez, CA 94553 925-335-1123

5.11.7 Permits Required and Permit Schedule

It is expected that all the required permits for grading and stormwater discharge can be secured as long as applications are provided to the appropriate agency within the timeframe specified by the agency. Water Resources Section 5.15.6 presents permitting requirements for NPDES general permit requirements for construction activities. Alameda County may require an excavation and grading permit before construction at the site. Permits and agency contacts are provided in Table 5.11-7.

5.11.8 References

Alameda County, 2000. East County Area Plan [Online]. Available at: http://www.acgov.org/cda/planning/plans/EastCountyAreaPlancombined.pdf (verified March 24, 2009). Revised by Initiative Nov. 2000.

Bay Area Air Quality Management District (BAAQMD). 2005. Permit handbook. Available at: http://www.baaqmd.gov/pmt/handbook/rev02/permit_handbook.htm (verified March 19, 2009).

Bay Area Air Quality Management District. 1999. BAAQMD CEQA Guidelines: Assess the Air Quality of Projects and Plans. Adopted April 1996. Revised December 1999. San Francisco, CA

Contra Costa County. 2009. Permits [Online]. Available at: http://www.co.contra-costa.ca.us/index.asp?NID=526 (verified March 24, 2009).

Contra Costa County Community Development Department. 2005. Contra Costa General Plan 2005-2020 [Online]. Available at: http://www.co.contra-costa.ca.us/depart/cd/current/advance/GeneralPlan/CCCGeneralPlan.pdf (verified March 24, 2009).

International Code Council. 1997. Uniform Building Code (International Building Code), 75th ed., published by the International Conference of Building Officials.

LexisNexis Municipal Codes. 2006. Alameda County General Ordinance Code [Online]. Available at: http://www.co.alameda.ca.us/admin/admincode/index.htm (verified March 24, 2009).

LexisNexis Municipal Codes. 2008. Contra Costa County Code [Online]. Available at: http://www.ordlink.com/codes/ccosta/maintoc.htm (verified March 24, 2009). Code passed November 8, 2008; current through Ordinance 2008-29.

Midwest Research Institute. 1996. South Coast AQMD Project No. 95040, Level 2 Analysis Procedure. March.

Soil Survey Staff. 2008. Official Soil Series Descriptions (Online). Available at: http://soils.usda.gov/technical/classification/osd/index.html (verified March 19, 2009).

South Coast Air Quality Management District. 1993. CEQA Air Quality Handbook. Diamond Bar, CA.

State Water Resources Control Board (SWRCB). 1999. General Construction Permit [Online]. Available at: http://www.swrcb.ca.gov/stormwtr/docs/finalconstpermit.pdf (verified March 19, 2009).

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS). 1983. *National Engineering Handbook.*

USDA-NRCS. 2008a. Soil Survey Geographic (SSURGO) database for Alameda Area, California (Online). Available at: http://soildatamart.nrcs.usda.gov (verified March 19, 2009).

USDA-NRCS. 2008b. Soil Survey Geographic (SSURGO) database for Contra Costa County, California (Online). Available at: http://soildatamart.nrcs.usda.gov (verified March 19, 2009).

U.S. Environmental Protection Agency (EPA). 1995. Compilation of Air Pollutant Emission Factors AP 42. Volume I: Stationary Point and Area Sources, 5th edition (Online). Available at: http://www.epa.gov/ttn/chief/ap42/index.html (verified March 19, 2009).