5.6 AGRICULTURE AND SOILS

This section discusses the Project's baseline agricultural and soil conditions at the Genesis Solar Energy Project (the Project) site and within the surrounding area including physical soil. Impacts as a result of site development to these resources are discussed.

5.6.1 Affected Environment

Genesis Solar, LLC (Genesis Solar) is proposing to develop a 250-megawatt (MW) solar thermal power generating plant in Riverside County, California. Genesis Solar has applied for a 4,640-acre right-of-way (ROW) grant from the Bureau of Land Management (BLM) for development of the Project. Once constructed, the Project would permanently occupy approximately 1,800 acres within this area, plus approximately 90 acres for linear facilities. The total permanent Project footprint would be 1,890 acres (collectively referred to as the Project area).

The site is situated within the Chuckwalla Valley and is relatively flat. The site generally slopes from north to south with elevations of approximately 400 to 370 feet above mean sea level. The site is comprised of low creosote scrub vegetation and includes portions of the Ford Dry Lake lakebed.

Surrounding features include the McCoy Mountains to the east, the Palen Mountains (including the Palen/McCoy Wilderness Area) to the north, and Ford Dry Lake to the south. Interstate 10 (I-10) is located approximately 2 miles south of the southernmost border of the ROW. Most of the land near the site is managed by BLM and there is no California State Land in the vicinity, but there are some private in-holdings.

5.6.1.1 Agriculture Resources

The Project area has historically been used for sheep grazing, according to the BLM. The Project site is located within the BLM designated Ford Dry Lake Allotment. In 2007, BLM prepared an Environmental Assessment (EA) to convert the Ford Dry Lake Allotment to a purpose which precludes livestock grazing in accordance with 43 Code of Federal Regulations (CFR) 4110.4-2(b) (BLM, 2007). The Allotment was designated unavailable for grazing in the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) which was approved in December 2002. Section 2.3.1.2 of NECO provides that the "Ford Dry Lake sheep allotment would no longer be available for domestic sheep use because it is less than nine miles from occupied bighorn sheep range in the Palen Mountains" (BLM, 2002).

It is unknown how many sheep grazed in the Ford Dry Lake Allotment in the past. Historically, the Ford Dry Lake Allotment did not specify a number of sheep authorized to graze, it being dependent on the ephemeral forage availability. However, the season of grazing use was specified as from March 1st to April 30th. Due to the BLM change in the Allotment's designation, it is unlikely any sheep have been grazed in the area in several years.

5.6.1.2 Prime Farmland

The California Department of Conservation, Division of Land Resource Protection compiles Important Farmland maps combining current land use information with U.S. Department of Agriculture (USDA) National Resources Conservation Service (NRCS) soil surveys. Soil units qualifying for Prime Farmland and Farmland of Statewide Importance are determined by the NRCS. The Project site does not meet the qualifications for Important Farmland, Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (California Department of Conservation, 2008).

In addition, the Project area was evaluated using the Riverside County Land Information System Geographic Information System (GIS). The Project area does not have any farmland designation and is not identified as an agricultural preserve on the County's GIS mapping (Riverside County, 2009).

5.6.1.3 Soil Resources

Soil classification was made using data from the USDA NRCS. The USDA soil survey classified the soil on site as typical durorthids, loamy-skeletal, mixed, hyperthermic, and shallow (Cherioni series), and typical torripsamments, mixed, hyperthermic (Rositas series). The following are descriptions of the two main soil series at the Project site:

Cherioni Series

The Cherioni series consists of very shallow and shallow to a hardpan and bedrock, somewhat excessively drained soils that formed in slope alluvium on volcanic bedrock. Cherioni soils are on fan terraces or hills and have slopes of 0 to 70 percent. The mean annual precipitation is about four inches and the mean annual air temperature is about 72 degrees F. Somewhat excessively drained; medium to rapid runoff; moderate permeability. Used for livestock grazing. Present vegetation is creosotebush, paloverde, saguaro, cholla, ocotillo, triangleleaf bursage, and ratany.

Rositas Series

The Rositas series consists of very deep, somewhat excessively drained soils formed in sandy eolian material. Rositas soils are on dunes and sand sheets. Slopes range from 0 to 30 percent with hummocky or dune micro relief. Mean annual precipitation is about four inches and the mean annual air temperature is about 72 degrees F. Somewhat excessively drained; negligible to low runoff; rapid permeability. Rositas soils are used for rangeland and wildlife habitat. Present vegetation is creosotebush, white bursage, desert buckwheat, and mesquite.

The soil is classified within hydrologic Soil Group D (NRCS, 2009) which has the following description:

> High run off potential. Soils having very slow infiltration rates when thoroughly wetted and consisting chiefly of clay soils with high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material.

These soils have a very slow rate of water transmission (WorleyParsons, 2009). Figure 5.6-1 shows the soils present at the Project site using the NRCS.

As part of the records review for the Phase 1 Environmental Site Assessment for the Project, regulatory agency databases were searched which might indicate a potential for contaminated soils. The Project site was not identified on any databases and no nearby sites were identified within the search radius (TetraTech, 2009). Therefore, it is unlikely there is existing soil contamination at the Project site.

5.6.2 Environmental Impacts

Environmental impacts associated with the construction and operations of the Project are discussed in the following sections. Significance criteria were developed based on California CEQA Guidelines and evaluated using professional judgment. Impacts would be considered significant if:

- Substantially increased wind or water-induced soil erosion occurred as a result of Project construction or operation.

- Substantially increased sedimentation occurred in areas adjacent to construction areas.
- Prime Farmlands, Farmlands of Statewide Importance, or Unique Farmland were lost.
- Construction activities were to occur in areas of high erosion susceptibility and the disturbed areas were left exposed and not properly stabilized.

5.6.2.1 Construction

Construction can affect soil resources in the following ways: increased soil erosion, soil compaction, loss of soil productivity, and disturbance of saturated soils. Soil erosion results in the loss of topsoil and increases sedimentation of surface waters downstream of the construction site. The magnitude, extent, and duration of this construction-related impact would depend on several factors, including the proximity of the construction to water, the soils affected, and the method, duration, and time of year of construction.

Solar fields have fairly stringent grading requirements as parabolic troughs must be almost level along their troughs and grades perpendicular to the troughs are generally benched to two percent or less.

Under pre-developed conditions, each 125 MW module generally slopes from the northeast to the southwest. Grading for post-developed conditions will slightly modify the existing contours to provide a surface level appropriate for the parabolic troughs. The preliminary grading is designed to ensure the run-off from solar fields is directed into the appropriate drainage channel, and the power block, evaporation ponds, and land farm units are protected in the 100-year, 24-hour storm event.

The conceptual grading plan (Worley Parsons, 2009) includes the finished grade elevations and preliminary contour lines across the entire site. The total site earth work quantities for the project site, including the evaporation and retention pond excavations and protective berm fill placement, will result in a balanced cut-and-fill earthwork of approximately 712,000 cubic yards of cut and 1 million cubic yards of fill, based on the preliminary site design and layout (Genesis Solar, LLC, 2009). There will be no fill disposal or fill procurement sites. More exact earthwork quantities will be determined after the detailed aerial and ground survey is completed. Final site design and layout will take into account additional environmental, land use, and engineering constraints. The final grading design will include adjustments to the grades to provide balanced earthwork cut and fill quantities. This will be accomplished by raising/lowering the grades to obtain a balanced site.

The runoff potential of the soil is high since it is classified as hydrologic soil group D. The water erosion hazard is moderate, and the wind erosion hazard is moderate. Topographic slopes in the Project area are generally less than two percent.

During construction, the plant site area, the gas pipeline alignment, and areas along the transmission route will be disturbed. At that time, the surface of the disturbed areas will be devoid of vegetation and there will be the highest potential for erosion, as well as associated effects including soil loss and increased sediment yields downstream from disturbed areas. With the implementation of BMPs such as straw bales, silt fences, limiting exposed areas, etc., the impacts of soil erosion during construction should be less than significant.

Soil compaction results from vehicle traffic along access roads and in equipment staging areas. Compaction damages soil structure and reduces pore space, which impedes the movement of air and water. The degree of compaction depends on the moisture content and texture of the soil.

Compaction impacts are not expected to be significant as they will occur in limited areas that are currently vacant.

Water Erosion

The Project site is in a desert fluvial drainage system where there are rare intense events that form and alter the drainage features. During a storm event, the ephemeral streams will transport sediment downstream, until the sediment drops out of the system due to gravity, velocity of the water flow, or other impediments. As outlined in the preliminary Draft Erosion and Sedimentation Control Plan (DESCP), Best Management Practices (BMPs) would include temporary erosion control measures such as crushed rock, silt fences, and fiber rolls (WorleyParsons, 2009).

The potential for soil loss by water erosion was estimated using the Revised Universal Soil Loss Equation (RUSLE2) software (NRCS, 2002). Soil loss was calculated as tons/acre/year by the program and then multiplied by the site feature acreage and assumed construction period to get total soil loss in tons for the project duration. This information is summarized in Table 5.6-1 and includes assumptions for the RUSLE2 software.

The following BMPs during construction will limit the potential for soil loss from water erosion:

- Local soil berms and a detention area will be constructed to contain storm water runoff.
- During site grading, clearing and grubbing will be confined to only those areas needed for facility construction as indicated in the conceptual grading plan (WorleyParsons, 2009).
- Temporary erosion controls including crushed rock, silt fences, and fiber rolls will be used as needed to minimize erosion in active grading areas. Soil stockpiles will be covered prior to forecasted storm events and during windy conditions. Fiber rolls or gravel bags will be placed around the perimeter of the stockpiles to further minimize the potential for runoff.
- Additionally, water will be used to control dust and will be applied at a rate so as to minimize runoff.

BMPs will be applied and repaired as soon as erosion is evident and as soon as possible. Temporary erosion control measures will be implemented as needed to control erosion.

Temporary sediment control materials will be maintained on site throughout the life of the Project so as to respond as needed to unforeseen rain or emergencies.

Wind Erosion

The soils on the Project site have a moderate hazard for wind erosion. BMPs as described above and in the DESCP (WorleyParsons, 2009) are expected to minimize soil loss due to wind erosion. Systematic watering of active grading areas during construction at least twice daily is expected to significantly reduce wind-borne dust. Water applied to control dust will be pumped from existing groundwater wells and applied at a rate to minimize and control runoff.

Table 5.6-1. Estimate of Soil Loss by Water Erosion Using Revised Universal Soil Loss Equation (RUSLE2)[a]

			Estimates Using RUSLE2[a]		
Feature (acreage)[b]	**Activity**	**Duration (months)**	**Soil Loss (tons) without BMPs**	**Soil Loss (tons) with BMPs**	**Soil Loss (tons/yr) No Project**
Project Site	Grading	6	330.8	5.198	1.148
(1,800 acres total, 1,350 acres to be graded)	Construction	19	1047.4	16.458	--
Roads (15.76 acres)	Grading Construction	3	1.931	0.0303	0.0134
Transmission Lines	Grading	2	0.0041	0.000064	0.00043
(9.18 acres for construction; 0.05 acre for pole footprints)	Construction	4	1.499	0.0236	--
Natural Gas Pipeline	Grading	2	0.238	0.0037	0.00247
(36.36 acres for construction; 2.91 acres for trench)	Construction	3	4.454	0.0699	--
Project Soil Loss Estimates	**All activities listed above**		**1386.3**	**21.78**	**1.16**

Notes:

[a] Soil losses (tons/acre/year) are estimated using RUSLE2 software. (NCRS, 2002)
The soil characteristics were estimated using RUSLE2 soil profiles corresponding to the mapped soil unit.
Estimates of actual soil losses use the RUSLE2 soil loss times the duration and affected area.
The No Project Alternative estimate does not have a specific duration, and loss is given in tons/year.

[b] Project Acreages based on the assumption that 75 % of the project site will be graded.
Other areas based project disturbance table for acreage outside the project footprint.

[c] Duration of activities based upon assumptions in the Plan of Development (Genesis Solar, LLC, 2009)

RUSLE2 Assumptions:
100-ft slope length, 2% slope
Construction and Grading soil losses assume the following inputs: Management – bare ground; Contouring – None, rows up and down hill; Diversion/terracing – None; Strips and Barriers – None.
Construction and Grading with BMP soil losses assume the following inputs: Management – Silt fence; Contouring – Perfect, no row grade; Diversion/terracing – None; Strips and Barriers- 2 fences, 1 at end of slope.
No Project soil losses assume the following inputs: Management – Dense grass, not harvested; Contouring – None, rows up and down hill; Diversion/terracing – None; Strips and Barriers – None.

5.6.2.2 Operations

With the implementation of BMPs, and associated monitoring activities included in the operations phase Storm Water Pollution Prevention Plan (SWPPP) and the DESCP, soil erosion would be expected to be minor during Project operations. Further, the Project will utilize soil stabilizers within the solar array area in order to reduce the amount of dust deposited on the solar collectors (dust affects their efficiency).

Post-construction actions will include dust control through periodic watering, and placement of gravel berms and detention structures to control sediment loss and manage storm water runoff. The power block area will be graded with moderate slopes to direct runoff and divert storm water to retention areas. Diversion ditches and the detention area will be designed to accommodate flow from a 100-year storm event. Roads and paved areas will be kept free of dust, dirt, and visible soil materials. Sufficient materials will be kept on site to implement temporary control measures during the operational life of the plant.

By its nature, a solar thermal project must keep dust to a minimum, as a film on the mirrors of the solar array will reduce their efficiency for power production. Dust control will be achieved by a combination of soil stabilizers. Operational controls designed to control dust will reduce the overall soil erosion in the area.

5.6.2.3 Agriculture Resources

The productivity of the soil for agricultural purposes will be lost. However, the site is not currently used for agriculture and has been precluded from grazing by the BLM. Therefore, there will be no effective loss of soil or productive agricultural land. Impacts to agricultural resources from Project operations would be less than significant.

5.6.2.4 Soil Resources

Project operation would not result in impacts to the soil from erosion or compaction. Routine vehicle traffic during project operation would be limited to existing roads, most of which will be paved or covered with gravel. Access routes will also be graded between the parabolic troughs to permit washing of the mirrors with a pick-up truck mounted tanker and the occasional cutting of vegetation to reduce the risk of fire due to plant regrowth. Impacts to soil resources from project operations would be less than significant.

5.6.3 Mitigation Measures

Implementation of the mitigation measures presented below will minimize soil loss, and thus also protect water quality, from Project construction and operations phase activities.

SOIL-1: Erosion control will be developed and implemented to ensure minimum soil loss and maintain water quality. Temporary and long-term erosion control measures will be constructed and maintained as necessary during and following construction until long-term stabilization has been established for the life of the Project.

Such erosion and sedimentation control measures may include, but are not limited to: minimizing disturbance; wetting the roads in active construction areas and laydown areas; controlling speed on unpaved surfaces; placing gravel in entrance ways; and use of straw bales, silt fences, and earthen berms to control runoff.

SOIL-2: Conduct Project construction grading in compliance with good industry practice and Riverside County grading permit requirements.

SOIL-3: Conduct project construction activities and operations in accordance with the construction and operations phase SWPPPs and associated Monitoring Program, and with the DESCP submitted to the CEC. SWPPPs will be required for both construction and operations phases (the DESCP will encompass both Project phases), and these documents will include BMPs (*e.g.,* use of runoff control measures such as hay bales and silt fences, regular inspections of drainage control structures) to reduce erosion and sedimentation.

5.6.4 Significant Unavoidable Adverse Impacts

Impacts due to soil disturbance on and off the site are expected to occur primarily during construction. However, these impacts would be mitigated to a less than significant level through the use of good engineering practices, compliance with Federal and State Laws, Ordinances, Regulations, and Standards (LORS), and the application of BMPs. After construction is complete, long-term erosion control BMPs would be implemented, and soil erosion on the site is expected to be less than the current, natural conditions. As such, the Project would not be expected to contribute to significant unavoidable adverse impacts on agriculture and soils during either construction or operation.

5.6.5 Cumulative Impacts

Potential cumulative impacts to soils could occur as a result of the conversion of agricultural lands to non-agricultural uses and increased soils disturbance which increases the potential for soil erosion. As previously described, the Project would have no effect on agriculture, because there are no agricultural uses on or in the immediate vicinity of the Project site.

It is expected that additional proposed solar projects, as described in Section 5.1, would be required to employ good engineering practices and comply with all the same water quality-related regulatory programs (*e.g.,* National Pollutant Discharge Elimination System (NPDES) permits and grading ordinances), and would be required to control erosion under these regulations. Thus, the cumulative soils impacts in the general area would be expected to be less than significant. The Project would have no impacts on agricultural resources, and thus would not contribute to possible cumulative impacts on agricultural resources of the area.

5.6.6 Applicable Laws, Ordinances, Regulations, and Standards (LORS)

This section addresses the LORS applicable to soils that are relevant to the Project. Table 5.6-2 and the following text summarize the LORS that are expected to apply to the Project.

Table 5.6-2. LORS Applicable to Soils

LORS	Applicability	Where Discussed in AFC
Federal:		
Farmland Protection Policy Act - Subtitle I of Title XV, Section 1539-1549	The Farmland Protection Policy Act requires the assessment of the project impacts on farmlands.	Section 5.6.6.1

Table 5.6-2. LORS Applicable to Soils

LORS	Applicability	Where Discussed in AFC
Federal Water Pollution Control Act of 1972: Clean Water Act of 1977	Regulates stormwater discharge from construction and industrial activities.	Section 5.6.6.1
Natural Resources Conservation Service (1983); National Engineering Handbook Sections 2 and 3	Standards for soil conservation.	Section 5.6.6.1
Bureau of Land Management	Regulations for construction on federal land.	Section 5.6.6.1
State:		
Williamson Act	The Williamson Act is the State's premier agricultural land protection program.	Section 5.6.6.2
California Porter Cologne Water Quality Control Act	A NPDES California General Activities Construction Permit is necessary if an area greater than one acre will be disturbed. Industrial facilities (including power plants) with potential to affect storm water discharges are required to obtain an NPDES permit during operation (Industrial Storm Water General Permit).	Section 5.6.6.2
Local:		
Riverside County Building Codes & Fees (Ordinance 457)	Riverside County requires a grading permit for earth moving activities exceeding 50 cubic yards.	Section 5.6.3
Riverside County Ordinance Regulating Flood Hazard Areas, (Ordinance 458)	Riverside County requires a separate application prior to any construction or other development within any area of special flood hazards, areas of flood-related erosion hazards, or areas of mudslide (*i.e.,* mudflow).	Section 5.6.3

5.6.6.1 Federal Authorities and Administering Agencies

The Farmland Protection Policy Act

The Farmland Protection Policy Act (FPPA) of 1981 was enacted to identify and protect the nation's farmlands. The purpose of the Act is to preserve agricultural and open space lands by discouraging premature and unnecessary conversion to urban uses. The Act creates an arrangement whereby private landowners contract with counties and cities to voluntarily restrict land to agricultural and open-space uses.

Federal Water Pollution Control Act of 1972

The Federal Water Pollution Control Act of 1972, commonly referred to as the Clean Water Act following amendment in 1977, establishes requirements for discharges of stormwater or waste water from any point source that would affect the beneficial uses of waters of the United States. The State Water Resources Control Board (SWRCB) adopted statewide NPDES general permits that apply to stormwater discharges associated with construction, industrial, and municipal activities. The Regional Water Quality Control Board (RWQCB) is the administering agency for the NPDES permit program. The Project would comply with the Clean Water Act through the preparation and implementation of a Construction and Industrial SWPPP (refer to Section 5.4, Water Resources).

Natural Resources Conservation Service
The USDA NRCS, *National Engineering Handbook*, 1983, Sections 2 and 3 provide standards for soil conservation during planning, design, and construction activities. The Project would need to conform to these standards during grading and construction to limit soil erosion.

Bureau of Land Management
The Project site is located on lands managed by the BLM. Pending approval of the Applicant's ROW application, grading and soil erosion regulations will be developed and included in the Conditions of Approval. A site-wide inspection report, completed by a certified professional soil scientist, will be been provided by the Applicant.

5.6.6.2 State Authorities and Administering Agencies

The Williamson Act
The Williamson Act was passed by the California Legislature in 1965 to preserve agricultural and open space lands by discouraging premature and unnecessary conversion to urban uses. The Act creates an arrangement whereby private landowners contract with counties and cities to voluntarily restrict land to agricultural and open-space uses. As discussed below, the Project site is not covered by this Act.

Porter-Cologne Water Quality Control Act
The Porter-Cologne Water Quality Control Act of 1967, Water Code Section 13000 et seq., requires the SWRCB and the nine RWQCBs to adopt water quality criteria to protect State waters. Those criteria include the identification of beneficial uses, narrative and numerical water quality standards, and implementation procedures. Water quality criteria for the Project area are contained in the Water Quality Control Plan for the Colorado Region (Basin Plan) which was adopted in 1993 and is in the process of being amended. This plan sets numerical and/or narrative water quality standards controlling the discharge of wastes to the State's waters and land.

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). No discharges of soil into surface waters are anticipated, and thus, no waste discharge permit is anticipated.

5.6.6.3 Local Authorities and Administering Agencies

Ordinances for land grading and storm water pollution control have been established by Riverside County (Riverside County Ordinance No. 457 and 754.1). These ordinances establish permitting requirements and exemptions for grading land and activities that can cause the discharge of pollutants into storm water systems or water courses.

5.6.6.4 Project Compliance with Agriculture and Soils LORS

The Project will conform to the goals, objectives, or policies in the general plans for the planning, developing, design, and construction of the facility as contained in the Riverside County General Plan. The following objectives and goals from the General Plan are applicable to this section:

- Agricultural Objective 1 - Agriculturally productive lands will be encouraged to remain in agricultural uses.

- Agricultural Objective 2 - Incompatible urban development adjacent to productive agricultural lands shall be discouraged.
- Environmental Hazards and Resources Goal 9 - Encourage the preservation and growth of agriculture while providing sufficient flexibility in land uses and densities to allow agricultural land to phase into other land uses.

The Project does not involve agriculturally productive land; therefore, it complies with these objectives.

The Safety Element of the Riverside County General Plan also contains objectives for minimizing wind erosion of soils. The Project site is in an area identified as having “high” to “moderate” wind erosion susceptibility by Riverside County. Riverside County Policy S 3.11 requires studies that address wind erosion on proposed development within “high” and “very high” wind erosion (Riverside County, 2008). Therefore, a more detailed consideration of wind erosion would be submitted with the building permit.

5.6.7 Involved Agencies and Agency Contacts

The agency contacts for grading, building, NPDES, and floodplain development permits are identified in Table 5.6-3.

Table 5.6-3. Agencies and Agency Contacts

Agency Contact	Phone/E-mail	Permit/Issue
John Carmona Senior Water Resources Control Engineer Or Cliff Raley Colorado River Basin Region (7) Colorado River Basin RWQCB 73-720 Fred Waring Drive, Suite 100 Palm Desert, CA 92260	(760) 340-4521 jcarmona@waterboards.ca.gov (760) 776-8962 craley@waterboards.ca.gov	Storm Water Pollution Prevention Plans
David Mares, Planning Department; or Robert Liman, Building Inspections Riverside County Desert Permit Assistance Center 38686 El Cerrito Road Palm Desert, CA 92211	(760) 863-8271	Building permits, grading permit for earthmoving activities exceeding 50 cubic yards, and application for construction in a special flood hazard area

5.6.8 Permits Required and Permit Schedule

Building and grading permits are required by the Riverside County. Applications are required at least six weeks prior to construction. A list of required permits and their schedule is provided in Table 5.6-4.

Table 5.6-4. Permits Required and Permit Schedule

Permit/Approval	Schedule
California General Permit for Storm Water Discharge Associated with Construction (NPDES Permit)	A Notice of Intent (NOI) application will be submitted 30 days prior to the start of construction.

Table 5.6-4. Permits Required and Permit Schedule

Permit/Approval	Schedule
California General Permit for Storm Water Discharge Associated with Industrial Activities	A Notice of Intent (NOI) will be filed the month prior to Project startup.
Building permit	Application must be submitted six weeks prior to the start of construction.
Grading permit	Application must be submitted six weeks prior to the start of construction.
Floodplain development permit	Application must be submitted six weeks prior to the start of construction.

5.6.9 References

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