5.12 Soils

This section discusses the BSEP's potential soils-related hazards and impacts.

5.12.1 LORS Compliance

This section addresses the LORS applicable to soils that are relevant to the BSEP. Table 5.12-1 and the following text summarize the LORS that are expected to apply to the Project.

Table 5.12-1 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 5.12.3
State:		
Williamson Act	The Williamson Act is the State's premier agricultural land protection program.	Section 5.12.2
California Porter Cologne Water Quality Act	A National Pollution Discharge Elimination System (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 5.12.3
Local:		
Kern County Grading Code, (Ord. G-6914 § 9 (part), 2002)	Kern County requires a grading permit for earth moving activities exceeding 50 cubic yards.	Section 5.12.3
Kern County Floodplain Management Ordinance, (Ord. G-6914 § 14 (part), 2002)	Kern County requires a development permit 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 5.12.3

5.12.1.1 Federal LORS

<u>The Farmland Protection Policy Act</u>

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.

5.12.1.2 State LORS

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 State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (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 Lahontan Region (Basin Plan) which was adopted in 1994 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.

A disturbance of greater than one acre requires a California General Permit for Storm Water Discharges Associated with Construction Activity and thus the Project will require an NPDES Permit-California General Construction Activity Storm Water Permit prior to discharge of storm water facilities (also see Section 5.17, Water Resources). A key feature of the requirements under this permit is the management of erosion and soil movement. Industrial facilities in California (such as the BSEP), with the potential to impact storm water discharges during operations are required to obtain an NPDES Permit- Industrial Storm Water General Permit (SWRCB Order 97-03 DWQ) to ensure proper management and reduction of potential pollutants in runoff.

5.12.1.3 Local LORS

Kern County's Grading Code

The Project is subject to the Kern County's Building Inspection Division requirements for building, grading, and flood development permits. The flood development permit is for development in areas with in special flood hazards.

Kern County Floodplain Management Ordinance

If a watercourse is to be altered or relocated, adjacent communities and the California Department of Water Resources must be notified prior to such alteration or relocation of a watercourse, and evidence of such notification must be submitted to the Federal Insurance Administration and Federal Emergency Management Agency. The ordinance also requires that the flood carrying capacity of the altered or relocated portion of said watercourse be maintained (Ord. G-6914 § 14 (part), 2002).

5.12.1.4 Involved Agencies

The agency contacts for grading, building, NPDES, and floodplain development permits are identified in Table 5.12-2.

Table 5.12-2 Agencies and Agency Contacts

Contact	Phone/Email	Permit/Issue
Mike Plaziak Sr. Water Resources Control Engr. Lanhontan RWQCB Victorville Office 14440 Civic Drive, Suite 200 Victorville, CA 92392	(760) 241-6583 mplaziak@waterboards.ca.gov	NPDES Permit governing Storm Water Discharges Associated with Construction Activity for any disturbance of greater than one acre and for industrial activities.
Kim Baldwin Kern County Engineering and Survey Services Department – Building Inspections Division 2700 M Street Bakersfield, CA 93301	(661) 862-8650 baldwink@co.kern.ca.us	Building permits, Grading Permit for earthmoving activities exceeding 50 cubic yards, and Floodplain Development Permits for construction in a special flood hazard area

5.12.1.5 Required Permits and Permit Schedule

Building and grading permits are required by the Kern County Engineering and Survey Services Department, Building Inspections Division. Applications are required at least six weeks prior to construction.

Table 5.12- 1 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.
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.
Kern County Building Permit	Building permit applications will be submitted six (6) weeks prior to the start of construction.
Kern County Grading Permit	A grading plan and permit application will be submitted six (6) weeks prior to the start of construction.
Kern County Flood Plain Development Permit	Flood plain development permit application will be submitted six (6) weeks prior to the start of construction.

5.12.2 Affected Environment

This subsection discusses baseline soil and agricultural conditions at the Project site. Physical soil properties and the potential for contaminated soils are discussed.

5.12.2.1 Regional Setting

The BSEP site is located in the northwestern Mojave Desert, in Kern County, California. The Mojave Desert is part of the greater Mojave Desert Geomorphic Province. This province lies between the northeast-trending Garlock fault on the north and the northwest-trending San Andreas Fault on the south. Characteristic landforms in the Mojave Desert include alluvial fans, plains, low pediments, and scattered buttes. The majority of the natural drainage in the vicinity of the Project site is to the northeast.

Soils in the Mojave Desert are shallow, deep, or very deep and are well drained to excessively drained (U.S. Department of Agriculture, 1981). The surface layer ranges from sand to clay loam. Sandy surface layers are highly susceptible to blowing, shallow soil depth, low available water capacity and a have a hazard of erosion due to slopes and insufficient plant cover (U.S. Department of Agriculture, 1981).

The Project is located in an undeveloped area and no agricultural activities are ongoing at or in the immediate vicinity of the site. A review of the Kern County Williamson Act Lands 2005 Map (2006) indicates that the site is “non-Enrolled Land” meaning that the county land is not enrolled with the Williamson Act Program. No lands designated as containing Prime, Statewide Important farmlands are present within the Project site. For a more detailed discussion of agricultural resources, please refer to Section 5.7, Land Use.

Climate in the area of the Project site is highly variable because of the mountain ranges and desert areas. The Mojave Desert is generally sunny, dry, and warm. Annual precipitation in the Mojave Desert ranges from three to six inches (U.S. Department of Agriculture, 1981). Precipitation in Cantil (located neaby to the northeast of the Project site) averages just over three inches annually (U.S. Department of Agriculture, 1981). The majority of the rainfall occurs during December, January, and February. Winds in the Mojave Desert are prevalent from the west-southwest. They are generally light and range from four to 12 miles per hour (U.S. Department of Agriculture, 1981).

5.12.2.2 Soils at the Project Site

The ground surface in the region of the Project generally slopes gently downward to the northeast direction at a gradient of less than two percent (see Section 5.5.2.1). Drainage at the BSEP plant site occurs as sheet flow across the property. Much of the surface water infiltrates into the sandy alluvium.

The majority of the plant site is underlain by Cajon loamy sand and Rosamond clay loam with Arizo gravelly loamy sand and Cajon gravelly loamy sand occurring on small portions of the site (Soils Map, Figure 5.12-1). Both transmission line options occur on Arizo gravelly loamy sand and Cajon loamy sand. The gas pipeline will traverses Cajon loamy sand, Rosamond Clay loam, Rosamond clay loam, saline-alkali, Garlock loamy sand, and Cajon gravelly loamy sand soil types. Soil survey mapping units characterizing the types and distribution of soils within the Project area from NRCS and soil descriptions The electronic shape files for these mapping units were downloaded from the NRCS web site. Detailed soil descriptions were developed from the Official Series Descriptions (OSDs; NRCS, 2007a). Soil characteristics including depth, texture, drainage, permeability, and erosion hazard of individual soil mapping units are included in Table 5.12- 4. Land capability classification is an indicator of the soils primary limitations for revegetation. All soil types on the plant site are Capability Subclass VIIe, which means the soils have very severe limitations that make it unsuitable for cultivation. The Project area has been heavily disturbed by past agricultural activities, and parts of the area are in the process of recolonization with desert saltbush vegetation.

Table 5.12- 4 Soil Mapping Unit Descriptions and Characteristics

Map Unit	Description[1]
114	**Cajon Loamy Sand** - Formed in sandy alluvium from dominantly granitic rocks - Very deep and somewhat excessively drained. - Slopes range from 0 -15% - Negligible to low runoff - Rapid permeability - Slight to moderate water erosion hazard - High hazard of wind erosion - Capability Subclass VIIe - Taxonomic Class: Mixed, thermic Typic Torripsamments
116	**Cajon Gravelly Loamy Sand** - Formed in sandy alluvium from dominantly granitic rocks - Very deep and somewhat excessively drained. - Slopes range from 0 -15% - Negligible to low runoff - Rapid permeability - High water and wind erosion hazard - Capability Subclass VIIe - Taxonomic Class: Mixed, thermic Typic Torripsamments
137	**Garlock Loamy Sand** - Formed from mixed alluvium - Very deep and well-drained - Slopes from 2 – 9% - Low to medium runoff - Rapid permeability - Moderate hazard from wind and water erosion - Capability Subclass VIIe - Taxonomic Class: Fine-loamy, mixed, superactive, thermic Typic Haplargids
171	**Rosamond Clay Loam, Saline-Alkali** - Formed from granitic alluvium - Deep and well drained - Slopes are 0 - 2% - Moderate runoff - Moderate to moderately slow permeability - Moderate hazard from wind and water erosion - Capability Subclass VIIe - Taxonomic Class: Fine-loamy, mixed, superactive, calcareous, thermic Typic Torrifluvents

Map Unit	Description[1]
172	**Rosamond Clay Loam** - Formed from granitic alluvium - Deep and well drained - Slopes are 0 - 2% - Moderate runoff - Moderate to moderately slow permeability - Moderate hazard from wind and water erosion - Capability Subclass VIIe - Taxonomic Class: Fine-loamy, mixed, superactive, calcareous, thermic Typic Torrifluvents
[1] U.S. Department of Agriculture's Soil Conservation Service Soil Survey of Kern County, California, Southeastern Part (1981)	

5.12.2.3 Hazards Related to Soil Conditions

Please see Section 5.5.2.3, Geologic Hazards for discussions concerning slope stability, subsidence, collapsible soil conditions, and expansive soils. Based on the Phase I Environmental Site Assessments (ESA) conducted for the site (ENSR 2007 and 2008), contaminated soils that could be disturbed by Project construction are not present at the Project site or at properties adjacent to the site (see additional discussion in Section 5.16, Waste Management and the Phase 1 ESAs provided in Appendix I).

5.12.3 Environmental Impacts

Environmental impacts associated with the construction and operations of the BSEP 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 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, or
- Construction activities were to occur in areas of high erosion susceptibility and the disturbed areas were left exposed and not properly stabilized.

5.12.3.1 Construction

Mass grading of the plant site will result in a 1 to 1.5 percent slope downward from the southwest to the northeast of the site. Earthwork associated with the Project will include excavation for foundations and underground systems, and the total earth movement that will occur is approximately 5,160,000 cubic yards.

As the vast majority of the Project grading and excavation will occur on the plant site as opposed to the linear facilities, only two soils types will be affected- Cajon loamy sand and Rosamond clay loam. The runoff potential of these soils is negligible to moderate, the water erosion hazard is moderate, and the wind

erosion hazard is moderate to high. 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. There will be no fill disposal or fill procurement sites.

Water Erosion

The runoff designations for the soils affected during site grading are low to negligible for the Cajon loamy sand and moderate for the Rosamond clay loam. In contrast the Cajon loamy sand has rapid permeability whereas the Rosamond clay loam has a moderate to moderately slow permeability. The majority of site features are located on soil units that have rapid permeability and negligible to low runoff potential. The exceptions are the Rosamond clay loam and Rosamond clay loam – saline alkali soil units which have moderate runoff potential. Given the climatic conditions, potential for precipitation, and storm water runoff which historically does not reach the valley from surrounding mountains, the implementation of BMPs during construction will limit the potential for soil loss from water erosion. As outlined in the preliminary Draft Erosion and Sedimentation Control Plan (DESCP), BMPs would include temporary erosion control measures such as crushed rock, silt fences and fiber rolls (see Appendix L).

The potential for soil loss by water erosion was estimated using the Universal Soil Loss Equation for pre-development, during construction, and post-development conditions. Under current conditions, the soil loss is estimated to be about one ton per year. As described above and in the DESCP, construction activities will increase the potential for soil loss, and the estimate of soil loss during this period is about 150 tons per year without implementation of control measures and BMPs as described in the DESCP. Although infiltration at the site is expected to be rapid, BMPs will include the following:

- 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 (see Appendix L).
- 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 need to control erosion. Temporary sediment control materials will be maintained onsite throughout the life of the Project so as to respond as needed to unforeseen rain or emergencies.

Wind Erosion

The soils on the BSEP plant site have a moderate to high hazard for wind erosion. BMPs as described above and in the DESCP (Appendix L) 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. As discussed in Section 2.0, Project Description, and 5.17, Water Resources, between 5 and 10 million gallons per day will be used during grading, both in the site preparation, compaction effort and to support dust control. Water applied to control dust will be pumped from existing groundwater wells and will be applied at a rate to minimize and control runoff.

5.12.3.2 Operations

With the implementation of BMPs, and associated monitoring activities included in the operations phase 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). Please note that impacts of Project operation on the desert wash that will be rerouted around the eastern and southern perimeter of the plant site are discussed in Section 5.3, Biological Resources.

Post construction actions will include dust control through periodic watering, 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 surface swales directed to the relocated dry wash. 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. An entrance/outlet tire wash will be constructed and maintained. Sufficient materials will be kept onsite to implement temporary control measures during the operational life of the plant.

As discussed in Section 5.2, Air Quality, 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, water from the mirror washing, and compaction of the driving surface over time. Discussions with personnel at the Honda Proving Center east of the Project site (Pawling, 2007) indicate that the exposed open fields on this formerly farmed property are currently a major source of wind blown dust. Therefore, operational controls designed to control dust will reduce the overall soil erosion in the area.

5.12.3.3 Cumulative Impacts

With the implementation of measures to control erosion and sedimentation, including standard, good construction practices and the mitigation measures described below, the BSEP would have minimal impacts on soils conditions. Cumulative projects in the area (the Pine Tree Wind Development Project and the Barren Ridge-Castaic Transmission Project), would be required to comply with the same water quality-related regulatory programs (e.g., NPDES permits and grading ordinances), and would be expected to control erosion under these regulations. Thus, the cumulative soils impacts in the general area would be expected to 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.

5.12.4 Mitigation Measures

Implementation of the mitigation measure 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 to 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; 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 Kern County grading permit requirements.

SOIL-3 Conduct project construction activities and operations in accordance with the construction and operations phase Storm Water Pollution Prevention Plans (SWPPP) 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 Best Management Practices (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.

5.12.5 References

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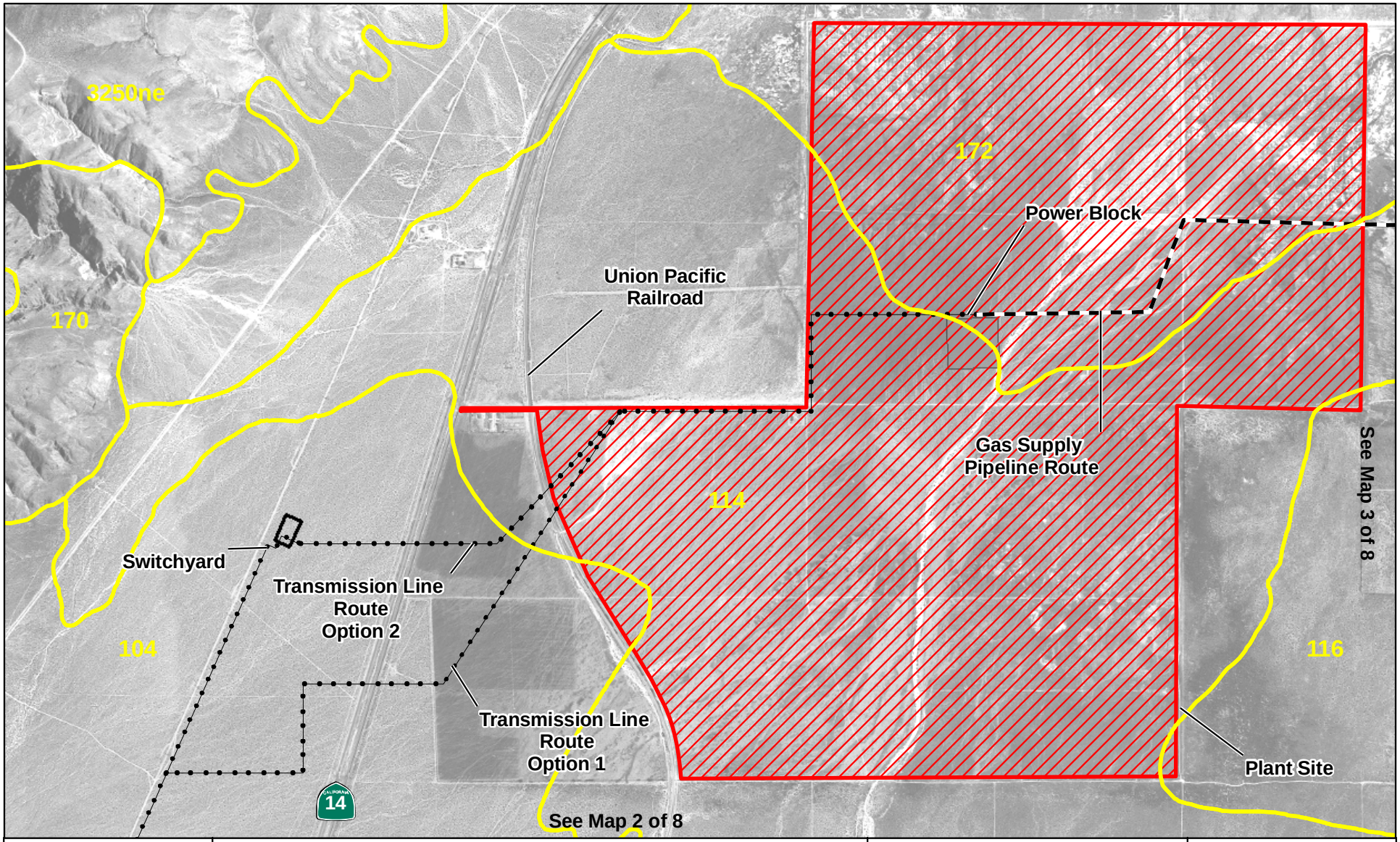

Map Location

Legend

- Plant Site
- Power Block
- Gas Supply Pipeline
- Transmission Lines
- Soil Boundaries (See Soils Legend for Definitions)

N W E S

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0 2,000 4,000 6,000 8,000 Feet

Beacon Solar Energy Project

Figure 5.12-1
Soils Map

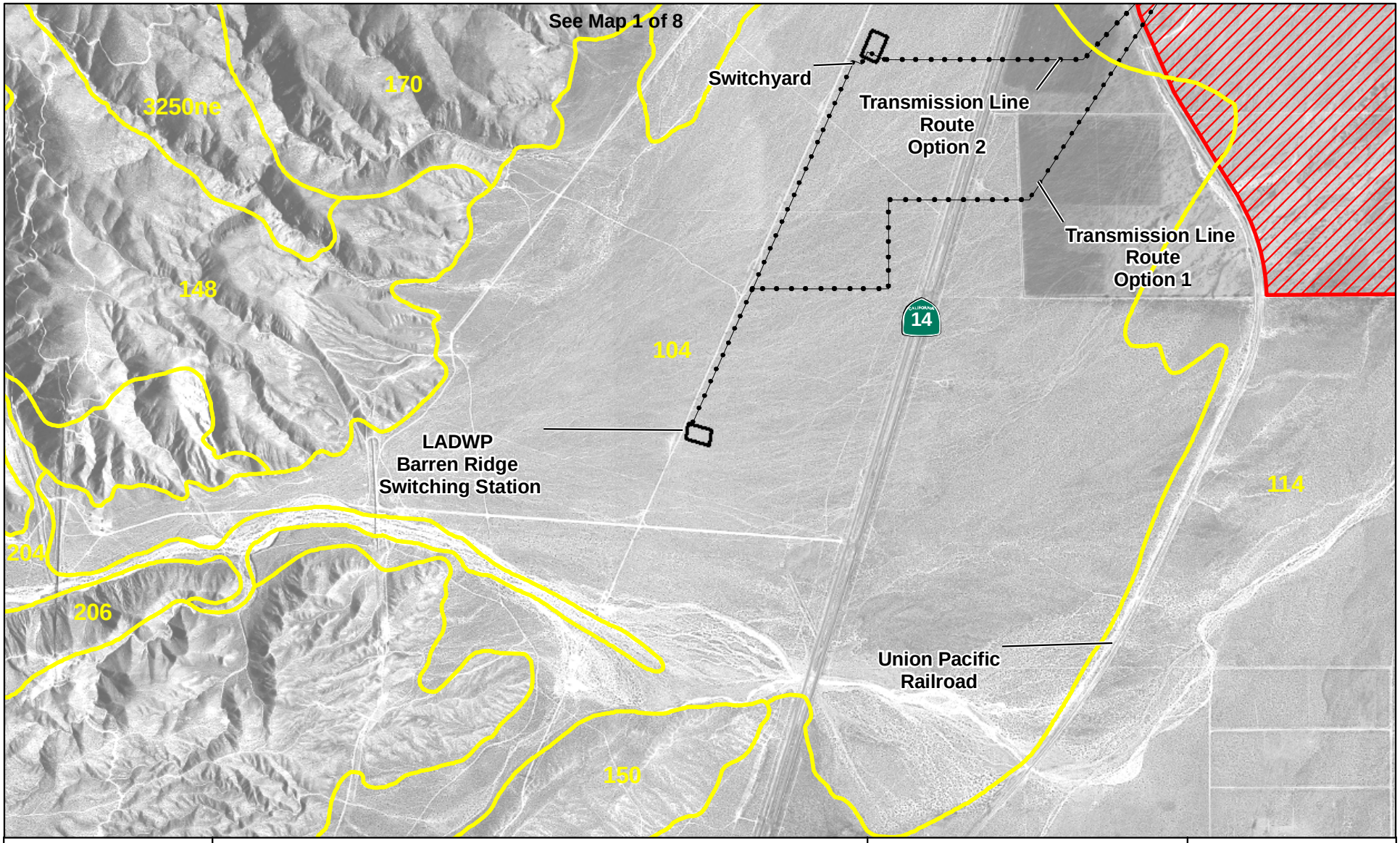
Mapsheet 1 of 8

Source: NAIP 2006; NCSS Websoil Survey 2008

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008



Map Location

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- Gas Supply Pipeline
- Transmission Lines
- Soil Boundaries (See Soils Legend for Definitions)

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Beacon Solar Energy Project

Figure 5.12-1
Soils Map

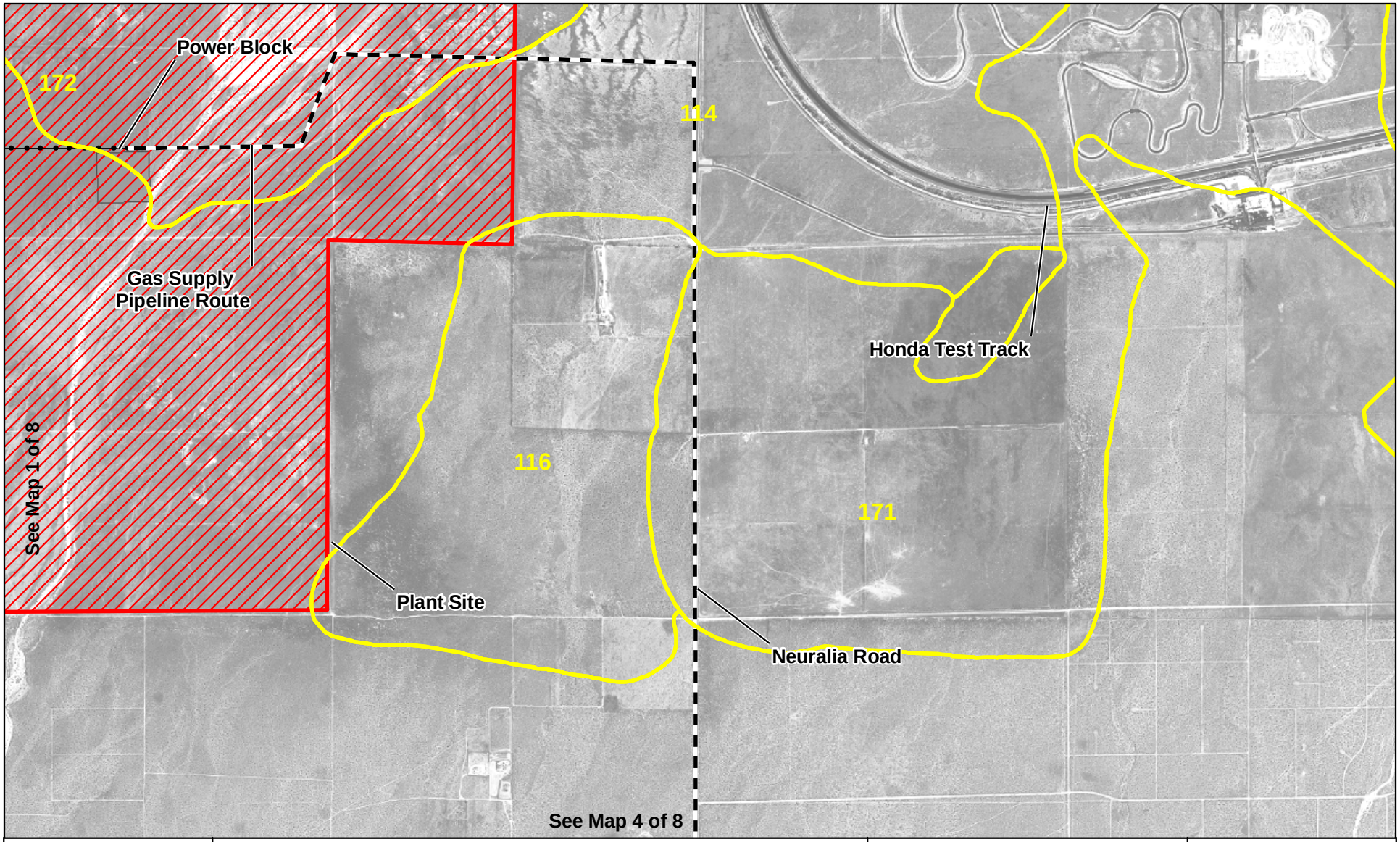
Mapsheet 2 of 8

Source: NAIP 2006; NCSS Websoil Survey 2008

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008



Map Location

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- Soil Boundaries (See Soils Legend for Definitions)

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Beacon Solar Energy Project

Figure 5.12-1
Soils Map

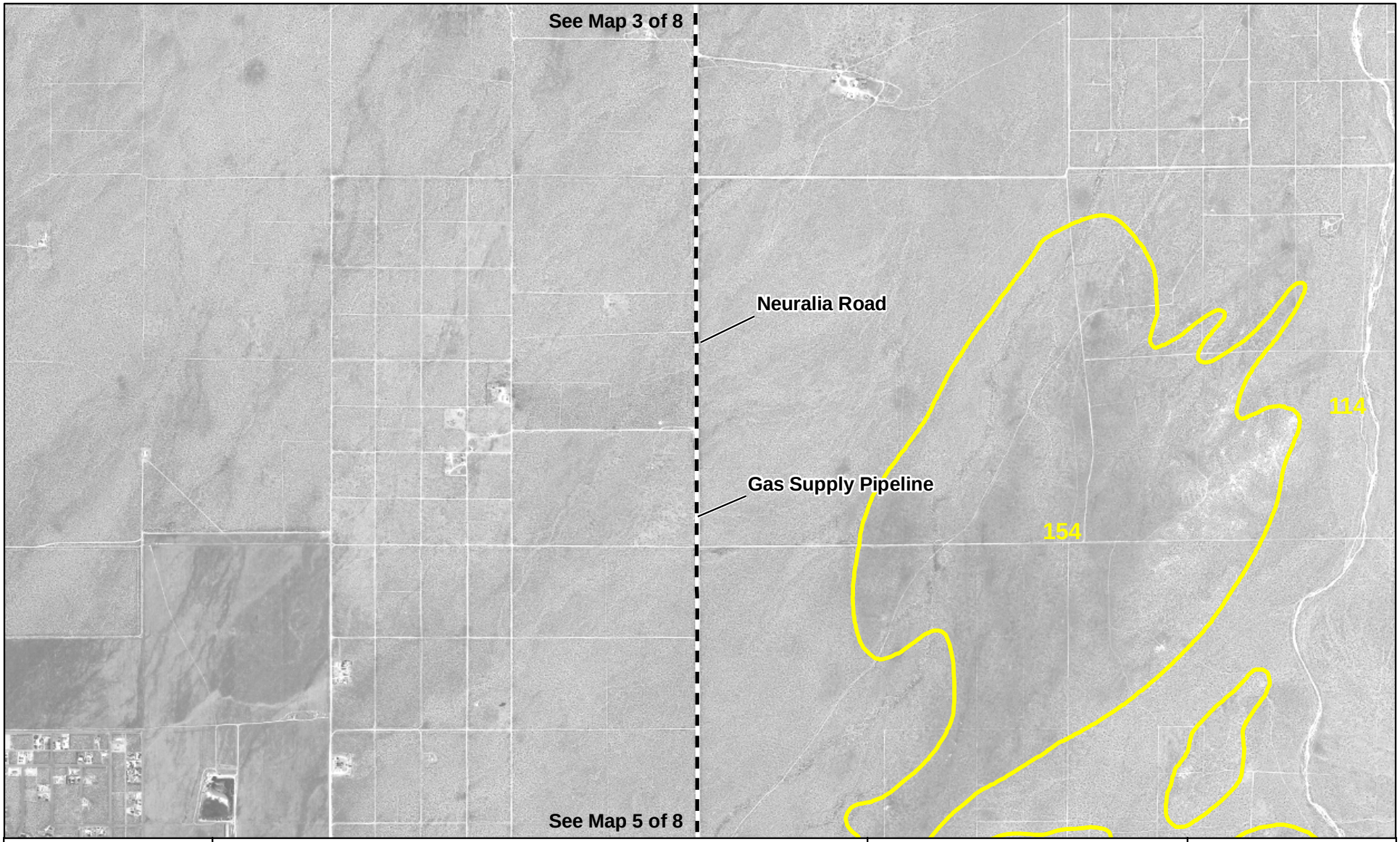
Mapsheet 3 of 8

Source: NAIP 2006; NCSS Websoil Survey 2008

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008



Map Location

Legend

- Plant Site
- Power Block
- Gas Supply Pipeline
- Transmission Lines
- Soil Boundaries (See Soils Legend for Definitions)

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Beacon Solar Energy Project

Figure 5.12-1
Soils Map

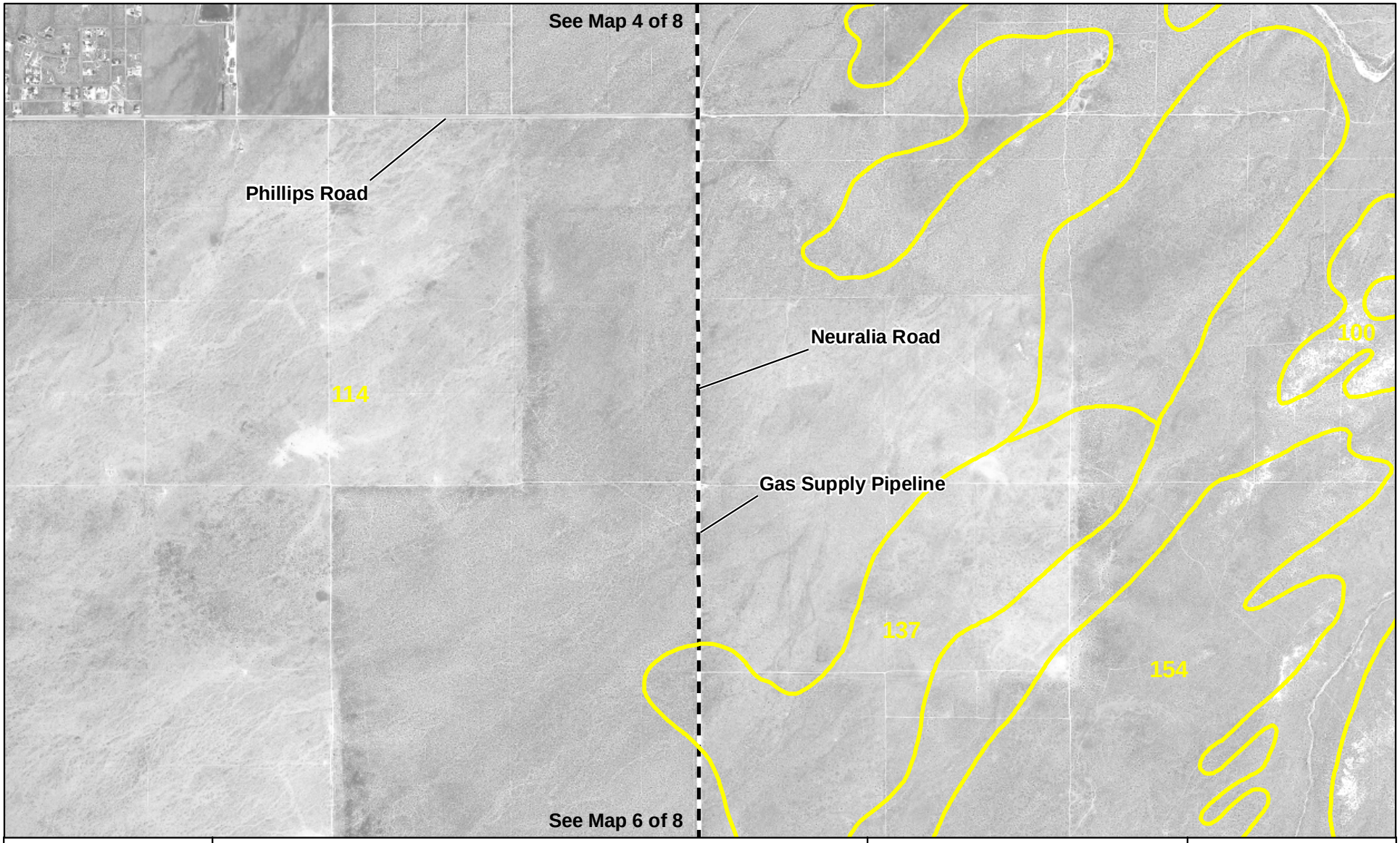
Mapsheet 4 of 8

Source: NAIP 2006; NCSS Websoil Survey 2008

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008



Map Location

Legend

- Plant Site
- Power Block
- Gas Supply Pipeline
- Transmission Lines
- Soil Boundaries (See Soils Legend for Definitions)

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Beacon Solar Energy Project

Figure 5.12-1
Soils Map

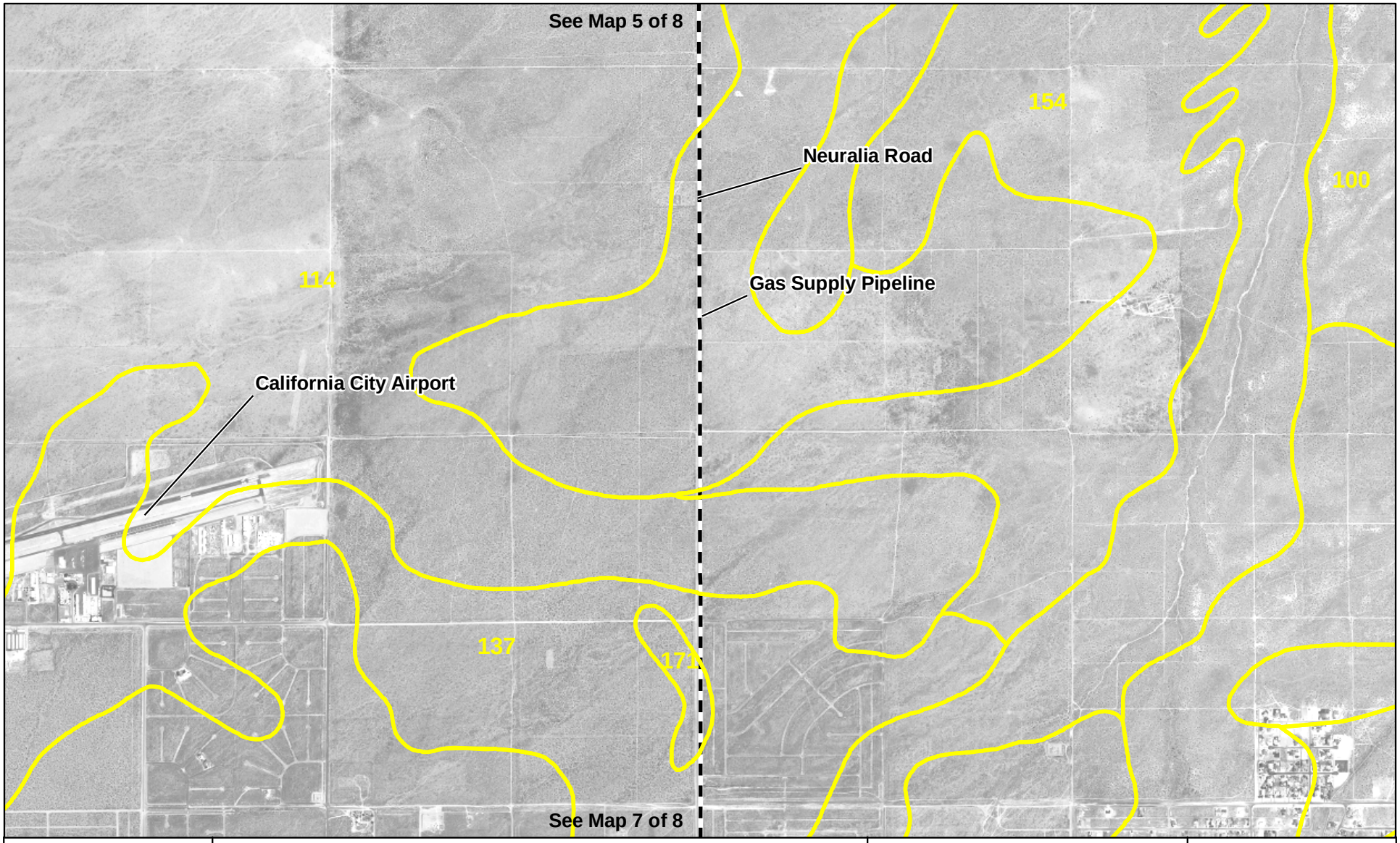
Mapsheet 5 of 8

Source: NAIP 2006; NCSS Websoil Survey 2008

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008



Map Location

Legend

- Plant Site
- Power Block
- Gas Supply Pipeline
- Transmission Lines
- Soil Boundaries (See Soils Legend for Definitions)

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Beacon Solar Energy Project

Figure 5.12-1
Soils Map

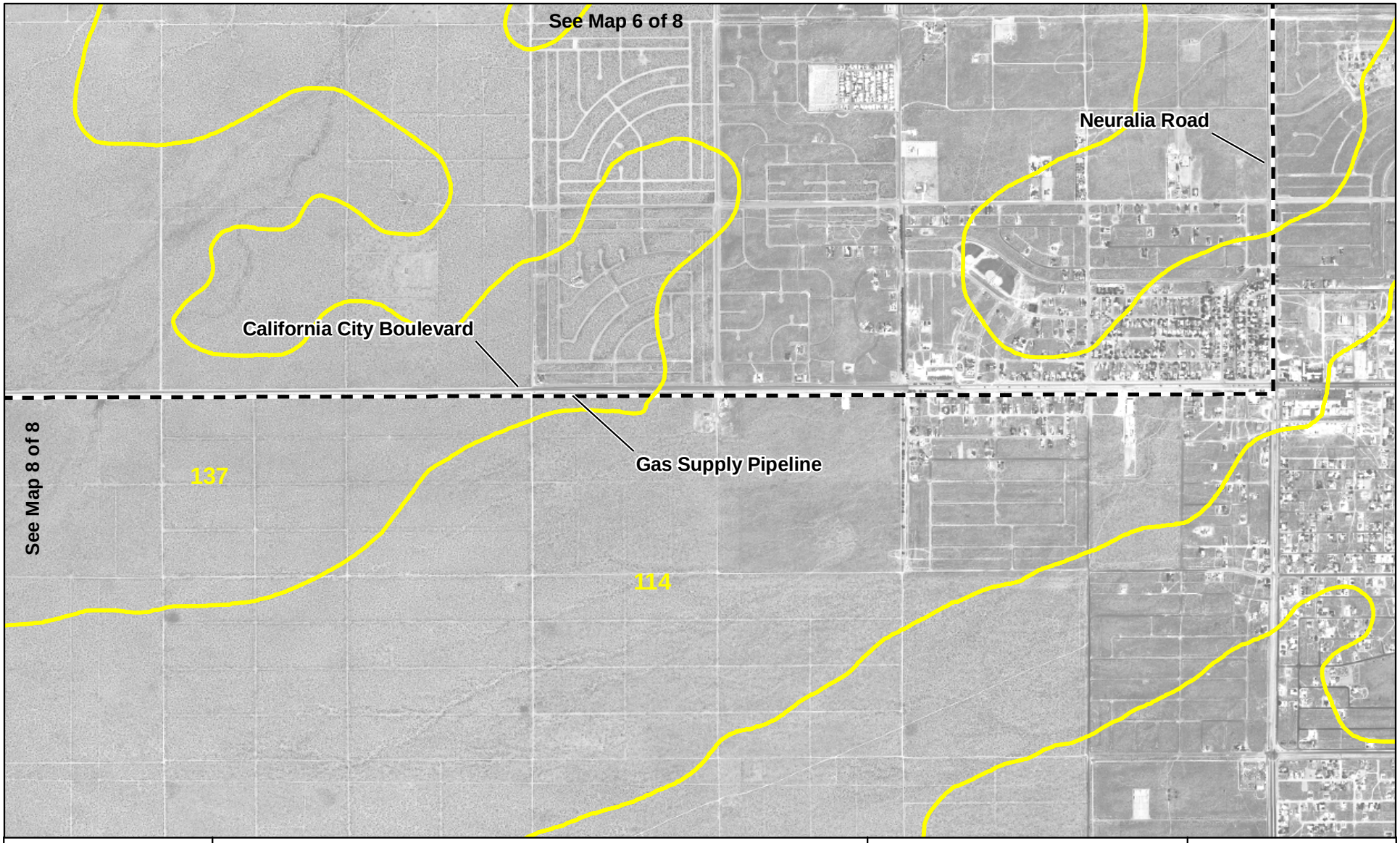
Mapsheet 6 of 8

Source: NAIP 2006; NCSS Websoil Survey 2008

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008



Map Location

Legend

- Plant Site
- Power Block
- Gas Supply Pipeline
- Transmission Lines
- Soil Boundaries (See Soils Legend for Definitions)

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Beacon Solar Energy Project

Figure 5.12-1
Soils Map

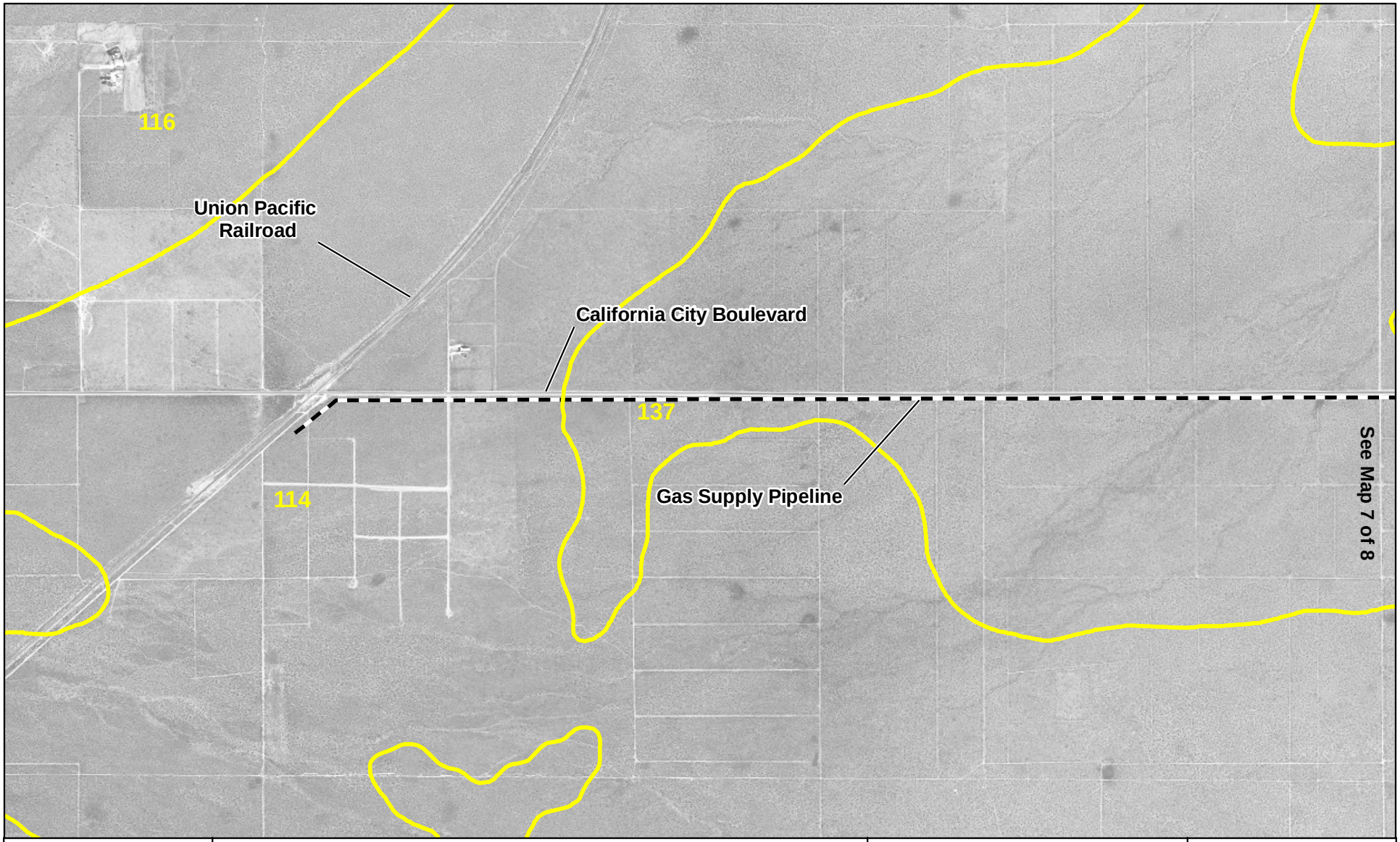
Mapsheet 7 of 8

Source: NAIP 2006; NCSS Websoil Survey 2008

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008



Map Location

Legend

- Plant Site
- Power Block
- Gas Supply Pipeline
- Transmission Lines
- Soil Boundaries (See Soils Legend for Definitions)

N W E S

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Beacon Solar Energy Project

Figure 5.12-1
Soils Map

Mapsheet 8 of 8

Source: NAIP 2006; NCSS Websoil Survey 2008

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008

Map Unit Legend

Kern County, California, Southeastern Part

Map symbol	Map unit name
100	Alko-Neuralia sandy loams, 0 to 9 percent slopes
101	Anaheim variant very fine sandy loam, 2 to 30 percent s lopes
102	Anaverde gravelly loam, 30 to 50 percent slopes
103	Anaverde gravelly loam, 50 to 75 percent slopes
104	Arizo gravelly loamy sand, 2 to 9 percent slopes
105	Arujo sandy loam, 9 to 15 percent slopes
106	Arujo-Friant-Tunis, 9 to 15 percent slopes
107	Arujo-Friant-Tunis complex, 15 to 50 percent slopes
108	Arujo-Friant-Tunis complex, 50 to 75 percent slopes
109	Arvin sandy loam, 2 to 5 percent slopes
110	Arvin sandy loam, 5 to 9 percent slopes
111	Arvin stony sandy loam, 5 to 9 percent slopes
112	Badland-Orthents complex, 30 to 75 percent slopes
113	Cajon sand, 5 to 15 percent slopes
114	Cajon loamy sand, 0 to 5 percent slopes
115	Cajon loamy sand, saline-alkali, 0 to 2 percent slopes
116	Cajon gravelly loamy sand, 0 to 9 percent slopes
117	Cajon-Garlock sands, 2 to 9 percent slopes
118	Chanac-Badland complex, 30 to 50 percent slopes
119	Chanac-Pleito complex, 9 to 30 percent slopes
120	Chanac-Pleito complex, 30 to 50 percent slopes
121	Chino variant clay loam, 0 to 2 percent slopes
122	Cibo cobbly clay, 2 to 30 percent slopes
123	Cibo cobbly clay, 30 to 75 percent slopes
124	Cinco gravelly loamy sand, 50 to 75 percent slopes
125	DeStazo sandy loam, 0 to 2 percent slopes
126	DeStazo sandy loam, 5 to 9 percent slopes, eroded
127	DiGiorgio sandy clay loam, 0 to 2 percent slopes
128	Dumps, mine
129	Edmundston sandy loam, 30 to 50 percent slopes
130	Edmundston gravelly sandy loam, 30 to 50 percent slopes
131	Edmundston gravelly sandy loam, 50 to 75 percent slopes
132	Edmundston gravelly sandy loam, dry, 30 to 50 percent s lopes
133	Edmundston-Godde-Tollhouse complex, 30 to 50 percent sl opes
134	Edmundston-Godde-Tollhouse complex, 50 to 75 percent sl opes
135	Fluvents, ponded
136	Friant sandy loam, 50 to 75 percent slopes
137	Garlock loamy sand, 2 to 9 percent slopes
138	Godde-Tollhouse gravelly sandy loams, 30 to 75 percent slopes
139	Haploxerolls, hilly
140	Havala sandy loam, 0 to 2 percent slopes
141	Havala sandy loam, 2 to 5 percent slopes
142	Havala sandy loam, 5 to 9 percent slopes
143	Havala sandy loam, 9 to 15 percent slopes
143ne	Calicreek loamy coarse sand, 0 to 2 percent slopes, rarely flooded
144	Hesperia sandy loam, 0 to 2 percent slopes
144ne	Calicreek sandy loam, 0 to 2 percent slopes, occasionally flooded
145	Hesperia sandy loam, 2 to 5 percent slopes
146	Hesperia sandy loam, 5 to 9 percent slopes
147	Hi Vista sandy loam, 2 to 9 percent slopes

Map Unit Legend

Kern County, California, Southeastern Part

Map symbol	Map unit name
148	Jawbone gravelly loamy sand, 15 to 75 percent slopes
149	Los Osos variant clay loam, 30 to 50 percent slopes
150	Muroc sandy loam, 2 to 9 percent slopes
151	Muroc-Randsburg sandy loams, 5 to 9 percent slopes
152	Nacimiento loam, 30 to 50 percent slopes, eroded
152ne	Pleito gravelly sandy clay loam, 2 to 5 percent slopes
153	Nacimiento loam, 50 to 75 percent slopes, eroded
154	Neuralia sandy loam, 2 to 5 percent slopes
155	Norob-Neuralia complex, 0 to 5 percent slopes
156	Pajuela-Whitewolf association, steep
157	Pits
158	Playas
159	Pleito sandy clay loam, 2 to 5 percent slopes
160	Pleito sandy clay loam, 9 to 50 percent slopes
161	Pleito-Chanac sandy clay loams, 5 to 9 percent slopes
162	Pleito-Chanac sandy clay loams, 15 to 30 percent slopes
163	Porterville clay, 5 to 9 percent slopes
164	Porterville cobbly clay, 5 to 9 percent slopes
165	Psamments-Xerolls complex, nearly level
166	Quarries
167	Randsburg sandy loam, 2 to 15 percent slopes
168	Rescue variant loam, 15 to 30 percent slopes
169	Rescue variant loam, 30 to 50 percent slopes
170	Rock outcrop
171	Rosamond clay loam
172	Rosamond clay loam, saline-alkali
173	Rosamond variant sandy loam, 5 to 15 percent slopes
174	Steuber sandy loam, 0 to 2 percent slopes
175	Steuber sandy loam, 2 to 5 percent slopes
176	Steuber sandy loam, 5 to 9 percent slopes
177	Steuber stony sandy loam, 5 to 9 percent slopes
178	Sween variant-rock outcrop complex, 5 to 30 percent slo pes
179	Tehachapi sandy loam, 2 to 15 percent slopes
180	Tehachapi loam, 15 to 30 percent slopes, eroded
181	Tehachapi cobbly sandy clay loam, 2 to 30 percent slope s
182	Tehachapi cobbly sandy clay loam, warm, 2 to 9 percent slopes
183	Tehachapi variant sandy clay loam, 15 to 50 percent slo pes
184	Torrifluvents-Cajon complex, nearly level
184ne	Cuyama sandy loam, 2 to 5 percent slopes
185	Torriorthents-Rock outcrop complex, very steep
186	Tujunga loamy sand, 2 to 5 percent slopes
187	Tunis sandy loam, 5 to 30 percent slopes
188	Tunis-Walong complex, 50 to 75 percent slopes
189	Tweedy sandy loam, 30 to 50 percent slopes
190	Tweedy sandy loam, 50 to 75 percent slopes
191	Tweedy-Anaverde complex, 30 to 50 percent slopes
192	Tweedy-Anaverde complex, 50 to 75 percent slopes
193	Walong sandy loam, 15 to 30 percent slopes
193ne	Chanac-Pleito complex, 2 to 5 percent slopes
194	Walong sandy loam, 30 to 50 percent slopes

Map Unit Legend

Kern County, California, Southeastern Part

Map symbol	Map unit name
195	Walong-Arujo sandy loams, 15 to 30 percent slopes
196	Walong-Arujo sandy loams, 30 to 50 percent slopes
197	Walong-Arujo sandy loams, 50 to 75 percent slopes
198	Walong-Rock outcrop complex, 30 to 75 percent slopes
199	Walong-Edmundston association, steep
200	Walong-Edmundston association, very steep
201	Wasioja sandy loam, 2 to 9 percent slopes
202	Wasioja sandy loam, cool, 5 to 9 percent slopes
203	Whitewolf loamy sand, 2 to 5 percent slopes
204	Whitewolf loamy sand, cool, 2 to 5 percent slopes
205	Xererts-Xerolls complex, steep
206	Xeric Torriorthents, very steep
207	Xerolls, very steep
208	Xerolls-Rock outcrop complex, very steep
209	Xerorthents, very steep
209ne	Whitewolf loamy sand, 0 to 2 percent slopes, occasionally flooded
210	Xerorthents, loamy, very steep
211	Xerorthents-Rock outcrop complex, very steep
212	Water
213	Miscellaneous water
213ne	Calicreek loamy coarse sand, 0 to 2 percent slopes, occasionally flooded
216ne	Inyo-Riverwash complex, 0 to 5 percent slopes, frequently flooded
250ne	Hoffman-Tips-Pilotwell association, 15 to 50 percent slopes
260ne	Cowspring-Tips-Rock outcrop complex, 30 to 50 percent slopes
264ne	Arujo-Walong-Tunis association, 9 to 30 percent slopes
267ne	Cieneba-Vista-Rock outcrop complex, 30 to 60 percent slopes
268ne	Tunis-Tollhouse-Sorrell association, 30 to 75 percent slopes
270ne	Locobill-Backcanyon-Sesame complex, 20 to 60 percent slopes
271ne	Walong-Tunis-Rock outcrop association, 30 to 60 percent slopes
275ne	Strahle-Sesame-Tweedy association, 30 to 75 percent slopes
276ne	Tips-Hoffman-Cinco association, 30 to 60 percent slopes
277ne	Feethill-Vista-Walong association, 15 to 60 percent slopes
279ne	Strahle-Rock outcrop-Sesame association, 30 to 60 percent slopes
286ne	Tollhouse-Tweedy-Locobill association, 30 to 60 percent slopes
287ne	Tweedy-Strahle association, 40 to 75 percent slopes
294ne	Edmundston-Tweedy-Walong association, 30 to 60 percent slopes
296ne	Arujo-Walong-Tunis association, 30 to 75 percent slopes
3250ne	Jawbone association, 30 to 60 percent slopes
3251nm	Jawbone association, 8 to 50 percent slopes
3301nm	Cutterbank association, 15 to 60 percent slopes
3430nm	Pasopeak-Rock outcrop association, 30 to 75 percent slopes
3630nm	Koehn coarse sand, 2 to 8 percent slopes
4432ne	Koehn association, 2 to 4 percent slopes