BSK Associates
Engineers & Laboratories

PRELIMINARY SOIL AND GEOLOGY PHASE I STUDY

PROPOSED ANAEROBIC BIOGAS PRODUCTION FACILITY
TULARE COUNTY, CALIFORNIA

BSK E12-076-01F

PREPARED FOR:

HARVEST POWER CALIFORNIA, LLC.
24487 ROAD 140
TULARE, CALIFORNIA 93274

MARCH 1, 2013

BSK Associates
Engineers & Laboratories

567 West Shaw Avenue Suite B
Fresno CA 93704
P 559.497.2880
F 559.497.2886
www.bskassociates.com

March 1, 2013

BSK E12-076-01F

Ms. Linda Novick
Harvest Power California, LLC
24487 Road 140
Tulare, California 93274

SUBJECT: Preliminary Soil and Geology Phase I Study
Proposed Anaerobic Biogas Production Facility
Tulare County, California

Dear Ms. Novick:

As requested and authorized, BSK Associates (BSK) has performed a Preliminary Soil and Geology Phase I Study at the subject site. Our investigation was performed in accordance with our Proposal No. EF12-7940R4, dated November 19, 2012.

The accompanying report contains a preliminary CEQA level evaluation for the requested items on the Tulare County Environmental Checklist Form [Issues VI (a - e), VIII (j), and X] with regard to proposed construction of an anaerobic biogas production facility at the subject site.

We appreciate the opportunity to be of service to you on this project. Should you have questions or comments regarding the contents of this report, please contact us.

Sincerely,
BSK ASSOCIATES

Noelle Willbanks, P.E.
Senior Engineer

Martin B. Cline, P.G., C.E.G
Senior Engineering Geologist

Danny Cohen, P.E., G.E.
Fresno Branch Manager

Distribution:

Ms. Linda Novick, Harvest Power California, LLC. (2 originals + lnovick@harvestpower.com)
BSK (1 original + eCopy)

© **BSK ASSOCIATES.** All rights reserved. Reproduction of any part of this document without the written permission of BSK is prohibited

TABLE OF CONTENTS

1.0 INTRODUCTION AND BACKGROUND 1
2.0 SITE DESCRIPTION 1
2.1 Site Topography 2
2.2 Groundwater Conditions 2
2.3 Geologic Setting 2
3.0 CEQA ENVIRONMENTAL FACTORS CHECKLIST 3
3.1 Issue VI – Geology and Soils 3
3.2 *Issue VIII Item* (j) – Hydrology and Water Quality, Inundation by Seiche, Tsunami, or Mudflow 6
3.3 Issue X-Mineral Resources 7
4.0 LIMITATIONS 7
5.0 REFERENCES 9

TABLES

Table 1 Site Soils Engineering Properties

FIGURES

Figure 1 Vicinity Map
Figure 2 Site Plan
Figure 3 Topographic Map
Figure 4 Geologic Map
Figure 5 Regional Fault Map
Figure 6 Soil Map
Figure 7 Tulare County Mineral Resources

BSK

PRELIMINARY SOIL AND GEOLOGY PHASE I STUDY
PROPOSED ANAEROBIC BIOGAS PRODUCTION FACILITY
TULARE COUNTY, CALIFORNIA

1.0 INTRODUCTION AND BACKGROUND

BSK Associates (BSK) is pleased to submit this Preliminary Soil and Geology Phase I Study for the proposed anaerobic biogas production facility in Tulare County, California. The proposed project is understood to include construction of an anaerobic digestion and biogas production facility, a compressed natural gas (CNG) fueling station, a buried delivery gas line, an all-weather surface access road, a paved area serving the production facility, and a new retention basin. Pavement structural sections, foundation systems, and structural loading are not known at this time in that the project is in the environmental review phase.

The purpose of this Phase I study is to provide a preliminary summary of published geology and soil information to support the preparation of a California Environmental Quality Act (CEQA) document for the proposed construction of an anaerobic biogas production facility at the subject site. The scope of this Phase I investigation is intended to evaluate potential site conditions based on available published information and to identify data gaps that may need further investigation during a more detailed Phase II study.

This Phase I study addresses the following criteria listed in California Code of Regulations, Title 14 Chapter 3, CEQA Appendix G, Environmental Checklist:

- Issue VI (Geology and Soils) Items (a) through (e);
- Issue VIII (Hydrology and Water Quality) Item (j), Inundation by Seiche, Tsunami, or Mudflow;
- Issue X (Mineral Resources).

The scope of tasks for this Phase I study included: 1) a site reconnaissance visit by a BSK professional on November 20, 2012; and, 2) a review of available published references to collect preliminary information on soils and geology, inundation potential, and mineral resources for the proposed site.

2.0 SITE DESCRIPTION

The proposed Harvest Power biogas production project is located in the west-central part of Tulare County approximately 2-miles east of the City of Tulare (Figure 1). State Highway 99 lies approximately 3.5-miles to the west of the site. The project area lies within four parcels identified as Assessors Parcel Numbers (APN) 150-130-004, 150-140-009, 150-140-014, and 150-140-016. Specifically the biogas facility will be located in the east-most portion of the site and appears to occupy approximately 5.5-acres (Figure 2).

Land use designations at the site include (Tulare County GIS Parcel Data, Accessed 2012):

- APN 150-140-004: Feed Lot
- APN 150-140-009: Feed Lot
- APN 150-140-014: Misc.
- APN 150-140-016: Field Crops/Row Crops

Excluding the existing entrance road, office building and truck scales, the site is spread over approximately 37.82–acres in a rectangular pattern. On the west end of the property there are two existing water retention basins. The larger and north-most basin receives surface water runoff form the adjoining heifer replacement ranch. The smaller southern basin receives surface water runoff from the existing green-waste and manure aerobic-digestion mulching operations. It was represented to BSK personnel during the site visit (Jones, 2012) that presently all mulching operations are via aerobic digestion methods with 10-acres processing manure and 25 acres processing green waste. The vast majority of the mulch product is provided to local farmers. The site currently has a system of screen fences and Austrees trees forming a wind and visual barrier along its southern and eastern property lines.

2.1 Site Topography

As shown on Figure 3, the site and surrounding area topography is relatively flat with a ground surface elevation ranging from 310 to 315-feet, USGS datum.

2.2 Groundwater Conditions

The site lies within the San Joaquin Basin Hydrologic Study Area. This includes approximately the southern two-thirds of the Great Valley. Within the Study Area, 39 groundwater basins and areas of potential storage have been identified. The boundaries of these areas are based largely on hydrologic as well as political considerations.

Department of Water Resources well data from Well 19S25E28H001M, approximately one mile north of the site, indicates that the depth to groundwater in the area fluctuates from over 100-feet below ground surface (bgs) to 11-feet bgs. Recent depths to groundwater are greater than of 102-feet below ground surface (bgs), but in in the past 30 years, historical depths to groundwater have been as shallow as 11-feet bgs.

2.3 Geologic Setting

The site is located in the Great Valley geomorphic province. The site is located in the structural region identified by Bartow, 1991 as the San Joaquin Valley portion of the southern Sierran block. This area forms a broad syncline with deposits of marine and overlying continental sediments, Jurassic to Holocene in age. The thickness of the sediments increases to the west and reach a thickness of as much as 20,000-feet on the west side of the San Joaquin Valley syncline. As shown on Figure 4, the site is situated on Recent Alluvial Fan Deposits.

3.0 CEQA ENVIRONMENTAL FACTORS CHECKLIST

Sections 3.1 through 3.3 address Environmental Factors from the CEQA Environmental Checklist that were included within the scope of work for this Phase I study. The publicly available information sources that were used for the preliminary evaluations of the potentially affected environmental factors are identified and preliminary evaluations are discussed. As previously stated, our Phase I evaluation is based on available literature and a reconnaissance survey. Detailed field exploration, laboratory testing of soils, and engineering analyses will be required for definitive evaluations of any potentially significant environmental impacts of the proposed site.

3.1 Issue VI – Geology and Soils

VI. GEOLOGY AND SOILS

Will the Project:

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

According to the *Division of Mines and Geology Special Publication 42* and the "*GIS files of Official Alquist-Priolo Earthquake Fault Zones, Central California Region*," the proposed site does not lie within an Alquist-Priolo Special Studies Zone. According to the *USGS Quaternary fault and fold database for the United States*, there are no mapped active faults at the site. According to the *Safety Element of the 2010 Tulare County General Plan*, the site is not intersected by known faults. Figure 5 shows the locations of active faults in the vicinity of the project area. The hazard associated with surface rupture from faults in the vicinity of the project area is minimal.

EVALUATION: No Impact.

ii) Strong seismic ground shaking?

The site is located in an area of California with low to moderate seismicity. Deaggregation of the seismic hazard was performed by using the USGS Interactive Deaggregation website. The deaggregation at the Maximum Considered Earthquake (MCE) hazard level results in distance,

BSK

magnitude and epsilon (round-motion uncertainty) for each source which contributes to the hazard. In general, the site may experience relatively moderate ground motion, primarily from California Crustal Gridded Source (also known as background seismicity), which is capable of a 5.9 magnitude earthquake. Other active faults that may impact the site seismicity include the San Andreas Fault (Magnitude 7.9) and Great Valley 14 Fault (Magnitude 7.1) which are located 66 miles and 40 miles west of the site, respectively. Ground motion acceleration parameters are dependant on the amplification properties of the subsurface units present at the site; a Geotechnical investigation would be required to characterize site ground motion acceleration values.

The site is situated on mostly granular alluvial fan deposits, therefore soft soils that may produce significant ground motion amplification are not anticipated at the site. With appropriate structural and foundation design from the Structural Engineer and Geotechnical Engineer, the potential impact to the proposed structures caused by strong ground shaking can be mitigated to a tolerable level.

EVALUATION: Less than Significant Impact with Mitigation.

iii) Seismic-related ground failure, including liquefaction?

The site is not currently located in a Seismic Hazard Zone (Liquefaction) specified by State of California or Tulare County.

Liquefaction potential depends on soil type, void ratio, depth to groundwater, duration of shaking and confining pressures over the potentially liquefiable soil mass. Fine, well sorted, loose sand, shallow groundwater, severe seismic ground motion, and particularly long durations of ground shaking are conditions conducive for liquefaction.

Based on the historical shallow depth to groundwater the potential for liquefaction may exist at the site and should be evaluated in a Geotechnical Investigation. To evaluate the site soil density and liquefaction potential, the investigation should include soil borings completed to depths of 50 feet bgs.

EVALUATION: Less than Significant Impact with Mitigation.

iv) Landslides?

Landslides are not a significant threat as the topography in the project area is relatively flat. The site is not currently located in a Seismic Hazard Zone (Landslide) specified by State of California or Tulare County.

EVALUATION: No Impact.

b) Result in substantial soil erosion or the loss of topsoil?

The project area is relatively flat and more prone to inundation and sedimentation by standing water than to soil erosion by the runoff of water. With respect to potential soil erosion by wind, earthwork at the sites during construction might cause some disturbed soils to be affected by wind erosion. After construction at the proposed sites, vehicles in high traffic areas could contribute to soil erosion by wind. Implementation of mitigation measures may be necessary during construction and operation of the proposed facility to minimize potential soil erosion by wind at the site.

EVALUATION: Less than Significant Impact with Mitigation.

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

The site is located on units mapped as Recent Alluvial Fan Deposits. Due to the flat site topography, it is unlikely that soils at the site would become unstable as a result of the project and potentially result in an on- or off-site landslide.

Land subsidence in California generally occurs in areas of fluid removal (petroleum and groundwater) and in arid areas due to hydrocompaction of loose, near surface soils. Hydrocompaction is the consolidation of loose dry soils from the infiltration of water. Materials of unusually low density deposited in areas of low rainfall undergo significant compaction when they become thoroughly wetted. The site is not located in an area known for potential hydrocompaction or regional settlement from petroleum and groundwater withdrawal.

As stated above, evaluation for liquefaction, lateral spread and collapse would be performed in the Geotechnical Investigation.

EVALUATION: Less than Significant Impact with Mitigation.

d) Be located on expansive soil, as defined in Table 18 1 B of the Uniform Building Code (1994), creating substantial risks to life or property?

Figure 6 presents a map showing the site area mapped soil types. Table 1 – Site Soils Engineering Properties presents a summary of pertinent soil characteristics from the USDA SSURGO Database Version 2.2 of Western Tulare County, California.

The native site soils (Nord fine sandy loam) are predominately sandy soils with non-plastic fines. These soil types are generally considered as having none to very low expansion potential.

Although native site soils are anticipated to have none to low expansion potential, the existing site operations involve the aerobic digestion mulching of manure and green waste. The import of material to the site over time may have resulted in expansive soils being brought in and placed on-site. Determination of the expansion potential of the existing near surface soils would be performed as part of the Geotechnical Investigation.

EVALUATION: Less than Significant Impact with Mitigation.

e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

The site is not intended for use as a septic tank absorption field or other wastewater disposal.

EVALUATION: Less than Significant Impact

3.2 *Issue VIII Item* (j) – Hydrology and Water Quality, Inundation by Seiche, Tsunami, or Mudflow

VIII. HYDROLOGY AND WATER QUALITY

Would the project:

j) Inundation by seiche, tsunami, or mudflow?

The proposed project is not susceptible to inundation by a tsunami as it lies too distant from the Pacific Ocean and is east of the Coast Ranges. The proposed project site is not susceptible to a seiche as there are no inland lakes within the site vicinity. The proposed project site is not likely prone to inundation by a mudflow due to its distance of more than 10-miles from mapped steep slopes located in the foothills east of the site

EVALUATION: No Impact

3.3 Issue X-Mineral Resources

X. MINERAL RESOURCES

Would the project:

a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

As shown on Figure 7, according to 1) Mineral land classification of concrete aggregate resources in the Tulare County, GIS Data and 2) California Geologic Survey Topographically Occurring Mine Symbols, it does not appear that the proposed development at the site would result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.

EVALUATION: Less than Significant Impact

b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

According to the Tulare County GIS Parcel Data and the General Plan, the Site and adjacent parcels are zoned for agricultural related purposes. Areas designated for mineral production are not located on or near the site.

EVALUATION: Less than Significant Impact

4.0 LIMITATIONS

The findings expressed in this report are based on a limited Phase I study for the site that consisted of an initial site reconnaissance and a review of publicly available references. The findings and evaluations in this report do not represent an engineering analysis of actual site conditions such as those that would be determined through on-site geologic or geotechnical investigations. A detailed Phase II investigation consisting of field exploration (drilling and soil sampling), laboratory testing of soil samples, and engineering analysis will be required for definitive evaluation of the potential environmental impacts from the proposed site.

The findings of this report are valid as of the present. However, changes in the conditions of the site can occur with the passage of time, whether caused by natural processes or the work of man, on this property or adjacent property. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation, governmental policy or the broadening of knowledge.

BSK has prepared this report for the exclusive use of Harvest Power. No other warranties, either express or implied, are made as to the professional advice provided under the terms of BSK's agreement with Harvest Power and included in this report.

BSK ASSOCIATES

5.0 REFERENCES

Bryant, W.A. and Hart, E.W., 2007. California Department of Conservation, California Geological Survey Special Publication 42, Fault-Rupture Hazard Zones in California, Interim Revision 2007.

California Department of Conservation, Division of Mines and Geology, 2001, GIS files of Official Alquist-Priolo Earthquake Fault Zones, Central California Region, DMG CD 2001-04.

California Department of Conservation, Office of Mine Reclamation, Abandoned Mined Lands Unit, 2001, *Topographically Occurring Mine Symbols (TOMS).*

California Department of Water Resources, *Groundwater Level Data*, http://wdl.water.ca.gov/gw/accessed November 2012.

Jones, John, (2012), Personal communication during site assessment, November 20, 2012.

Poland, J.F., 1984, Guidebook To Studies Of Land Subsidence Due To Ground-Water Withdrawal, Prepared for the International Hydrological Programme, Working Group 8.4.

Tulare County GIS Department, 2012, Tulare County Parcel and Mineral Resources GIS Files, accessed November 2012.

Tulare County Planning Department, 2010, Tulare County General Plan, Safety Element.

Matthews, R.A. and Burnett, J.L., Geologic Map of California: Fresno sheet: California Division of Mines and Geology, scale 1:250000.

United States Department of Agriculture, Natural Resources Conservation Service, Soil Survey Geographic (SSURGO) database for Tulare County, California, West Part, 2008.

U.S. Geological Survey and California Geological Survey, 2006, Quaternary fault and fold database for the United States, accessed January 2012, from USGS web site: http//earthquakes.usgs.gov/regional/qfaults/.

USGS Interactive Deaggregation website, Accessed 2012, https://geohazards.usgs.gov /deaggint /2008/.

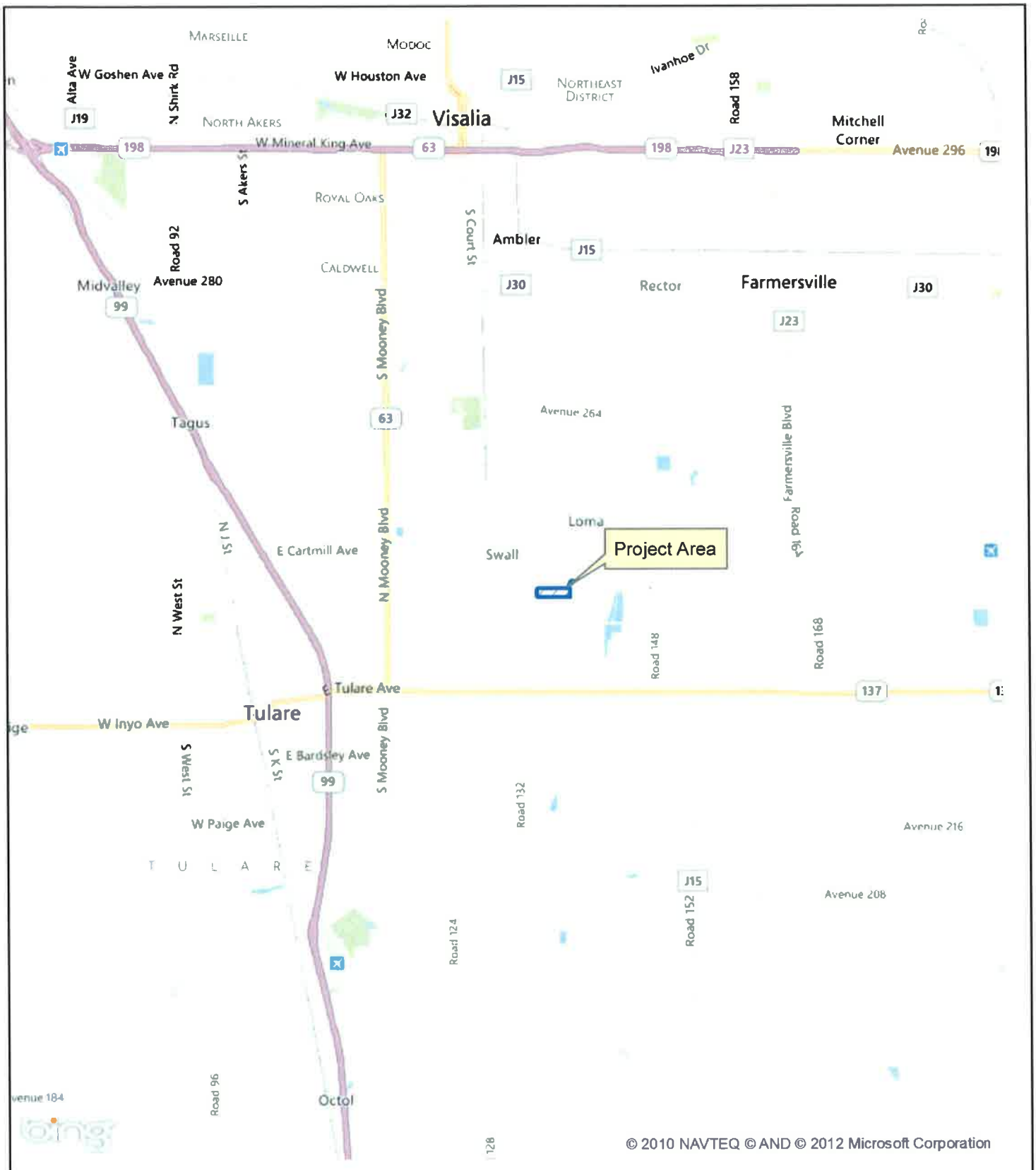
TABLES

TABLE 1
Site Soils Engineering Properties
USDA SSURGO Database Version 2.2

Map Unit Symbol	Unit Name	Horizon Depth Range (inches)	USDA Texture	USCS Classification	3-10" Fragments Range (percent)	4 Sieve Range (percent)	10 Sieve Range (percent)	40 Sieve Range (percent)	200 Sieve Range (percent)	Liquid Limit Range (percent)	Plasticity Index Range (percent)
130	Nord	0-11	Fine sandy loam	ML, SM	0	100	100	70-85	35-55	20-30	NP-5
		11-38	Stratified sandy loam to loam	CL-ML, ML, SC-SM, SM	0	100	100	60-95	35-70	20-30	NP-10
		38-50	Stratified loamy coarse sand to coarse sandy loam	SM	0	100	100	25-60	20-50	15-20	NP
		50-72	Stratified sandy loam to silt loam	CL-ML, ML, SC-SM, SM	0	100	100	60-95	35-70	20-30	NP-10

BSK

FIGURES



BSK Associates Engineers & Laboratories

Figure Date: 12/3/2012

Harvest Power California
Tulare Facility
24487 Road 140
Tulare, California

FIGURE 1
VICINITY MAP
BSK Project E1207601F

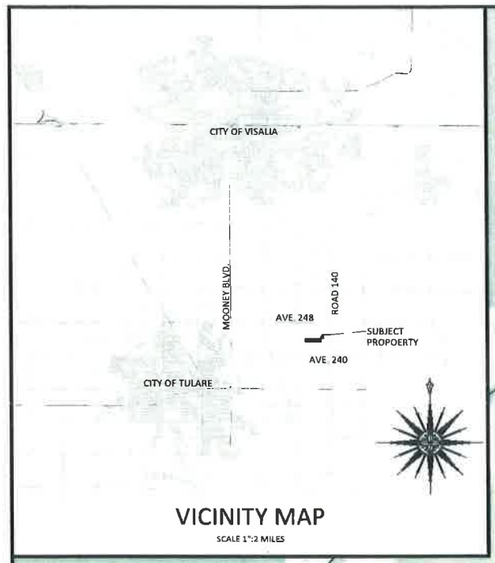
HARVEST POWER CALIFORNIA, LLC

TULARE FACILITY SITE PLAN

24487 ROAD 140, TULARE, CA93274

HARVEST

PREPARED BY:
4CREEKS
2929 W. MAIN ST., STE. A
P.O. BOX 7593
VISALIA, CA 93291
TEL: 559.802.3052
FAX: 559.802.3215



VICINITY MAP

SCALE 1":2 MILES

NORTH

80' 0' 80'

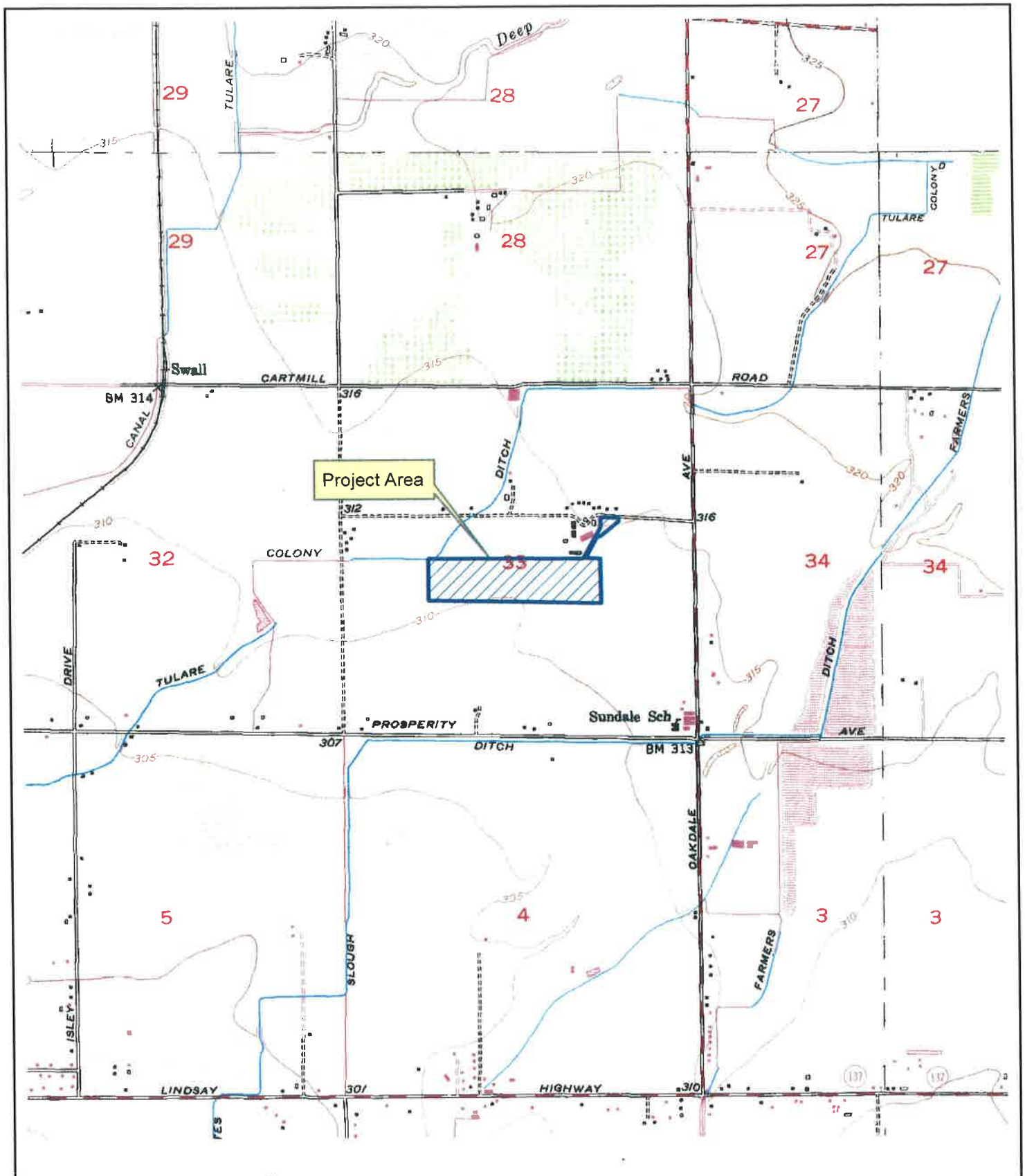
APN:150-130-004
52.78 AC.

EXISTING LANDSCAPING
EXISTING RESTROOM
EXISTING OFFICE
EXISTING OUT GOING SCALE
EXISTING INCOMING SCALE
PROPOSED CNG FUELING STATION (APPROXIMATELY 5,000 SQ.FT
EXISTING STRUCTURE
ALL WEATHER SURFACE
HEIFER REPLACEMENT RANCH (NOT APART)
COLONY DITCH
EXISTING MAINTENANCE SHED AND EMPLOYEE PORTABLE RESTROOM
EXISTING EQUIPMENT OIL AND FUEL BULK STORAGE TANKS
EMERGENCY ACCESS ROAD
NEAREST PROPERTY LINE 380'
R100'
ELECTRICAL 3-PHASE SERVICE PANEL WITH OVERHEAD FEED
WATER WELL WITH BOOSTER PUMP AND FIRE HYDRANT
TYPICAL DRAINAGE
APN:150-140-014
20.0 AC.
APN:150-140-016
15.0 AC.
APN:
150-140-009
2.82 AC.
HEIFER RANCH RETENTION BASIN (NOT A PART)
RETENTION BASIN
PROPOSED RETENTION BASIN
640.79'
630.42'
PAVED AREA
LIQUIDS RECEPTION
GREASE PIT
FOOD PIT
TURBO-SEPARATOR
FEED HOPPER
BIOFILTER
MIXING
CSTR
CSTR
GREEN WASTE UNLOADING AREA
6' CHAIN LINK PRIVACY FENCE / WIND BREAK
2513.30'
BIOGAS UPGRADING
FLARE

PLEASE NOTE: AERIAL, PROPOERTY LINES AND OTHER ITEMS ARE FOR REPRESENTATION ONLY AND NOT BASED UPON A TOPOGRAPHICAL SURVEY

SHEET 1 OF 3

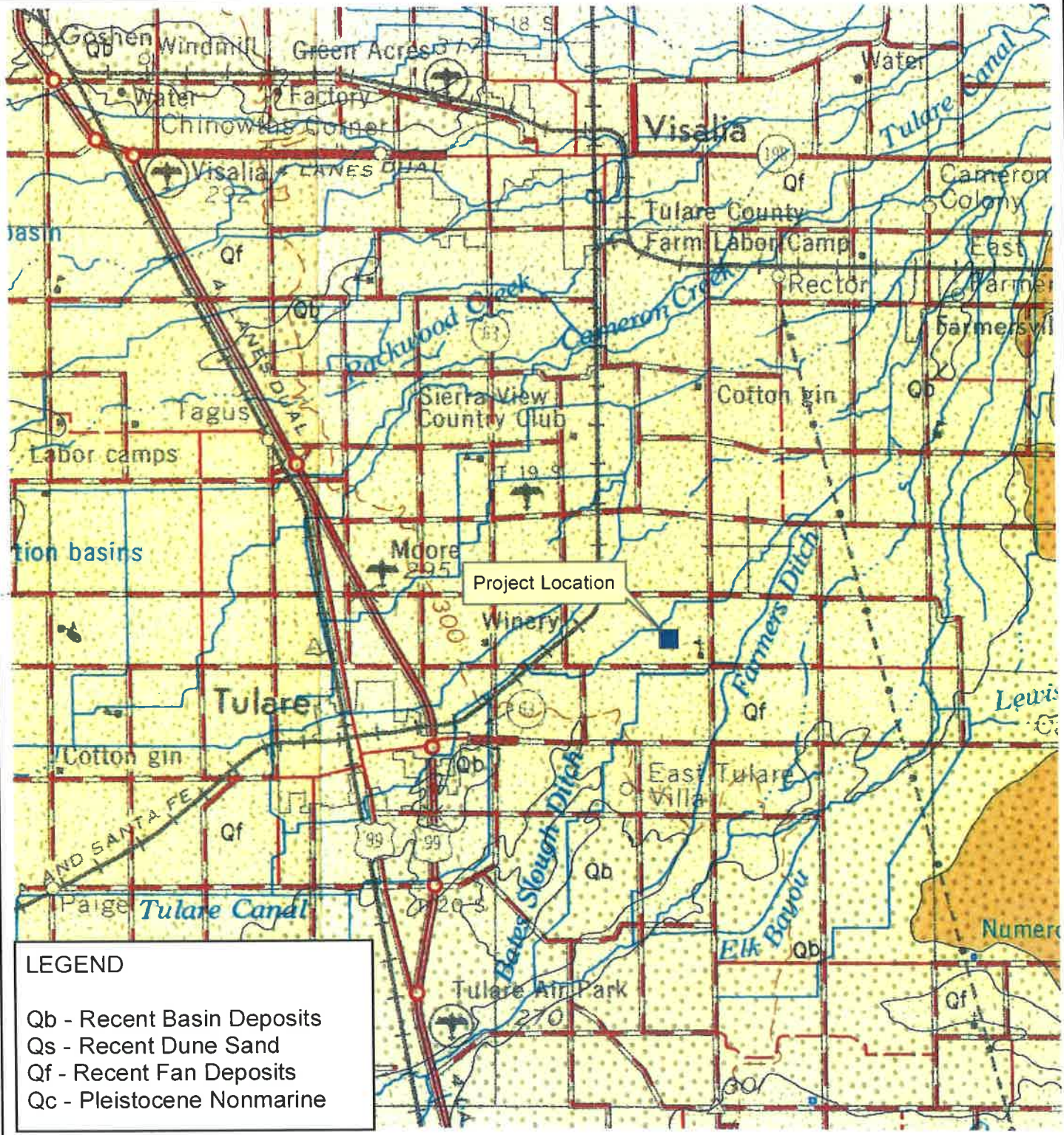
FIGURE 2
SITE PLAN



BSK Associates Engineers & Laboratories

Harvest Power California
Tulare Facility
24487 Road 140
Tulare, California

FIGURE 3
TOPOGRAPHIC MAP
BSK Project E1207601F



Reference: Geologic Map of California, Fresno Sheet, California Geologic Survey 1965

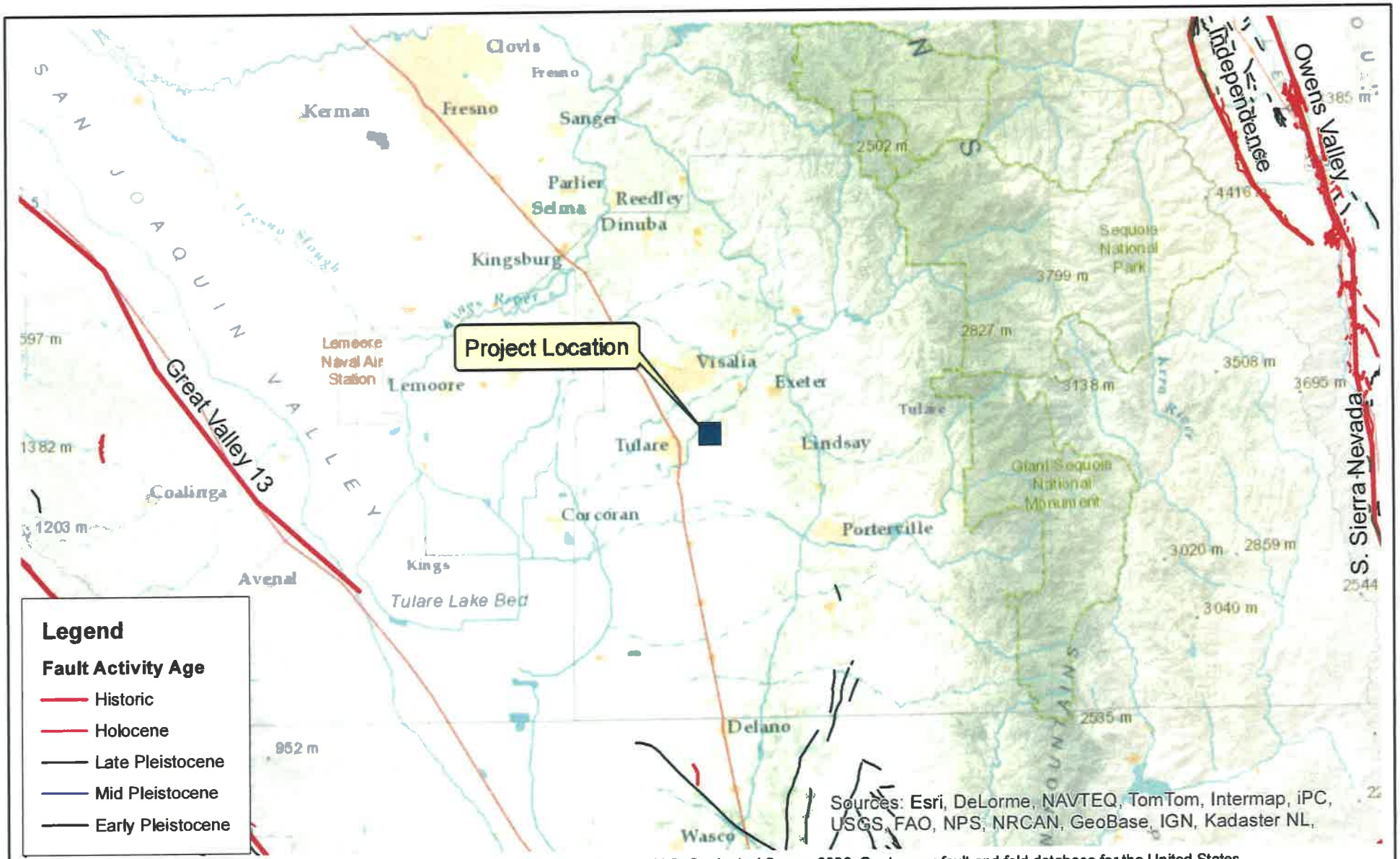
N
W E
S

0 1 2
Miles

BSK Associates
Engineers & Laboratories

Harvest Power California
Tulare Facility
24487 Road 140
Tulare, California

FIGURE 4
GEOLOGIC MAP
BSK Project E1207601F

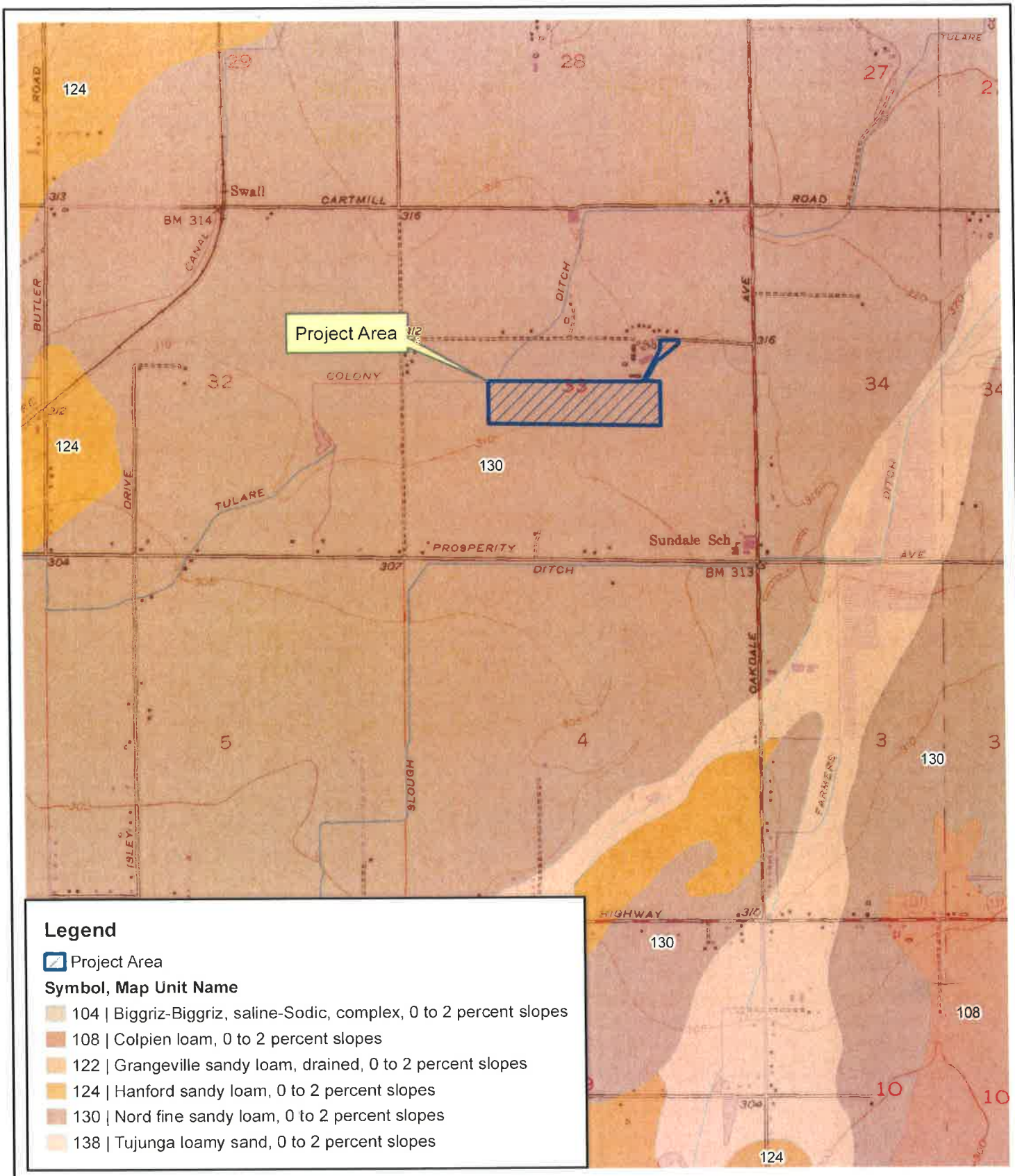


Source: U.S. Geological Survey 2006, Quaternary fault and fold database for the United States, accessed Jan. 2010, from USGS web site: http//earthquakes.usgs.gov/regional/qfaults/

BSK Associates
Engineers & Laboratories

Harvest Power California
Tulare Facility
24487 Road 140
Tulare, California

FIGURE 5
REGIONAL FAULT MAP
BSK Project E1207601F



Source: USDA SSURGO GIS Database Files ca659

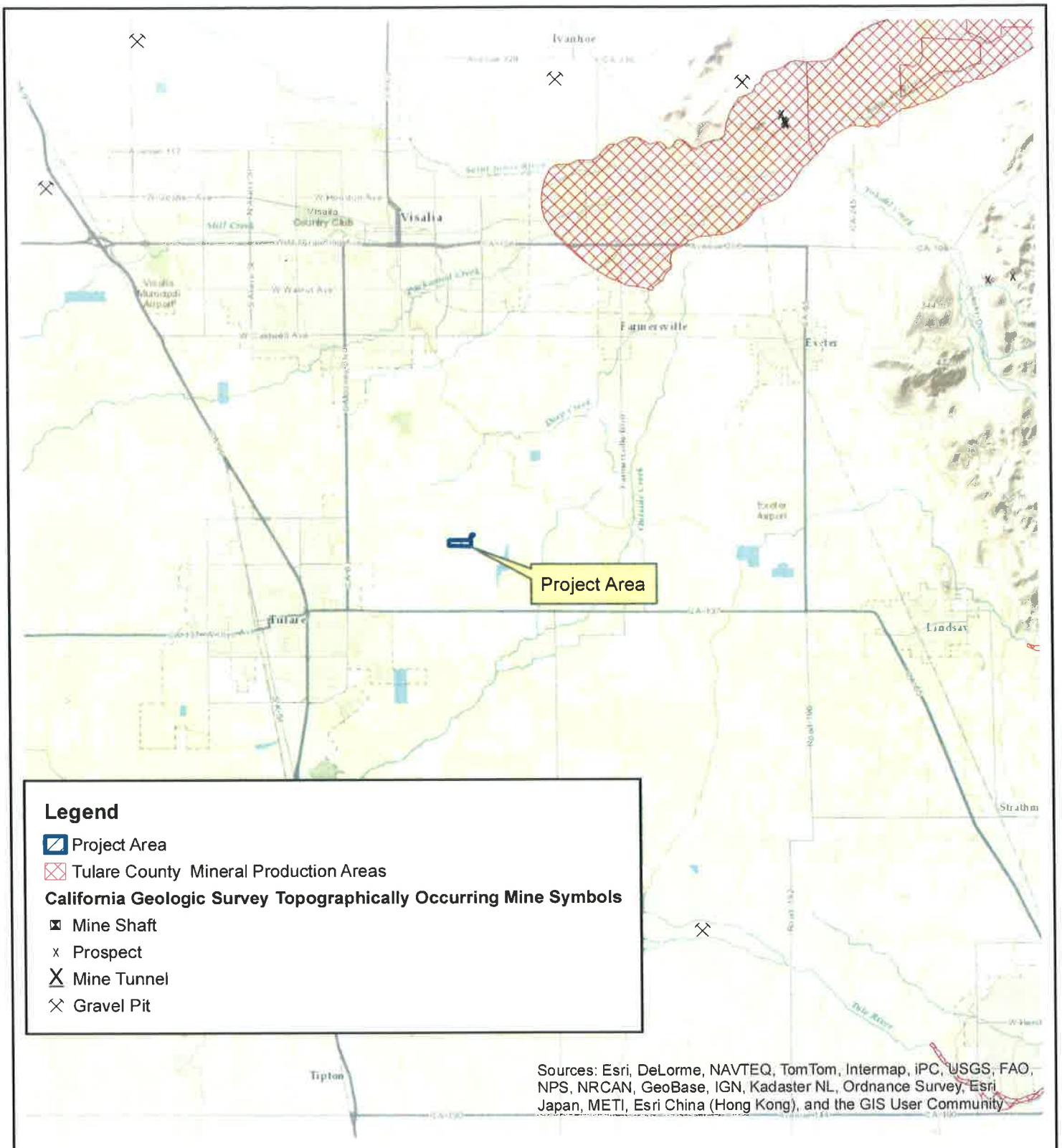
BSK Associates Engineers & Laboratories

N W E S

0 500 1,000 2,000 Feet

Harvest Power California
Tulare Facility
24487 Road 140
Tulare, California

FIGURE 6
SOIL MAP
BSK Project E1207601F



Source: Tulare County MRZ GIS Files, California Geologic Survey TOMS GIS data

BSK Associates Engineers & Laboratories

N W E S

0 1.5 3 Miles

Harvest Power California
Tulare Facility
24487 Road 140
Tulare, California

FIGURE 7
TULARE COUNTY
MINERAL RESOURCES
BSK Project E1207601F