5.11 Soils

This section describes the potential effects of the construction and operation of the CPV Vaca Station (CPVVS) on soil resources and is organized as follows: Section 5.11.1 describes the existing environment that could be affected, 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 all involved agencies; Section 5.11.7 describes permits required for the project; and Section 5.11.8 provides the references used to develop this section.

5.11.1 Affected Environment

The project site is on land that was formerly used for agriculture. Surrounding land use is primarily agricultural, with the exception of the City of Vacaville's Easterly Wastewater Treatment Plant (EWTP) to the northwest. A few rural residential properties are located within 1 mile of the proposed CPVVS site, mostly off Lewis Road, Fry Road, and Chicorp Lane. The town of Elmira is also located nearby, with the closest residential properties located approximately 0.7 mile to the northwest of the proposed CPVVS project site. In addition, the Cypress Lakes Golf Course is located just over 1 mile southwest of the project site. With the exception of the EWTP, the proposed CPVVS project site is surrounded by agricultural land. The project site and laydown areas are located on land that was formerly agricultural but that has not been cultivated for more than a decade and has been redesignated for community facilities.

The project laydown area will be directly north of the project site. The CPVVS will connect with the Pacific Gas and Electric Company (PG&E) electrical transmission system via a 0.95-mile-long transmission line that will run west from the project site along Fry Road to a transmission corridor. Connections to PG&E's existing high-pressure natural gas pipeline will be through a new pipeline that will run for 1.03 mile east along Fry Road to a PG&E gas transmission line. The project will connect with the EWTP for supplies of potable water, sanitary sewer, and recycled water through a utility corridor linking the project and EWTP.

A description of the soils in the proposed project area was developed using the online Soil Survey of Solano County, California (Natural Resources Conservation Service [NRCS], 2008). Descriptions of the soil mapping units were developed from the soil survey and the online soil series descriptions (Soil Survey Staff, 2008).

Soil map units for the project area are identified in Figure 5.11-1. Soil map unit characteristics for the area potentially affected by project construction are summarized in Table 5.11-1. The project area includes the project site and construction laydown area, and linear features (that is, overhead electrical lines and substation, and underground gas, and sewer and water pipelines). The table summarizes 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 past grading at the site and natural soil variations.

5.11.1.1 Agricultural Use

Aerial photography and site reconnaissance confirm that much of the land immediately surrounding the proposed CPVVS project site is or was used for agricultural production. Most of this land is planted in field crops, including alfalfa and possibly wheat.

5.11.1.2 Soil Mapping Units

Table 5.11-1 describes the properties of the soil mapping units that are found in the vicinity of the project site. As indicated, the soil mapping units in the project area are primarily fine-textured soils formed from sedimentary deposits. These soils are moderately well to well drained and have moderate to very low permeability. All of the soils within the vicinity of the CPVVS project are considered to have high shrink-swell potential. A geotechnical investigation of the construction suitability of these soils is in progress and will be completed before construction begins.

As shown on Figure 5.11-1, the entire project site lies within soil mapping unit Ca - Capay silty clay loam. The laydown area is also partially within the Ca mapping unit, and also includes mapping units SeA - San Ysidro sandy loam and Yr - Yolo loam, clay substratum. The linear features cross soil map units Ca, SeA, Yr, and also M-W - Miscellaneous Water and Cc - Capay clay.

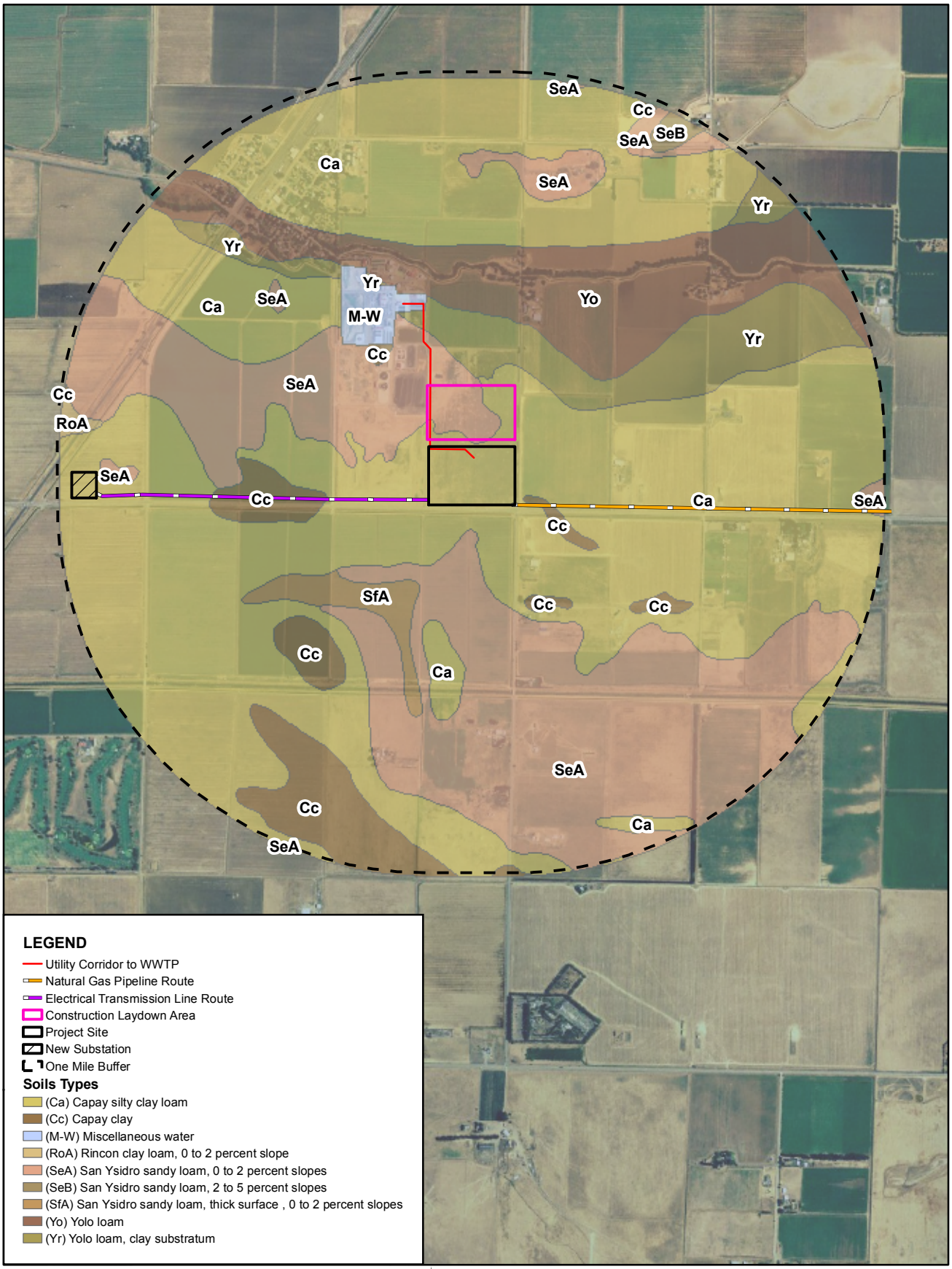
5.11.1.3 Potential for Soil Loss and Erosion

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 project area are nearly level, with an estimated average slope of less than 2 percent.

In general, soils at the project site are medium to fine in texture, ranging from sandy loam to clay (NRCS, 2008). The erosion potential of these soils will vary, based upon the wetness of the soil, soil compaction, sizes of soil particles, and other site-specific properties. The soils at the project site are expected to have relatively high water erosion potential and a moderate wind erosion potential for the following reasons:

- There are nearly level conditions at the site and laydown areas; however, some of the soil units are expected to have slow to very slow permeability (and consequently, high runoff).
- The silty clay and clay surface materials of the Capay soils are not expected to be readily transported by wind. The sandy loam and loam surface materials of the San Ysidro and Yolo soils may be more readily transported by wind. It is expected that the laydown areas will be covered (by gravel or paving) immediately after grading to prevent subsequent wind erosion losses.

Given the potential for expansive native soils at the project site, structures may have to be founded upon imported soils of construction fill. These soils, if exposed, could be subject to higher rates of water and wind erosion than the native soils. Sources of fill will be identified during final construction planning.



Notes:
1. Source: U.S. Department of Agriculture, Natural Resources Conservation Service, Soil Survey Geographic (SSURGO) database for Solano County, California.

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 WITHIN ONE MILE OF SITE
CPV VACA STATION
VACAVILLE, CA

CH2MHILL

SAC \\ZION\SACGIS\PROJ\VACAVILLE_AFC_370668\MAPFILES\SOILS.MXD SSCOPES 8/4/2008 09:55:55

TABLE 5.11-1
Soil Mapping Unit Descriptions and Characteristics

Map Unit	Description
Ca	**Capay silty clay loam:** The entire CPVVS project site, portions of the laydown area, and all three utility corridors cross this soil unit. Formation: In mod. fine and fine textured alluvium derived from sandstone and shale Typical profile: Silty clay loam over clay and clay loam Shrink-swell capacity: High Depth and drainage: Very deep; moderately well drained Permeability: Slow to very slow Runoff: Negligible to high Inherent fertility: Moderately high Capability class: 2s (irrigated), 4s (non irrigated) Taxonomic class: Fine, smectitic, thermic Typic Haploxererts
Cc	**Capay clay:** The proposed transmission line and natural gas corridors traverse this soil unit Formation: In mod. fine and fine textured alluvium derived from sandstone and shale Typical profile: Clay over clay loam Shrink-swell capacity: High Depth and drainage: Very deep; moderately well drained Permeability: Slow to very slow Runoff: Negligible to high Inherent fertility: Moderately high Capability class: 2s (irrigated), 4s (non irrigated) Taxonomic class: Fine, smectitic, thermic Typic Haploxererts
M-W	**Miscellaneous water:** A small part of the utility corridor between the CPVVS project site and the EWTP falls within this soil unit. This is an anthropogenic map unit.
SeA	**San Ysidro sandy loam, 0 to 2 percent slopes:** The proposed utility corridor and natural gas pipeline traverse this soil unit. Formation: In alluvium from sedimentary rocks Typical profile: Sandy loam over clay loam and sandy clay loam Shrink-swell capacity: High Depth and drainage: Very deep; moderately well drained Permeability: Very slow Runoff: Slow to medium Inherent fertility: Moderate Capability class: 4s (irrigated), 4e (non irrigated) Taxonomic class: Fine, smectitic, thermic Typic Palexeralfs
Yr	**Yolo loam, clay substratum:** The proposed utility corridor traverses this soil unit. Formation: In fine loamy alluvium derived from sedimentary formations Typical profile: Loam over clay Shrink-swell capacity: High Depth and drainage: Very deep; well drained Permeability: Moderate Runoff: Slow to medium Inherent fertility: Moderately high Capability class: 2s (irrigated), 4e (non irrigated) Taxonomic class: Fine-silty, mixed, superactive, nonacid, thermic Mollic Xerofluvents

Soil characteristics are based on soil mapping descriptions provided in the online soil survey (http://websoilsurvey.nrcs.usda.gov).

Soil descriptions provided above are limited to those soil units that could be directly affected by the CPVVS. Other soil mapping units, which are well outside of the project area but are shown on Figure 5.11-1, include RoA - Rincon clay loam, 0 to 2 percent slopes; SfA - San Ysidro sandy loam, thick surface, 0 to 2 percent slopes; Yo - Yolo loam.

5.11.1.4 Other Significant Soil Characteristics

A significant soil characteristic concerning the project site is the potential for soils with a high shrink-swell potential. The soil map unit that the project will be built upon (Ca) is classified as having smectitic mineralogy with a high shrink-swell potential. The official series description for the Capay series (NRCS, 2008) lists slickensides and cracking as soil features; these features are typical of expansive soils exhibiting shrinking and swelling behavior. The presence of expansive clays in the soil may affect the suitability of the soil as a bearing surface for foundations and pipelines because expansive clays have the potential to heave or collapse with changing moisture content.

A geotechnical soil investigation (Kleinfelder, 2008 and Appendix 2H) has confirmed the presence of shrink-swell soils at the project site. The investigation indicates that fill may need to be brought in to stabilize the soils and provide a suitable base for the CPVVS. The geotechnical report contains recommendations for construction and building modifications to mitigate the effects of these soils, and will be used as a guide for final project design.

The geotechnical investigation also reported the presence of soil layers that may pose a liquefaction risk (Kleinfelder, 2008). Soil liquefaction is a condition where saturated soils undergo a substantial loss of strength and deformation due to pore pressure increase resulting from stress due to earthquakes (Kleinfelder, 2008). If liquefaction were to occur, it could result in damage to and settling of foundations. Kleinfelder's analysis indicated that thin sand layers in the upper 7 to 12 feet within the project area may be susceptible to liquefaction during an earthquake (2008).

The geotechnical report also addresses soil settling, and gives expected percentages of soil settling resulting from the weight of the proposed structures (Kleinfelder, 2008). The majority of the soils within the CPVVS project site are fine textured, and are anticipated to experience time-dependent settlement (Kleinfelder, 2008).

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 Jurisdictional Wetlands

Based on the mapped soil units at the CPVVS project area and field surveys by a qualified biologist/wetland scientist, it does not appear that there are any jurisdictional wetlands present on or immediately surrounding the project site. Therefore, the proposed CPVVS should not impact jurisdictional wetlands or "waters of the United States." Section 5.2, Biological Resources, addresses this topic in greater detail.

5.11.2.3 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.

Because conditions that could lead to excessive soil erosion are not present at the CPVVS project site, little soil erosion is expected during the construction period. In addition, Best Management Practices (BMPs) will be implemented during construction in accordance with the stormwater pollution prevention plan (SWPPP) required for all construction projects over 1 acre by the Regional Water Quality Control Board (RWQCB). The California Energy Commission (CEC) also requires that project owners develop and implement a drainage, erosion, and sediment control plan (DESCP) to reduce the impact of runoff from the construction 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.

Despite the low potential for soil erosion in the proposed CPVVS project area, estimates of erosion by water and wind are provided in the following sections.

5.11.2.3.1 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 estimates are found in Appendix 5.11A.

- The CPVVS construction site totals 24 acres. Active soil grading will occur over a 4-month period. The soil in this area will then be exposed for an additional 20-month construction period, after which the majority of the site will be paved or covered with CPVVS facilities. It is assumed that around one-half of the project site will have bare soil exposure during the construction period.
- Estimates of soil loss (in tons) were made for the site-specific soil mapping unit characteristics that were all available within the RUSLE2 database.
- RUSLE2 rainfall erosivity conditions were estimated for the CPVVS site coordinates using site-specific rainfall estimates from online National Weather Service data (NOAA

Atlas 2) at online at http://hdsc.nws.noaa.gov/hdsc/pfds/other/nca_pfds.html (verified May 2, 2008).

TABLE 5.11-2
CPVVS Construction Soil Loss Estimates Using the 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
Project Site - 24 acres	Grading	4	26.4	0.04	0.336
	Construction	20	6.4	0.18	--
Laydown Area - 18.9 acres	Grading	1	5.4	0.00	0.27
	Construction	22	85.1	2.40	--
New Substation - 6 acres	Grading	1	1.7	0.00	0.084
	Construction	9	0.7	0.02	--
Transmission Line = 6.14 acres (plus 0.0098 acre for poles)	Grading	1	0.002	0.001	0.000
	Construction	2	0.096	0.003	--
Natural Gas Line - 9.67 acres (plus 0.55 acre for trench)	Grading	1	0.151	0.018	0.01
	Construction	2	1.283	0.036	--
Utility Corridor - 4.97 acres (plus 0.28 acre for trench)	Grading	1	0.0736	0.00875	0.004
	Construction	2	0.624	0.018	--
Project Soil Loss Estimates		**22**	**127.83**	**2.83**	**0.70**

[a] Soil losses (tons/acre/year) are estimated using RUSLE2 software available online [http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_index.htm].

[b] Acreages assume 70-foot corridors for the transmission line, natural gas, and utility construction corridors. Trenches for the natural gas and utility corridors are assumed to be 4 feet wide.

- A 100-foot slope length was assumed for all soil units. The median of each soil unit slope class was used for the RUSLE calculations. For this project, an average slope of 0.5 percent (that is, mid-point of 0 to 1 percent slope class) was assumed for all soil units.

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" 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 silt fences, one at end of RUSLE2 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.

With the implementation of appropriate BMPs that will be required under the National Pollutant Discharge Elimination System (NPDES) permit, and as described in Section 5.11.4.1, the total project soil loss of 2.83 tons 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 (overestimate of soil loss) because it assumes only a single BMP (that is, silt fencing), whereas a SWPPP will require multiple soil erosion control measures.

5.11.2.3.2 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 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, 1995; also in Table 11.9-4 in Bay Area Air Quality Management District, 2005).

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 11.0 tons over the course of the project construction cycle. This estimate is reduced to approximately 3.9 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 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
Soil Loss from CPVVS Grading and Wind Erosion

Emission Source	Acreage	Duration (months)	Unmitigated TSP (tons)	Mitigated TSP (tons)
Grading Dust:				
Project Site	24	4	1.650	0.578
Laydown Area	18.94	1	0.326	0.114
New Substation	6	1	0.103	0.036
Transmission Line (poles)	0.0098	1	0.00017	0.00006
Natural Gas Line (4-foot wide trench)	0.5528	1	0.00950	0.00333
Utility Corridor (4-foot wide trench)	0.2845	1	0.0049	0.0017

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

Emission Source	Acreage	Duration (months)	Unmitigated TSP (tons)	Mitigated TSP (tons)
Wind Blown Dust:				
Project Site	24	20	1.520	0.532
Laydown Area	18.94	22	6.597	2.309
New Substation	6	9	0.171	0.060
Transmission Line Corridor	3.07	2	0.195	0.068
Natural Gas Line	4.84	2	0.306	0.107
Utility Corridor	2.49	2	0.1576	0.0552
Estimated Total		**22**	**11.0**	**3.9**

Note:
All linear feature impacts noted above are for portions outside of the project area footprints. Other assumptions for these calculations are found in Appendix 5.11A.

5.11.2.4 Expansive Soils

An important characteristic of the proposed CPVVS project site is the potential for soils with a high shrink-swell potential. The soil map unit that the project will be built on (Ca) is classified as having smectitic mineralogy with a high shrink-swell potential. The official series description for the Capay series (NRCS, 2008) lists slickensides and cracking as soil features; these features are typical of expansive soils exhibiting shrinking and swelling behavior. The presence of expansive clays in the soil may affect the suitability of the soil as a bearing surface for foundations and pipelines because expansive clays have the potential to heave or collapse with changing moisture content.

Although the EWTP has already been built on another portion of the property, it should not be assumed that the soils will behave similarly. The portion of the property that the EWTP was built on is mapped as having soils with more suitable characteristics than those of the area of the proposed CPVVS project.

An onsite geotechnical soil investigation (see Appendix 2H) has confirmed the presence of shrink-swell soils at the CPVVS site. The investigation indicated that fill may need to be brought in to stabilize the soils and provide a suitable base for the CPVVS construction. Sources and precise quantities of this fill will be determined during the final construction planning phase. The geotechnical report contains recommendations for construction and building modifications to mitigate the effects of these soils, and should be used as a guide for the design of this project. The potential for liquefaction and soil settling will also be addressed during the final project engineering design phase. With the geotechnical report's findings and recommendations, the presence of expansive soils will not create a substantial risk to life or property and this potentially adverse impact will be reduced to a level below significance.

5.11.2.5 Compaction during Construction and Operation

Construction of the proposed project would result in soil compaction during the construction of foundations and paved roadway and parking areas. Soil compaction would also result from vehicle traffic along temporary access roads and in the equipment staging (laydown) area. Soil compaction increases soil density by reducing soil pore space. This 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.

Before the site is used as the construction laydown area, minimal grading is expected because the site and proposed laydown areas are relatively flat. After grading, runoff from the site and laydown area would either occur as overland flow or percolate to groundwater. However, the laydown area will likely be covered with gravel to allow wet season use and to further minimize soil erosion potential. Heavy equipment stored onsite will be placed on dunnage to protect it from ground moisture. Once construction is completed, the gravel will either be removed from the site or incorporated into the site paving.

Because the CPVVS will be constructed in previously undeveloped areas, a fair amount of soil compaction will be required to establish permanent road beds and foundation areas for buildings. Because these areas will be paved or otherwise protected after construction, the overall anticipated effects of compaction during construction are considered to be less than significant.

Operation of the CPVVS would 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 are paved or will be covered in gravel, and standard operational activities should not involve the disruption of soil. Therefore, impacts on soil from project operations would be less than significant.

5.11.2.6 Effects of Emissions on Soil-Vegetation Systems

There is a concern that emissions from a generating facility, principally oxides of nitrogen from the combustors or drift from the cooling towers, would have an adverse effect on soil-vegetation systems in the project vicinity. This is principally a concern where environments that are highly sensitive to nutrients or salts, such as serpentine habitats, are downwind of the project.

The proposed CPVVS project will include a selective catalytic reduction (SCR) system to control nitrogen oxide (NO_x) air emissions and a carbon monoxide (CO) catalyst to control carbon monoxide air emissions (one SCR/CO catalyst per exhaust train). In addition, there are no serpentine habitats in or surrounding the project area; therefore, the addition of small amounts of nitrogen to the area would result in less-than-significant impacts on soil-vegetation systems.

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).

The project's effects on soil erosion, sedimentation, and compaction would not be significant with the implementation of mitigation measures described in Section 5.11.4.1. Therefore, the potential for cumulative impacts of the proposed CPVVS combined with other projects would be low.

5.11.4 Mitigation Measures

BMPs in accordance with the SWPPP and DESCP will be used to minimize erosion at the site during construction. These erosion-control measures would be 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 would 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

BMPs will be implemented during construction in accordance with the SWPPP required for all construction projects over 1 acre by the RWQCB. The CEC also requires that project owners develop and implement a DESCP to reduce the impact of runoff from the construction site.

Temporary erosion control measures required for the SWPPP and DESCP would be implemented before construction begins, and would be evaluated and maintained during construction. These measures typically include but are not limited to revegetation, mulching, physical stabilization, dust suppression, berms, ditches, and sediment barriers. These 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, which slow runoff and trap sediment, would be incorporated as discussed below. Sediment barriers include straw bales, sand bags, straw wattles, and silt levees. 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.

The site will be constructed on relatively level ground; therefore, it is not considered necessary to place sediment barriers around the entire property boundary. However, some barriers would be placed in locations where offsite drainage could occur to prevent

sediment from leaving the site. If used, sediment barriers would 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 not considered necessary because of the site's small 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. 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 (that is, 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 site will include gravel, paving, and drainage systems.

5.11.4.3 Geotechnical Soil Investigation

The project owner has completed a geotechnical soil investigation to evaluate the engineering characteristics of project site soils and determine remedial measures to address impacts related to expansive soils (Appendix 2H). The investigation indicates that fill may need to be brought in to stabilize the soils and provide a suitable base for the CPVVS. The source and quantity of the fill will be determined during final construction planning. Following the recommendations of the geotechnical investigation will mitigate the potential for expansive soils to cause an adverse impact to a level below significance.

5.11.5 Laws, Ordinances, Regulations, and Standards

Federal, state, county, and local laws, ordinances, regulations, and standards (LORS) applicable to soils are discussed below and summarized in Table 5.11-5.

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) following an amendment in 1977, establishes requirements for discharges of stormwater or wastewater from any point source that would affect the beneficial uses of waters of the United States. The CWA effectively prohibits discharges of stormwater from construction sites unless the discharge is in compliance with a NPDES permit. The State

Water Resources Control Board (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, 1999) that applies to projects resulting in 1 or more acres of soil disturbance. The proposed project would result in disturbance of more than 1 acre of soil. Therefore, the project will require the preparation of a stormwater management plan. The requirements are described in greater detail in Section 5.15, Water Resources.

The CWA's primary requirement for soils in the project area consists of control of soil erosion and sedimentation during construction, including the preparation and execution of erosion- and sedimentation-control plans and measures for any soil disturbance during construction.

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 1987 amendments).	Regulates stormwater discharge from construction and industrial activities	RWQCB – Central Valley Region under State Water Resources Control Board. The U.S. Environmental Protection Agency may retain jurisdiction at its discretion.	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 of 1972; Cal. Water Code 13260-13269: 23 CCR Chapter 9.	Regulates stormwater discharge	CEC and the Central Valley Region under State Water Resources Control Board	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 5.11.2.5
Local			
Solano County Code, 2006	Establishes ordinances for grading, drainage, land leveling and erosion control	Division of Building and Safety Services, Resource Management Department, Solano County	Section 5.11.5.3.1
City of Vacaville Municipal Code, 2007	Describes local for grading and requirements for stormwater discharge control	City Engineer, Public Works Department, City of Vacaville	Section 5.11.5.3.1

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) provide standards for soil conservation during planning, design, and construction activities. The proposed CPVVS project 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 of 1972 is the state equivalent of the federal CWA, and its effect on the CPVVS would be similar. The California Water Code requires protection of water quality by appropriate design, sizing, and construction of erosion and sediment controls. The discharge of soil into surface waters resulting from land disturbance may require filing a report of waste discharge (see Water Code Section 13260a). The Central Valley RWQCB, which controls surface water discharges in the proposed CPVVS project area, may become involved indirectly if soil erosion threatens water quality.

5.11.5.3 Local LORS

5.11.5.3.1 Solano County - County Code

Solano County has established ordinances for grading, drainage, land leveling, and erosion control (Solano County, 2006). These ordinances may apply to those portions of land outside of the City of Vacaville that are disturbed by this project. The Solano County ordinances provide the means for controlling soil erosion, sedimentation, increased rates of water runoff and related environmental damage by establishing minimum standards and providing regulations for the construction and maintenance of fills, excavations, cuts and clearing of vegetation, revegetation of cleared areas, drainage control, and the protection of exposed soil surfaces to protect downstream waterways and wetlands and to promote the safety, public health, convenience, and general welfare of the community (Solano County, 2006). The code outlines several rules, including the duration of the construction season, and grading and drainage permit requirements.

The grading of utility trenches is listed as exempt from the grading code in Solano County (Solano County, 2006b). Because the only portions of the project that will be located on land outside the City of Vacaville limits are the transmission line and natural gas lines, it is likely that this project will not require a grading permit.

5.11.5.3.2 City of Vacaville - Municipal Code

Prior to construction of the proposed site, a grading permit may be required in accordance with City of Vacaville Municipal Code (14.19.242). The grading code includes requirements for grading within the City, exceptions and exclusions from the code, and details the information required for grading permit application. City of Vacaville Municipal Code also outlines requirements for urban stormwater quality management and discharge control (14.26.030). BMPs are required to be implemented to prevent, control, and reduce stormwater pollution for all construction within the City. At this time there is no formal permit required for the BMPs; the requirements are built into City construction and land development permits. Details of BMPs required by the City for use under this division can be obtained from the Public Works and Community Development Departments.

Municipal code states that public improvement projects or grading on City owned property may be exempt from grading permits. Regardless of exemption, grading is subject to all Grading Standards established in the municipal code and as determined by the Director of Public Works.

5.11.6 Agencies and Agency Contacts

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

TABLE 5.11-6
Permits and Agency Contacts for Soils

Permit or Approval	Agency Contact	Applicability
Grading Permit	Mike Yankovich, Planning Program Manager Solano County Resource Management Department (707) 784-6765	Likely exempt. Utility trenches and power facilities are typically exempt from permitting.
Issuance of Grading Permit	Fred Buderi, City Planner City of Vacaville Community Development Department (707) 449-5307	Grading of City land for construction purposes; establishment of BMPs.

5.11.7 Permits and Permit Schedule

It is expected that all the required permits for grading can be secured as long as completed applications are provided to the appropriate agency a minimum of 6 months prior to construction.

5.11.8 References

Bay Area Air Quality Management District (BAAQMD). 2005. Permit handbook. Available at http://www.baaqmd.gov/pmt/handbook/rev02/permit_handbook.htm (verified May 6, 2008).

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

Jones and Stokes Associates. 2003. *Software User's Guide: URBEMIS-2002 for Windows with Enhanced Construction Module, Version 7.4*.

Kleinfelder. 2008. *Preliminary Geotechnical Investigation Report - CPV Vacaville Power Plant*. August.

Natural Resources Conservation Service (NRCS). 1983. *National Engineering Handbook*.

Natural Resources Conservation Service (NRCS). 2008. Soil Survey Geographic (SSURGO) database for Solano County, California (Online). Available at http://soildatamart.nrcs.usda.gov (verified May 6, 2008).

Soil Survey Staff. 2008. Official Soil Series Descriptions (Online). Available at http://soils.usda.gov/technical/classification/osd/index.html (verified May 6, 2008).

Solano County. 2006a. Solano County Code - Chapter 31, Grading, Drainage, Land Leveling and Erosion Control (Online). Available at http://www.solanocounty.com/countycode.asp (verified April 16, 2008).

Solano County. 2006b. Grading Exemptions (Online). Available at http://www.solanocounty.com/SubSection/SubSection.asp?NavID=343 (verified May 7, 2008).

Solano County. 2008. Solano County Draft General Plan (Online). Available at http://www.solanocountygeneralplan.net/ (verified May 6, 2008).

South Coast Air Quality Management District (SCAQMD). 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 May 6, 2008).

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 May 6, 2008).