

C.8 Geology, Mineral Resources, and Soils

This section analyzes whether the Revised Project and PG&E Upgrades would result in any new significant impacts to geology, mineral resources, and soils that were not previously identified and disclosed in the 2010 Final EIR, or whether there would be a substantial increase in the severity of any previously identified impacts to geology, mineral resources, and soils. As part of this analysis, the section considers changes to the existing geology, minerals, and soils in the study area, changes to the ground disturbance footprint of the Approved Project, and changes to potential geologic, mineral, and soil resource impacts and related mitigation measures.

Data sources that were used for this analysis include California Geological Society regulatory maps (CGS, 2014), soil survey data from the Natural Resources Conservation Service (NRCS, 2014), and geologic data from the United States Geological Society (USGS, 2005).

C.8.1 Environmental Setting

This section describes changes to the environmental setting that have occurred since 2010. Section C.8.1.1 describes any changes to the environmental setting that was presented in the 2010 Final EIR. Section C.8.1.2 describes the environmental setting for the area surrounding the PG&E transmission system upgrades.

C.8.1.1 Revised Solar Project

The geology, mineral resources, and soils environmental setting for the Revised Project site has remained substantially unchanged since approval of the 2010 Final EIR. No new geologic hazards have been identified. No new soil hazards (expansive, corrosive, or liquefiable soils) have been identified. No new minerals of local or regional importance have been designated. No new development has occurred, and no major new structures have been built in the valley.

In the Revised Project, the total acreage of graded areas has roughly doubled from 200 acres to 392 acres. The area of total permanent disturbance has decreased from 2,203 acres to 1,888 acres.

C.8.1.2 PG&E Upgrades

The PG&E Upgrades associated with the Revised Project include installation of approximately 17 miles of optical ground wire (OPGW) on existing transmission towers between the Panoche Valley Solar Project site and the existing Panoche Substation in Fresno County. The telecommunications system upgrades also include construction of up to three new microwave communication towers and upgrades to an existing microwave tower. The PG&E transmission system upgrades would include eight new transmission structures that are required to tie the existing Moss Landing–Panoche 230 kV transmission line into the proposed PG&E switchyard, located within the Revised Project site boundaries. The new transmission structures would be installed by PG&E after site preparation is completed by the Applicant.

The environmental setting for these upgrades includes the area surrounding the Moss Landing–Panoche 230 kV transmission line between the project site and the Panoche Substation, the Call Mountains (west of the Panoche Valley), Panoche Mountain (east of the Panoche Valley), and the area surrounding the Helm Substation (approximately 13 miles southwest of the City of Fresno).

The upgraded portion of the Moss Landing–Panoche transmission line runs east to west, beginning at the Panoche Substation and ending adjacent to the project substation. The line first heads west-

southwest, crossing flat to gently sloping agricultural land. As the line leaves the San Joaquin Valley floor, it continues west crossing between the Panoche and Tumey Hills roughly parallel to the Panoche Creek valley. Finally, the line turns slightly northwest, leaving the Panoche Hills and entering Panoche Valley, terminating at the project substation.

On the valley floors, the line is underlain mostly by Quaternary alluvium, along with small areas of Pliocene and/or Pleistocene sandstone, shale, and gravel deposits. The Panoche and Tumey Hills are mostly composed of Upper Cretaceous sandstone, shale, and conglomerate. There are no active mines or minerals of local or regional importance along this upgraded segment of transmission line. No active faults cross this upgraded segment of transmission line, and there are no nearby Earthquake Fault Zones of Required Investigation. In the San Joaquin Valley, the line is underlain by clay loam and sandy loam, which are both classified as having a slight risk of erosion hazard. In the Panoche and Tumey Hills, the line is underlain by clay loam and sandy loam, which both have a slight risk of erosion hazard on flat land and a severe risk of erosion hazard on steeper slopes. A portion of the line in these hills is underlain by sedimentary rock that has a very severe risk of erosion hazard. In the Panoche Valley, the line is underlain by loam that has a slight risk of erosion hazard.

A new microwave communication tower would be constructed within the fence line of the proposed PG&E switchyard. For this new tower, the environmental setting for geology, mineral resources, and soils remains the same as described in the 2010 Final EIR.

The Call Mountain site is in an area of uninhabited mixed forest and shrubland open space located west of the Panoche Valley. At this location, a microwave dish would be added to an existing microwave communication tower. The Call Mountain site (at approximately 3,900 feet of elevation) is located on a broad ridge near the summit of Call Mountain. The topography surrounding the site is composed of steeply sloped ridges and valleys. The underlying geology of the site is composed of Upper Cretaceous sandstone, shale, and conglomerate. There are no active mines or minerals of local or regional importance nearby. No active faults run near the site, and there are no nearby Earthquake Fault Zones of Required Investigation. The site is underlain by rocky outcrops as well as eroded loamy soil that is classified as having a severe risk of erosion hazard.

Panoche Mountain (at approximately 2,100 feet of elevation), northeast of the project site, consists of uninhabited grassland and shrubland open space. Panoche Mountain currently has two existing microwave communication towers, and a new tower (100 feet tall) is proposed within the developed site of one existing tower. The site is located at the summit of Panoche Mountain and is surrounded by steeply sloped ridges and valleys. The underlying geology of the site is composed of Upper Cretaceous sandstone, shale, and conglomerate. There are no active mines or minerals of local or regional importance nearby. No active faults run near the site, and there are no nearby Earthquake Fault Zones of Required Investigation. The site is underlain by loamy soil that is classified as having a severe risk of erosion hazard.

PG&E's Helm Substation is surrounded by agricultural lands, 13 miles southwest of the City of Fresno. There is currently no microwave communication tower at the substation. A new tower would be constructed within the fence line of the substation, and would be approximately 100 feet tall. The topography of the site is a flat to gently sloped valley floor. The underlying geology of the site is composed of Quaternary alluvium. There are no active mines or minerals of local or regional importance nearby. No active faults run near the site, and there are no nearby Earthquake Fault Zones of Required Investigation. The site is underlain by loamy sand that is classified as having a slight risk of erosion hazard.

C.8.2 Applicable Regulations, Plans, and Standards

No changes have occurred to the regulatory setting for geology, mineral resources, and soils since 2010.

C.8.3 Environmental Impacts and Mitigation Measures

This section addresses whether changes to the Approved Project would result in any new significant geology, mineral, and soils impacts or increase the severity of previously identified geology, mineral and soils impacts. Section C.8.3.1 restates the significance criteria used in 2010 to determine whether any project changes result in any new or more severe significant impacts. Section C.8.3.2 summarizes the impacts and mitigation measures presented in the 2010 Final EIR for ease of reference. Section C.8.3.3 presents the updated impact analysis for the Revised Project, and Section C.8.3.4 addresses changes to one adopted mitigation measure and one APM. Section C.8.3.5 addresses the environmental impacts that would occur as a result of the PG&E transmission system upgrades, and Section C.8.3.6 describes cumulative impacts.

C.8.3.1 Significance Criteria

The following significance criteria for geology, mineral resources, and soils were derived from the Environmental Checklist in CEQA Appendix G. These significance criteria were used for the 2010 Final EIR and are also applied to this Supplemental EIR. They have been amended or supplemented, as appropriate, to address the nature of solar photovoltaic (PV) facilities and transmission line upgrades in general, and the full range of potential impacts related to this Revised Project in particular. An impact of the Revised Project and PG&E Upgrades would be considered significant and would require mitigation if it would:

- Result in triggering or acceleration of geologic processes, such as landslides, substantial soil erosion, or loss of topsoil during construction.
- Expose people or structures to potential risk of loss or injury where there is high potential for seismically induced ground shaking, landslides, liquefaction, settlement, lateral spreading, and/or surface cracking.
- Expose people or structures to potential risk of loss or injury where there is high potential for earthquake-related ground rupture in the vicinity of major fault crossings.
- Expose people or structures to potential risk of loss or injury where corrosive, expansive or other unsuitable soils are present.
- Preclude or interfere with the future extraction of valuable mineral resources during the lifetime of the project.
- Result in soils that are unable to support an on-site wastewater disposal system (septic).

Significance conclusions are presented regarding the significance of each identified geology, mineral resources, and soils impact, per the significance classification system provided in Section C.1 (Introduction to Environmental Analysis).

C.8.3.2 Approved Project Impacts and Mitigation Measures

Table C.8-1 presents a summary of the impacts and mitigation measures applicable to the Approved Project.

Table C.8-1. Summary of Impacts and Mitigation: Geology, Mineral Resources, and Soils

Impact No. and Text	Mitigation Required	CEQA Conclusion
Impact GE-1: Results in triggering or acceleration of geologic processes, such as landslides, substantial soil erosion or loss of topsoil.	None	Class III
Impact GE-2: Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground failure and/or groundshaking.	None	Class III
Impact GE-3: Project would expose people or structures to potential substantial adverse effects as a result of surface fault rupture at crossings of active and potentially active faults.	None	Class III
Impact GE-4: Project would expose people or structures to potential substantial adverse effects as a result of problematic soils (e.g., corrosive or expansive soils, or collapsible soil).	GE-4.1: Implementation of Geotechnical Report Recommendations	Class II
Impact GE-5: Project would interfere with access to known mineral resources.	None	No Impact
Impact GE-6: Project soils would be incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems.	None	Class III
Impact GE-7: Contribute to cumulatively considerable geology, mineral resources, and soils impacts.	None	No Impact

C.8.3.3 Revised Solar Project Impacts

Six geology, mineral resources, and soils impacts are addressed in this section; cumulative impacts are evaluated in Section C.8.3.6.

Impact GE-1: Results in triggering or acceleration of geologic processes, such as landslides, substantial soil erosion or loss of topsoil (Class III)

Although the total area for grading activities has increased, the topography of the Revised Project area remains flat to gently sloping. Applicant Proposed Measures (APMs) WR-2 (surface restoration during decommissioning) and WR-3 (BMPs for road construction near drainages) would ensure that areas of soil disturbance are restored and that stream crossings would be constructed in a manner that minimizes disturbance to drainages. The full text of these APMs is provided in Section B.10 of the Project Description for this Supplemental EIR. Compliance with existing laws, including the Clean Water Act, would ensure that runoff is properly managed and that erosion is minimized. This impact would remain less than significant (Class III).

Impact GE-2: Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground failure and/or groundshaking (Class III)

No new faults or liquefaction zones have been identified in the project area. No new structures designed for human occupancy would be constructed under the Revised Project. This impact would remain less than significant (Class III).

Impact GE-3: Project would expose people or structures to potential substantial adverse effects as a result of surface fault rupture at crossings of active and potentially active faults (Class III)

No new active faults have been identified in the project area. No structures would be placed in an Earthquake Fault Zone, and no people or structures would be exposed to potential substantial adverse effects as a result of surface fault rupture. This impact would remain less than significant (Class III).

Impact GE-4: Project would expose people or structures to potential substantial adverse effects as a result of problematic soils (e.g., corrosive or expansive soils, or collapsible soil) (Class II)

As with the Approved Project, the Revised Project site includes potentially corrosive and expansive soils. Implementation of MM GE-4.1 would ensure that structures are properly designed, engineered, and sited to avoid or withstand hazards associated with problematic soils. This impact would remain less than significant with mitigation (Class II).

Impact GE-5: Project would interfere with access to known mineral resources (No Impact)

No new mineral resources or active mining operations have been identified. No impacts would result from construction or operation of the Revised Project.

Impact GE-6: Project soils would be incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems (Class III)

The design for the septic system and leach field has not changed. The soil is still appropriate for an on-site septic system. This impact would remain less than significant (Class III).

C.8.3.4 Changes to Adopted Mitigation Measures

The applicant has proposed one change to the mitigation measure adopted from the 2010 Final EIR as well as a change to two of the APMs for geology, mineral resources, and soils. These changes are shown below (modified text is shown in strikeout for removed text and underline for added text). For Mitigation Measure GE-4.1, the only proposed change is deletion of the first bullet, which is shown here in strikeout. For APM GEO-1, the entire measure is proposed to be deleted; it is shown here in strikeout. For APM GEO-2, the change clarifies that overexcavation of building and equipment pads will be guided by the requirements of the geotechnical report. Mitigation Measures and APMs not shown in this section have not changed and are presented for reference only in Appendix 3.

The proposed changes to MM GE-4.1, APM GEO-1, and APM GEO-2 would not result in more severe or more extensive impacts. The latest geotechnical investigation concluded that over-excavation and importation of non-expansive fill is not necessary for a building that would be constructed on the project site. Additionally, the western boundary for the Revised Project has moved more than 500 feet to the east compared to the Approved Project, and therefore APM GEO-1 is no longer necessary as no structures would be placed within 50 feet of the referenced topographical feature.

MM GE-4.1 Implement Geotechnical Report recommendations. All earthwork operations, including site preparation, and the selection, placement, and compaction of fill materials shall be performed in accordance with the recommendations and the project specifications set forth in the Geotechnical Report (ENGEO, 2010) to ensure the safety of people and structures. Earthwork recommendations relative to adverse soil conditions are summarized below, and shall be implemented:

- ~~■ To reduce the potential for damage to the planned improvements, the upper 18 inches of the building and equipment pad extending at least 10 feet laterally beyond building areas, be underlain by non-expansive fill. Due to the relatively flat nature of the site, selective grading to mitigate expansive soil may not be a practical alternative and imported fill may be required. In lieu of importing non-expansive fill, it may be cost effective to lime treat the upper 18 inches of the building pad to reduce the expansion potential of the on-site soil.~~

- Recommendation that further corrosion testing be performed to better characterize the site and properly design piles to withstand corrosion.
- Review the final grading and foundation plans and specifications prior to construction to determine whether ENGEO's recommendations have been implemented, and to provide additional or modified recommendations, if necessary, to verify whether changes have occurred in the nature, design, or location of the proposed improvements.
- Construction monitoring should occur to check the validity of the assumptions in preparing the geotechnical report. All earthwork operations should be performed under the observation of a Professional Geologist to ensure that the site is properly prepared, the selected fill materials are satisfactory, and placement and compaction of the fills has been performed in accordance with the report recommendations and project specifications. Sufficient notification prior to earthwork shall be given.
- Clean and backfill excavations extending below the planned finished site grades with suitable material compacted to the recommendations presented in the geotechnical report.

~~**APM GEO-1** No structures shall be placed within 50 feet from the topographical feature along the western boundary of the project site unless trench exploration is undertaken by geotechnical engineer that demonstrates that the topographical feature is not fault related.~~

APM GEO-2 In order to avoid expansive clay and mitigate possibly disturbed surface soil, overexcavation of building and equipment pads will be considered as required by the geotechnical report.

C.8.3.5 PG&E Upgrades Impacts

The temporary and permanent geology, mineral resources, and soils impacts of the PG&E Upgrades are analyzed in this section. This analysis is based on the impact statements defined for the solar project, but only Impact GE-1 applies to the PG&E Upgrades and is evaluated. Most impacts addressed for the solar project would not occur as a result of construction or operation of the PG&E Upgrades due to the temporary nature of the construction activities and the small permanent changes to PG&E facilities that would result. The following five impacts would not occur as a result of construction or operation of the PG&E Upgrades:

- Impact GE-2: Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground failure and/or groundshaking
- Impact GE-3: Project would expose people or structures to potential substantial adverse effects as a result of surface fault rupture at crossings of active and potentially active faults
- Impact GE-4: Project would expose people or structures to potential substantial adverse effects as a result of problematic soils (e.g., corrosive or expansive soils, or collapsible soil)
- Impact GE-5: Project would interfere with access to known mineral resources
- Impact GE-6: Project soils would be incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems

Impact GE-1: Results in triggering or acceleration of geologic processes, such as landslides, substantial soil erosion or loss of topsoil (Class III)

Installation of the OPGW along the 17-mile upgraded section of the Moss Landing–Panoche transmission line would involve soil disturbance for preparation of pulling/stringing sites, and for minor improvements to existing access roads. PG&E would also construct up to twelve new tubular steel poles (TSPs) to tie the existing transmission line into the new PG&E switchyard located within the Revised Project boundaries. Although this soil disturbance could result in soil erosion, these activities would occur on generally flat terrain. Compliance with existing regulations, including implementation of a Stormwater Water Pollution Prevention Plan (SWPPP), would minimize the risk of soil erosion. As a result, the impact associated with transmission system upgrades would be less than significant (Class III)

The new microwave communication tower at the project substation would be constructed within the fence line of the proposed PG&E switchyard and would be subject to the same geologic conditions as described for the Project above and in the 2010 Final EIR. No additional soil disturbance beyond what was described for the Revised Project would occur, and impacts associated with construction of this tower would be less than significant (Class III).

The Call Mountains communication tower site is located on steep terrain and would be subject to potential erosion and landslide. However, the upgrades at the Call Mountain site involve installing a new microwave communication dish on an existing tower. No soil disturbance would be required, and no impact would occur.

The Panoche Mountain communication tower site is located on the relatively level top of a ridge. Soil disturbance at this site could lead to accelerated erosion. However, construction of this tower would occur within the fence line of an existing communication tower on land that has already been graded and compacted. Compliance with existing regulations, including implementation of a SWPPP, would reduce the risk of accelerated erosion. Impacts associated with construction of this tower would be less than significant (Class III).

Construction of a new microwave communication tower at the Helm Substation would occur within the fence line of the existing PG&E substation. The surrounding terrain is very flat, and there would be no risk of landslide. Any potential erosion would be controlled through compliance with existing regulations, including implementation of a SWPPP. Impacts associated with construction of this tower would be less than significant (Class III).

C.8.3.6 Cumulative Impacts

The projects that have been constructed or proposed in the area of potential cumulative effects have changed since 2010, as described in Section D. However, even considering the new project list, the Revised Project would not combine with impacts of the PG&E Upgrades or other projects to result in a cumulatively significant impact (No Impact).

C.8.4 Summary of Impacts

The significance of impacts for geology, mineral resources, and soils for the Revised Project and for the PG&E Upgrades is summarized in Sections C.8.4.1 and C.8.4.2. Section C.8.4.3 summarizes the impacts of all project components.

C.8.4.1 Revised Solar Project

There are no changes to the significance of impacts from the conclusions of the 2010 Final EIR. The impacts summarized in Table C.8-1 remain accurate. With implementation of the APMs that would be included as part of the project design, standard and recommended engineering design, as well as Mitigation Measure GE-4.1 (Implement geotechnical report recommendations), potential project impacts to geology, soils, and mineral resources would be less than significant (Class II)

C.8.4.2 PG&E Upgrades

The PG&E Upgrades would result in an adverse but less than significant impact due to the risk of accelerated erosion caused by soil disturbance (Class III). This impact is less than significant due to the generally flat terrain of the majority of the project area and the minor amount of soil disturbance required for the upgrades. Existing regulations (including the required implementation of a SWPPP) would further reduce the potential for accelerated soil erosion.

C.8.4.3 Overall Significance of Impacts

The overall impacts of the solar project and the PG&E Upgrades would be less than significant with implementation of mitigation (Class II). For the solar project, all seismic and soil loss related impacts would be less than significant (Class III). Impacts related to problematic soils would be less than significant with implementation of Mitigation Measure GE-4.1, Implementation of Geotechnical Report Recommendations (Class II). All geology, mineral resources, and soils impacts for the PG&E Upgrades would be less than significant (Class III). No cumulative impacts for geology, mineral resources, and soils would occur.

C.8.5 References

- CGS (California Department of Conservation – California Geological Survey). 2014. Regulatory Maps. <http://www.quake.ca.gov/gmaps/WH/regulatorymaps.htm>. Accessed November 7, 2014.
- NRCS (U.S. Department of Agriculture: Natural Resources Conservation Service). 2014. Map Viewer: USA Soil Survey. <http://www.arcgis.com/home/webmap/viewer.html?webmap=0edea1c7bbb84ba5842d20483af11679>. Accessed November 10, 2014.
- USGS (U.S. Geological Survey). 2005. USGS Open-File Report 2005-1305: Preliminary integrated geologic map databases for the United States – western states: California, Nevada, Arizona, Washington, Oregon, Idaho, and Utah. <http://pubs.usgs.gov/of/2005/1305/>. Accessed November 7, 2014.