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RB INYOKERN DATA CENTER

Application for Small Power Plant Exemption (SPPE)

Inyokern, Kern County, California

Docket Number - 26-SPPE-01

Supporting Document Appendix E

Subsection(s):

- E.1 - Hydrology Study
- E.2 - Nitrogen Study
- E.3 - Water Supply Assessment
- E.4 - Thermal Plume Analysis

RB INYOKERN DATA CENTER

Application for Small Power Plant Exemption (SPPE)

Inyokern, Kern County, California

Docket Number - 26-SPPE-01

Supporting Document Appendix E

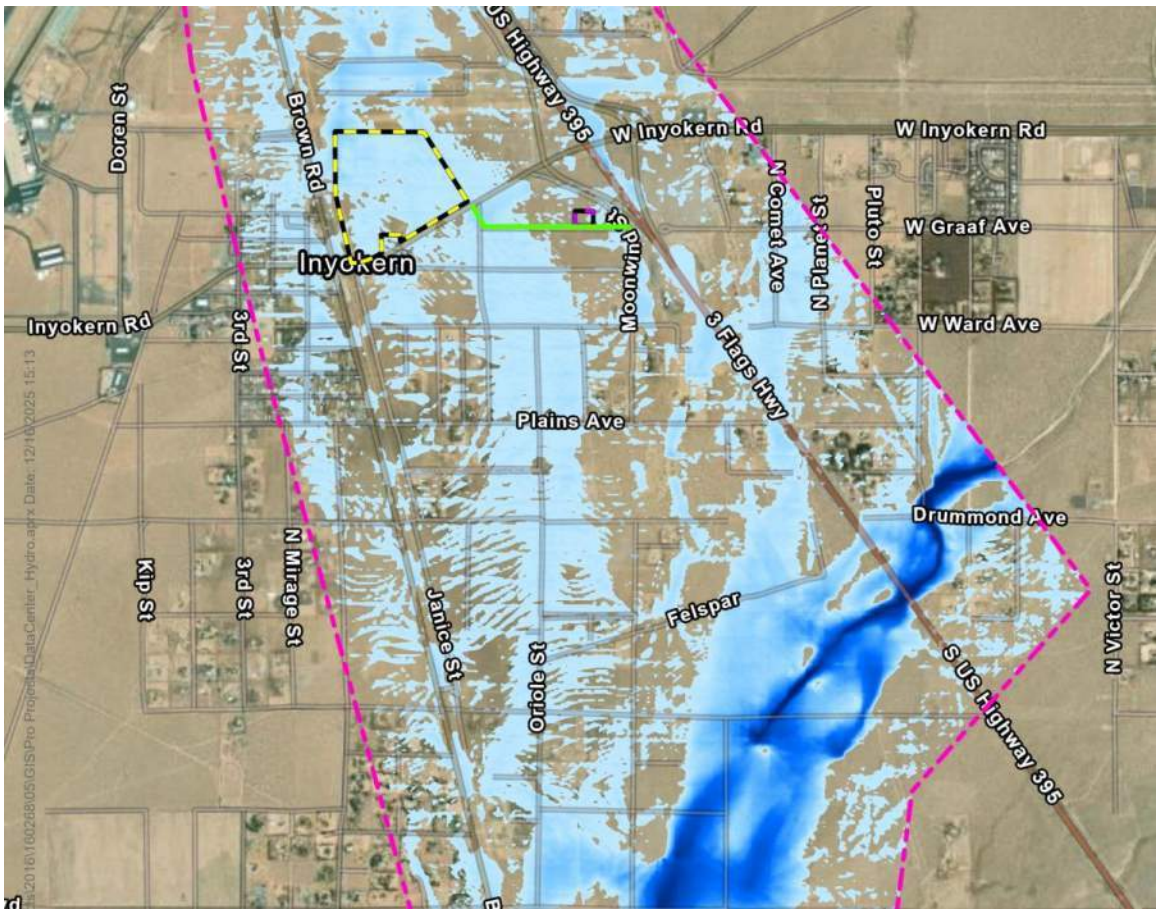
Subsection(s):

- E.1 - Hydrology Study

HYDROLOGY STUDY

INYOKERN DATA CENTER

INYOKERN, CALIFORNIA



JANUARY 2026

INYOKERN DATA CENTER HYDROLOGY STUDY

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TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

SECTION 1 - INTRODUCTION

1.1 - Project Description

The proposed project is a 99 megawatts Teir 3 hyperscale data center and associated infrastructure, including a new substation that interconnects to Southern California Edison's Inyokern Substation to the east of the facility. The facility is designed to be continuously operational. Some of the notable project elements are as follows:

- Power infrastructure: Dedicated new substation interconnection to SCE's Inyokern Substation (115 kV)
- Uninterruptable Power Supply (UPS): Modular, concurrently maintainable UPS system designed to support Tier 1+ availability.
- Cooling: Hybrid system with air-cooled chillers and provisions for liquid cooling to support high-density racks.
- Backup Generation: 99MW of on-site backup generation (diesel or natural gas, depending on interconnection results) to meet tier 3 and 4 data center requirements.
- Fiber connectivity: Access to Digital 395 fiber.

The project consists of three connected components, the data center, gen-tie, and a Southern California Edison (SCE) point of intersection (POI). The largest of the three is the data center which is located on the parcel delineated as the Project Site on Figure 1-2. The Data Center is located on a 41.2 acre site, on Assessor's Parcel Numbers (APN) 084-010-43, -44, and -45, and includes a 270,218 square foot (SF) building, 17,640 SF office and several other smaller elements associated with the operation of a data center. A preliminary site layout is shown in Appendix A. The gen-tie is a dedicated above-ground or underground transmission line that will connect the data center to the SCE POI and the existing power line. The SCE POI is a substation will be a fenced facility with above-ground, uncovered electrical equipment with a footprint of 300 by 300 feet.

1.2 - Project Location

The Project is located in the northeastern portion of Kern County, California on the western side of the Indian Wells Valley in Inyokern, California, a census designated place. The project site is 8 miles west of Ridgecrest, CA near the intersection of United States Highway 395 and CA State Route 178.

The project site is located within the Inyokern, CA United States Geologic Survey (USGS) 7.5-minute topographical quadrangle, and within Section 29 Township 26 South Range 39 East, San Bernadino Base and Meridian (SBB&M).

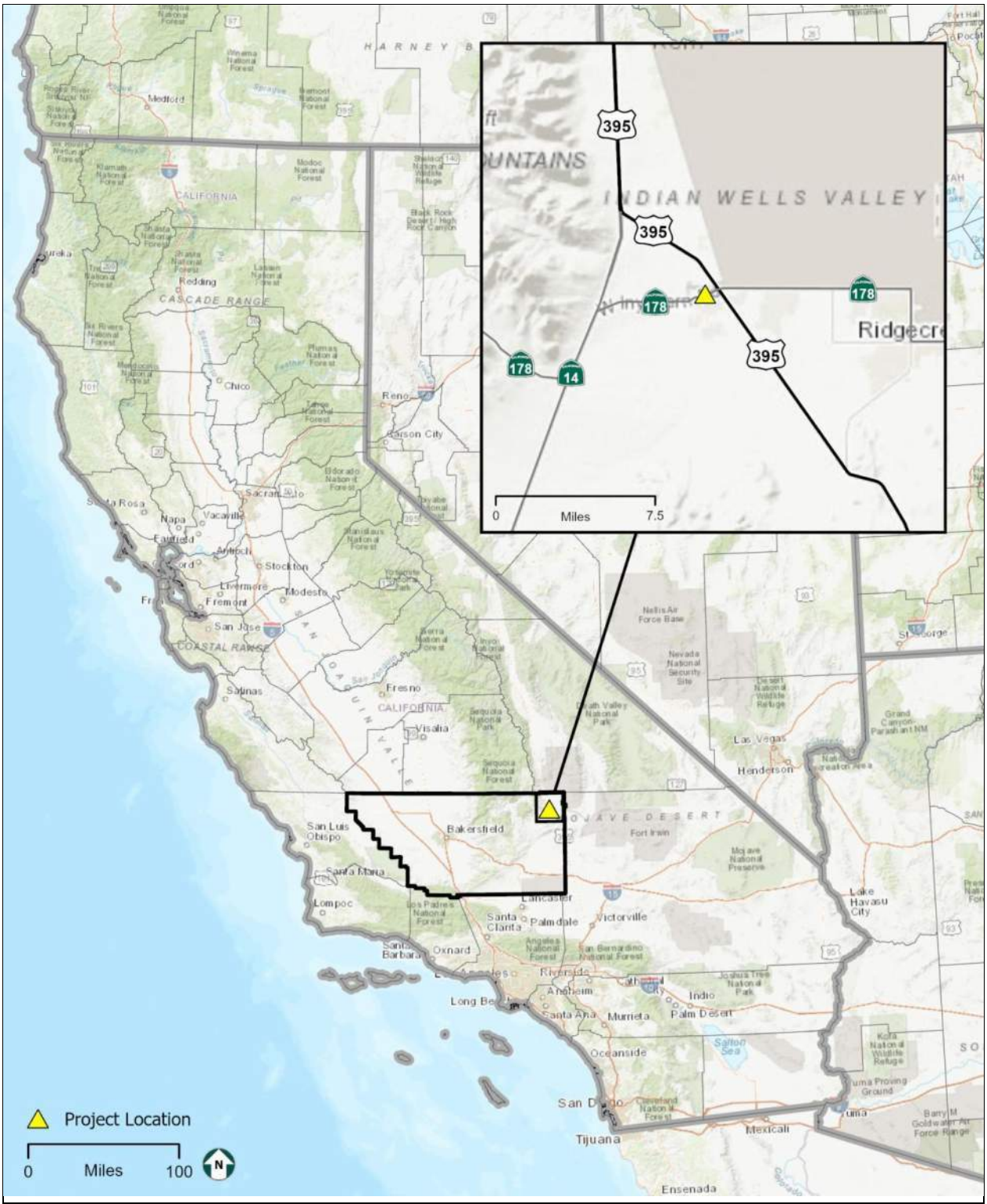


Figure 1-1
Regional Map

Figure 1-2
Vicinity Map

SECTION 2 - REGULATOR SETTINGS

This Hydrology Study incorporates Kern County Floodplain Management Ordinance requirements and County drainage design criteria. The following regulatory settings shall be considered through the planning, design, construction, and maintenance of the Project.

2.1 - Federal

2.1.1 - CLEAN WATER ACT (33 USC 1251-1387)

The Federal Clean Water Act (CWA) 33 U.S.C 1251-1387 has its origin in 1899 with the Rivers and Harbor Act. Since that time, the CWA has evolved into its present form via numerous amendments, including the Federal Water Pollution Control Act of 1972 (P.L. 92-217), the Clean Water Act of 1977 (P.L. 95-217), and the Water Quality Act of 1987 (P.L. 100-4). The Clean Water Act is administered by the Federal Environmental Protection Agency, which has delegated authority and enforcement to some states, including California. The stated objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Except within the provisions of the CWA, discharge of pollutants into any navigable waters of the United States is prohibited.

Pollutants have been broadly defined to include anything introduced from the outside world, or an increase in a material that is already present. This includes erosion of natural material into the watershed in excess of that which naturally occurs. The jurisdiction of the CWA is based on Congress's authority to protect the flow of interstate commerce. One component of interstate commerce is protection of navigable waters of the United States. The CWA defines "Navigable Waters" as "waters of the United States." Under the regulation of the Environmental Protection Agency, "waters of the United States" include the following:

- The territorial seas, and waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including waters which are subject to the ebb and flow of the tide.
- Tributaries.
- Lakes and ponds, and impoundments of jurisdictional waters.
- Adjacent Wetlands.

2.1.2 - FEDERAL EMERGENCY MANAGEMENT AGENCY

The Federal Emergency Management Agency (FEMA) administrates the regulations of new developments encroaching within a flood zone as published in "Standards for Flood Risk Analysis and Mapping," November 2016.

2.1.3 - NATIONAL FLOOD INSURANCE PROGRAM

The National Flood Insurance Program (NFIP), implemented by the Congress of the United States in 1968, enables participating communities to purchase flood insurance. Flood

insurance rates are set according to flood-prone status of property as indicated by FIRM (flood insurance rate maps) developed by the Federal Emergency Management Agency. FIRMs identify the estimated limits of the 100-year floodplain for mapped watercourses, among other flood hazards. As a condition of participation in the NFIP, communities must adopt regulations for floodplain development intended to reduce flood damage for new development through such measures as floodproofing, elevation on fill, or floodplain avoidance. Kern County participates in the NFIP.

2.2 - State of California

2.2.1 - Requirements for an Application for Certification or Small Power Plant Exemption (20 CCR Div. 2 Ch. 5 App. B)

Requirements for an Application for Certification (AFC) or Small Power Plant Exemption (SPPE) with the California Energy Commission (CEC) involve providing comprehensive environmental and technical information to demonstrate complaint with state laws. This report specifically addresses the project elements associated with stormwater drainage detailed in Section (14)(D) of Appendix B. The requirements are as follows:

(D) Identify all project elements associated with stormwater drainage, including a description of the following:

(i) Monthly and/or seasonal precipitation and stormwater runoff and drainage patterns for the proposed site and surrounding are that may be affected by the project's construction and operation.

(ii) Drainage facilities and the design criteria used for the plant site and ancillary facilities, including but not limited to capacity of designed system, design storm, and estimated runoff;

(iii) All assumptions and calculations used to calculate runoff and to estimate changes in flow rates between pre- and post- construction; and

(iv) A copy of applicable regional and local requirements regulation the drainage systems, and a discussion of how the project's drainage design complies with these requirements.

2.2.2 - Porter-Cologne Act (California Water Code Section 13000 et. Seq.)

Water quality in California is further protected under the Porter-Cologne Water Quality Control Act. This law assigns responsibility for protection of water quality to the State Water Resources Control Board (SWRCB). The SWRCB is divided into nine statewide Regional Water Quality Control Boards (RWQCBs), which enforce water quality standards. The governing Board for the Project area is under the jurisdiction of the Central Valley Regional Board, with offices in Redding, Sacramento and Fresno. The Central Valley Region has developed a Water Quality Control Plan (Basin Plan) to show how the quality of the surface and ground waters in the Central Valley Region should be managed to provide the highest water quality reasonably possible. The Basin Plan lists the various beneficial uses of water

within the region; describes the water quality that must be maintained to allow those uses; describes the programs, Projects, and other actions necessary to achieve the standards established in this plan; and summarizes plans and policies to protect water quality.

2.2.3 - PERMITTING AND COMPLIANCE FOR THE CLEAN WATER ACT

The CWA contains a broad range of tools to meet the statutory objectives, including the following:

Section 301 of the CWA prohibits discharges of pollutants, except as provided by the CWA.

Section 303 of the CWA requires states to identify "impaired" water bodies as those that do not meet water quality standards. States are required to compile this information in a list and submit the list to the USEPA for review and approval. This list is known as the Section 303(d) list of impaired waters. As part of this listing process, states are required to prioritize waters and watersheds for future development of Total Maximum Daily loads (TMDL) requirements. The SWRCB and RWQCBs have ongoing efforts to monitor and assess water quality, to prepare the Section 303(d) list, and to develop TMDL requirements.

Section 401 of the CWA requires any activity that may result in any discharge into navigable water to provide certification to the appropriate state agency that any such discharge will comply with the applicable provisions of the CWA. In the case of California, the enforcing agency is the RWQCB.

Section 402 of the CWA established a framework for regulating municipal and industrial discharges of storm water into waters of the United States under the NPDES permit program. The latest update to the NPDES program (referred to as Phase II rule – effective December 8, 1999), requires permitting for construction activity that disturbs land greater than or equal to one acre. The NPDES regulations provide two permitting options for storm water discharges (Individual and General Permits). However, the SWRCB has opted to acquire one statewide General Permit (NPDES No. CAS000002) to cover all construction activity in the State of California, except Tribal Lands, Projects by the California Department of Transportation, and the Lake Tahoe Hydrologic Unit. These exceptions are regulated under separate permits. This Project is covered under the State's General Permit (provided the provisions of the permit are followed). The State of California's General Permit was issued with the requirement that all construction activity that disturbs one or more acres is subject to the following requirements:

a) Develop and implement a SWPPP. The SWPPP must specify BMPs to prevent construction pollutants from contacting storm water and keeping all products of erosion from moving off site into receiving waters.
b) Eliminate or reduce non-storm water discharges to storm sewer systems and other waters of the United States.
c) Perform inspections of BMPs.
d) Prior to commencement of grading or other land disturbance, the landowner must provide notification to the SWRCB. This obligation is met when the landowner files a

"Notice of Intent" (NOI) with the SWRCB and pays the appropriate fee. The NOI is a mechanism to establish responsible parties, dischargers, and scope of the proposed operations.

Section 404 of the CWA requires a permit for the discharge or placement of dredge or fill material within "jurisdictional waters," or waters of the United States. This permit is issued by the United States Army Corps of Engineers (USACE). As discussed, jurisdiction of the CWA is limited to "waters of the United States" (often referred to as "jurisdictional waters"). The SWRCB defers determination of "jurisdictional waters" to the USACE. The USACE has made the determination the watershed associated with the Project is non-jurisdictional waters. This determination means that the Project will not require a Section 404 permit. However, under the California Porter-Cologne Water Quality Control Act, the SWRCB has released a legal memorandum confirming the State's jurisdiction over isolated wetlands. Said memorandum has indicated generally that discharges to "Waters of the State" are subject to state regulation. "Waters of the State" have been defined under State law to mean any surface water, groundwater, or saline water, within the State's boundary. "Waters of the state" includes all "waters of the U.S." The following wetlands are considered "Waters of the state":

a) Natural wetlands
b) Wetlands created by modification of a surface water of the state
c) Artificial wetlands that meet any of the following criteria:

    i. Approved by an agency as compensatory mitigation for impacts to other waters of the state, except where the approving agency explicitly identifies the mitigation as being of limited duration
    ii. Specifically identified in a water quality control plan as a wetland or other water of the State
    iii. Resulted from historic human activity, is not subject to ongoing operation and maintenance, and has become a relatively permanent part of the natural landscape
    iv. Greater than or equal to one acre in size, unless the artificial wetland was constructed, and is currently used and maintained, primarily for one or more of the following purposes (i.e., the following artificial wetlands are not waters of the state unless they also satisfy the criteria set forth in b), c) i, or c) ii):

        - Industrial or municipal wastewater treatment or disposal.
        - Settling of sediment.
        - Detention, retention, infiltration, or treatment of stormwater runoff and other pollutants or runoff subject to regulation under a municipal, construction, or industrial stormwater permitting program.
        - Treatment of surface waters.
        - Agricultural crop irrigation or stock watering.
        - Fire suppression.
        - Industrial processing or cooling.

- Active surface mining – even if the site is managed for interim wetlands functions and values.
- Log storage.
- Treatment, storage, or distribution of recycled water.
- Maximizing groundwater recharge (this does not include wetlands that have incidental groundwater recharge benefits).
- Fields flooded for rice growing.

All artificial wetlands that are less than an acre in size and do not satisfy the criteria set forth in b), c) i, or c) ii are not waters of the state. If an aquatic feature meets the wetland definition, the burden is on the applicant to demonstrate that the wetland is not a water of the state. As a result, the SWRCB regulates discharges to "Waters of the State" and isolated waters similarly to waters of the United States. Again, for waters not subject to federal jurisdiction, SWRCB regulation is under the authority of Porter-Cologne rather than the CWA.

In effect, the Project must comply with all the requirements of the NPDES permitting process as applicable.

2.2.4 - California Department of Fish and Wildlife – Section 1602

In the interest of conserving and protection fish, wildlife and native plant resources, Section 1602 of the California Fish and Wildlife (CDFW) Code requires anyone to notify the CDFW of any proposed activity that may substantially modify a river, stream, or lake. Section 1602 applies to all perennial, intermittent, and ephemeral rivers, streams and lakes in the State of California. Upon notification, the CDFW will evaluate the proposed activity, and make a determination whether an alteration agreement is needed. The alteration agreement will impose conditions upon the proposed activity.

2.2.5 - Public Resources Code Section 21060.1

The Public Resource Code Section 21060.1 defines agricultural land for the purposes of assessing environmental impacts using the FMMP. The FMMP was established in 1982 to assess the location, quality, and quantity of agricultural lands and the conversion of these lands. The FMMP provides an analysis of agricultural land use and land use changes throughout California.

2.3 - Review and Oversight

The Kern County General Plan and the Kern County Zoning Ordinance control local land uses within agricultural areas. These documents identify the types of land uses permitted in agricultural zones and define the development parameters within each land use category.

2.3.1 - Kern County Public Works

The County's Public Works staff will review all grading and drainage improvements, including hydrology and hydraulic calculations. In accordance with the California Building

Code and Grading Guidelines for Kern County, a grading permit will be required. At the time of this report, the County of Kern does not review the SWPPPs. However, the County "Applicability of NPDES Storm Water Program" form must be completed and approved.

2.3.2 - THE CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

The RWQCB will review the Project in accordance with the requirements of the CWA and Porter Cologne. A Section 401 Water Quality Certification will be required as applicable for the Project. In addition, the RWQCB will review the SWPPP. Upon its acceptance of the SWPPP, the RWQCB will issue a Waste Discharge Identification (WDID) Number for the Project. As discussed in Section 4.1 of this report, preparation of a SWPPP and issuance of a WDID number are part of the requirements of the State of California's General Permit for the NPDES program.

2.3.3 - CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

The California Department of Fish and Wildlife Service (CDFW) will review the Project in accordance with the requirements of Section 1600 et seq. of the CDFW. Said Section 1600 *et seq*. applies to all perennial, intermittent and ephemeral rivers, streams, and lakes in the State

SECTION 3 - ENVIRONMENTAL SETTING

3.1 - Climate

The climate of the region is representative of a typical desert climate with hot summers and mild winters. The project site is located in the North-Western Mojave Desert and experiences little precipitation. The Mojave desert is not influenced by the ocean due to the coastal range and is located in a broad rain shadow leading to arid conditions year-round. Normally, approximately 90 percent of the precipitation occurs between November and April with an average annual precipitation of approximately 4.17inches. Average maximum temperature occurs in July at 102.7 degrees Fahrenheit (F) and the average minimum temperature occurs in December at 30.2 degrees F. Table 3-1 summarizes the monthly climate summary.

Table 3-1
Inyokern, CA Monthly Climate Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max Temperature (F)	59.6	64.8	70.3	77.7	87.0	96.7	102.7	101.2	94.2	83.2	69.0	59.7	80.5
Average Min Temperature (F)	30.8	34.6	38.7	44.3	52.9	60.5	66.2	64.6	58.1	48.2	37.3	30.2	47.2
Average Total Precipitation (in.)	0.74	0.95	0.55	0.17	0.07	0.02	0.16	0.22	0.20	0.10	0.38	0.59	4.17

Source: Western Regional Climate Center, 2025

3.1.1 - CLIMATOLOGY

Isohyets are precipitation contours that depict rainfall depth for various storm events. The rainfall totals for the 2-year and 100-year return periods for the 6-hour and 24-hour durations of the regional watershed were estimated using National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Volume 6, Version 2 Point Precipitation Frequency Estimates. The rainfall isohyets for the Project watershed are summarized in Table 3-2. Kern County requires the design volume of a storm water retention basin to be based upon the runoff of the 10-year, five-day storm event. The depth of rainfall for the 10-year, five-day storm is 2.66 inches.

Table 3-2
Rainfall Isohyets for Project Watershed

Storm Duration	2-Year Return (in)	100-Year Return (in)
6-Hour	0.602	1.65
24-Hour	1.06	3.00

Source: NOAA Atlas 14

3.2 - Topography

The Project Site is relatively flat and exhibits little topographic variation. The Project Site gently slopes from South to North from an approximate elevation of 2430 to 2420 feet above mean sea level (ASML). The surrounding area is relatively flat as well and gently slopes from South to North as depicted in the Inyokern 7.5-minute Topographic Quadrangle in Figure 3-1.

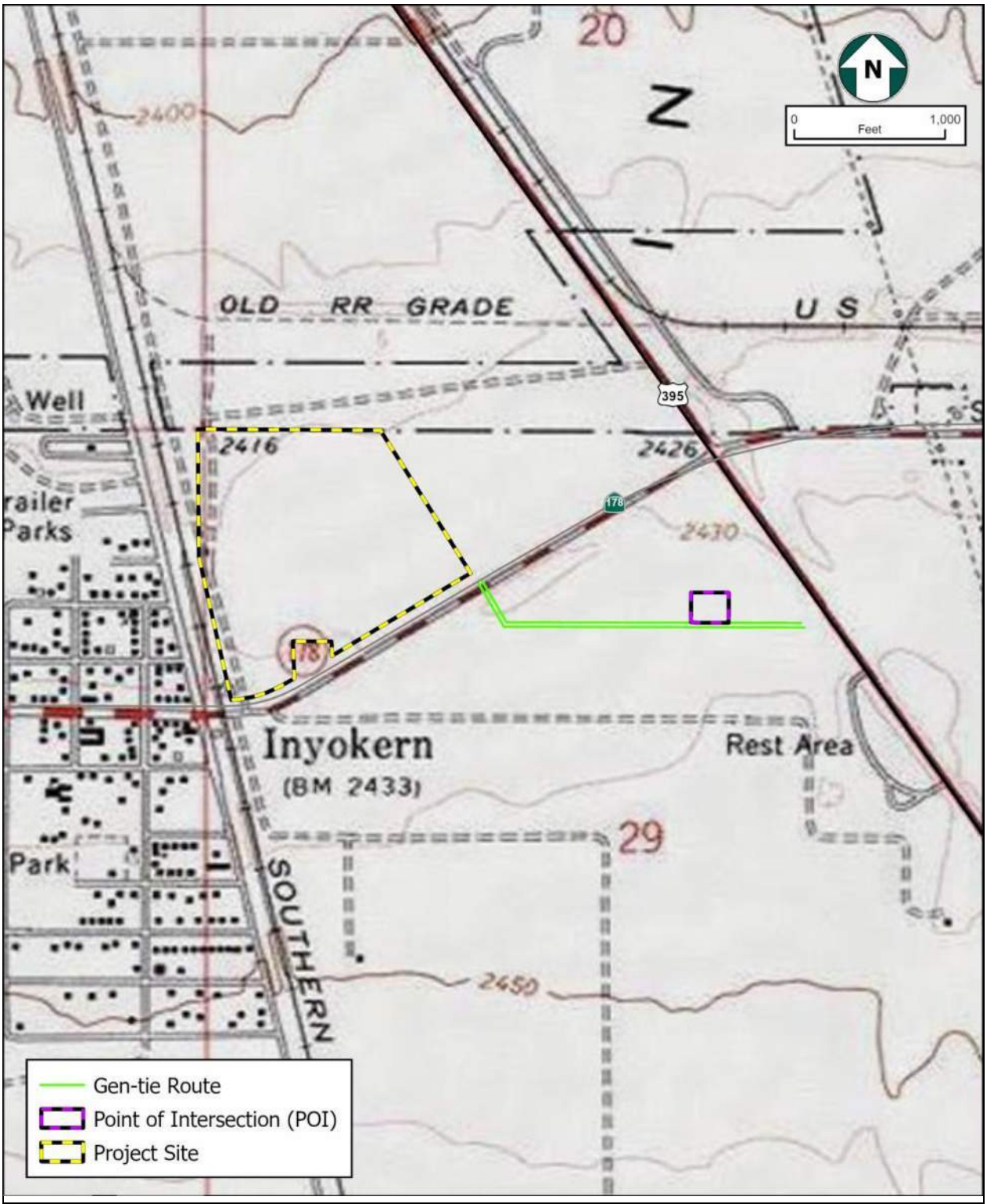


Figure 3-1
Inyokern USGS 7.5-minute Topographic Quadrangle

3.3 - Land Use

The land of the project site and adjacent area is mostly native, undisturbed habitat. There are some scattered, low-density residential properties to the South and a small area of commercial, industrial, and residential properties to the West on the west side of Brown Road. Inyokern has industries including solar energy, mining, agriculture, retail trade, and various support services. Immediately adjacent to the Project Site is a gas station and hardware store along CA SR-178.

3.4 - Soil Conditions

Based on the groundwater elevation data from the California Department of Water Resources (DWR), the groundwater depth in the vicinity of the Project Site is approximately 300 feet (ft). Since the depth to groundwater is greater than 50 ft, the potential for liquefaction, lateral spread of liquefaction induced ground collapse is very low.

A review of the Natural Resources Conservation Service's Soil Survey Geographic Database (SSURGO) showed no digital data available for the Project Site or surrounding area. A geotechnical survey, Geotechnical Engineering Report RB Solar Inyokern Project, 2015, was completed 550 ft North of the Project Site. Due to the close proximity, it is reasonable to assume the soil properties reported are similar to those of the Project Site. Majority of the soil borings from the report showed at least a 5-foot surface layer of Silty Sand (SM) and a mix of Poorly Graded Sand with Silt (SP-SM) and Silt Sand (SM) to a depth of approximately 15 ft.

3.4.1 - HYDROLOGIC SOIL GROUPS

The hydrologic soil groups area categorized by the Kern County Hydrology Manual. Soil groups are classified based on the minimum infiltration rate, and rated A, B, C, or D. The soil properties correlate to saturation levels during a flood event. Based on the hydrologic soils maps, the Soil Conservation Service describes soils groups as follows:

Soils Group A are characterized by soils having high infiltration rates even when thoroughly wetted, consisting chiefly of deep, well to excessively drained sands or gravel. The soils have high water transmission and low runoff potential. These soils, which are prevalent in the streambeds and on-site areas, are excellent for storm water retention basin use.

Soils Group B are characterized by having slow infiltration rates even when thoroughly wetted, consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately coarse textures. These soils have a moderate rate of water transmission and are generally suitable for storm water retention basins on a case-by-case basis.

Soils Group C are characterized by having slow infiltration rates even when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water or soils with moderately fine to fine textures. These soils have a slow rate of water transmission.

Soils Group D are characterized by having very slow infiltration rates when thoroughly wetted, consisting chiefly of clay soils with clay pan or clay layer at or near the surface, and shallow soils over nearly impervious materials. These soils have very slow water transmission and high storm runoff potential. Storm water retention basins are not recommended for Group D soils.

Based on the soil borings of the Geotechnical Engineering Report, it is reasonable to assume the hydrologic soil group of the Project Site is primarily Soils Group A due to the Silty Sand and Poorly Graded Sand and Silt soil classifications. However, no infiltration tests were performed as a part of the report, therefore, the hydrologic soil group will need to be confirmed when the Geotechnical Report for the Project Site is completed.

SECTION 4 - STORMWATER ANALYSIS

4.1 - FEMA Special Flood Hazard Area

Site hydrology and climatology data were utilized to determine the characteristics of the watershed and thus estimate the quantity of runoff. FEMA data, previous hydrology reports, historical rainfall data, soils reports and maps, topographic maps, and climatologic data were reviewed to determine the characteristics of the watershed.

The project area is located within a Zone A FEMA special flood hazard area shown in Figure 4-1. Zone A flood hazard areas are subject to inundation by the 1% annual chance of flood; however, no base flood elevation is determined. The flood water in the project area is the result of being adjacent to Little Dixie Wash, located south of the project site approximately 8,000 ft away.

4.2 - CivilD Flood Model

Flood modeling for the Project was conducted using Civil Design Unit Hydrograph Software (CivilD) in accordance with the proscribed method in the Kern County Hydrology Manual. The extent of the watershed analyzed is shown in Figure 4-2. HEC-RAS was used to model the flood depth and velocities at the project site and surrounding area. Surface elevation data from the United States Geological Survey was used. A Manning's n value of 0.035 was used for the floodplain in the model accordance with CivilD's guidance. The 100-year, 24-hour rainfall was distributed over the project area in addition to modeling the flood volume from Little Dixie Wash.

The local watershed delineated in Figure 4-3 is analyzed through the rainfall distribution added to the model. Existing runoff generally flows North towards a wash near US Highway 395 and N Owens Peak Street, with localized sheet flow across the site. Project grading will maintain the existing offsite flow paths while providing onsite retention to control post-development runoff.

Flow across the project site was modeled without infiltration because soil data was unavailable. As a result, the hydraulic model provides conservative estimates. The results indicate that floodwater from Little Dixie Wash does not reach the project area (see Figure 4-4). The maximum water depth and velocity on the site is caused by accumulation and transport from the 100-year, 24-hour rainfall event (Figure 4-5 and 4-6). Within the project site, water depth does not exceed 1.0 ft, except in a localized depression in the northwest corner. No development is planned in this area, and the increased depth is due to the depression rather than a watercourse or other hydrologic feature. Therefore, it is recommended to assume a flood depth of 1.0 ft above existing or finished grade to comply with FEMA Floodplain Map Zone A requirements.

Floodplain impacts were evaluated conceptually for early planning purposes. Prior to construction, a final hydraulic model and drainage plan will be completed to demonstrate compliance with Kern County Floodplain Management Ordinance requirements, including

maintaining flood conveyance and limiting increases in water surface elevation consistent with the County criteria. Any required floodplain permits and mapping actions will be obtained.

Construction activities may temporarily increase sediment generation and alter onsite drainage patterns. These effects will be minimized through the implementation of the SWPPP and BMPS such that offsite discharge and downstream drainage patterns are not adversely affected during construction.

Key Finding:

- Preliminary flood depths on the site are generally less than 1.0 foot; final modeling will confirm compliance prior to construction.

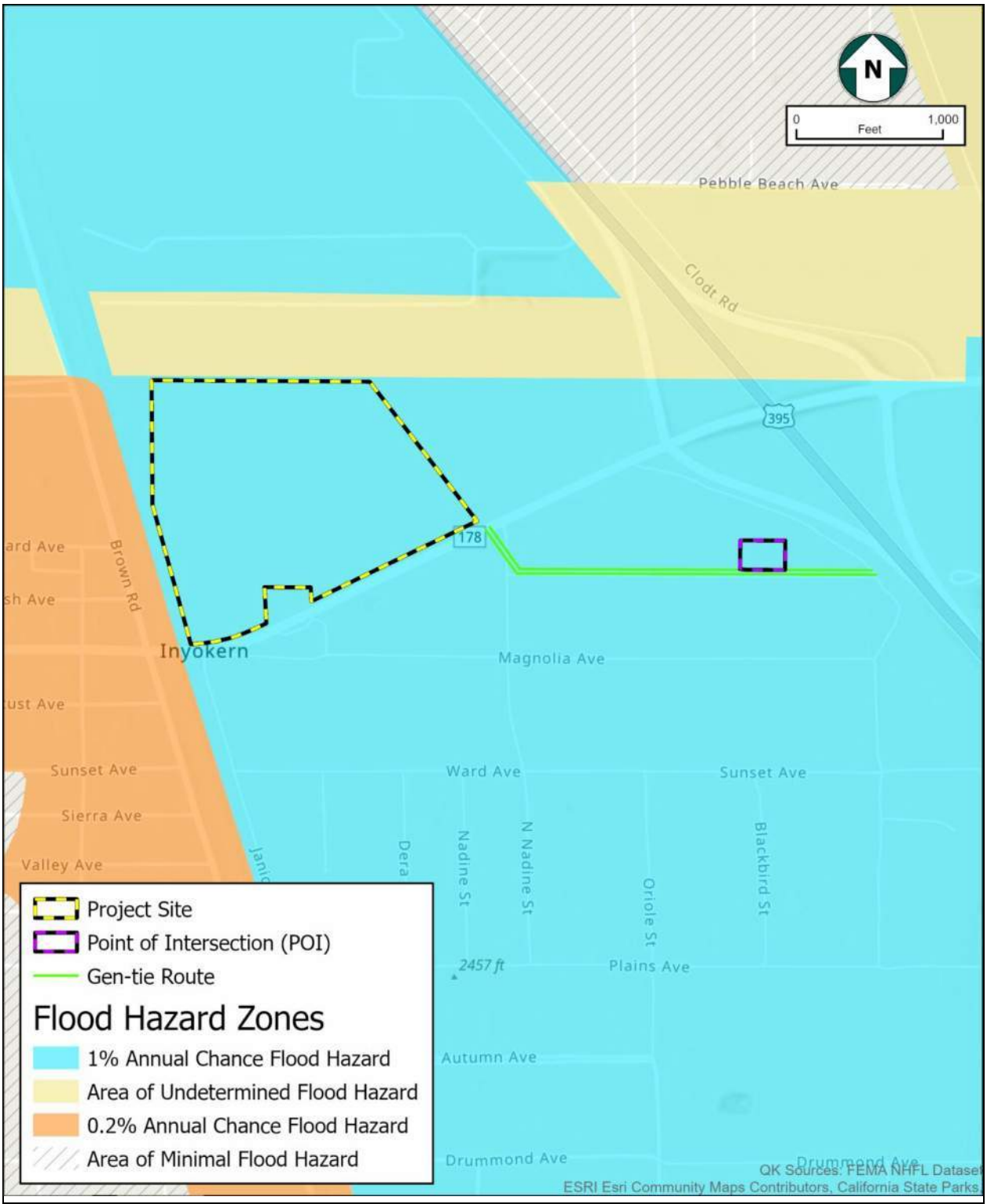


Figure 4-1
FEMA Floodplain Map

Figure 4-2
Project Site Watershed

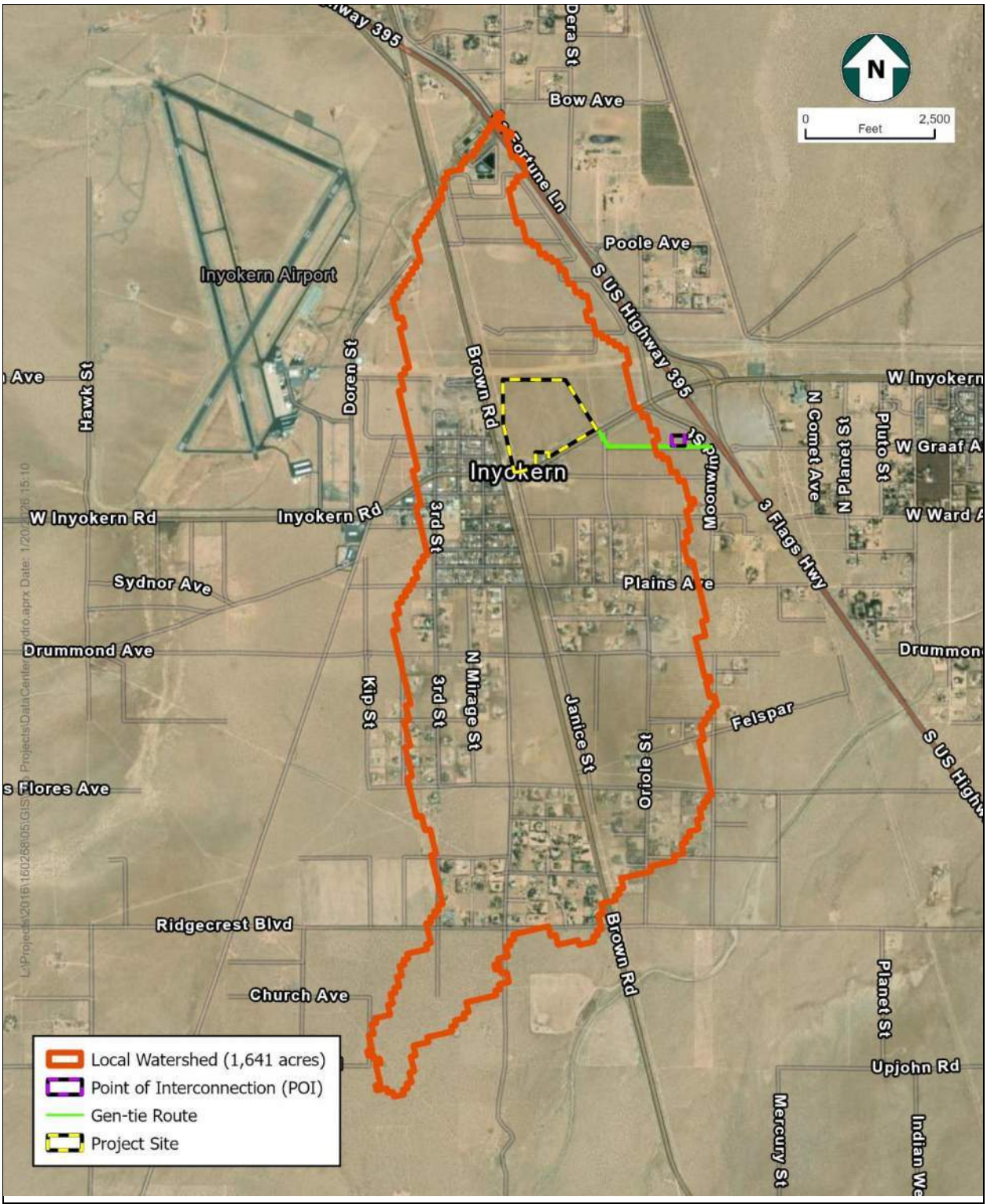


Figure 4-3
Local Watershed

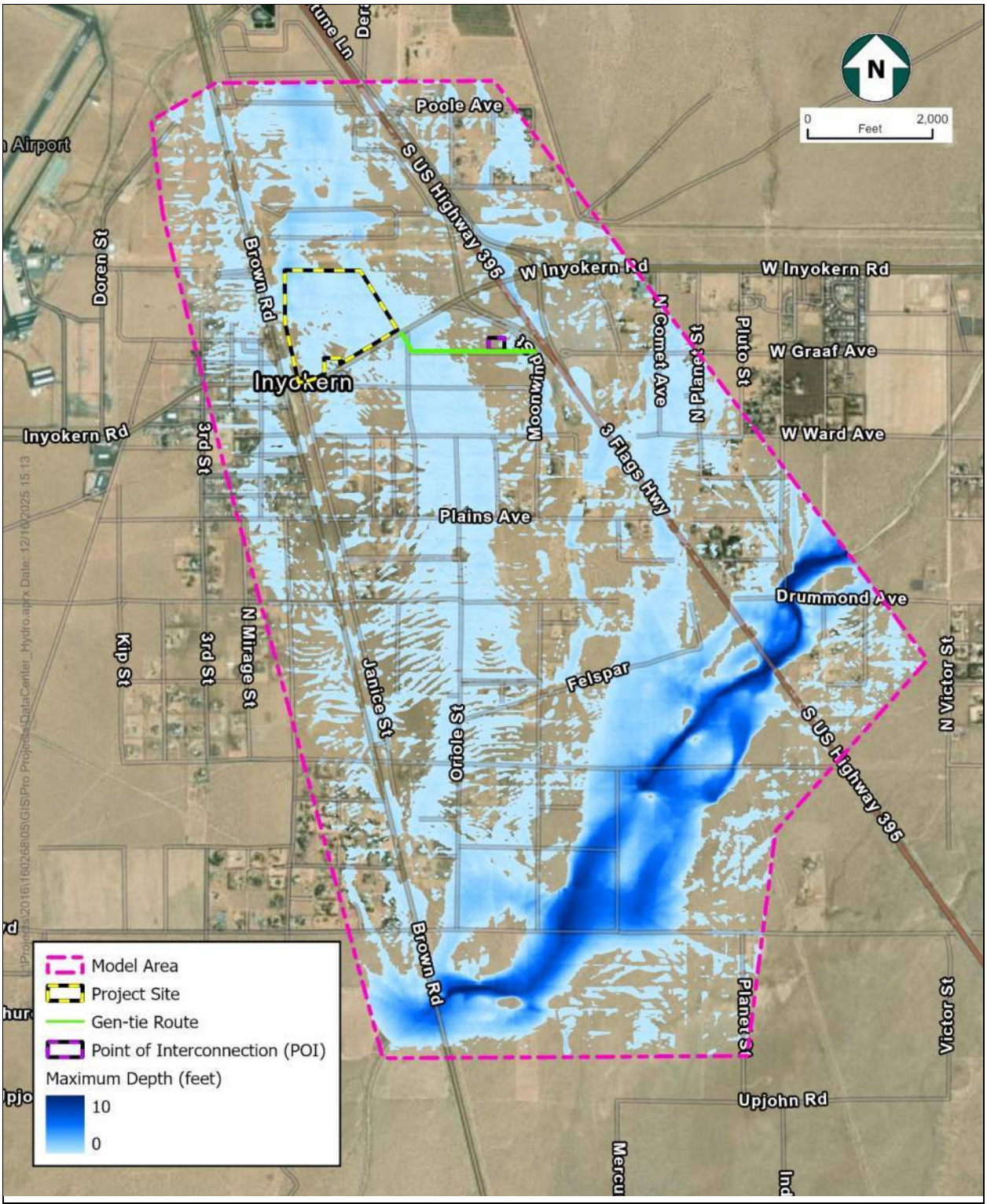


Figure 4-4
Hydraulic Model Area

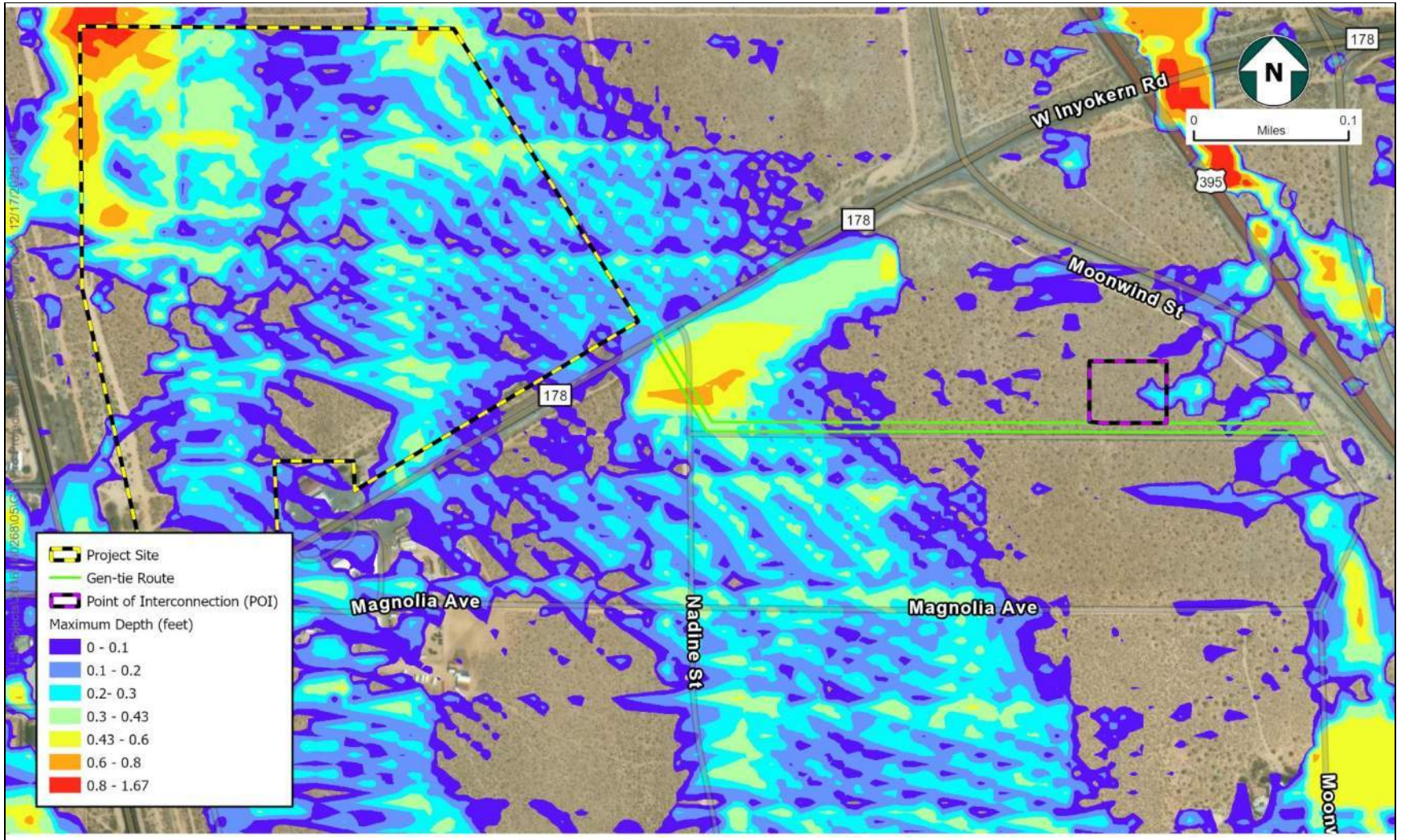


Figure 4-5
Project Site Maximum Water Depth (Feet)

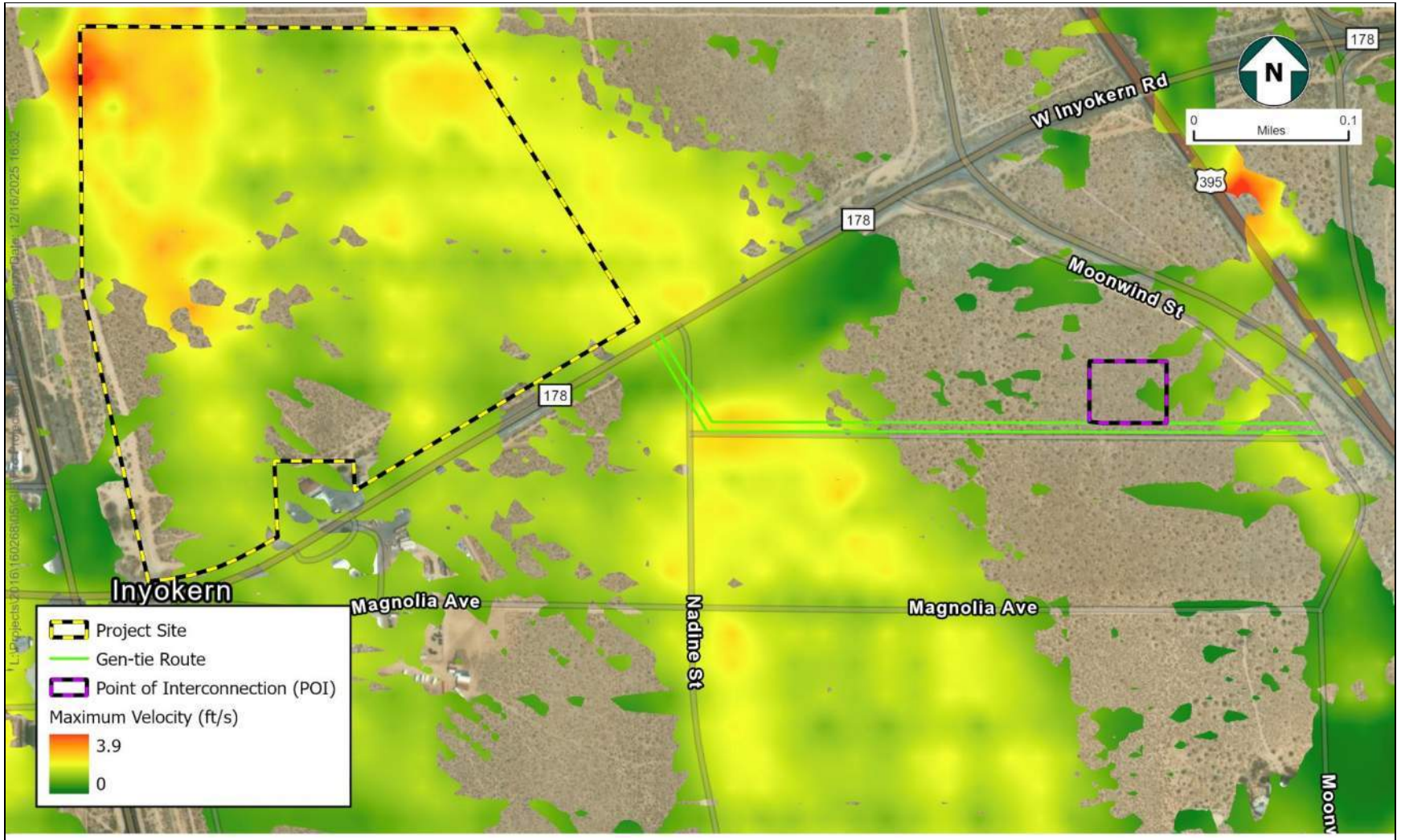


Figure 4-6
Project Site Maximum Velocity (Ft/s)

4.3 - Site Specific Conditions and Drainage

Majority of the site area will remain undeveloped. The natural vegetation in this area will be maintained where possible to assist in erosion control and to maintain existing soil characteristics (i.e. infiltration rates). The greatest increase in impervious area will be Northwest of CA SR-178. The 41.2-acre site contains the data center, office, parking area, and access road. There is approximately 16% building coverage depicted in the conceptual site plan in Appendix A.

A pre- and post-development hydrology analysis was performed to evaluate changes in runoff rates and volumes. Post-development peak flow rates and runoff volumes will be mitigated through onsite retention facilities such that discharge conditions do not exceed pre-development conditions for the design storm event according to Kern County. The pre-development runoff volume was determined using The Rational Method with a C value of 0.1, typical of unimproved areas. The Kern County Hydrology Manual requires the post-development runoff volume and therefore the retention basin design volume to be calculated using the following formula:

$$Runoff\ Volume = \left[\frac{(D_{10})}{12}\right](a_i)(Area) = \left(\frac{2.66}{12}\right)(0.252)(41.2) = 2.2\ acre-feet$$

$D_{10} = 10-year, 5-day\ depth\ of\ rainfall = 2.66\ inches$
$a_i = Average\ percentage\ of\ impervious\ area = 0.252$
$Area = Drainage\ area\ of\ total\ development = \ 41.2\ acres$

The pre-development and post-development runoff volumes are summarized in Table 4-1.

Table 4-1
Pre- and Post-Development Runoff Volumes

Condition	Runoff Volume (acre-feet)
Pre-Development	0.9
Post-Development	2.2

The proposed retention basin is located on the west side of the data center project site seen in Appendix A and shall be designed to accommodate a runoff volume of 2.2 acre-ft and in accordance with Kern County Standards – Division Four Drainage, (Appendix E). The retention basin will be designed to not exceed a ponding depth of 18 inches to ensure fencing and freeboard is not required according to Section 408-3 and 408-4. General construction requirements are outlined in Section 408-7 of the standards and include slope, freeboard, and fencing requirements. The retention basin will be designed to drain the design runoff volume within seven (7) days, consistent with the Kern County Standards outline in Section 408-8.01. A soils engineer is required to test the location of the proposed retention basin to establish soil drainage rates that comply with the retention basin drainage requirements. Drainage rate testing requirements are outlined in Section 408-8.02 The project site will be

graded to naturally drain to the proposed retention basin on the west side of the project site. There will be no underground storm drain infrastructure. Table 4-2 summarizes the retention basin, design storm criteria, and key sizing parameters used to demonstrate compliance.

Table 4-2
Retention Basin Design Parameters

Design Element	Standard According to Kern County Standards
Design Storm	10-year, 5-day - 2.22 inches
Runoff Storage Volume	2.2 acre-feet
Freeboard Requirement	None when design water depth does not exceed 18 inches
Fencing Requirement	None when design water depth does not exceed 18 inches
Side Slopes	2:1 Minimum
Dimensions	Minimum of 20 feet by 20 feet
Drainage	Basin will completely drain the design volume within seven (7) days.
Drainage Rate	A soils engineer shall establish the soil drainage rate with a minimum of one (1) boring in the proposed retention basin location. The boring shall be advanced below the invert of the basin to a depth equivalent to at least three (3) times the design ponding depth.

Source: Kern County Standards – Division Four Drainage (Appendix E)

The gen-tie transmission line will be installed above ground with power poles at regular intervals along the route. The SCE POI substation consists of above-ground, uncovered electrical equipment on a primarily native soil footprint. Neither of these site elements will increase runoff after construction and therefore do not require on-site retention.

Hydraulic modeling confirms that the data center, gen-tie, and substation are not located in areas subject to flood accumulation from Little Dixie Wash or existing watercourses. Consequently, construction of these project components will not increase flood heights or velocities, in compliance with the Kern County Floodplain Management Ordinance, Appendix F. However, the project site elements shall comply with the recommended base flood elevation of 1.0 ft to comply with FEMA Floodplain Map Zone A requirements.

Given the Project's implementation of onsite retention and compliance with Kern County Standards, the Project is not expected to contribute to cumulatively considerable increase in downstream peak flows, flood risk, or pollutant loading when combined with other reasonably foreseeable projects in the area.

4.3.1 - OPERATIONS AND MAINTENANCE

The Applicant shall operate and maintain stormwater conveyance and storage facilities for the life of the project. Maintenance activities will include removal of sediment and debris, repair of erosion, and inspection of outlet structures and spillways. Inspections shall occur at least annually and following major storm events, with corrective actions documented.

4.4 - Water Quality

Potential construction-related pollutant sources include sediment, fuels, lubricants, and concrete washout. Operational pollutant sources may include vehicle fluids and equipment oils. The project will implement BMPs consistent with the Construction General Permit and SWPPP to minimize pollutant discharge, including perimeter controls, stabilize entrances, sediment basins where required, and spill prevention/response measures.

Spill prevention and response measures will be implemented during construction and operation to prevent pollutants from being mobilized by stormwater. Fueling and maintenance activities will be conducted in designated areas with secondary containment and appropriate spill kits. Any spills will be promptly contained and cleaned up to prevent discharge to stormwater conveyances or offsite areas.

SECTION 5 - CONCLUSION

The proposed project will not impact overland drainage upstream or downstream of the site. However, the data center project site will increase runoff due to the added impervious surfaces. To comply with Kern County Drainage Standards, a 2.2-acre-foot retention basin is required.

Hydraulic calculations, performed in accordance with the Kern County Hydrology Manual and using approved flood modeling software, indicate that the maximum water depth within the project area results solely from the 100-year, 24-hour rainfall event and not from off-site flood accumulation. The projected maximum water depth is generally less than 1.0 foot. Therefore, establishing a base flood elevation of 1.0 foot above existing or finished grade is appropriate to meet FEMA Floodplain Map Zone A requirements.

Applicable laws, ordinances, regulations, and standards (LORS) for hydrology and water quality include the SWRCB Construction General Permit (CAS000002), Kern County Hydrology Manual and drainage criteria, Kern County grading requirements, and Kern County Flood Plain Management ordinance. Project design and implementation measures will be consistent with these requirements.

5.1 - Flood Control Measures

The project area is located within a Zone A FEMA special flood hazard area and therefore must comply with all requirements of the Kern County Floodplain Management ordinance included in Appendix F.

In addition to the floodplain hazard mitigation measures, the following general flood control measures shall be implemented to ensure no significant stormwater impact would result from the project:

HYD-1: *Prior to issuance of grading permits or building permits, the Project operator shall submit an SWPPP to the Kern County Planning and Community Development Department and the Regional Water Control Board, that specifies best management practices to prevent all construction pollutants from contacting stormwater, with the intent of keeping all products of erosion from moving off site and into receiving waters. The requirements of the SWPPP shall be incorporated into design specifications and construction contracts. The SWPPP will include inspection, monitoring, and corrective action procedures, including routine inspections, post-storm inspections, and documentation requirements for BMP performance and repair. Recommended BMPs for the construction phase may include the following:*

a) Stockpiling and disposing of demolition debris, concrete, and soil properly.
b) Installation of a stabilized construction entrance/exit and stabilization of disturbed areas.
c) Implementing erosion controls.
d) Properly managing construction materials.

e) Proper protections for fueling and maintenance of equipment and vehicles.
f) Managing waste, aggressively controlling litter, and implementing sediment controls.

With the implementation of Flood Control Measure **HYD-1**, no significant impact would result from the Project. Prior to obtaining a grading permit, the site plan design and SWPPP will be submitted for review and comment by the County of Kern. The requirements of the RWQCB as listed above are expected to be addressed through the development and approval of the final site plan design and SWPPP.

HYD-2: *Prior to issuance of a grading permit, the Project operator shall prepare a drainage plan that is designed to minimize runoff and surface water pollution and will include engineering recommendations to minimize the potential for impeding or redirecting 100-year flood flows. Site grading shall be designed to prevent increasing the existing 100-year water surface elevations more than one foot or as required by Kern County's Floodplain Ordinance. The drainage plan shall be prepared in accordance with the Kern County Grading Code, Kern County Hydrology Manual and policies related thereto and approved by the Kern County Engineering, Surveying and Permit Services Department.*

HYD-3: *Prior to the issuance of grading or building permits, the Applicant shall submit final drainage plans and hydraulic calculations demonstrating compliance with Kern County drainage and floodplain requirements. The applicant shall implement the approved drainage controls during construction and operations and shall inspect stormwater facilities at least annually and after major storm events, documenting maintenance actions.*

SECTION 6 - REFERENCES

1. California Department of Water Resources. *Water Data Library*. California Department of Water Resources, n.d., https://wdl.water.ca.gov/.

2. Desert Research Institute. *Western Regional Climate Center*. Western Regional Climate Center, n.d., https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?cainyo+sca.

3. Kern County (Calif.), Public Works Department. *Floodplain Management*. Kern County, n.d., https://www.kernpublicworks.com/services/development/floodplain-management.

4. Perica, Sanja, et al. *NOAA Atlas 14: Precipitation-Frequency Atlas of the United States. Volume 6, Version 2.3: California*. National Oceanic and Atmospheric Administration, National Weather Service, Office of Water Prediction, Hydrometeorological Design Studies Center, 2011 (rev. 2014), https://hdsc.nws.noaa.gov/pfds/pfds_map_cont.html?bkmrk=ca.

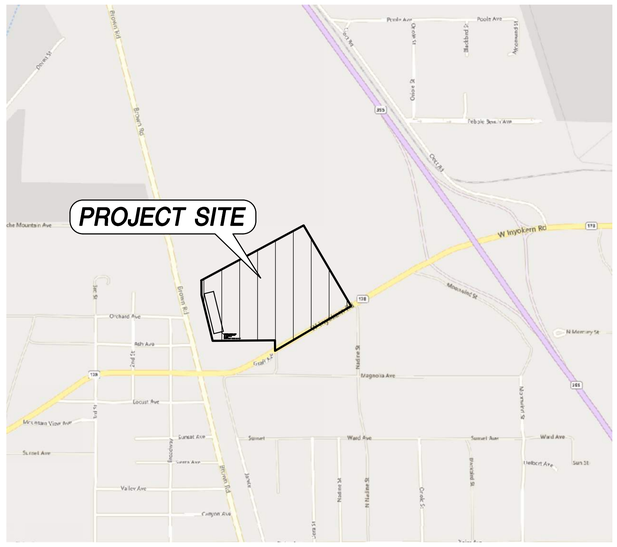
5. 5. United States Department of Agriculture, Natural Resources Conservation Service. *Web Soil Survey*. United States Department of Agriculture, n.d., https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

6. U.S. Geological Survey. *Download Data & Maps from The National Map*. U.S. Geological Survey, 3 Nov. 2022, https://apps.nationalmap.gov/downloader/.

APPENDIX A
CONCEPTUAL SITE PLAN

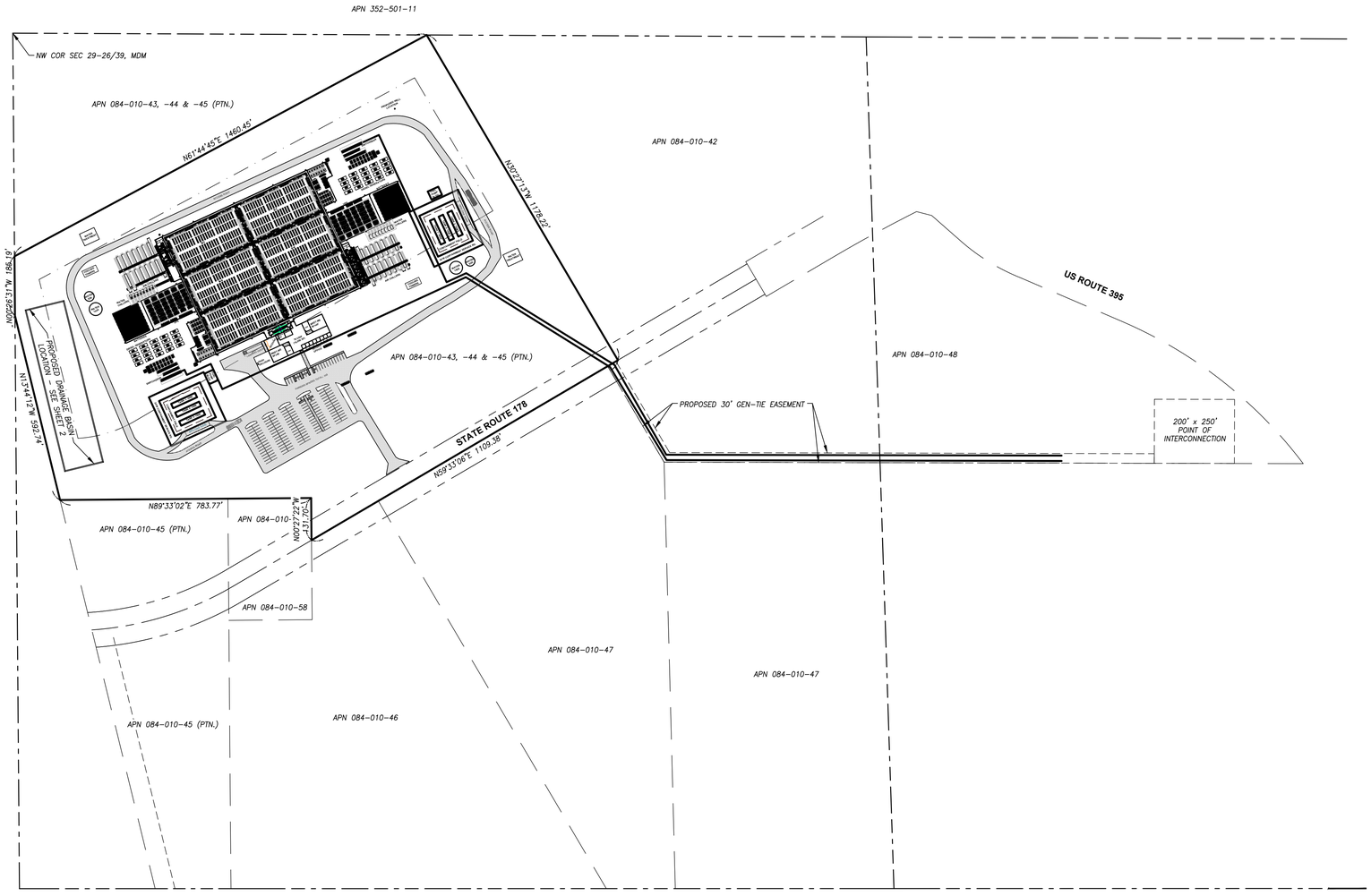
AREA MAP

NTS



VICINITY MAP

NTS



SITE OVERVIEW

N

200' 0' 200'

SCALE: 1"= 200'

REVISIONS			
ID	DATE	BY	DESCRIPTION

DRAFT

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INYOKERN DATA CENTER
CUP X, ZONE MAP 47 - OVERVIEW
APN: 084-010-43, -44 & -45 (PTN.)

PROJECT NO.:	**160268.05**
DRAWN BY:	**PH**
QA/QC BY:	**JB/BW**
SCALE:	**AS SHOWN**
SHEET NO.:	**1** OF **2**

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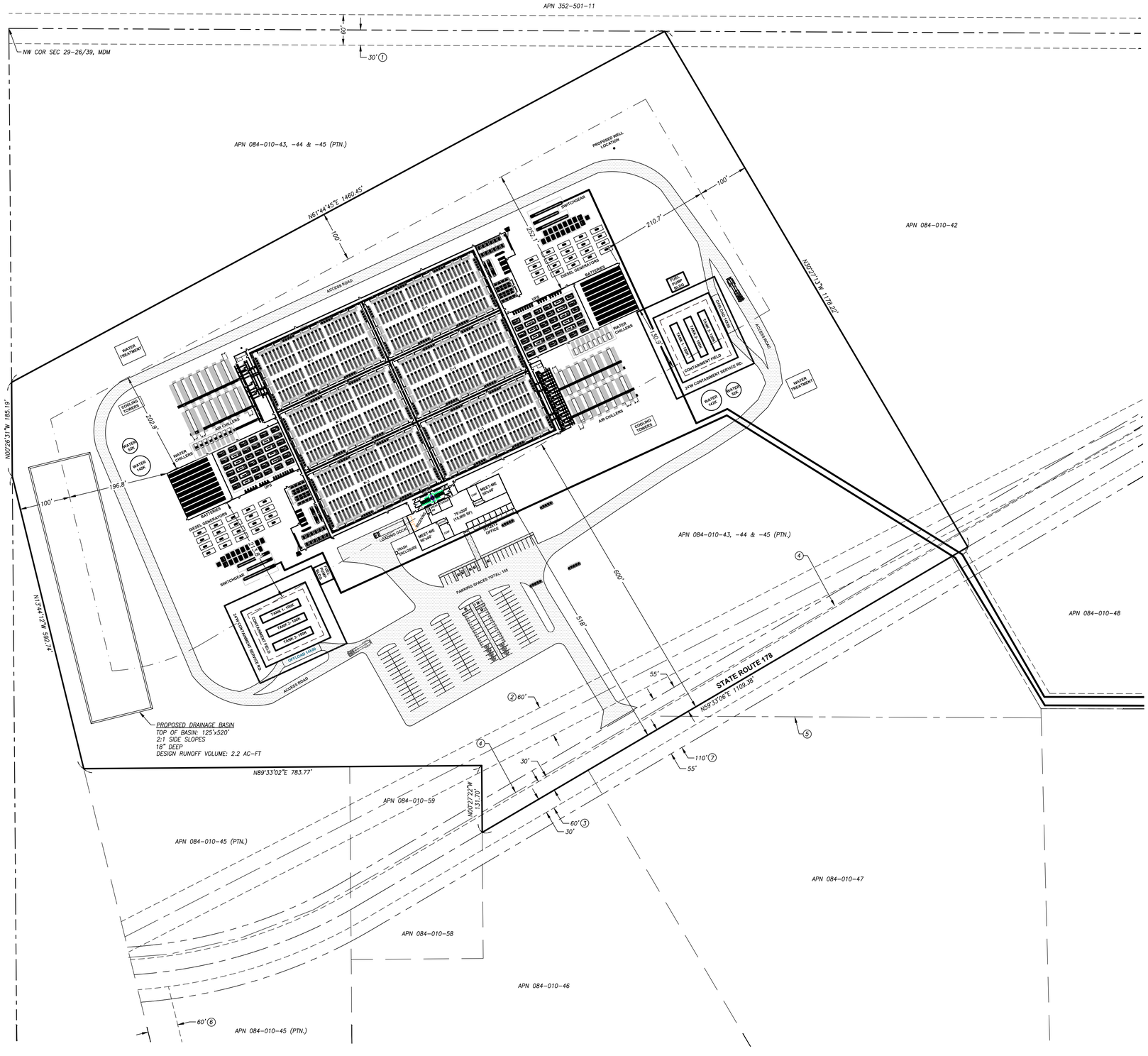

LEGAL DESCRIPTION:

BEING PORTIONS OF PARCELS 2, 3 AND 4 OF PARCEL MAP NO. 4949, AS PER MAP RECORDED APRIL 19, 1979 IN BOOK 22 OF PARCEL MAPS AT PAGE 142 SITUATED IN THE NORTHWEST QUARTER OF SECTION 29, T.26S., R.39E., M.D.M. IN THE UNINCORPORATED AREA OF THE COUNTY OF KERN, STATE OF CALIFORNIA,

STATISTICAL INFORMATION:

EXISTING ZONING: M-2 PD

EXISTING LAND USE DESIGNATION: 4.1 7.2/2.5

EXISTING USE: VACANT

PROPOSED USE: DATA CENTER

ACREAGE: 41.20 ACRES

PROPOSED BUILDING:

HEIGHT: SINGLE STORY MAX 25' HEIGHT

DATA CENTER: 270,218 S.F.

OFFICE: 17,640 S.F.

BUILDING COVERAGE: 16.0%

LANDSCAPE AREA:

PARKING SPACES PROVIDED: 155

124 REGULAR 9'x20'

PROVIDED – 2 REGULAR 9'x20',

1 ADA VAN ACCESSIBLE (CONCRETE)

ACCESSIBLE SIGNAGE AND STRIPING SHALL BE PER CBC 118-502

WATER: INYOKERN COMMUNITY SERVICES DISTRICT

SEWAGE: INYOKERN COMMUNITY SERVICES DISTRICT

ELECTRIC: SOUTHERN CALFORNIA EDISON

LEGEND

— · — · — · — BESS SETBACK

BESS BATTERY ENERGY STORAGE SETBACK

PAVED ROAD

NOTE:

OFFSITE GEN-TIE EASEMENT AND POINT OF INTERCONNECT ARE SHOWN ON SHEET 1.

EASEMENTS:

(1) EASEMENT FOR PUBLIC HIGHWAY PURPOSES, COUNTY ROAD NO. 449, ALSO KNOWN AS INYOKERN ROAD, AND IS LOCATED WITHIN THE NORTHERLY 30' OF SAID LAND, IN FAVOR OF COUNTY OF KERN AS ESTABLISHED BY ORDER OF THE BOARD OF SUPERVISORS OF KERN COUNTY ENTERED IN VOLUME 21 AT PAGE 130 OF MINUTE BOOKS.

(2) EASEMENT FOR PUBLIC HIGHWAY PURPOSES, COUNTY ROAD NO. 697, ALSO KNOWN AS STATE HIGHWAY ROUTE 178, IN FAVOR OF COUNTY OF KERN AS ESTABLISHED BY ORDER OF THE BOARD OF SUPERVISORS OF KERN COUNTY ENTERED IN VOLUME 27 AT PAGE 232 OF MINUTE BOOKS.

(3) EASEMENT FOR ROAD PURPOSES IN FAVOR OF COUNTY OF KERN PER BOOK 1131, PAGE 155 OF OFFICIAL RECORDS.

(4) EASEMENT FOR ELECTRIC LINES AND TELEPHONE LINES PURPOSES IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY, FORMERLY CALIFORNIA ELECTRIC POWER COMPANY AND INTERSTATE TELEGRAPH COMPANY PER BOOK 1182, PAGE 162 OF OFFICIAL RECORDS. (CENTERLINE SHOWN – NO WIDTH GIVEN)

(5) EASEMENT FOR TELEPHONE AND TELEPHONE LINES PURPOSES IN FAVOR OF CALIFORNIA INTERSTATE COMPANY, FORMERLY INTERSTATE TELEGRAPH COMPANY PER BOOK 1237, PAGE 160 OF OFFICIAL RECORDS. (CENTERLINE SHOWN – NO WIDTH GIVEN)

(6) EASEMENT FOR PUBLIC INGRESS, EGRESS, ROAD AND UTILITY PURPOSES IN FAVOR OF CLARENCE F. IVES, GLADYS IVES AND JACOB L. ORETSKY PER BOOK 4661, PAGE 446 OF OFFICIAL RECORDS.

(7) EASEMENT FOR INGRESS, EGRESS AND ROAD PURPOSES IN FAVOR OF THE PUBLIC IN GENERAL PER BOOK 5164, PAGE 593 AND RE-RECORDED PER BOOK 5186, PAGE 2231; BOTH OF OFFICIAL RECORDS.

N

100' 0' 100'

SCALE: 1"= 100'

REVISIONS			
ID	DATE	BY	DESCRIPTION

DRAFT

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INYOKERN DATA CENTER
CUP X, ZONE MAP 47 - SITE PLAN
APN: 084-010-43, -44 & -45 (PTN.)

PROJECT NO.:	160268.05
DRAWN BY:	PH
QA/QC BY:	JB/BW
SCALE:	AS SHOWN
SHEET NO.:	2 OF 2

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APPENDIX B
NOAA ATLAS 14 PRECIPITATION FREQUENCY DATA

NOAA Atlas 14, Volume 6, Version 2
Location name: Inyokern, California, USA*
Latitude: 35.6524°, Longitude: -117.8079°
Elevation: 2422 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.055 (0.045-0.069)	0.075 (0.061-0.094)	0.105 (0.085-0.131)	0.131 (0.105-0.165)	0.171 (0.133-0.222)	0.205 (0.157-0.271)	0.243 (0.181-0.328)	0.285 (0.208-0.396)	0.349 (0.244-0.503)	0.403 (0.273-0.600)
10-min	0.079 (0.064-0.098)	0.108 (0.087-0.134)	0.150 (0.121-0.187)	0.188 (0.151-0.236)	0.245 (0.191-0.318)	0.294 (0.224-0.388)	0.348 (0.260-0.471)	0.409 (0.298-0.567)	0.500 (0.350-0.721)	0.578 (0.392-0.860)
15-min	0.096 (0.078-0.119)	0.130 (0.106-0.162)	0.181 (0.147-0.226)	0.227 (0.182-0.286)	0.296 (0.231-0.384)	0.355 (0.271-0.470)	0.421 (0.314-0.569)	0.495 (0.360-0.686)	0.605 (0.424-0.872)	0.698 (0.474-1.04)
30-min	0.130 (0.106-0.162)	0.178 (0.144-0.221)	0.247 (0.200-0.308)	0.309 (0.248-0.389)	0.403 (0.314-0.523)	0.484 (0.370-0.640)	0.573 (0.428-0.775)	0.674 (0.490-0.935)	0.823 (0.577-1.19)	0.951 (0.645-1.42)
60-min	0.180 (0.146-0.224)	0.246 (0.199-0.306)	0.342 (0.277-0.427)	0.428 (0.343-0.538)	0.558 (0.435-0.724)	0.670 (0.512-0.885)	0.793 (0.593-1.07)	0.932 (0.678-1.29)	1.14 (0.798-1.64)	1.32 (0.893-1.96)
2-hr	0.270 (0.219-0.335)	0.357 (0.289-0.444)	0.482 (0.390-0.602)	0.593 (0.476-0.746)	0.758 (0.590-0.983)	0.896 (0.685-1.18)	1.05 (0.782-1.42)	1.21 (0.883-1.68)	1.46 (1.02-2.10)	1.66 (1.13-2.47)
3-hr	0.333 (0.271-0.415)	0.438 (0.355-0.545)	0.586 (0.474-0.732)	0.716 (0.575-0.901)	0.908 (0.707-1.18)	1.07 (0.816-1.41)	1.24 (0.927-1.68)	1.43 (1.04-1.98)	1.70 (1.19-2.46)	1.93 (1.31-2.88)
6-hr	0.460 (0.374-0.573)	0.602 (0.488-0.750)	0.801 (0.648-1.00)	0.973 (0.781-1.22)	1.22 (0.953-1.59)	1.43 (1.09-1.89)	1.65 (1.23-2.23)	1.89 (1.37-2.62)	2.23 (1.56-3.22)	2.51 (1.70-3.74)
12-hr	0.599 (0.486-0.745)	0.794 (0.644-0.989)	1.06 (0.862-1.33)	1.30 (1.04-1.63)	1.63 (1.27-2.12)	1.90 (1.45-2.51)	2.19 (1.64-2.96)	2.50 (1.82-3.46)	2.93 (2.06-4.23)	3.29 (2.23-4.90)
24-hr	0.786 (0.698-0.903)	1.06 (0.945-1.22)	1.45 (1.28-1.67)	1.78 (1.56-2.06)	2.24 (1.90-2.69)	2.61 (2.17-3.21)	3.00 (2.43-3.78)	3.42 (2.70-4.44)	4.02 (3.03-5.43)	4.50 (3.28-6.30)
2-day	0.951 (0.845-1.09)	1.31 (1.16-1.51)	1.80 (1.60-2.08)	2.22 (1.95-2.58)	2.81 (2.38-3.38)	3.28 (2.72-4.03)	3.78 (3.06-4.76)	4.31 (3.39-5.58)	5.05 (3.81-6.83)	5.65 (4.12-7.91)
3-day	1.02 (0.902-1.17)	1.42 (1.26-1.63)	1.97 (1.74-2.27)	2.43 (2.14-2.83)	3.09 (2.62-3.71)	3.61 (3.00-4.43)	4.16 (3.36-5.24)	4.74 (3.73-6.14)	5.55 (4.19-7.51)	6.21 (4.53-8.70)
4-day	1.06 (0.943-1.22)	1.49 (1.33-1.72)	2.09 (1.85-2.41)	2.59 (2.27-3.01)	3.29 (2.79-3.96)	3.85 (3.20-4.73)	4.44 (3.59-5.59)	5.06 (3.98-6.56)	5.94 (4.48-8.03)	6.64 (4.84-9.30)
7-day	1.10 (0.979-1.27)	1.57 (1.40-1.81)	2.22 (1.96-2.56)	2.77 (2.43-3.22)	3.54 (3.01-4.26)	4.16 (3.46-5.11)	4.80 (3.89-6.05)	5.49 (4.32-7.12)	6.45 (4.86-8.72)	7.21 (5.25-10.1)
10-day	1.14 (1.01-1.30)	1.63 (1.45-1.87)	2.32 (2.05-2.67)	2.90 (2.54-3.37)	3.73 (3.16-4.48)	4.39 (3.64-5.39)	5.08 (4.12-6.40)	5.82 (4.58-7.54)	6.86 (5.17-9.27)	7.68 (5.60-10.8)
20-day	1.29 (1.14-1.48)	1.86 (1.65-2.14)	2.66 (2.35-3.07)	3.35 (2.94-3.89)	4.33 (3.68-5.21)	5.13 (4.26-6.30)	5.97 (4.84-7.53)	6.88 (5.41-8.92)	8.15 (6.15-11.0)	9.19 (6.69-12.9)
30-day	1.45 (1.29-1.67)	2.10 (1.87-2.42)	3.02 (2.67-3.48)	3.80 (3.34-4.42)	4.94 (4.19-5.95)	5.87 (4.87-7.21)	6.85 (5.54-8.63)	7.90 (6.22-10.2)	9.39 (7.09-12.7)	10.6 (7.72-14.8)
45-day	1.61 (1.43-1.85)	2.34 (2.07-2.68)	3.37 (2.98-3.89)	4.27 (3.75-4.97)	5.59 (4.74-6.73)	6.67 (5.54-8.20)	7.82 (6.33-9.85)	9.04 (7.12-11.7)	10.8 (8.13-14.6)	12.2 (8.87-17.1)
60-day	1.80 (1.60-2.07)	2.59 (2.30-2.98)	3.71 (3.28-4.28)	4.70 (4.12-5.46)	6.13 (5.20-7.38)	7.31 (6.07-8.99)	8.57 (6.94-10.8)	9.92 (7.81-12.9)	11.8 (8.94-16.0)	13.4 (9.76-18.8)

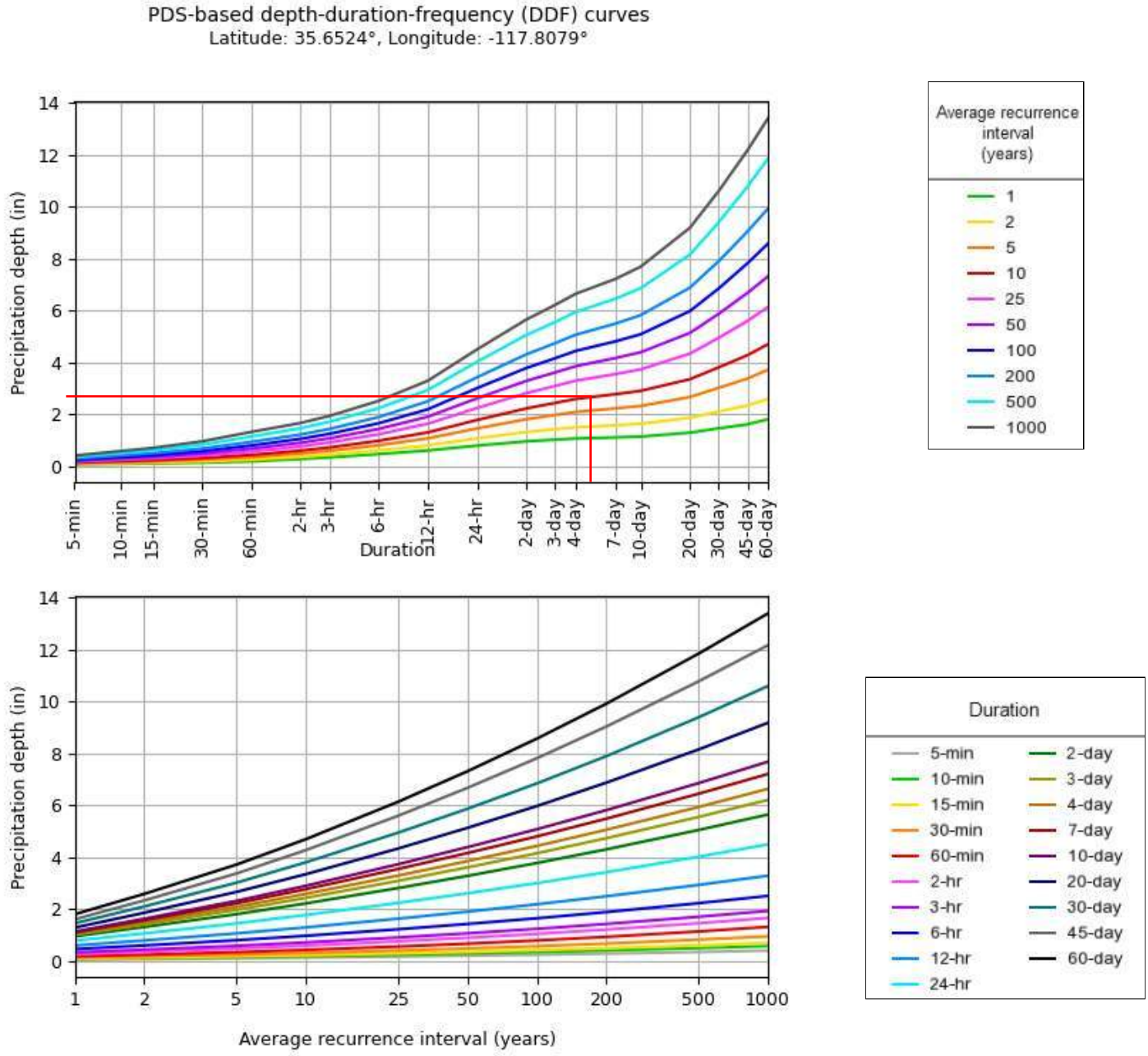
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



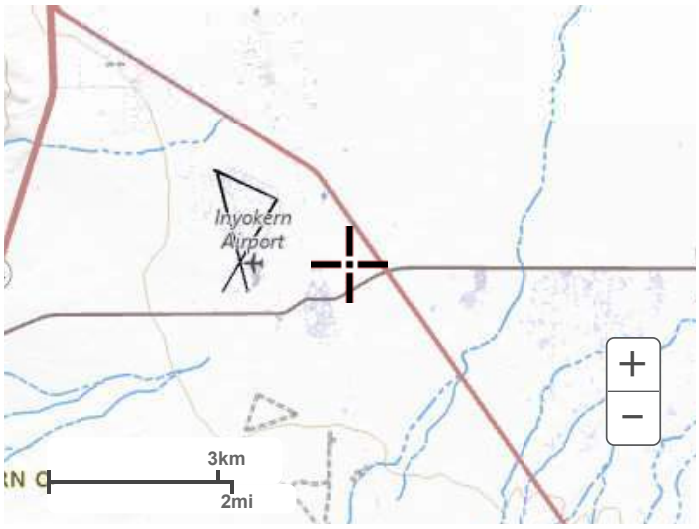
NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Thu Nov 13 23:06:39 2025

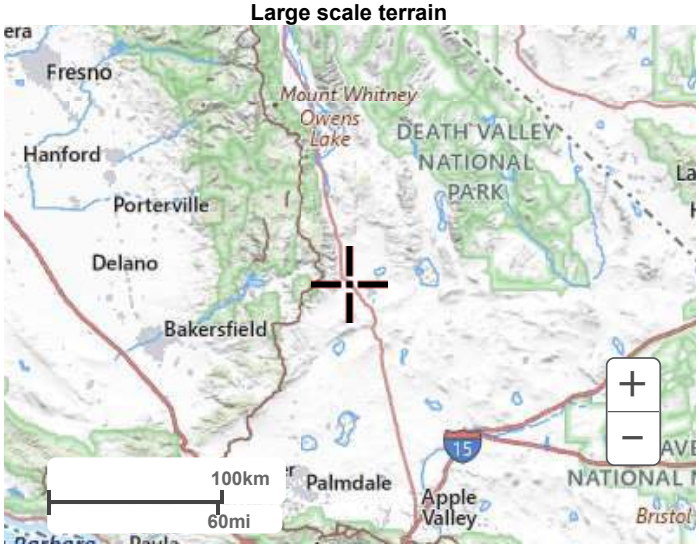
Back to Top

Maps & aerials

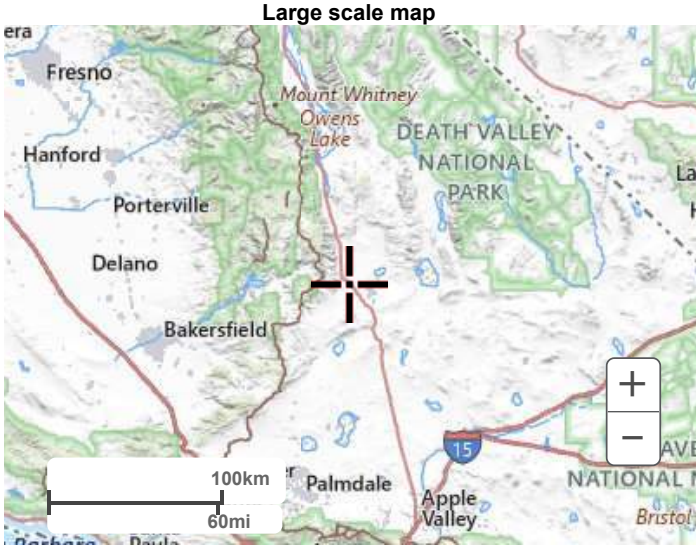
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

Back to Top

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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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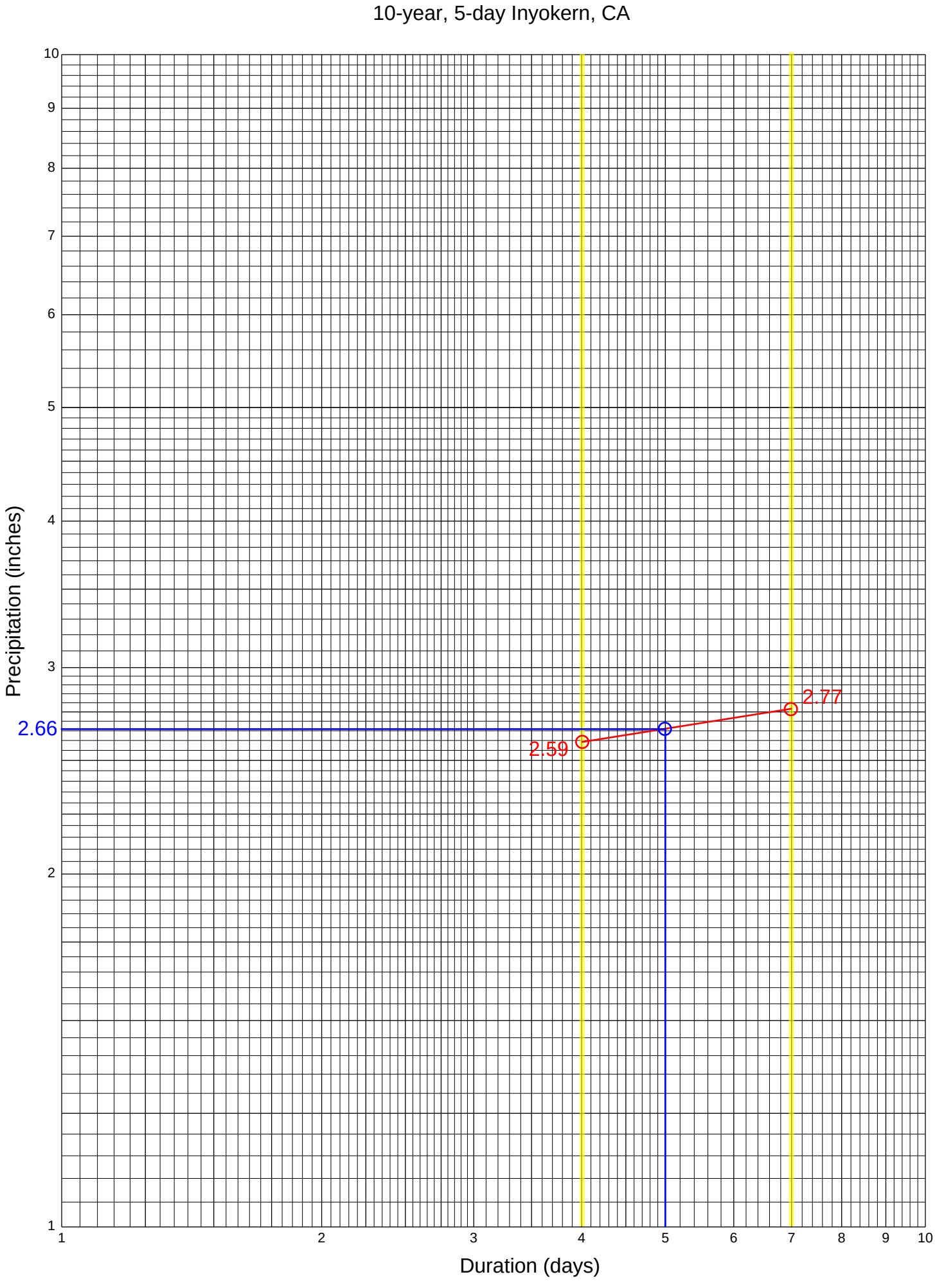

Free Logarithmic Graph Paper from http://incompetech.com/graphpaper/logarithmic/

APPENDIX C
GEOTECHNICAL ENGINEERING REPORT RB SOLAR INYOKERN PROJECT

Geotechnical Engineering Report

RB Solar Inyokern Project

NEC of West Inyokern Road and Brown Road

Inyokern, Kern County, California

July 14, 2015

Terracon Project No. 60155041

Prepared for:

RB Inyokern Solar

Inyokern, California

Prepared by:

Terracon Consultants, Inc.

Irvine, California

terracon.com

Terracon

Environmental ■ Facilities ■ Geotechnical ■ Materials

July 14, 2015

Cobia Capital, LLC
600 Anton Boulevard, 11th Floor
Costa Mesa, California 92626

Attn: Mr. Glen Casanova,
P: 949-529-5281
E: gcasanova@cobia.gmail.com

Re: Geotechnical Engineering Report
RB Solar Inyokern Project
NEC of West Inyokern Road and Brown Road
Inyokern, Kern County, California
Terracon Project No. 60155041

Dear Mr. Casanova:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. These services were performed in general accordance with our proposal number P60150197, dated May 14, 2015. This report provides: a description of project scope and site conditions; the details of our subsurface exploration, electrical resistivity testing, and thermal resistivity testing. Additionally, this report provides geotechnical engineering recommendations concerning earthwork and the design and construction of the proposed structures and site development elements for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,

Terracon Consultants. Inc.

REGISTERED PROFESSIONAL ENGINEER
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TABLE OF CONTENTS

APPENDICES

GEOTECHNICAL ENGINEERING REPORT
RB SOLAR INYOKERN PROJECT
NEC OF WEST INYOKERN ROAD AND BROWN ROAD
INYOKERN, KERN COUNTY, CALIFORNIA
Terracon Project No. 60155041
July 14, 2015

1.0 INTRODUCTION

This report presents the results of our geotechnical engineering services performed for the proposed RB Solar Inyokern Project to be located at the northeast corner of West Inyokern Road and Brown Road in Inyokern, Kern County, California. The "Site Location Plan" (Exhibit A-1) is included in Appendix A of this report. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- subsurface soil conditions
- earthwork recommendations
- driven pile design and construction
- groundwater conditions
- pavement design and construction
- foundation design and construction

The project is a proposed photovoltaic (PV) solar generating facility which encompasses a gross area of approximately 150 acres. Terracon's geotechnical engineering scope of work for this project included performing a total of eleven (11) borings. Nine (9) borings were advanced within the proposed solar arrays to approximate depths of 16½ feet bgs, and two (2) borings were advanced within the proposed substation area to approximate depths of 31½ feet bgs. In addition to the subsurface exploration, two (2) in-situ electrical resistivity tests and two (2) laboratory thermal resistivity tests were conducted.

Logs of the borings along with a "Boring and Test Location Plan" (Exhibit A-2) are included in Appendix A of this report. The results of the laboratory testing performed on selected soil samples obtained from the site during the field exploration are included in Appendix B of this report. Descriptions of the field exploration and laboratory testing are included in their respective appendices.

2.0 PROJECT INFORMATION

2.1 Project Description

ITEM	DESCRIPTION
Site layout	Refer to the Boring and Test Location Plan (Exhibit A-2 in Appendix A).
Proposed Structures	The project will include the construction of a PV solar generating facility with PV modules aligned in arrays and affixed to single-axis tracking systems or fixed arrays, and associated switchgear and transformer pads. Pole top interconnect structures are also planned for this project.
Finished grade elevation	A grading plan was not provided at this stage of the project. However, we assume proposed grades will follow existing grades with minimum earthwork.
Maximum loads	Assumed Foundation Loads: • Shear: 150 kips • Uplift: 20 kips • Moment: 5000 ft-kips Transformer and switchgear elements: less than 15 tons (assumed)
Pavements	It is our understanding that aggregate surface pavements for fire access roads, delivery roads, and parking areas will be constructed on the site.

2.2 Site Location and Description

ITEM	DESCRIPTION
Location	The project is located at the northeast corner of West Inyokern Road and Brown Road in Inyokern, Kern County, California. The "Site Location Plan" (Exhibit A-1) is included in Appendix A of this report.
Existing site features (site interior)	The project site is located on undeveloped land with minimal vegetation.
Current ground cover	The project site appears to be covered by native shrubs and soils.
Existing topography	The project site is relatively flat with an elevation of approximately 2,420 feet above mean sea level (MSL).

3.0 SUBSURFACE CONDITIONS

3.1 Typical Subsurface Profile

Specific conditions encountered at each boring location are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Details for each of the borings and can be found on the boring logs included in Appendix A of this report. Based on the results of the borings, subsurface conditions on the project site can be generalized as loose to very dense silty sand and poorly graded sand with silt.

Laboratory tests were conducted on selected soil samples and the test results are presented in Appendix B. The results of an Atterberg Limits test indicate that the tested materials exhibit non-plastic behavior. Laboratory test results indicate that the subgrade soils exhibit a slight collapse potential when saturated and tested at an approximate surcharge pressure of 2,000 psf. A direct shear test was performed on silty sand materials encountered at a depth of 30 feet and indicated an ultimate friction angle of 27˚ with a corresponding cohesion of 24 psf.

3.2 Field Soil Resistivity Test Results

Field measurements of soil resistivity were performed on June 3 and 4, 2015, in general accordance with ASTM Test Method G57, and IEEE Standard 81, using the Wenner Four-Electrode Method. The soil resistivity testing was performed near the center of the test locations identified on Exhibit A-2. The Wenner arrangement (equal electrode spacing) was used with “a” spacings of 2, 4, 6, 8, 12, 20, 30, and 40 feet. The “a” spacing is generally considered to be the depth of influence of the test. Results of the soil resistivity measurements are presented in Appendix D of this report.

3.3 Thermal Resistivity Test Results

Soil thermal resistivity samples were collected for laboratory thermal resistivity testing from the upper 36 inches bgs at two (2) of the boring locations. We recommend that the thermal resistivity results be discussed with an electrical design team to determine the influence on cable type and backfill materials. The thermal resistivity test results are presented in Appendix B.

3.4 Groundwater

Groundwater was not encountered during the field exploration. These observations represent groundwater conditions at the time of the field exploration and may not be indicative of other times, or at other locations. Groundwater conditions can change with varying seasonal and weather conditions, and other factors.

Groundwater levels can best be determined by implementation of a groundwater monitoring plan. Such a plan would include installation of groundwater monitoring wells, and periodic measurement of groundwater levels over a sufficient period of time.

State Department of Water Resources identifies the groundwater depth in a well located on the southeast corner of the project site. Based on groundwater data collected in 1953 within this well, groundwater was found to be greater than 100 feet bgs.[1] The possibility of groundwater fluctuations should be considered when developing design and construction plans for the project.

3.5 Seismic Design Considerations

3.5.1 Faulting and Estimated Ground Motions

The subject site is located in Southern California, which is a seismically active area. The type and magnitude of seismic hazards affecting the site are dependent on the distance to causative faults, the intensity, and the magnitude of the seismic event. The following table indicates the distance of the fault zones and the associated maximum credible earthquake that can be produced by nearby seismic events, as calculated using the USGS Earthquake Hazard Program 2002 interactive deaggregations. The modal magnitude is anticipated to be on the order of 6.4 for the project site. The Little Lake Fault, which is located approximately 14.2 kilometers from the site, is considered to have the most significant effect at the site from a design standpoint.

Characteristics and Estimated Earthquakes for Regional Faults

Fault Name	Approximate Distance to Site (kilometers)	Maximum Credible Earthquake (MCE) Magnitude
Little Lake	14.2	6.8
S. Sierra Nevada	3.5	7.2
S. Sierra Nevada GR M-distrib	4.6	6.9

Based on the USGS U.S. Seismic Design Maps, the peak ground acceleration (pga) for the project site is anticipated to be 0.491 g.[2]

The site is not located within an Alquist-Priolo Earthquake Fault Zone based on our review of the State Fault Hazard Maps.[3]

[1] Well No. 356522N1178032W001 (http://www.water.ca.gov/waterdatalibrary/)
[2] USGS, "U.S. Seismic Design Maps", (http://earthquake.usgs.gov/designmaps/us/application.php)
[3] California Department of Conservation Division of Mines and Geology (CDMG), *"Digital Images of Official Maps of Alquist-Priolo Earthquake Fault Zones of California, Southern Region"*, CDMG Compact Disc 2000-003, 2000.

3.5.2 Seismic Parameters

DESCRIPTION	VALUE
2013 California Building Code Site Classification (CBC) [1]	D
Site Latitude	N 35.6562°
Site Longitude	W 117.8106°
S_s Spectral Acceleration for a Short Period	1.233 g
S_1 Spectral Acceleration for a 1-Second Period	0.411 g

[1] Note: The 2013 California Building Code (CBC) Site Classification requires a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope does not include the required 100 foot soil profile determination. Boring extended to a maximum depth of 31½ feet, and this seismic site class definition considers that very dense soil continues below the maximum depth of the subsurface exploration. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration.

3.5.3 Liquefaction Potential

Liquefaction is a mode of ground failure that results from the generation of high pore water pressures during earthquake ground shaking, causing loss of shear strength. Liquefaction is typically a hazard where loose sandy soils exist below groundwater. Based on the documented depth of groundwater and subsurface conditions, the potential for liquefaction at the site is considered low. Other geologic hazards related to liquefaction, such as lateral spreading, are therefore also considered low.

3.6 Corrosion Potential

Results of soluble sulfate testing indicate that ASTM Type I/II Portland cement may be used for all concrete on and below grade. Foundation concrete may be designed for low sulfate exposure in accordance with the provisions of the ACI Design Manual, Section 318, Chapter 4.

Laboratory test results indicate the on-site soils have pH values ranging from 8.4 to 8.7, a water soluble sulfate content of ranging from 6.1 to 38 ppm, Red-Ox potential ranging from +230 to +253 mV, and a chloride content ranging from of 4.2 to 20 ppm as shown iin Appendix B. These values should be used to evaluate corrosive potential of the on-site soils to underground ferrous metals.

Refer to the Results of Corrosivity Analysis sheets in Appendix B for the complete results of the corrosivity testing conducted in conjunction with this geotechnical exploration.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings provided that the findings and geotechnical engineering recommendations presented in this report are incorporated into project design and construction.

The pole tope interconnect structures are anticipated to be supported on drilled shafts or directly buried. Substation transformers, inverters, and other self-contained structures may be supported on mat foundations or support slabs with thickened edges. PV solar panels will be supported by driven steel piles.

Geotechnical engineering recommendations for foundation systems and other earth connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of field and laboratory testing (which are presented in Appendices A and B), engineering analyses, and our current understanding of the proposed project.

4.2 Earthwork

The following presents recommendations for site preparation, excavation, subgrade preparation, and placement of engineered fills on the project. The recommendations presented for design and construction of earth supported elements including foundations and roadways are contingent upon following the recommendations outlined in this section. All grading within the substation should incorporate the limits of the proposed structures plus a minimum lateral distance of two feet beyond the perimeter edge of the foundations or structures.

Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, foundation bearing soils, and other geotechnical conditions exposed during the construction of the project.

Grading plans were not reviewed as part of the scope of work for this report. Terracon should be retained to evaluate the grading plans as they are developed, and to provide updated geotechnical engineering recommendations based on review of those plans.

4.2.1 Site Preparation

It is our assumption that development of the solar fields will include disking and rolling existing soils within the proposed solar arrays. Disc and roll process will include clearing, grubbing, and removing the majority of surface vegetation within the area of the proposed solar arrays.

The area within the outline of the proposed substation and roadways should be stripped from existing vegetation, debris, and other deleterious materials. Exposed surfaces within the substation area should be free of mounds and depressions which could prevent uniform compaction.

Stripped materials consisting of vegetation and organic materials should be wasted from the site, or used to revegetate landscaped areas or exposed slopes after completion of grading operations. If it is necessary to dispose of organic materials on-site, they should be placed in non-structural areas, and in fill sections not exceeding 5 feet in height.

If fill is placed in areas of the site where existing slopes are steeper than 4:1 (horizontal:vertical), the area should be benched to reduce the potential for slippage between existing slopes and fills. Benches should be wide enough to accommodate compaction and earth moving equipment, and to allow placement of horizontal lifts of fill.

4.2.2 Subgrade Preparation

Subsequent to the surface clearing, grubbing and fill removal efforts, the exposed subgrade soils within the footprint of proposed mat foundations and support slabs should be scarified, moisture conditioned, and compacted to a minimum depth of 10 inches.
Exposed subgrade soils beneath other planned fill areas and proposed pavements should be prepared to a minimum depth of 10 inches. Subgrade preparation should generally include scarification, moisture conditioning, and compaction. The moisture content and compaction of subgrade soils should be maintained until pavement construction.

4.2.3 Fill Materials and Placement

All fill materials should be inorganic soils free of vegetation, debris, and fragments larger than three inches in size. Pea gravel or other similar non-cementitious, poorly-graded materials should not be used as fill or backfill without the prior approval of the geotechnical engineer.

Surface and near surface soils consisted of silty sand with very low expansion potential. These soils are considered suitable for use as engineered fill on this project.

Imported soils (if required by the project) for use as fill material within proposed building and structure areas should conform to low volume change materials as indicated in the following specifications:

Gradation	Percent Finer by Weight (ASTM C 136)
3”	100
No. 4 Sieve	50 to 100
No. 200 Sieve	30 (max)

- Liquid Limit ..... 30 (max)
- Plasticity Index ..... 15 (max)
- Maximum Expansion Index* ..... 20 (max)

*ASTM D4829

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. Fill lifts should not exceed ten inches loose thickness.

4.2.4 Compaction Requirements

Recommended compaction and moisture content criteria for engineered fill materials are as follows:

Material Type and Location	Per the Modified Maximum Density Test (ASTM D1557)		
	Minimum Compaction Requirement (%)	Range of Moisture Contents for Compaction(% over optimum)	
		Minimum	Maximum
On-site approved native or imported fill soils: Beneath pavements:	95	0%	+4%
Beneath Aggregate Base Roadways:	90	0%	+4%
Miscellaneous backfill:	90	0%	+4%
Bottom of excavations:	90	0%	+4%
Compacted native soils roadways	90	0%	+4%
Utility trenches bottom:	90	0%	+4%
Beneath foundations:	95	0%	+4%
Aggregate base (pavements)	95	0%	+4%

4.2.5 Vault Pit Excavation

Vaults can be supported on undisturbed native soils encountered at the bottom of the vault pit excavations. The bottom of the vault pit excavation should be thoroughly cleaned of loose soils and disturbed materials prior to backfill placement and/or construction.

We recommend that the plan dimensions of the pits be over-excavated by about 2 feet laterally to provide adequate access around the excavation for vault placement. The walls of the proposed vault pit excavation should be shored or sloped in conformance with OSHA excavation and trench safety standards. If any excavation is extended to a depth of more than 20 feet, it will be necessary to have the side slopes designed by a professional engineer.

Soils from the pit excavations should not be stockpiled higher than six (6) feet or within ten (10) feet of the edge of an open trench. Construction of open cuts adjacent to existing structures, including underground pipes is not recommended within a 1½ H:1V plane extending beyond and down from the perimeter of the structure. Cuts that are proposed within five (5) feet of light standards, other utilities, underground structures, and pavement should be provided with temporary shoring.

It may be necessary for the Contractor to retain a geotechnical engineer to monitor the soils exposed in all excavations and provide engineering services for slopes. This will provide an opportunity to monitor the soils encountered and to modify the excavation slopes as necessary. It also offers an opportunity to verify the stability of the excavation slopes during construction.

4.2.6 Construction Considerations

At the time of our geotechnical exploration of the site, moisture contents of the surface and near-surface native soils ranged from about 2 to 4 percent. Based on these moisture contents, some moisture conditioning of the soils will likely be needed during construction of the project.

Although the exposed subgrades are anticipated to be relatively stable upon initial exposure, on-site soils may pump and unstable subgrade conditions could develop during general construction operations, particularly if the soils are wetted and/or subjected to repetitive construction traffic. The use of light construction equipment would aid in reducing subgrade disturbance. Should unstable subgrade conditions develop stabilization measures will need to be employed.

Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to construction of pavements. Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become desiccated, saturated, or disturbed, the affected material should be removed or these materials should be scarified, moisture conditioned, and recompacted prior to pavement construction.

Based upon the subsurface conditions determined from the geotechnical explorations, subgrade soils exposed during construction are anticipated to be relatively workable. We recommend that the earthwork portion of this project be completed during extended periods of dry weather if possible. If earthwork is completed during the wet season, it may be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork may require additional mitigative measures beyond that which would be expected during the drier summer and fall months. This could include diversion of surface runoff around exposed soils and draining of ponded water on the site. Once subgrades are established, it may be necessary to protect the exposed subgrade soils from construction traffic.

If unstable subgrade conditions develop during construction, suitable methods of stabilization will be dependent upon factors such as schedule, weather, size of area to be stabilized, and the

nature of the instability. If soil stabilization is needed, Terracon should be consulted to evaluate the situation as needed.

The individual contractor(s) is responsible for designing and constructing stable, temporary excavations (including utility trenches) as required to maintain stability of both the excavation sides and bottom. Excavations should be sloped or shored in the interest of safety following local, and federal regulations, including current OSHA excavation and trench safety standards.

The geotechnical engineer should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation; proof-rolling; placement and compaction of controlled compacted fills; backfilling of excavations to the completed subgrade.

4.3 Foundations

It is our understanding that the proposed solar PV panels will be supported on driven steel W-section steel piles. We recommend that pile testing be performed in order to verify the drivability of steel piles to support the proposed solar PV panels.

In addition, it is our understanding that pole top interconnect structures will be supported on drilled shafts or directly buried and transformers and switchgear self-contained structures will be supported by mat foundations and/or support slabs. Preliminary design recommendations for foundations for the proposed structures are presented in the following paragraphs.

4.3.1 Driven Pile Foundations

Subject to successful pile testing, the proposed solar PV panels may be supported on a driven pile foundation system. The design capacity of a single-driven pile is a function of several factors including:

- Size and type of pile;
- Type and capacity of pile installation equipment; and,
- Engineering properties of the subsurface soils.

The most effective means of verifying pile capacities for either tension or lateral loads is through pile load tests. Preliminary foundation design has been based upon calculated capacities utilizing soil strength criteria determined from the field and laboratory testing conducted during exploration.

The ultimate axial capacity of the straight sided pile in compression can be determined by the following equation:

$$Q_u = Q_s + Q_p = fA_s + qA_p$$

Where:
Q_u = ultimate axial capacity in compression (lb)
Q_s = ultimate skin-friction resistance (lb)
Q_p = ultimate end bearing (lb)
f = ultimate unit stress transfer in skin friction (lb/ft^2)
q = ultimate unit stress transfer in end bearing (lb/ft^2)
A_s = side surface area of the pile (ft^2)
A_p = gross end area of the pile (ft^2)

The end bearing component of the above equation is neglected when computing the ultimate axial capacity in tension (uplift). The allowable axial capacities of the pile in compression and tension are determined by dividing each ultimate axial capacity by a factor-of-safety (FS). A FS of 2.0 was used for the allowable skin friction. The allowable unit skin friction was determined using the soil strengths based on our field and laboratory testing.
In the event W-Sections are utilized to support the proposed PV panels, end bearing capacity should be neglected. Axial and uplift pile capacities may be increased by one-third when considering wind and/or earthquake loading.

The controlling factor to consider during preliminary design will be the amount of lateral support the foundation element can transfer to the surrounding soil. Recommended soil parameters for lateral load analysis of driven pile foundations for the two major “zones” have been developed for use in LPILE computer programs. Engineering properties have been estimated as outlined below:

Description	Top Depth (ft) Bottom Depth (ft)	Unit Weight (pcf)	LPILE Soil Type	Internal Friction ϕ	Coefficient of Subgrade Reaction k (pci)*	Allowable Unit Skin Friction (psf)
Stratum 1	1 4	115	Sand	32º	35	75
Stratum 2	4 7	110	Sand	30º	25	140
Stratum 3	7 10	115	Sand	31º	30	200

* This value increases linearly with depth an amount equal to the modulus and is independent of pile diameter.

4.3.2 Drilled Shaft Design Recommendations

The proposed interconnect structures will be supported on drilled shafts or directly buried. Recommended geotechnical parameters for lateral and axial compression load analyses of drilled shaft foundations have been developed for use in the L-PILE computer program. A Factor of Safety (FS) of 2.5 was used for skin friction and 3.0 for end bearing capacity. Based

on our review of the Standard Penetration Test (SPT) results, engineering properties have been estimated for the soils conditions as shown in the following table:

Top Depth (ft) / Bottom Depth (ft)	Unit Weight (pcf)	LPILE Soil Type	Internal Friction ϕ	Coefficient of Subgrade Reaction k (pci)*	Allowable Unit Skin Friction (psf)	Allowable End Bearing (psf)
2 / 7	117	Sand	34º	110	160	--
7 / 10	114	Sand	38º	250	300	12,000
10 / 15	112	Sand	34º	110	500	12,000
15 / 20	106	Sand	38º	300	700	12,000
20 / 30	106	Sand	35º	145	850	15,000

* This value increases linearly with depth an amount equal to the modulus and is independent of pile diameter.

Lateral load design parameters are valid within the elastic range of the soil. The coefficient of subgrade reaction are ultimate values; therefore, appropriate factors of safety should be applied in the shaft design or deflection limits should be applied to the design.

It should be noted that the load capacities provided herein are based on the stresses induced in the supporting soils. The structural capacity of the shafts should be checked to assure that they can safely accommodate the combined stresses induced by axial and lateral forces. Furthermore, the response of the drilled shaft foundations to lateral loads is dependent upon the soil/structure interaction as well as the shaft's actual diameter, length, stiffness and "fixity" (fixed or free-head condition).

4.3.3 Drilled Shaft Construction Considerations

Drilling to design depths should be possible with conventional single flight power augers. Due to the presence of sand on the site, caving of soils within the drilled shaft excavations should be anticipated. For drilled shaft depths above the depth of groundwater, temporary steel casing will likely be required to properly drill and clean shafts prior to concrete placement.

Drilled shaft foundation concrete should be placed immediately after completion of drilling and cleaning. If foundation concrete cannot be placed in dry conditions, a tremie should be used for concrete placement. Due to potential sloughing and raveling, foundation concrete quantities may exceed calculated geometric volumes

If casing is used for drilled shaft construction, it should be withdrawn in a slow continuous manner maintaining a sufficient head of concrete to prevent the creation of voids in shaft concrete. Shaft concrete should have a relatively high fluidity when placed in cased shaft holes or through a tremie. Shaft concrete with slump in the range of 6 to 8 inches is recommended.

We recommend that all drilled shaft installations be observed on a full-time basis by an experienced geotechnical engineer in order to evaluate that the soils encountered are consistent with the recommended design parameters. If the subsurface soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

The contractor should check for gas and/or oxygen deficiency prior to any workers entering the excavation for observation and manual cleanup. All necessary monitoring and safety precautions as required by OSHA, State or local codes should be strictly enforced.

4.3.4 Mat Foundation Design Recommendations

DESIGN ITEM	DESIGN RECOMMENDATIONS
Foundation Type	Mat foundations and/or support slabs with thickened edges
Bearing Material	A minimum of 10 inches of scarified, moisture conditioned, and compacted native soils in accordance with Section 4.2.4. of this report.
Allowable Bearing Pressure	2,500 psf for foundation widths up to 20 feet.
Minimum Embedment Depth Below Finished Grade	12 inches for mat foundations and support slabs with thickened edges
Total Estimated Settlement	1-inch
Estimated Differential Settlement	½-inch

The allowable foundation bearing pressure applies to dead loads plus design live load conditions. The design bearing pressure may be increased by one-third when considering total loads that include wind or seismic conditions. The weight of the foundation concrete below grade may be neglected in dead load computations.

For structural mat foundations bearing on prepared subgrade, a modulus of subgrade reaction (Kv_1) of 150 pounds per cubic inch (pci) should be used. The subgrade modulus (Kv_1) for the mat is affected by the size of the mat foundation and would vary according the following equation:

$$K_b = Kv_1 \times (B+1)^2 / 4B^2$$

Where: K_b is the modulus of vertical subgrade reaction
B is the width of the mat foundation.

4.3.5 Foundations Design Considerations

Finished grade is defined as the lowest adjacent grade within five feet of the foundation for perimeter (or exterior) footings.

Foundations should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement. The use of joints at openings or other discontinuities in masonry walls is recommended.

Foundation excavations should be observed by the geotechnical engineer. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

4.4 Lateral Earth Pressures

For native soils or imported low volume change fill materials above any free water surface, recommended equivalent fluid pressures for design of foundation elements are:

DESIGN CASE	VALUE
Active Case	32 psf/ft
Passive Case[a]	400 psf/ft
At-Rest Case	52 psf/ft
Coefficient of friction	0.40

The lateral earth pressures herein do not include any factor of safety and are not applicable for submerged soils/hydrostatic loading. Additional recommendations may be necessary if such conditions are to be included in the design.

4.5 Pavement and Roadway Design and Construction Recommendations

4.5.1 Aggregate Surface Roadway Design Recommendations

Aggregate surface roadway design was conducted in general accordance with the Army Corps of Engineers (ACOE), Technical Manual TM-5-822, Design of Aggregate Surface Roads and Airfields (1990). The design of pavement thickness was based on traffic containing less than 70 vehicles per day with 15 percent trucks, and about 1 percent of the total traffic composed of trucks having three or more axles, and no tracked vehicles. Terracon should be contacted if significant changes in traffic loads or characteristics are anticipated.

As a minimum, aggregate surface course should have a thickness of 5 inches. The recommended thickness should be measured after full compaction and constructed directly above 12 inches of scarified, moisture conditioned, and compacted native soils. This aggregate road section should

be considered suitable for variable weather conditions anticipated at the location of the project with periodic maintenance.

It is our understanding that aggregate surfaced roads and parking areas will be utilized during the construction of this project. Based on our previous experience with similar projects, it is the client's desire to use a section of 3 inches of aggregate base over 12 inches of compacted native soils for temporary parking areas and low traffic drives. This section is anticipated to perform under the anticipated light and temporary traffic loading provided the subgrade is prepared and compacted to a minimum depth of 12 inches, and with periodic maintenance.

Aggregate materials should conform to the specifications of Class II aggregate base in accordance with the requirements and specifications of the State of California Department of Transportation (CalTrans), or other approved local governing specifications.
Positive drainage should be provided during construction and maintained throughout the life of the roadways. Proposed roadway design should maintain the integrity of the road and eliminate ponding.

4.5.2 Compacted Native Soils Access Road Design Recommendations

It is our assumption that the client may use compacted native soils for the surface of interior roadways on the project. Based on our experience, such roads have performed in other facilities in the vicinity of the project site during the construction phase.

Due to the infrequent rain and minimal traffic in the vicinity of the project, it is our opinion that such unsurfaced roadways are anticipated to perform with periodic maintenance under the anticipated light and temporary traffic loading provided the roadways are compacted and prepared in conformance with section 4.2.4 to a minimum depth of 12 inches.

Compacted native soils roads are expected to pump and yield, and unstable conditions could develop during construction operations, particularly if the soils are wetted and/or subjected to repetitive construction traffic. Periodic maintenance and reshaping of these roadways should be anticipated.

4.5.3 Pavement and Roadway Design and Construction Considerations

Regardless of the design, gravel roadways will display varying levels of wear and deterioration. We recommend implementation of a site inspection program at a frequency of at least once per year to verify the adequacy of the roadways. Preventative measures should be applied as needed for erosion control and re-grading. An initial site inspection should be completed approximately three months following construction.

Shoulder build-up on both sides of proposed roadways should match the aggregate surface elevation and slope outwards at a minimum grade of 10% for five feet.

Preventative maintenance should be planned and provided for through an on-going pavement management program in order to enhance future pavement performance. Preventative maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment.

Materials and construction of pavements for the project should be in accordance with the requirements and specifications of the CalTrans, or other approved local governing specifications.

Base course or pavement materials should not be placed when the surface is wet. Surface drainage should be provided away from the edge of paved areas to minimize lateral moisture transmission into the subgrade.

5.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

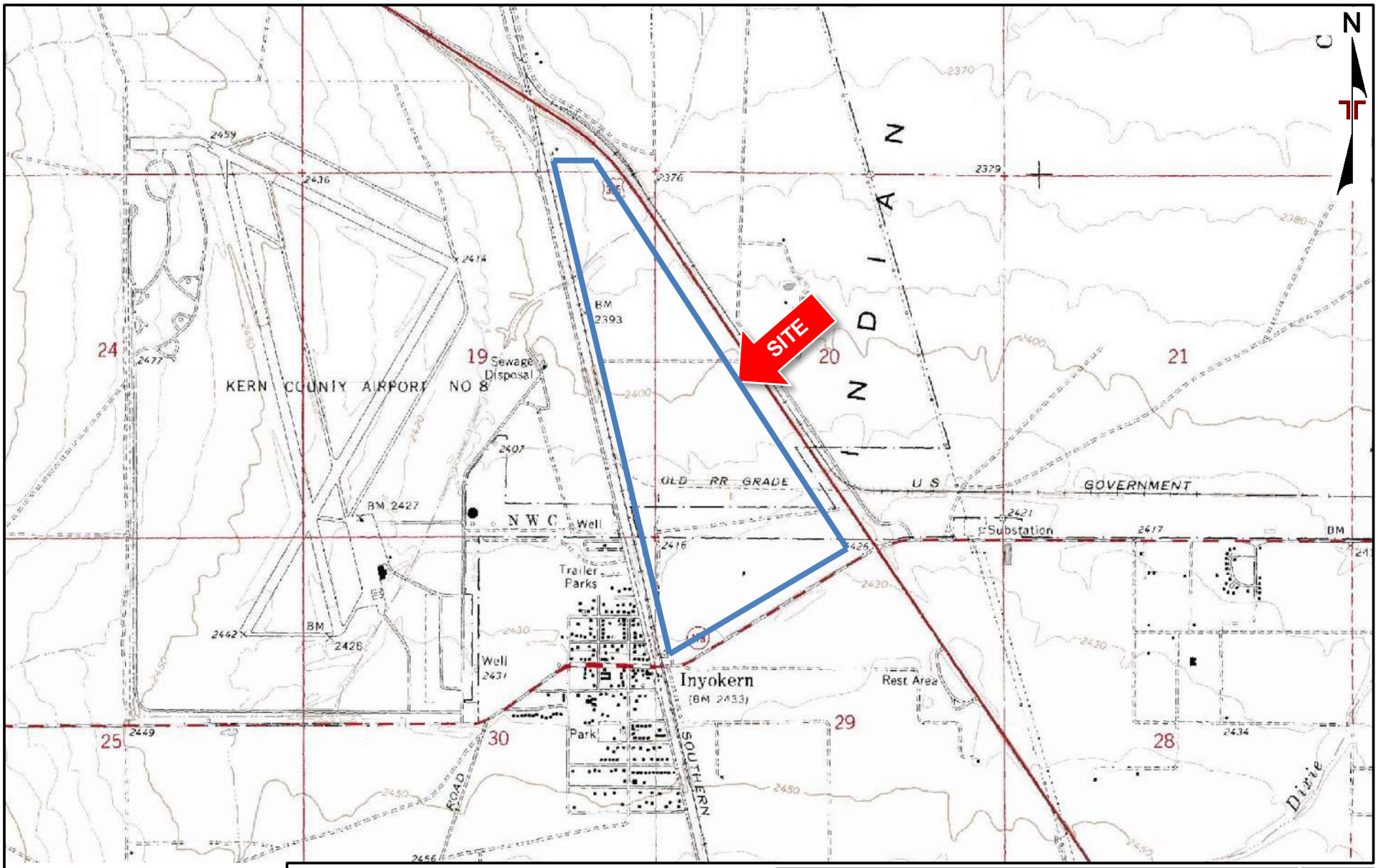
The analyses and recommendations presented in this report are based upon the data obtained from the field test program, the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A

FIELD EXPLORATION



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY QUADRANGLES INCLUDE: INYOKERN, CA (1/1/1972).

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	FH
Drawn by	SZ
Checked by	JM
Approved by	FH

Project No	60155041
Scale:	1"=2,000 SF
File Name:	A-1
Date:	6/15/2015

Terracon
2817 McGaw Ave.
Irvine, CA 92614

SITE LOCATION

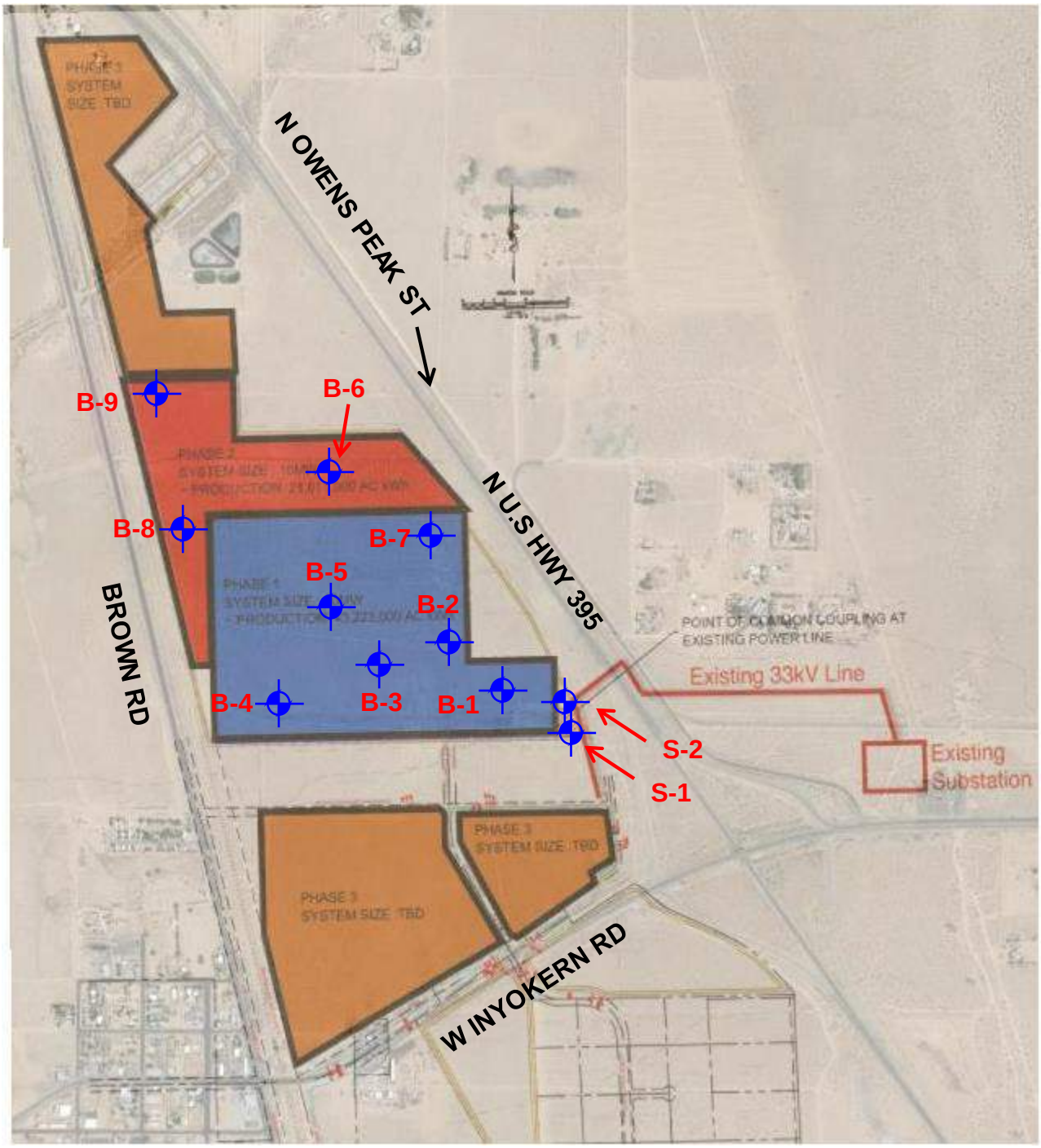
Cobia: RB Solar Inyokern

Northeast corner of W Inyokern & Brown Rd

Inyokern, CA

Exhibit

A-1



LEGEND

B-1, S-1 **SOIL BORING TESTING APPROXIMATE LOCATION**

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager: FH	Project No. 60155041	Terracon Consulting Engineers & Scientists	BORING LOCATION PLAN
Drawn by: SZ	Scale: 1" ~ 1100'	2817 McGaw Avenue Irvine, California 92614	**Cobia: RB Solar Inyokern**
Checked by: FH	File Name: A-2	PH. (949) 261-0051 FAX. (949) 261-6110	Northeast corner of W Inyokern & Brown Rd Inyokern, CA
Approved by: FH	Date: 06/15/2015		Exhibit A-2

Field Exploration Description

A total of eleven (11) test borings were drilled to approximate depths ranging between 16½ and 31½ feet bgs on June 3 and June 4, 2015. The test borings were advanced with track-mounted Mobil B-61 drill rig utilizing 6-inch diameter hollow-stem augers. Groundwater water was not encountered in the borings at the time of the field exploration program.

Approximate locations for borings are shown on the attached Boring and Test Location Plan, Exhibit A-2. The borings were located in the field using the proposed site plan, an aerial photograph of the site, and a handheld GPS unit. The accuracy of field exploration locations should only be assumed to the level implied by the method used.

Continuous lithologic logs of each boring was recorded by the field engineers during the drilling operations. At selected intervals, samples of the subsurface materials were taken by driving split-spoon or ring-barrel samplers. Bulk samples of subsurface materials were also obtained.

Penetration resistance measurements were obtained by driving the split-spoon and ring-barrel samplers into the subsurface materials with a 140-pound automatic hammer falling 30 inches. The penetration resistance value is a useful index in estimating the consistency or relative density of materials encountered.

An automatic hammer was used to advance the split-barrel sampler in the borings performed on this site. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the SPT-N value. The effect of the automatic hammer's efficiency has been considered in the interpretation and analyses of the subsurface information for this report.

The samples were tagged for identification, sealed to reduce moisture loss, and taken to our laboratory for further examination, testing, and classification. Information provided on the boring logs attached to this report includes soil descriptions, consistency evaluations, boring depths, sampling intervals, and groundwater conditions. The borings were backfilled with auger cuttings prior to the drill crew leaving the site.

BORING LOG NO. B-1

PROJECT: Cobia: RB Solar Inyokern

CLIENT: Cobia Capital, LLC
Costa Mesa, CA

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 / DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), trace gravel, brown, medium dense											27
					12-14				3	110		
		5										
					16-16				4	107		
	7.5											
	POORLY GRADED SAND WITH SILT (SP-SM), with gravel, dark brown, loose				3-4-5 N=9							
	medium dense	10			7-15							
		15			8-12-16 N=28							
	16.5											
	Boring Terminated at 16.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 6/3/2015 | Boring Completed: 6/3/2015

Drill Rig: B-61 | Driller: Cal Pac Drilling

Project No.: 60155041 | Exhibit: A-4

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL BORING LOG DRAFT.GPJ TERRACON2012.GDT 6/24/15

BORING LOG NO. B-2

PROJECT: Cobia: RB Solar Inyokern

CLIENT: Cobia Capital, LLC
Costa Mesa, CA

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 / DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), trace gravel, brown, medium dense											
					16-23				4	111		
	loose	5										
					5-8				12	104		
	6.0											
	POORLY GRADED SAND WITH SILT (SP-SM), with gravel, dark brown, loose											
					6-12							
	medium dense	10			6-9-10 N=19							
		15			14-14-14 N=28							
	16.5											
	Boring Terminated at 16.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 6/3/2015 | Boring Completed: 6/3/2015

Drill Rig: B-61 | Driller: Cal Pac Drilling

Project No.: 60155041 | Exhibit: A-5

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL BORING LOG DRAFT.GPJ TERRACON2012.GDT 6/24/15

BORING LOG NO. B-3

PROJECT: Cobia: RB Solar Inyokern

CLIENT: Cobia Capital, LLC
Costa Mesa, CA

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 / DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), trace gravel, brown, medium dense											
					16-20				2	116		
	5.0											
	POORLY GRADED SAND WITH SILT (SP-SM), trace gravel, brown, loose	5			7-9							
	medium dense				9-16				1	112		
	10.0											
	SILTY SAND (SM), trace gravel, brown, dense	10			13-20-18 N=38							
	13.0											
	POORLY GRADED SAND WITH SILT (SP-SM), with gravel, brown, dense	15			9-10-24 N=34							
	16.5											
	Boring Terminated at 16.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 6/3/2015 | Boring Completed: 6/3/2015

Drill Rig: B-61 | Driller: Cal Pac Drilling

Project No.: 60155041 | Exhibit: A-6

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL BORING LOG DRAFT.GPJ TERRACON2012.GDT 6/24/15

BORING LOG NO. B-4

PROJECT: Cobia: RB Solar Inyokern

CLIENT: Cobia Capital, LLC
Costa Mesa, CA

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 / DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), brown, medium dense										NP	18
					10-15				3	105		
	5.0	5										
	POORLY GRADED SAND WITH SILT (SP-SM), with gravel, brown, loose				6-10				2	112		
	7.0											
	SILTY SAND (SM), brown, dense				7-13-17 N=30							
	10.0	10										
	POORLY GRADED SAND WITH SILT (SP-SM), trace gravel, brown, medium dense				12-19							
		15			8-9-11 N=20							
	16.5											
	Boring Terminated at 16.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 6/3/2015 | Boring Completed: 6/3/2015

Drill Rig: B-61 | Driller: Cal Pac Drilling

Project No.: 60155041 | Exhibit: A-7

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL BORING LOG DRAFT.GPJ TERRACON2012.GDT 6/24/15

BORING LOG NO. B-5

PROJECT: Cobia: RB Solar Inyokern

CLIENT: Cobia Capital, LLC
Costa Mesa, CA

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 / DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), brown, loose											
					5-8				3	112		
		5										
	medium dense				8-13				2	114		
					13-14				2	110		
	9.0 **POORLY GRADED SAND WITH SILT (SP-SM)**, trace gravel, brown, medium dense											
		10			5-6-9 N=15							
	with gravel	15			6-8-6 N=14							
	16.5 ***Boring Terminated at 16.5 Feet***											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 6/3/2015 | Boring Completed: 6/3/2015

Drill Rig: B-61 | Driller: Cal Pac Drilling

Project No.: 60155041 | Exhibit: A-8

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL BORING LOG DRAFT.GPJ TERRACON2012.GDT 6/24/15

BORING LOG NO. B-6

PROJECT: Cobia: RB Solar Inyokern

CLIENT: Cobia Capital, LLC
Costa Mesa, CA

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 / DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), brown, loose											
					5-11				2	110		
	medium dense	5			12-15				3	102		
	6.0 **POORLY GRADED SAND WITH SILT (SP-SM)**, brown, medium dense											
					11-14				2	113		
		10			6-6-8 N=14							
	dense	15			14-14-16 N=30							
	16.5 ***Boring Terminated at 16.5 Feet***											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 6/3/2015 | Boring Completed: 6/3/2015

Drill Rig: B-61 | Driller: Cal Pac Drilling

Project No.: 60155041 | Exhibit: A-9

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL BORING LOG DRAFT.GPJ TERRACON2012.GDT 6/24/15

BORING LOG NO. B-7

PROJECT: Cobia: RB Solar Inyokern

CLIENT: Cobia Capital, LLC
Costa Mesa, CA

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 / DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), trace gravel, brown, very dense											15
					36-14/5"				3	112		
	5.0											
	POORLY GRADED SAND WITH SILT (SP-SM), brown, medium dense	5			11-13				2	111		
					4-7-10 N=17							
		10			9-18				3	110		
	13.0											
	SILTY SAND (SM), brown, medium dense	15			8-10-10 N=20							
	16.5											
	Boring Terminated at 16.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 6/3/2015 | Boring Completed: 6/3/2015

Drill Rig: B-61 | Driller: Cal Pac Drilling

Project No.: 60155041 | Exhibit: A-10

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL BORING LOG DRAFT.GPJ TERRACON2012.GDT 6/24/15

BORING LOG NO. B-8

PROJECT: Cobia: RB Solar Inyokern

CLIENT: Cobia Capital, LLC
Costa Mesa, CA

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 / DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), brown, loose											
					7-10				3	111		
		5										
					6-9				2	102		
	7.5											
	POORLY GRADED SAND WITH SILT (SP-SM), brown, loose				4-6				2	109		
	trace gravel	10			4-4-4 N=8							
	13.0											
	SILTY SAND (SM), brown, medium dense											
		15			12-7-9 N=16							
	16.5											
	Boring Terminated at 16.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 6/3/2015 | Boring Completed: 6/3/2015

Drill Rig: B-61 | Driller: Cal Pac Drilling

Project No.: 60155041 | Exhibit: A-11

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL BORING LOG DRAFT.GPJ TERRACON2012.GDT 6/24/15

BORING LOG NO. B-9

PROJECT: Cobia: RB Solar Inyokern

CLIENT: Cobia Capital, LLC
Costa Mesa, CA

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 / DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), brown, medium dense											16
					7-13							
	5.0											
	POORLY GRADED SAND WITH SILT (SP-SM), brown, medium dense	5			8-12				1	109		
					6-9-10 N=19							
		10			13-17				3	103		
	13.0											
	SILTY SAND (SM), brown, dense	15			22-22-24 N=46							
	16.5											
	Boring Terminated at 16.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 6/3/2015 | Boring Completed: 6/3/2015

Drill Rig: B-61 | Driller: Cal Pac Drilling

Project No.: 60155041 | Exhibit: A-12

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL BORING LOG DRAFT.GPJ TERRACON2012.GDT 6/24/15

BORING LOG NO. S-1

PROJECT: Cobia: RB Solar Inyokern

CLIENT: Cobia Capital, LLC
Costa Mesa, CA

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 / DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), with gravel, brown, medium dense											
					12-22				2	116		
		5			18-32				2	114		
	dense				16-23-25 N=48							
	10.0 **POORLY GRADED SAND WITH SILT (SP-SM)**, with gravel, brown, medium dense	10			14-26				2	110		
	very dense	15			27-30-25 N=55							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 6/3/2015 | Boring Completed: 6/3/2015

Drill Rig: B-61 | Driller: Cal Pac Drilling

Project No.: 60155041 | Exhibit: A-13

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL BORING LOG DRAFT.GPJ TERRACON2012.GDT 6/24/15

BORING LOG NO. S-1

PROJECT: Cobia: RB Solar Inyokern

CLIENT: Cobia Capital, LLC
Costa Mesa, CA

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	POORLY GRADED SAND WITH SILT (SP-SM), with gravel, brown, medium dense *(continued)*											
		20			21-29/6"				3	106		
	dense	25			14-15-19 N=34							
	medium dense	30			18-26				2	104		
	31.5 ***Boring Terminated at 31.5 Feet***											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 6/3/2015 | Boring Completed: 6/3/2015

Drill Rig: B-61 | Driller: Cal Pac Drilling

Project No.: 60155041 | Exhibit: A-13

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL BORING LOG DRAFT.GPJ TERRACON2012.GDT 6/24/15

BORING LOG NO. S-2

PROJECT: Cobia: RB Solar Inyokern

CLIENT: Cobia Capital, LLC
Costa Mesa, CA

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 / DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), with gravel, very dense											
					38-12/2"				3	110		
		5			22-28/4"				3	117		
	7.0 **POORLY GRADED SAND WITH SILT (SP-SM)**, with gravel, medium dense				17-32				2	109		
		10			18-22-23 N=45							
	very dense	15			50/6"				3	112		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 6/3/2015 | Boring Completed: 6/3/2015

Drill Rig: B-61 | Driller: Cal Pac Drilling

Project No.: 60155041 | Exhibit: A-14

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL BORING LOG DRAFT.GPJ TERRACON2012.GDT 6/24/15

BORING LOG NO. S-2

PROJECT: Cobia: RB Solar Inyokern

CLIENT: Cobia Capital, LLC
Costa Mesa, CA

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	POORLY GRADED SAND WITH SILT (SP-SM), with gravel, medium dense *(continued)*											
	dense	20			12-18-25 N=43							
	very dense	25			18-32/5"				2	107		
	dense	30			14-17-19 N=36							
	31.5 ***Boring Terminated at 31.5 Feet***											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 6/3/2015 | Boring Completed: 6/3/2015

Drill Rig: B-61 | Driller: Cal Pac Drilling

Project No.: 60155041 | Exhibit: A-14

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL BORING LOG DRAFT.GPJ TERRACON2012.GDT 6/24/15

APPENDIX B

LABORATORY TESTING

Laboratory Testing

Samples retrieved during the field exploration were taken to the laboratory for further observation by the project geotechnical engineer and were classified in accordance with the Unified Soil Classification System (USCS) described in Appendix C. At that time, the field descriptions were confirmed or modified as necessary and an applicable laboratory testing program was formulated to determine engineering properties of the subsurface materials.

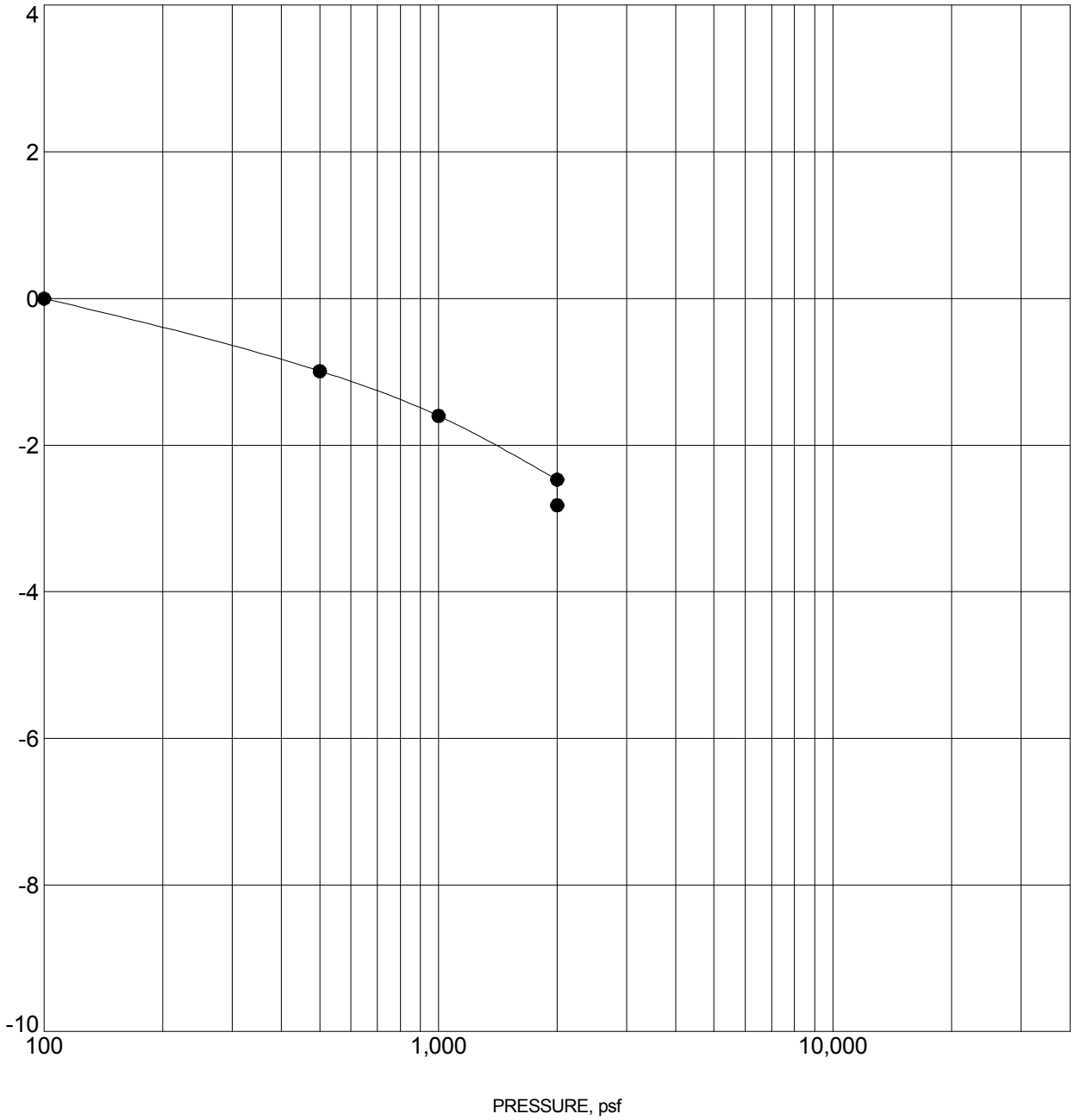
Laboratory tests were conducted on selected soil samples and the test results are presented in this appendix. The laboratory test results were used for the geotechnical engineering analyses, and the development of foundation and earthwork recommendations. Laboratory tests were performed in general accordance with the applicable ASTM, local or other accepted standards.

Selected soil samples obtained from the site were tested for the following engineering properties:

- Atterberg Limits
- Sieve Analysis
- Consolidation/Collapse Potential
- Thermal Resistivity
- California Bearing Ratio
- In-situ Water Content
- In-situ Dry Density
- Moisture Density Relationship
- Direct Shear

SWELL CONSOLIDATION TEST

ASTM D4546



Specimen Identification			Classification	γ_d, pcf	WC, %
●	S-1	2.5 ft	POORLY GRADED SAND WITH SILT	116	2

NOTES: Water added @ 2000 psf

PROJECT: Cobia: RB Solar Inyokern

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

Terracon
2817 McGaw Avenue
Irvine, California

PROJECT NUMBER: 60155041

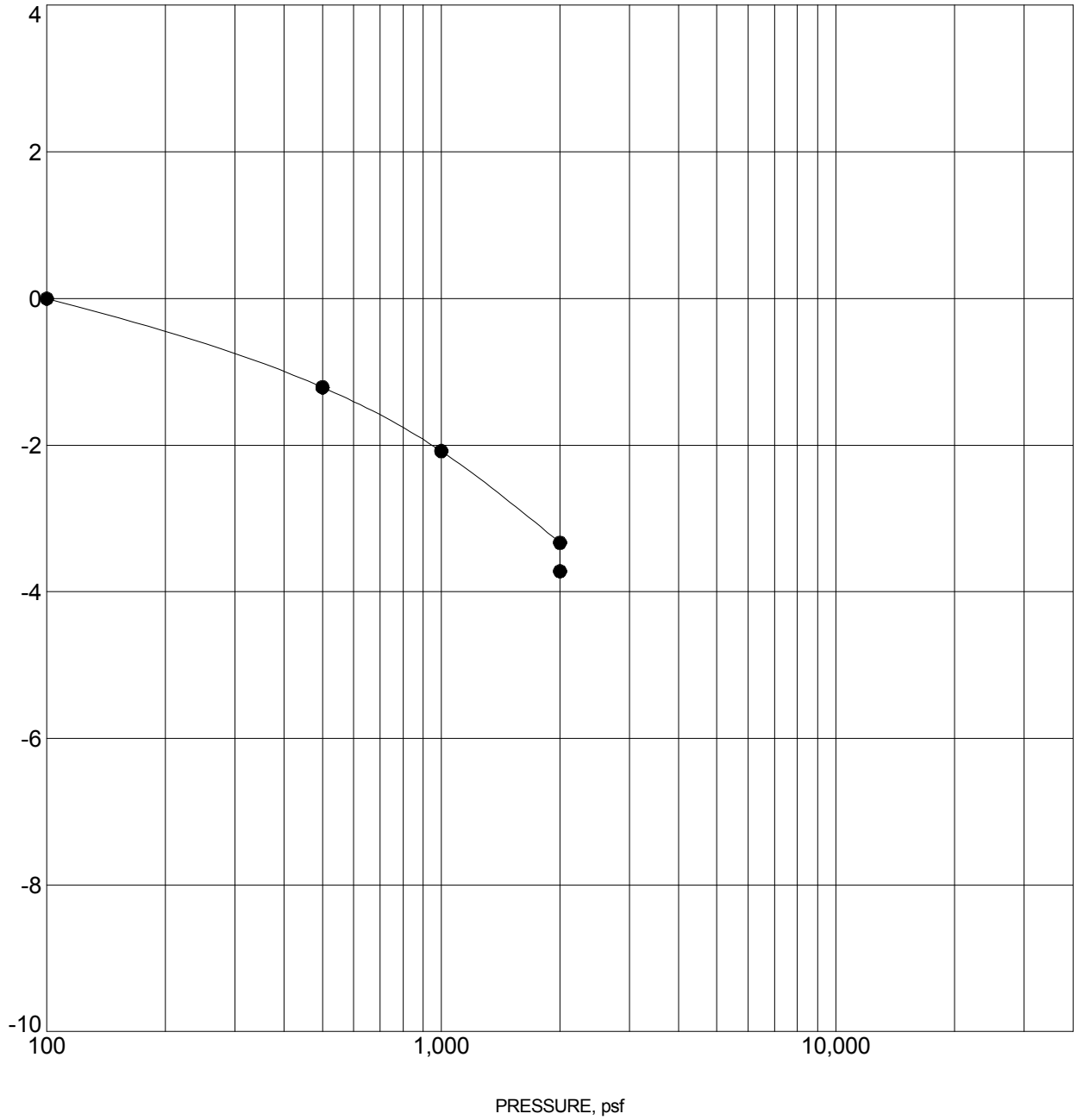
CLIENT: Cobia Capital, LLC
Costa Mesa, CA

EXHIBIT: B-2

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CONSOL_STRAIN-USCS BORING LOG DRAFT.GPJ TERRACON2012.GDT 7/1/15

SWELL CONSOLIDATION TEST

ASTM D4546



Specimen Identification			Classification	γ_d, pcf	WC, %
●	S-1	5.0 ft	POORLY GRADED SAND WITH SILT	114	2

NOTES: Water added @ 2000 psf

PROJECT: Cobia: RB Solar Inyokern

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

Terracon
2817 McGaw Avenue
Irvine, California

PROJECT NUMBER: 60155041

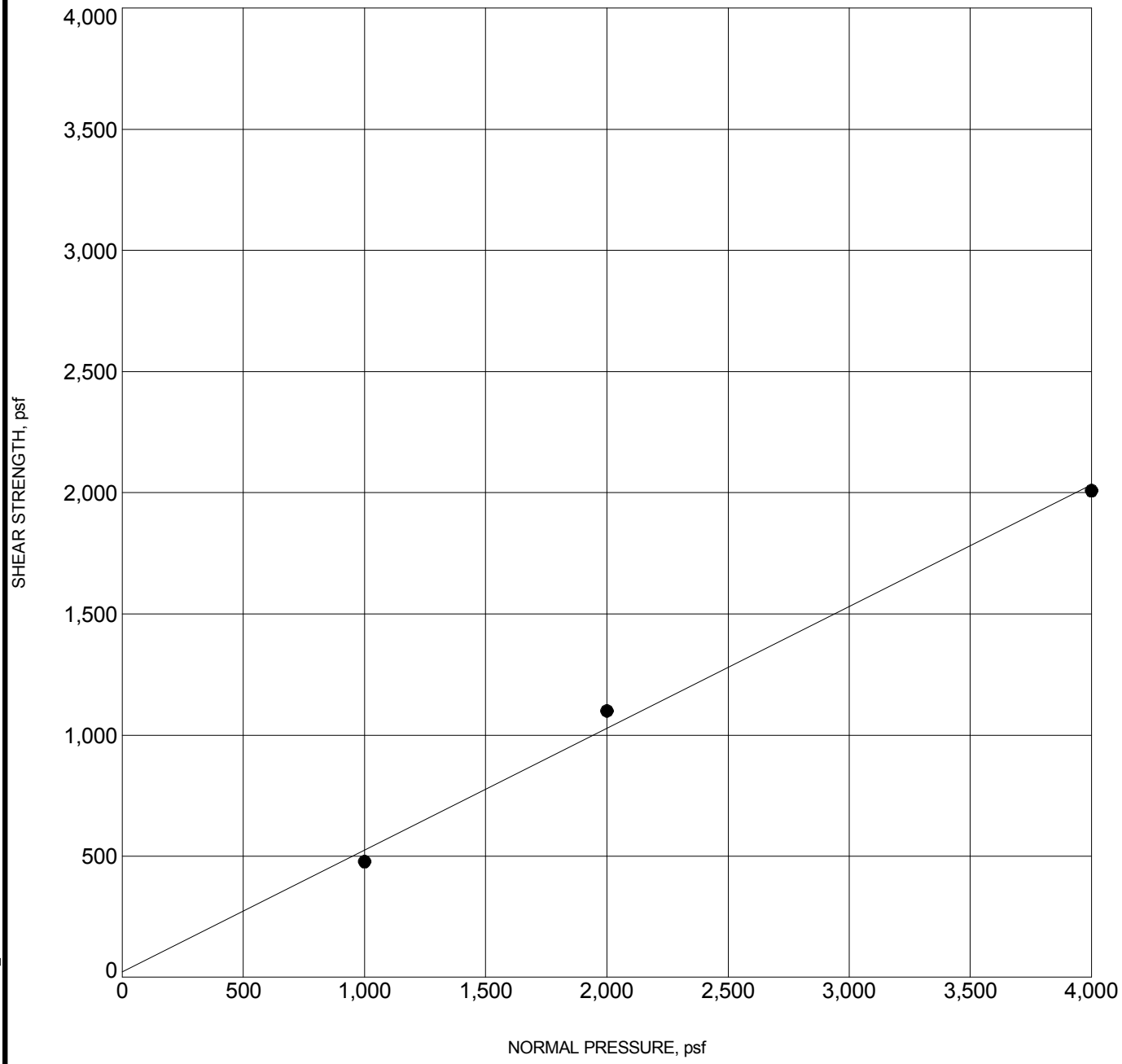
CLIENT: Cobia Capital, LLC
Costa Mesa, CA

EXHIBIT: B-3

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CONSOL_STRAIN-USCS BORING LOG DRAFT.GPJ TERRACON2012.GDT 7/1/15

DIRECT SHEAR TEST

ASTM D3080



Specimen Identification		Classification	γ_d, pcf	WC,%	c, psf	ϕ°
● S-1	30.0ft	**POORLY GRADED SAND WITH SILT**	**104**	**2**	**24**	**27**

PROJECT: Cobia: RB Solar Inyokern

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

Terracon
2817 McGaw Avenue
Irvine, California

PROJECT NUMBER: 60155041

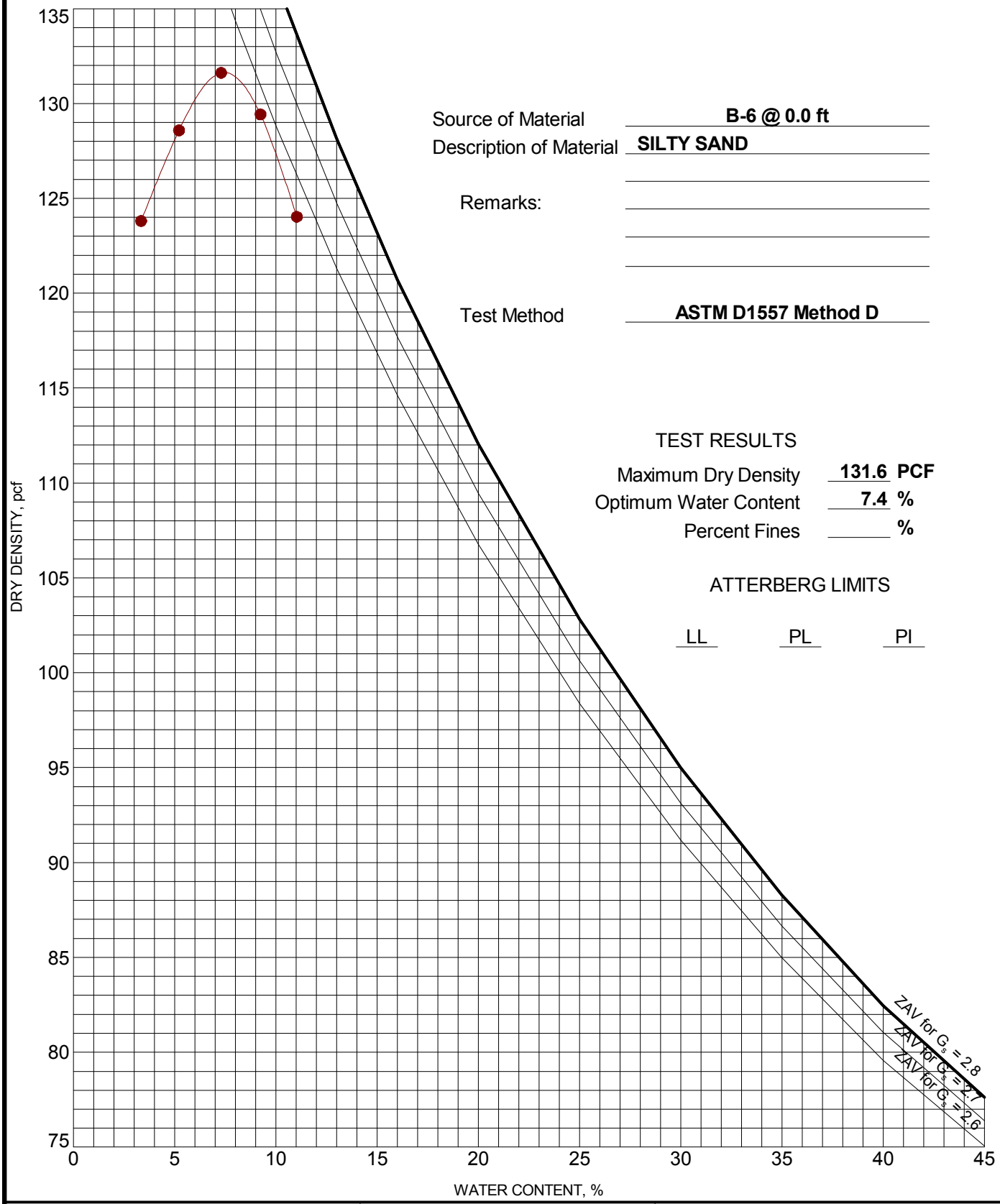
CLIENT: Cobia Capital, LLC
Costa Mesa, CA

EXHIBIT: B-4

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. DIRECT_SHEAR BORING LOG DRAFT.GPJ TERRACON2012.GDT 7/1/15

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **B-6 @ 0.0 ft**

Description of Material: **SILTY SAND**

Remarks:

Test Method: **ASTM D1557 Method D**

TEST RESULTS

Maximum Dry Density	**131.6**	**PCF**
Optimum Water Content	**7.4**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

PROJECT: Cobia: RB Solar Inyokern

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

Terracon
2817 McGaw Avenue
Irvine, California

PROJECT NUMBER: 60155041

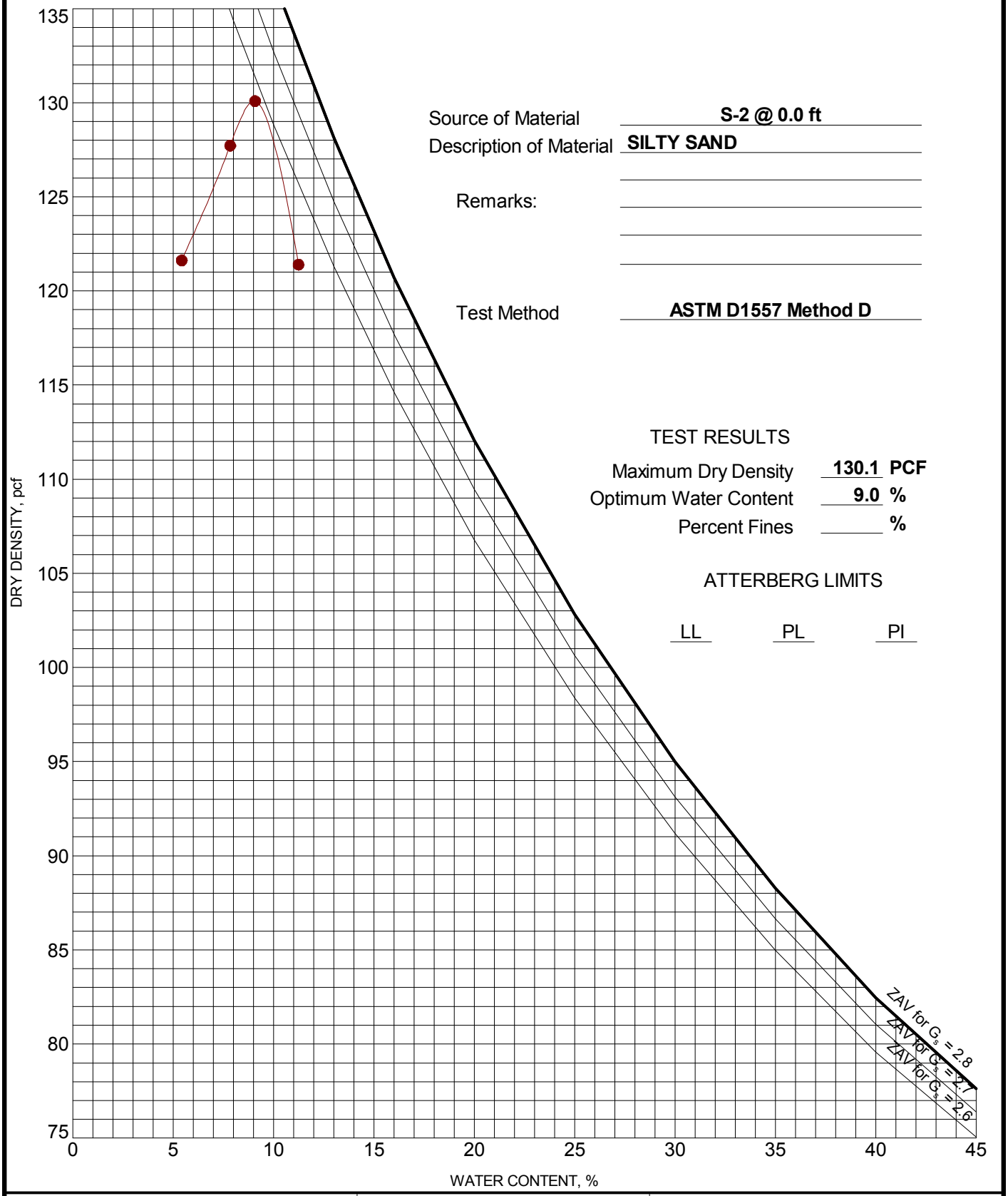
CLIENT: Cobia Capital, LLC
Costa Mesa, CA

EXHIBIT: B-5

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 BORING LOG DRAFT.GPJ TERRACON2012.GDT 7/1/15

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **S-2 @ 0.0 ft**

Description of Material: **SILTY SAND**

Remarks:

Test Method: **ASTM D1557 Method D**

TEST RESULTS

Maximum Dry Density	**130.1**	**PCF**
Optimum Water Content	**9.0**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

PROJECT: Cobia: RB Solar Inyokern

SITE: Northeast Corner of W Inyokern & Brown Rd
Inyokern, CA, CA

Terracon
2817 McGaw Avenue
Irvine, California

PROJECT NUMBER: 60155041

CLIENT: Cobia Capital, LLC
Costa Mesa, CA

EXHIBIT: B-6

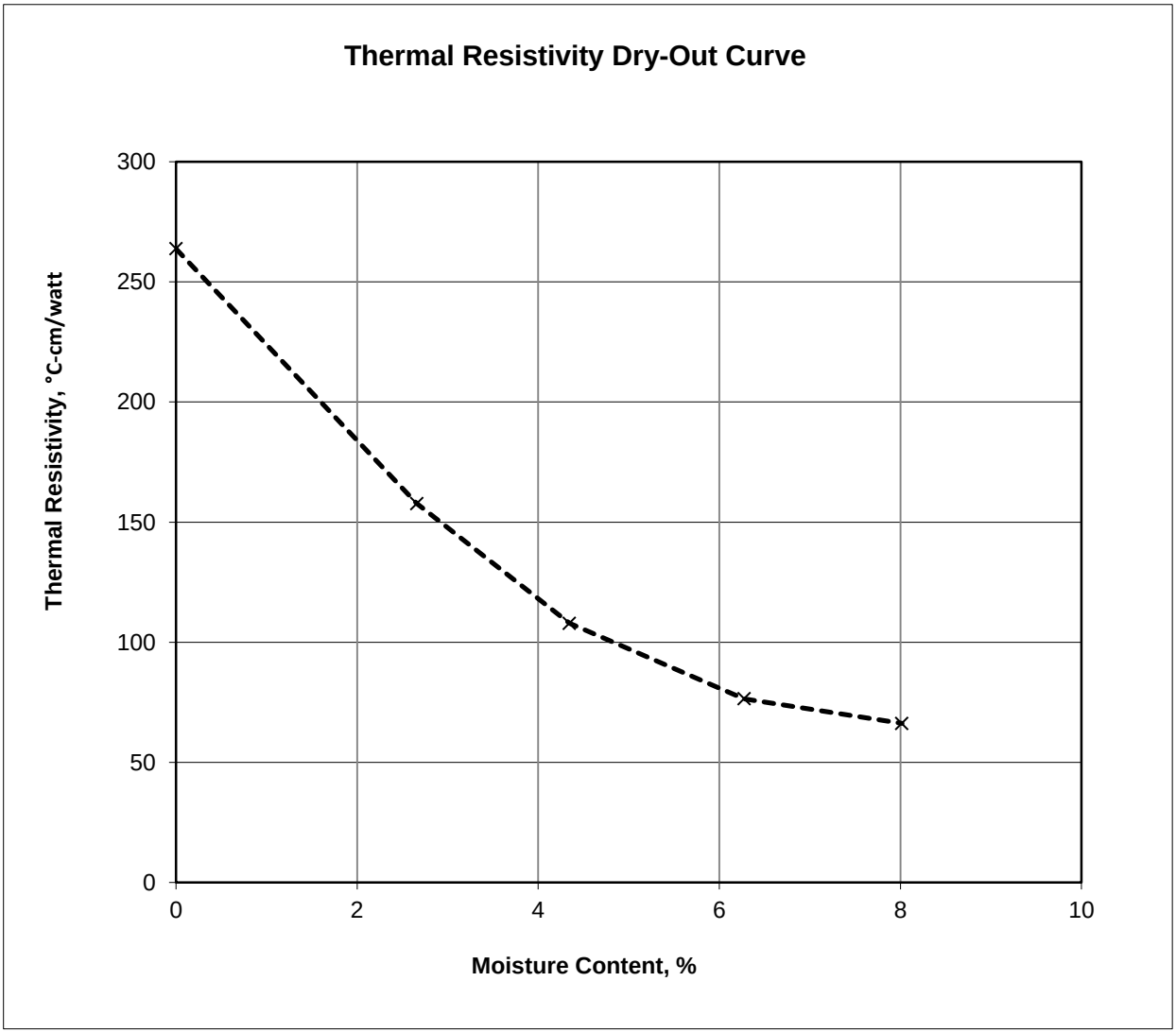
LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 BORING LOG DRAFT.GPJ TERRACON2012.GDT 7/1/15

Project Name: Cobia: RB Solar Inyokern
Project Number: 60155041

Thermal Resistivity Test Results

Moisture Content (%)	Thermal Resistivity (˚C-cm/watt)	Temperature (°C)
0.0	264	26.4
2.7	158	24.8
4.3	108	26.8
6.3	76	27.4
8.0	66	28.2

Sample ID: S2
Soil Type: Well Graded Sand w/ Clay
Standard/Modified Proctor: ASTM D 1557-A
Max Dry Density, pcf: 130.4
Optimum Moisture Content, %: 8.6
Target % Compaction: 90
Sample Dry Density, pcf: 118
Sample % Compaction: 90



Date: 6/24/15 | Run By: JAE | Reviewed By: KTH

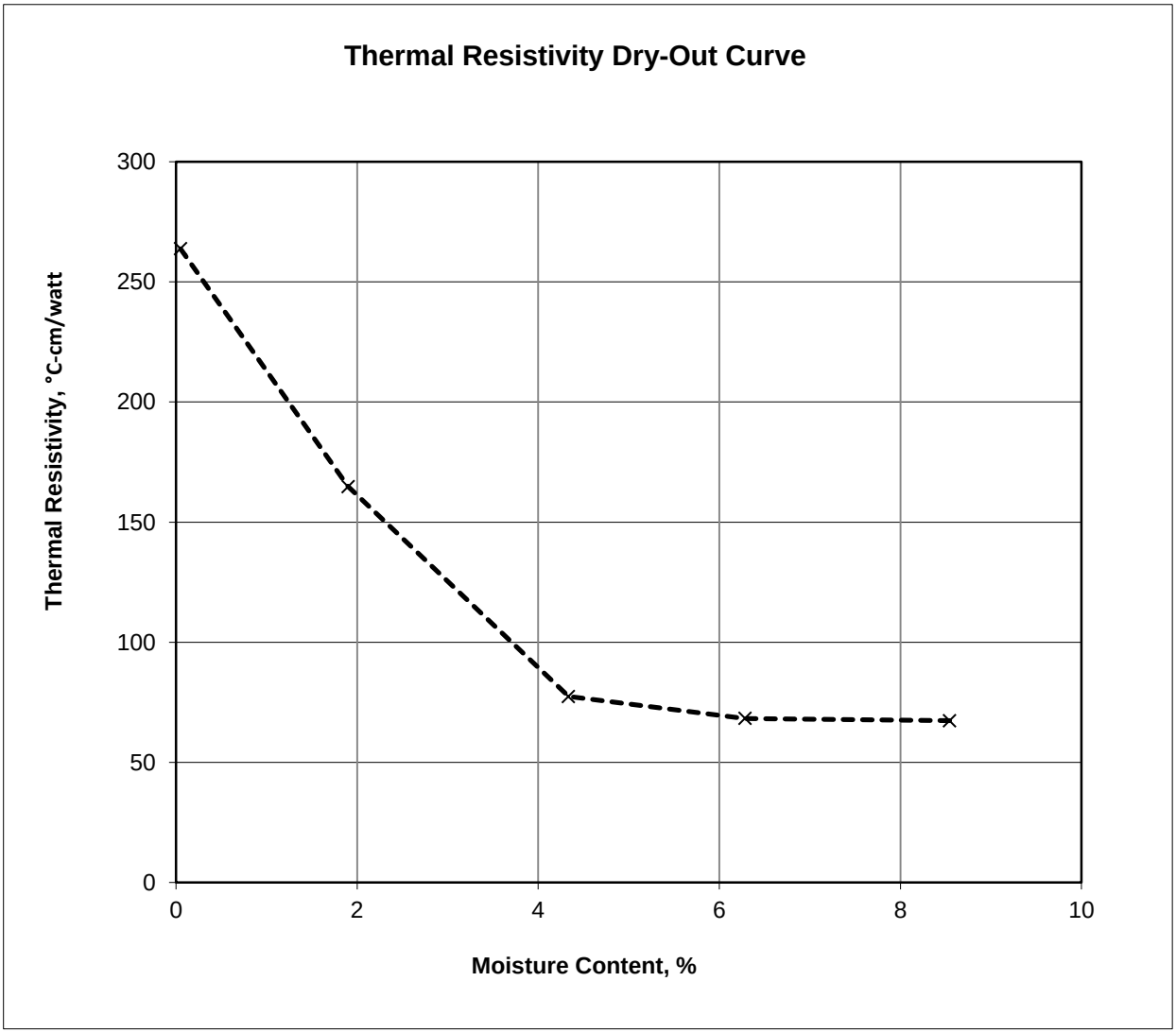
Terracon

Project Name: Cobia: RB Solar Inyokern
Project Number: 60155041

Thermal Resistivity Test Results

Moisture Content (%)	Thermal Resistivity (˚C-cm/watt)	Temperature (°C)
0.1	264	26.4
1.9	165	23.4
4.3	77	25.0
6.3	68	26.6
8.5	67	27.3

Sample ID: B-6
Soil Type: Well Graded Sand w/ Clay
Standard/Modified Proctor: ASTM D 1557-A
Max Dry Density, pcf: 131.6
Optimum Moisture Content, %: 7.5
Target % Compaction: 90
Sample Dry Density, pcf: 119
Sample % Compaction: 90



Date: 6/24/15 | Run By: JAE | Reviewed By: KTH

Terracon

MOTZZ LABORATORY, INC.

Terracon
Fred Hamdan
2817 McGaw Avenue
Irvine CA 92614

Project: 60155041
Sampler:
Date Received: 7/7/2015
Date Reported: 7/13/2015

PO Number: 60155041

Lab Number: 914131-01 **S1 (0-2')**

pH (C643)	Method	Result	Units	Levels
pH	CT 643	8.7	SU	

Chloride (C422)	Method	Result	Units	Levels
Chloride, Cl	CT 422	18	ppm	

Sulfate (C417)	Method	Result	Units	Levels
Sulfate, SO4	CT417	38	ppm	

Soil - Engineering Tests	Method	Result	Units	Levels
Redox Potential	ASTM G200-09	248	(Eo) mV	

Lab Number: 914131-02 **S4 (0-2')**

pH (C643)	Method	Result	Units	Levels
pH	CT 643	8.4	SU	

Chloride (C422)	Method	Result	Units	Levels
Chloride, Cl	CT 422	20	ppm	

Sulfate (C417)	Method	Result	Units	Levels
Sulfate, SO4	CT 417	14	ppm	

Soil - Engineering Tests	Method	Result	Units	Levels
Redox Potential	ASTM G200-09	253	(Eo) mV	

MOTZZ LABORATORY, INC.

Terracon
Fred Hamdan
2817 McGaw Avenue
Irvine CA 92614

Project: 60155041
Sampler:
Date Received: 7/7/2015
Date Reported: 7/13/2015

PO Number: 60155041

Lab Number: 914131-03 **S7 (0-2')**

pH (C643)	Method	Result	Units	Levels
pH	CT 643	8.7	SU	

Chloride (C422)	Method	Result	Units	Levels
Chloride, Cl	CT 422	13	ppm	

Sulfate (C417)	Method	Result	Units	Levels
Sulfate, SO4	CT 417	6.7	ppm	

Soil - Engineering Tests	Method	Result	Units	Levels
Redox Potential	ASTM G200-09	230	(Eo) mV	

Lab Number: 914131-04 **S9 (0-2')**

pH (C643)	Method	Result	Units	Levels
pH	CT 643	8.6	SU	

Chloride (C422)	Method	Result	Units	Levels
Chloride, Cl	CT 422	4.2	ppm	

Sulfate (C417)	Method	Result	Units	Levels
Sulfate, SO4	CT 417	6.1	ppm	

Soil - Engineering Tests	Method	Result	Units	Levels
Redox Potential	ASTM G200-09	241	(Eo) mV	

Terracon

PROJECT:	Cobia: RB Solar Inyokern	**JOB NO:**	601155041
LOCATION:	Irvine,CA	**WORK ORDER NO:**	
MATERIAL:	Native Soil	**LAB NO:**	
SAMPLE SOURCE:	B 6 @ 0-5'	**DATE SAMPLED:**	6/24/15

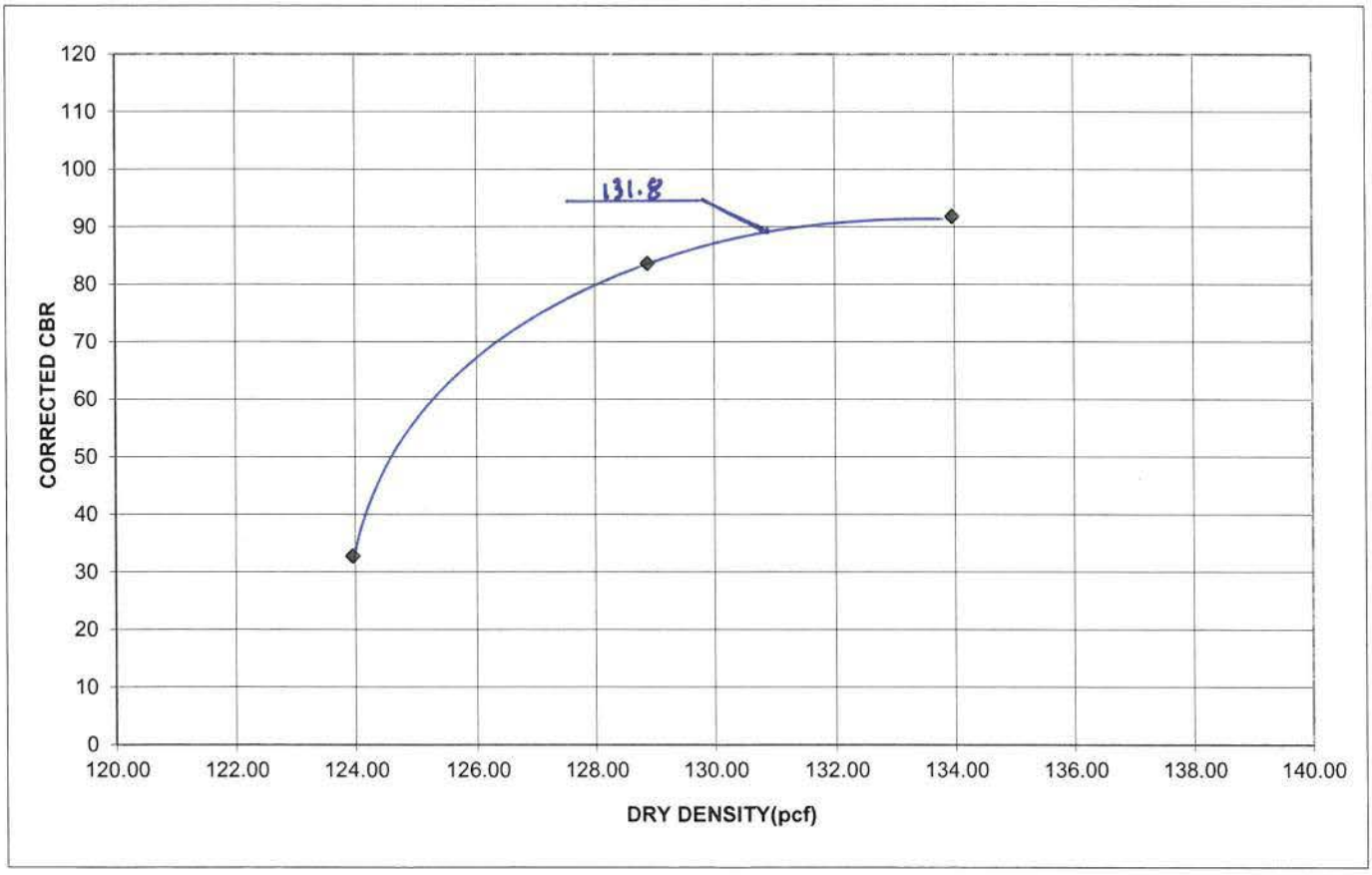
CBR(CALIFORNIA BEARING RATIO) OF LABORATORY-COMPACTED SOILS
ASTM D1883 (SOAKED)

COMPACTION(%)	100
COMPACTION METHOD	D1557 MODIFIED HAMMER
SAMPLE CONDITION	SOAKED
SURCHARGE WEIGHT	10 lbs
% RETAIN 19mm SIEVE	0

	SOAKED C B R
100% COMPACTION	**89**

ASTM D1557C PROCTOR

DRY DENSITY(pcf)	131.8
MOISTURE(%)	7.5
95% DRY DENSITY(pcf)	125.2
90% DRY DENSITY(pcf)	118.6

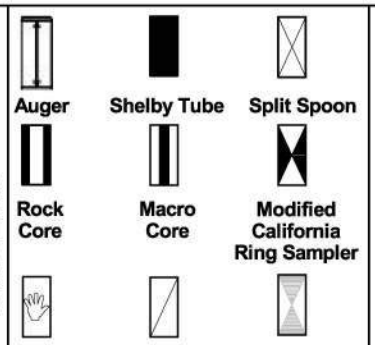


APPENDIX C
SUPPORTING DOCUMENTS

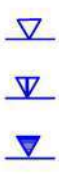
GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING



WATER LEVEL



Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

(HP)	Hand Penetrometer
(T)	Torvane
(b/f)	Standard Penetration Test (blows per foot)
N	N value
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer
(WOH)	Weight of Hammer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.			CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance			
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength, Qu, psf**	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**
Very Loose	0 - 3	0 - 6	Very Soft	less than 500	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	500 to 1,000	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium-Stiff	1,000 to 2,000	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	2,000 to 4,000	8 - 15	10 - 18
Very Dense	> 50	≥ 99	Very Stiff	4,000 to 8,000	15 - 30	19 - 42
			Hard	> 8,000	> 30	> 42

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G,H,I]
			Fines classify as CL or CH		SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A" line [J]		CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K,L,M,N]
			Liquid limit - not dried			Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K,L,M]
			PI plots below "A" line		MH	Elastic Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K,L,M,P]
			Liquid limit - not dried			Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

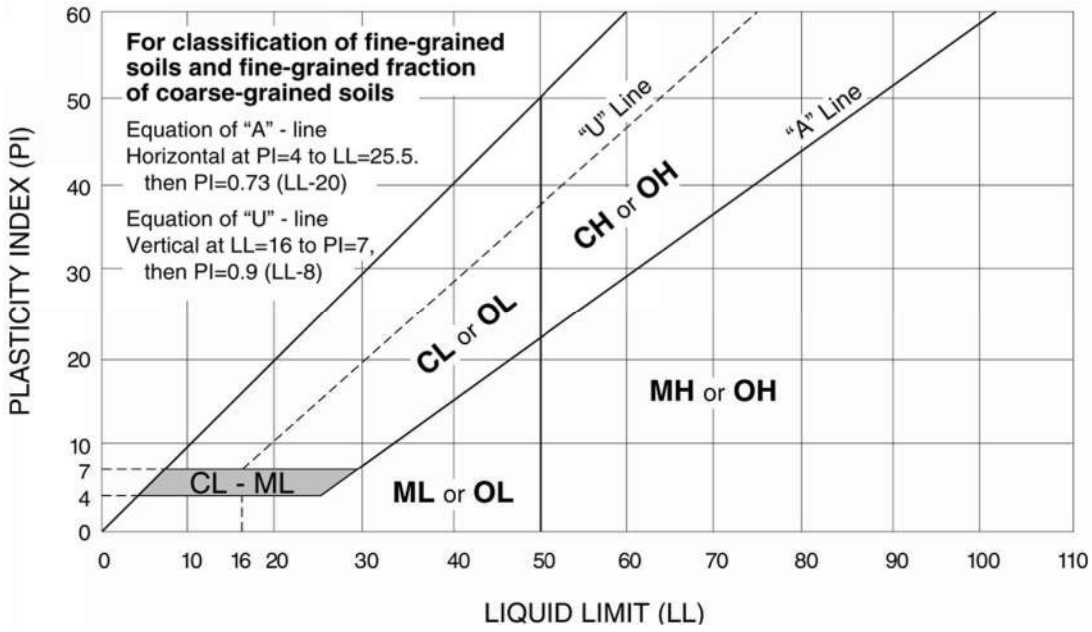
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



Terracon

Exhibit C-2

APPENDIX D

FIELD ELECTRICAL RESISTIVITY TESTING

Terracon

ELECTRICAL RESISTIVITY
TEST RESULTS

Project Name: Inyokern Solar
Project Number: 60155041

S-1

North-South Orientation			
"a" Spacing	Ohms	Ohm Feet	Ohm Centimeters
2	55.12	692	21102
4	24.56	617	18805
6	17.23	649	19788
8	13.22	664	20244
12	8.80	663	20211
20	5.48	689	20987
30	3.15	594	18106
40	2.13	536	16331

East-West Orientation			
"a" Spacing	Ohms	Ohm Feet	Ohm Centimeters
2	58.21	731	22284
4	23.25	584	17802
6	16.51	622	18962
8	12.98	652	19876
12	8.99	677	20647
20	5.24	658	20068
30	3.04	573	17480
40	2.29	576	17557

B-5

North-South Orientation			
"a" Spacing	Ohms	Ohm Feet	Ohm Centimeters
2	23.06	290	8828
4	11.54	290	8836
6	7.41	279	8510
8	6.15	309	9421
12	4.07	307	9344
20	2.44	306	9322
30	1.73	326	9952
40	1.40	353	10750

East-West Orientation			
"a" Spacing	Ohms	Ohm Feet	Ohm Centimeters
2	30.25	380	11581
4	14.22	357	10888
6	10.26	387	11783
8	8.01	402	12263
12	4.25	320	9760
20	2.28	287	8736
30	1.74	327	9975
40	1.40	351	10712

APPENDIX D
CIVIL DESIGN OUTPUT

U n i t H y d r o g r a p h A n a l y s i s

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Study date 11/19/25

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Kern County Synthetic Unit Hydrograph Hydrology Method
Manual date - 1992

Program License Serial Number 6404

Little Dixie Wash CivilD Output

Storm Event Year = 100

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

RAINFALL DATA INPUT:
Slope of Intensity-Duration Curve Slope = 0.600

Zone Designation: Desert Region Latitude = 35.64

Area averaged rainfall intensity isohyetal data:

	Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 2	138387.20	6	0.60
Rainfall data for year 2	138387.20	24	1.06
Rainfall data for year 100	138387.20	6	1.65

```
------------------------------------------------------------------------
Rainfall data for year 100
        138387.20          24          3.00
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
DESERT REGION area of study
Log-Log Rainfall Intensity Slope =  0.60
------------------------------------------------------------------------

******** Area-averaged max loss rate, Fm ********


SCS curve     Area       Area       Fp      Ap        Fm
Number         (Ac.)    Fraction   (In/Hr)  (dec.)   (In/Hr)
 77.0      93119.30      0.673     0.434    1.000    0.434
 86.0       5668.00      0.041     0.272    1.000    0.272
 94.0      39599.90      0.286     0.120    1.000    0.120

Area-averaged adjusted loss rate Fm (In/Hr) =  0.338

********* Area-Averaged low loss rate fraction, Yb **********

Area       Area          SCS CN        S     Pervious
 (Ac.)      Fract         (AMC2)             Yield Fr
 93119.30   0.673         77.0         2.99     0.357

  5668.00   0.041         86.0         1.63     0.554

 39599.90   0.286         94.0         0.64     0.783

Area-averaged catchment yield fraction, Y =  0.487
Area-averaged low loss fraction, Yb =  0.513
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watercourse length =  200000.00(Ft.)
Length from concentration point to centroid =  118219.00(Ft.)
Elevation difference along watercourse =    4770.00(Ft.)
Mannings friction factor along watercourse =  0.030
Watershed area =  138387.20(Ac.)
Catchment Lag time =   3.725 hours
Unit interval =  30.000 minutes
Unit interval percentage of lag time = 13.4230
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.338(In/Hr)
Average low loss rate fraction (Yb) = 0.513 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.384(In)
Computed peak 30-minute rainfall =  0.787(In)
Specified peak 1-hour rainfall =  1.038(In)
Computed peak 3-hour rainfall =  1.379(In)
Specified peak 6-hour rainfall =  1.650(In)
```

Specified peak 24-hour rainfall = 3.000(In)

Rainfall depth area reduction factors:
Using a total area of 138387.20(Ac.) (Ref: fig. E-4)

5-minute factor = 0.240 Adjusted rainfall = 0.092(In)
30-minute factor = 0.310 Adjusted rainfall = 0.244(In)
1-hour factor = 0.362 Adjusted rainfall = 0.376(In)
3-hour factor = 0.688 Adjusted rainfall = 0.949(In)
6-hour factor = 0.870 Adjusted rainfall = 1.436(In)
24-hour factor = 0.923 Adjusted rainfall = 2.769(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 278936.70 (CFS))	
1	0.746	2080.095
2	2.443	4735.079
3	5.184	7645.847
4	9.615	12360.121
5	17.261	21324.905
6	29.823	35041.157
7	42.818	36247.229
8	50.110	20340.434
9	56.759	18546.461
10	62.075	14828.479
11	66.191	11481.508
12	69.564	9409.596
13	72.545	8313.115
14	75.125	7197.701
15	77.326	6138.880
16	79.293	5485.839
17	81.131	5126.558
18	82.767	4564.441
19	84.197	3988.758
20	85.432	3443.927
21	86.574	3185.799
22	87.645	2987.968
23	88.601	2667.320
24	89.496	2496.114
25	90.325	2313.548
26	91.071	2080.924
27	91.813	2069.095
28	92.471	1835.475
29	93.096	1741.475

30	93.720	1740.719
31	94.231	1427.132
32	94.651	1170.053
33	95.070	1170.053
34	95.490	1170.053
35	95.902	1149.431
36	96.185	788.599
37	96.420	656.872
38	96.655	656.872
39	96.891	656.872
40	97.126	656.872
41	97.362	656.872
42	97.597	656.872
43	97.833	656.872
44	98.037	568.593
45	98.173	380.608
46	98.307	374.417
47	98.442	374.417
48	98.576	374.417
49	98.710	374.417
50	98.844	374.417
51	98.979	374.417
52	99.113	374.417
53	99.247	374.417
54	99.381	374.417
55	99.516	374.417
56	99.650	374.417
57	99.784	374.417
58	100.000	602.499

Rainfall values calculated at 5 minute intervals:

Peak Rainfall Unit Number	Intensity	Depth	Adjusted	Unit Rainfall (In)
1	4.61	0.38	0.09	0.092
2	3.04	0.51	0.13	0.042
3	2.38	0.60	0.17	0.033
4	2.01	0.67	0.20	0.028
5	1.76	0.73	0.22	0.025
6	1.57	0.79	0.24	0.023
7	1.43	0.84	0.27	0.025
8	1.32	0.88	0.29	0.023
9	1.23	0.93	0.31	0.022
10	1.16	0.97	0.34	0.021
11	1.09	1.00	0.36	0.021
12	1.04	1.04	0.38	0.020
13	0.98	1.06	0.40	0.026
14	0.93	1.08	0.43	0.026
15	0.88	1.10	0.45	0.026
16	0.84	1.12	0.48	0.025
17	0.80	1.14	0.50	0.025

18	0.77	1.15	0.53	0.025
19	0.74	1.17	0.55	0.025
20	0.71	1.18	0.58	0.024
21	0.69	1.20	0.60	0.024
22	0.66	1.21	0.63	0.024
23	0.64	1.23	0.65	0.024
24	0.62	1.24	0.67	0.024
25	0.60	1.26	0.70	0.024
26	0.59	1.27	0.72	0.023
27	0.57	1.28	0.74	0.023
28	0.55	1.29	0.77	0.023
29	0.54	1.30	0.79	0.023
30	0.53	1.32	0.81	0.023
31	0.51	1.33	0.84	0.023
32	0.50	1.34	0.86	0.023
33	0.49	1.35	0.88	0.023
34	0.48	1.36	0.90	0.022
35	0.47	1.37	0.93	0.022
36	0.46	1.38	0.95	0.022
37	0.45	1.39	0.96	0.016
38	0.44	1.40	0.98	0.015
39	0.43	1.41	1.00	0.015
40	0.43	1.42	1.01	0.015
41	0.42	1.43	1.03	0.015
42	0.41	1.44	1.04	0.015
43	0.40	1.44	1.06	0.015
44	0.40	1.45	1.07	0.015
45	0.39	1.46	1.08	0.014
46	0.38	1.47	1.10	0.014
47	0.38	1.48	1.11	0.014
48	0.37	1.49	1.13	0.014
49	0.37	1.49	1.14	0.014
50	0.36	1.50	1.15	0.014
51	0.36	1.51	1.17	0.014
52	0.35	1.52	1.18	0.014
53	0.35	1.52	1.20	0.014
54	0.34	1.53	1.21	0.013
55	0.34	1.54	1.22	0.013
56	0.33	1.55	1.24	0.013
57	0.33	1.55	1.25	0.013
58	0.32	1.56	1.26	0.013
59	0.32	1.57	1.27	0.013
60	0.31	1.57	1.29	0.013
61	0.31	1.58	1.30	0.013
62	0.31	1.59	1.31	0.013
63	0.30	1.59	1.33	0.013
64	0.30	1.60	1.34	0.013
65	0.30	1.61	1.35	0.012
66	0.29	1.61	1.36	0.012
67	0.29	1.62	1.38	0.012

68	0.29	1.63	1.39	0.012
69	0.28	1.63	1.40	0.012
70	0.28	1.64	1.41	0.012
71	0.28	1.64	1.42	0.012
72	0.27	1.65	1.44	0.012
73	0.25	1.54	1.44	0.009
74	0.25	1.55	1.45	0.009
75	0.25	1.56	1.46	0.009
76	0.25	1.56	1.47	0.009
77	0.25	1.57	1.48	0.009
78	0.24	1.58	1.49	0.009
79	0.24	1.59	1.50	0.009
80	0.24	1.60	1.51	0.009
81	0.24	1.61	1.52	0.009
82	0.24	1.62	1.53	0.009
83	0.23	1.63	1.54	0.009
84	0.23	1.63	1.54	0.009
85	0.23	1.64	1.55	0.009
86	0.23	1.65	1.56	0.009
87	0.23	1.66	1.57	0.009
88	0.23	1.67	1.58	0.009
89	0.23	1.67	1.59	0.008
90	0.22	1.68	1.60	0.008
91	0.22	1.69	1.60	0.008
92	0.22	1.70	1.61	0.008
93	0.22	1.71	1.62	0.008
94	0.22	1.71	1.63	0.008
95	0.22	1.72	1.64	0.008
96	0.22	1.73	1.65	0.008
97	0.22	1.74	1.65	0.008
98	0.21	1.75	1.66	0.008
99	0.21	1.75	1.67	0.008
100	0.21	1.76	1.68	0.008
101	0.21	1.77	1.69	0.008
102	0.21	1.78	1.69	0.008
103	0.21	1.78	1.70	0.008
104	0.21	1.79	1.71	0.008
105	0.21	1.80	1.72	0.008
106	0.20	1.81	1.72	0.008
107	0.20	1.81	1.73	0.008
108	0.20	1.82	1.74	0.008
109	0.20	1.83	1.75	0.008
110	0.20	1.84	1.75	0.008
111	0.20	1.84	1.76	0.008
112	0.20	1.85	1.77	0.008
113	0.20	1.86	1.78	0.007
114	0.20	1.86	1.78	0.007
115	0.20	1.87	1.79	0.007
116	0.19	1.88	1.80	0.007
117	0.19	1.88	1.81	0.007

118	0.19	1.89	1.81	0.007
119	0.19	1.90	1.82	0.007
120	0.19	1.91	1.83	0.007
121	0.19	1.91	1.84	0.007
122	0.19	1.92	1.84	0.007
123	0.19	1.93	1.85	0.007
124	0.19	1.93	1.86	0.007
125	0.19	1.94	1.86	0.007
126	0.19	1.95	1.87	0.007
127	0.18	1.95	1.88	0.007
128	0.18	1.96	1.89	0.007
129	0.18	1.97	1.89	0.007
130	0.18	1.97	1.90	0.007
131	0.18	1.98	1.91	0.007
132	0.18	1.99	1.91	0.007
133	0.18	1.99	1.92	0.007
134	0.18	2.00	1.93	0.007
135	0.18	2.00	1.93	0.007
136	0.18	2.01	1.94	0.007
137	0.18	2.02	1.95	0.007
138	0.18	2.02	1.95	0.007
139	0.18	2.03	1.96	0.007
140	0.17	2.04	1.97	0.007
141	0.17	2.04	1.97	0.007
142	0.17	2.05	1.98	0.007
143	0.17	2.05	1.99	0.007
144	0.17	2.06	1.99	0.007
145	0.17	2.07	2.00	0.007
146	0.17	2.07	2.01	0.007
147	0.17	2.08	2.01	0.007
148	0.17	2.09	2.02	0.006
149	0.17	2.09	2.03	0.006
150	0.17	2.10	2.03	0.006
151	0.17	2.10	2.04	0.006
152	0.17	2.11	2.05	0.006
153	0.17	2.12	2.05	0.006
154	0.17	2.12	2.06	0.006
155	0.16	2.13	2.06	0.006
156	0.16	2.13	2.07	0.006
157	0.16	2.14	2.08	0.006
158	0.16	2.15	2.08	0.006
159	0.16	2.15	2.09	0.006
160	0.16	2.16	2.10	0.006
161	0.16	2.16	2.10	0.006
162	0.16	2.17	2.11	0.006
163	0.16	2.17	2.11	0.006
164	0.16	2.18	2.12	0.006
165	0.16	2.19	2.13	0.006
166	0.16	2.19	2.13	0.006
167	0.16	2.20	2.14	0.006

168	0.16	2.20	2.14	0.006
169	0.16	2.21	2.15	0.006
170	0.16	2.21	2.16	0.006
171	0.16	2.22	2.16	0.006
172	0.16	2.23	2.17	0.006
173	0.15	2.23	2.17	0.006
174	0.15	2.24	2.18	0.006
175	0.15	2.24	2.19	0.006
176	0.15	2.25	2.19	0.006
177	0.15	2.25	2.20	0.006
178	0.15	2.26	2.20	0.006
179	0.15	2.26	2.21	0.006
180	0.15	2.27	2.22	0.006
181	0.15	2.27	2.22	0.006
182	0.15	2.28	2.23	0.006
183	0.15	2.29	2.23	0.006
184	0.15	2.29	2.24	0.006
185	0.15	2.30	2.25	0.006
186	0.15	2.30	2.25	0.006
187	0.15	2.31	2.26	0.006
188	0.15	2.31	2.26	0.006
189	0.15	2.32	2.27	0.006
190	0.15	2.32	2.27	0.006
191	0.15	2.33	2.28	0.006
192	0.15	2.33	2.28	0.006
193	0.15	2.34	2.29	0.006
194	0.14	2.34	2.30	0.006
195	0.14	2.35	2.30	0.006
196	0.14	2.35	2.31	0.006
197	0.14	2.36	2.31	0.006
198	0.14	2.36	2.32	0.006
199	0.14	2.37	2.32	0.006
200	0.14	2.37	2.33	0.006
201	0.14	2.38	2.34	0.006
202	0.14	2.39	2.34	0.005
203	0.14	2.39	2.35	0.005
204	0.14	2.40	2.35	0.005
205	0.14	2.40	2.36	0.005
206	0.14	2.41	2.36	0.005
207	0.14	2.41	2.37	0.005
208	0.14	2.42	2.37	0.005
209	0.14	2.42	2.38	0.005
210	0.14	2.43	2.38	0.005
211	0.14	2.43	2.39	0.005
212	0.14	2.44	2.39	0.005
213	0.14	2.44	2.40	0.005
214	0.14	2.45	2.41	0.005
215	0.14	2.45	2.41	0.005
216	0.14	2.45	2.42	0.005
217	0.14	2.46	2.42	0.005

218	0.14	2.46	2.43	0.005
219	0.14	2.47	2.43	0.005
220	0.13	2.47	2.44	0.005
221	0.13	2.48	2.44	0.005
222	0.13	2.48	2.45	0.005
223	0.13	2.49	2.45	0.005
224	0.13	2.49	2.46	0.005
225	0.13	2.50	2.46	0.005
226	0.13	2.50	2.47	0.005
227	0.13	2.51	2.47	0.005
228	0.13	2.51	2.48	0.005
229	0.13	2.52	2.48	0.005
230	0.13	2.52	2.49	0.005
231	0.13	2.53	2.49	0.005
232	0.13	2.53	2.50	0.005
233	0.13	2.54	2.50	0.005
234	0.13	2.54	2.51	0.005
235	0.13	2.55	2.51	0.005
236	0.13	2.55	2.52	0.005
237	0.13	2.56	2.52	0.005
238	0.13	2.56	2.53	0.005
239	0.13	2.56	2.53	0.005
240	0.13	2.57	2.54	0.005
241	0.13	2.57	2.54	0.005
242	0.13	2.58	2.55	0.005
243	0.13	2.58	2.55	0.005
244	0.13	2.59	2.56	0.005
245	0.13	2.59	2.56	0.005
246	0.13	2.60	2.57	0.005
247	0.13	2.60	2.57	0.005
248	0.13	2.61	2.58	0.005
249	0.13	2.61	2.58	0.005
250	0.13	2.61	2.59	0.005
251	0.13	2.62	2.59	0.005
252	0.12	2.62	2.60	0.005
253	0.12	2.63	2.60	0.005
254	0.12	2.63	2.61	0.005
255	0.12	2.64	2.61	0.005
256	0.12	2.64	2.62	0.005
257	0.12	2.65	2.62	0.005
258	0.12	2.65	2.63	0.005
259	0.12	2.65	2.63	0.005
260	0.12	2.66	2.64	0.005
261	0.12	2.66	2.64	0.005
262	0.12	2.67	2.65	0.005
263	0.12	2.67	2.65	0.005
264	0.12	2.68	2.66	0.005
265	0.12	2.68	2.66	0.005
266	0.12	2.69	2.67	0.005
267	0.12	2.69	2.67	0.005

268	0.12	2.69	2.68	0.005
269	0.12	2.70	2.68	0.005
270	0.12	2.70	2.69	0.005
271	0.12	2.71	2.69	0.005
272	0.12	2.71	2.70	0.005
273	0.12	2.72	2.70	0.005
274	0.12	2.72	2.70	0.005
275	0.12	2.72	2.71	0.005
276	0.12	2.73	2.71	0.005
277	0.12	2.73	2.72	0.005
278	0.12	2.74	2.72	0.005
279	0.12	2.74	2.73	0.005
280	0.12	2.75	2.73	0.005
281	0.12	2.75	2.74	0.005
282	0.12	2.75	2.74	0.005
283	0.12	2.76	2.75	0.005
284	0.12	2.76	2.75	0.005
285	0.12	2.77	2.76	0.005
286	0.12	2.77	2.76	0.005
287	0.12	2.78	2.76	0.005
288	0.12	2.78	2.77	0.005

Time = 24.00 Hours Total unit rainfall = 2.77(In)

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0275	0.0141	0.0134
2	0.0280	0.0144	0.0136
3	0.0285	0.0146	0.0139
4	0.0290	0.0149	0.0141
5	0.0296	0.0152	0.0144
6	0.0302	0.0155	0.0147
7	0.0308	0.0158	0.0150
8	0.0314	0.0161	0.0153
9	0.0321	0.0165	0.0156
10	0.0329	0.0169	0.0160
11	0.0337	0.0173	0.0164
12	0.0345	0.0177	0.0168
13	0.0354	0.0182	0.0173
14	0.0364	0.0187	0.0177
15	0.0375	0.0192	0.0183
16	0.0387	0.0198	0.0188
17	0.0400	0.0205	0.0195
18	0.0414	0.0212	0.0202
19	0.0430	0.0220	0.0209
20	0.0447	0.0229	0.0218
21	0.0467	0.0240	0.0228
22	0.0490	0.0251	0.0239
23	0.0516	0.0265	0.0252

24	0.0547	0.0281	0.0267
25	0.0731	0.0375	0.0356
26	0.0775	0.0397	0.0377
27	0.0828	0.0425	0.0403
28	0.0897	0.0460	0.0437
29	0.1359	0.0697	0.0662
30	0.1432	0.0735	0.0698
31	0.1419	0.0728	0.0691
32	0.1689	0.0866	0.0823
33	0.2180	0.1118	0.1062
34	0.1408	0.0722	0.0686
35	0.0875	0.0449	0.0426
36	0.0760	0.0390	0.0370
37	0.0537	0.0276	0.0262
38	0.0483	0.0248	0.0235
39	0.0441	0.0226	0.0215
40	0.0409	0.0210	0.0199
41	0.0383	0.0196	0.0186
42	0.0361	0.0185	0.0176
43	0.0342	0.0176	0.0167
44	0.0326	0.0167	0.0159
45	0.0312	0.0160	0.0152
46	0.0300	0.0154	0.0146
47	0.0289	0.0148	0.0141
48	0.0279	0.0143	0.0136
	2.7690	1.4202	1.3488

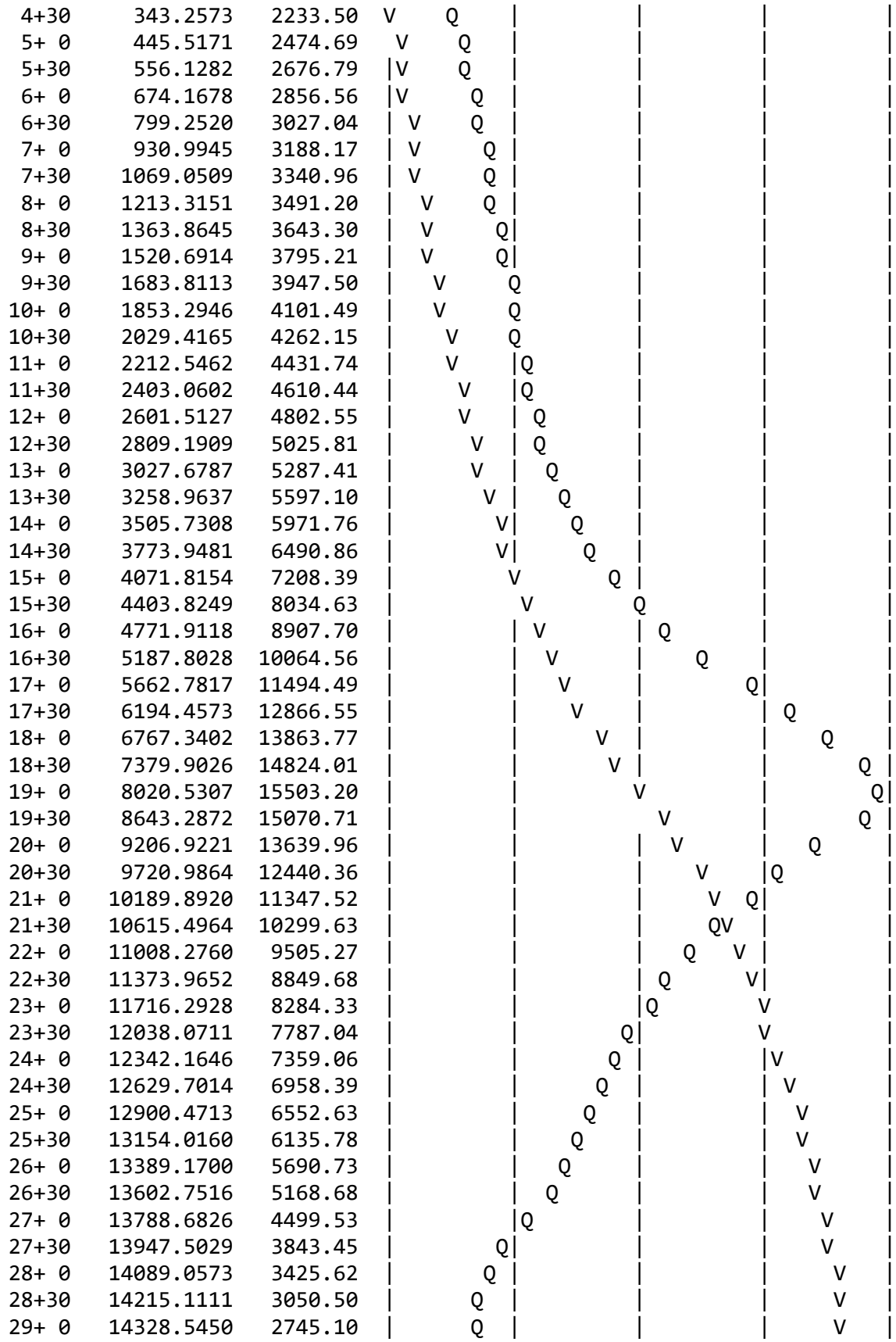
Total soil rain loss = 1.42(In)
Total effective rainfall = 1.35(In)
Peak flow rate in flood hydrograph = 15503.20(CFS)

++

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 30 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	3900.0	7800.0	11700.0	15600.0
0+30	1.1531	27.90	Q				
1+ 0	4.9507	91.90	Q				
1+30	13.0523	196.06	Q				
2+ 0	28.1470	365.29	Q				
2+30	55.3288	657.80	VQ				
3+ 0	102.4174	1139.54	V Q				
3+30	170.4388	1646.12	V Q				
4+ 0	250.9637	1948.70	V Q				



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   29+30   14431.4302   2489.82  |     Q   |         |         |      V  |
   30+ 0   14524.8421   2260.57  |    Q    |         |         |      V  |
   30+30   14609.8984   2058.36  |    Q    |         |         |      V  |
   31+ 0   14687.6758   1882.21  |   Q     |         |         |      V  |
   31+30   14758.5389   1714.89  |   Q     |         |         |      V  |
   32+ 0   14822.9641   1559.09  |  Q      |         |         |       V |
   32+30   14881.8630   1425.35  |  Q      |         |         |       V |
   33+ 0   14935.9631   1309.22  |  Q      |         |         |       V |
   33+30   14985.6304   1201.95  |  Q      |         |         |       V |
   34+ 0   15030.9304   1096.26  | Q       |         |         |       V |
   34+30   15072.4752   1005.38  | Q       |         |         |       V |
   35+ 0   15111.0149    932.66  | Q       |         |         |       V |
   35+30   15146.9817    870.40  | Q       |         |         |       V |
   36+ 0   15180.5964    813.48  | Q       |         |         |        V|
   36+30   15211.9023    757.60  |Q        |         |         |        V|
   37+ 0   15241.0637    705.71  |Q        |         |         |        V|
   37+30   15268.0935    654.12  |Q        |         |         |        V|
   38+ 0   15292.9692    601.99  |Q        |         |         |        V|
   38+30   15315.7175    550.51  |Q        |         |         |        V|
   39+ 0   15336.7395    508.73  |Q        |         |         |        V|
   39+30   15356.4515    477.03  |Q        |         |         |        V|
   40+ 0   15375.0866    450.97  |Q        |         |         |        V|
   40+30   15392.7358    427.11  |Q        |         |         |        V|
   41+ 0   15409.4887    405.42  |Q        |         |         |        V|
   41+30   15425.1856    379.86  Q         |         |         |        V|
   42+ 0   15440.0212    359.02  Q         |         |         |        V|
   42+30   15454.0504    339.51  Q         |         |         |        V|
   43+ 0   15467.4132    323.38  Q         |         |         |        V|
   43+30   15479.5935    294.76  Q         |         |         |        V|
   44+ 0   15490.5055    264.07  Q         |         |         |        V|
   44+30   15500.2964    236.94  Q         |         |         |        V|
   45+ 0   15508.8710    207.51  Q         |         |         |        V|
   45+30   15515.2857    155.23  Q         |         |         |        V|
   46+ 0   15520.2849    120.98  Q         |         |         |        V|
   46+30   15524.5690    103.68  Q         |         |         |        V|
   47+ 0   15528.1778     87.33  Q         |         |         |        V|
   47+30   15531.3566     76.93  Q         |         |         |        V|
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APPENDIX E
KERN COUNTY STANDARDS – DIVISION FOUR DRAINAGE

DIVISION FOUR

STANDARDS FOR DRAINAGE

CHAPTER I. GENERAL

Sec. 401-1 General Purpose

401-1.01 It is the general purpose of these standards that waters generated by storms, springs, or other sources be mitigated so as to provide reasonable levels of protection for life and property, and the maintenance of necessary access to property or passage of the traveling public on the public highways.

401-1.02 To meet this general purpose, it is necessary that these standards reasonably protect life from the direct effects of flood waters, the indirect health effects associated with stagnating water, and the attractive nuisance provided by standing waters. It is necessary to reasonably protect property from the damaging effects of flood waters. Property access for the ingress and egress of emergency vehicles, or the general public should be reasonably provided. The passage of public vehicles on the public highways should also be reasonably ensured.

401-1.03 In general, the mitigation measures for the protection of life and property, and the maintenance of emergency vehicle access are based upon the Capital Storm Design Discharge (CSDD). The issues related to property access (by the public) and passage on public highways, and local drainage facility design are based upon the Intermediate Storm Design Discharge (ISDD).

401-1.04 The design standards in this section are to be deemed to be minimal and shall not limit the design engineer from using higher standards based upon the engineer's assessment of the protection needs of the development. Alternatives are permissible which are determined by the Director to be of equal or higher quality.

401-1.05 The Director may allow such exceptions as he may find to be reasonably required by the specific circumstances, to be in the public interest and in conformity with the general objectives of these standards.

401-1.06 Special circumstances may exist that require additional mitigation above and beyond these standards as determined by the Director.

Sec. 401-2 Maintenance

401-2.01 All facilities intended for public maintenance shall be designed and constructed subject to the approval of the Director and the maintenance entity, or these standards, whichever is more conservative.

401-2.02 All drainage facilities intended for private maintenance shall provide a maintenance plan, subject to the approval of the Director. All such facility maintenance plans shall include, but not be limited to: (a) schedule of cleaning (or clearing), (b) mosquito and vector abatement measures (if applicable), (c) pump maintenance schedule (if applicable), (d) notarized statement by the owner(s) acknowledging his/her/their responsibility and intent to maintain the proposed facility in accordance with the approved maintenance schedule.

401-2.03 Subdivisions with privately maintained streets shall have the drainage facilities maintained by a home-owners association or other entity which has the ability to assess fees for maintenance.

CHAPTER II. DEFINITIONS

Sec. 402-1 Definitions:

402-1.01 **AGENCY**: refers to the Department of the County of Kern with jurisdiction.

402.1.02 **ALLUVIAL FAN**: is a landform originating at an apex and characterized by high-velocity flows; active processes of erosion, sediment transport, and deposition; and unpredictable flow paths.

402-1.03 **APEX**: means a point on an alluvial fan or similar landform below which the flow path of the major stream that formed the fan becomes unpredictable and alluvial fan flooding can occur.

402-1.04 **CAPITAL STORM DESIGN DISCHARGE (CSDD)**: is that flow determined based upon a precipitation event having a one percent probability of being equaled or exceeded in any given year, commonly referred to as the 100-year storm.

402-1.05 **CLOSED CONDUIT**: is any system of underground drainage facilities, other than culverts.

402-1.06 **COMPREHENSIVE DRAINAGE PLAN**: refers to a storm water runoff mitigation plan for multi-phase developments. Such a plan need not be adopted by the County but will be kept on file by the Director.

402-1.07 **CONSTRUCTED CHANNEL**: refers to the physical modification of natural channels or the construction of channels.

402-1.08 **CONTROL FACILITY**: are those hydraulic structures which mitigate the effects of surface runoff resulting from development, flow pattern modification, or flood flows.

402-1.09 **CULVERT**: is a hydraulically short conduit which conveys storm runoff flows through a roadway embankment or past some other type of flow obstruction.

402-1.10 **DESIGN PONDING DEPTH**: is the depth to which the design volume will pond in a storm water basin.

402-1.11 **DETENTION BASIN**: is a storm water facility designed to affect flood hydrograph peak attenuation.

402-1.12 **EMBANKMENT AREA**: is an area of compacted fill material.

402-1.13 **ENCROACHMENT:** refers to any change in land use that materially alters the lands flow conveyance potential.

402-1.14 **FLOOD CONTROL PLAN**: is a plan for the mitigation of flood flows originating from off-site watersheds or resulting from on-site development.

402-1.15 **FLOOD FLOW**: shall be considered to be the CSDD for reference in these standards.

402-1.16 **FLOW PATTERN**: refers to any physical tracing resultant from the historic or existing runoff of water.

402-1.17 **INTERMEDIATE STORM DESIGN DISCHARGE (ISDD**): is that flow determined based upon a precipitation event having a ten percent probability of being equaled or exceeded in any given year, commonly referred to as the ten-year storm.

402-1.18 **LEVEE**: is an embankment whose primary purpose is to furnish drainage or flood protection from storm water run-off and which is, therefore, subject to water loading for periods of only a few days or weeks a year.

402-1.19 **MASTER DRAINAGE PLAN**: refers to a comprehensive drainage plan or flood control plan adopted by the County which includes adopted funding mechanisms.

402-1.20 **NATURAL CHANNEL**: is a flow pattern characterized by incised flow channelization with well defined banks and including the overbank flow areas.

402-1.21 **NUISANCE FLOW**: shall be considered as those waters originating from within, or adjacent to, the development not resulting from storm runoff.

402-1.22 **ONE PERCENT RISK FLOW**: is the flow on an alluvial fan based upon the joint probability of the flow distribution at the fan apex and the probability of occurring at the development site.

402-1.23 **REASONABLE:** in the context of this section refers to the balancing of the utility of the facilities or circumstances described against the gravity of the potential for harm.

402-1.24 **RETENTION BASIN**: is a terminal storm water facility for the storage of runoff. Commonly referred to as a sump.

402-1.25 **RETARDATION BASIN**: Synonymous with Detention Basin.

402-1.26 **SLOPE EASEMENT**: shall include the horizontal dimension from the top to toe of slope plus the setback requirements specified by the Grading Ordinance.

402-1.27 **SOILS ENGINEER (GEOTECHNICAL ENGINEER):** shall mean an engineer experienced and knowledgeable in the practice of soils engineering (geotechnical engineering).

402-1.28 **SOILS ENGINEERING (GEOTECHNICAL ENGINEERING):** shall mean the application of the principles of soil mechanics in the investigation, evaluation and design of civil works involving the use of earth materials and the inspection and/or testing of the construction thereof.

402-1.29 **STRESS AREA**: refers to those locations where the erosion potential is greater than a straight, uniform channel reach, and includes junctions, transitions, and curves.

402-1-30 **WATERWAY**: refers to any natural channel, artificial channel or closed conduit, which provides a course for drainage water to flow.

Sec. 402-2 Off-Site Capital Storm Design Discharge (CSDD) Mitigation

The CSDD flow determined from the off-site watershed shall consider the total area of the off-site watershed. The watershed development condition may be considered in its existing condition at the time of the proposed development if no control facilities mitigating surface runoff exist, and as undeveloped if adequate control facilities mitigating surface runoff exist.

The design of all structures within the development shall be protected to a minimum of one (1) foot above the water surface associated with the CSDD.

The CSDD flow shall be received into the development without diversion onto adjacent property or causing more than one-foot rise in pre-development water surface and shall be discharged in a manner as similar as possible to the existing condition downstream of the development.

Sec. 402-3 Off-Site Intermediate Storm Design Discharge (ISDD) Mitigation

The ISDD flow shall be based upon the uncontrolled developed watershed proximate to the development when no defined flow pattern exists. When a flow pattern is defined, the ISDD flow determination shall include the total watershed contributing to the flow pattern.

The off-site ISDD shall be mitigated in conjunction with requirements for on-site ISDD flows.

Sec. 402-4 Hydrologic Flow Determinations

The CSDD and ISDD flows shall be calculated in accordance with the current Kern County Hydrology Manual.

CHAPTER III. DRAINAGE PLANS

Sec. 403-1 Authority

403-1.01 County Master Drainage Plans

The County administers master drainage plans (MDP) over some portions of the County. In these MDP areas, the design hydrology is governed by the assumption made and methodology used, in the development of the MDP or its most recent revision. Modifications to the MDP's assumed land uses may result in the requirement of additional permanent facilities being constructed to mitigate unanticipated runoff.

If MDP planned facilities have not been constructed at the time of site development, then temporary facilities will be required to be constructed by the Developer. Such facilities may be abandoned upon completion of the MDP facilities intended to serve the site.

403-1.02 Special Districts

Special Districts, such as Community Service Districts, may prepare comprehensive drainage and/or flood control plans for areas under their jurisdiction. Such plans are subject to the review and approval of the County.

If the Special Districts planned facilities have not been constructed at the time of site development, then temporary facilities will be required to be constructed. Such facilities may be abandoned upon completion of the planned facilities intended to serve the site.

County Service Areas are typically required to be formed for the maintenance of drainage facilities in the absence of another maintenance entity.

403-1.03 Subdivisions

These standards shall apply to the drainage/floodplain management requirements specified for subdivisions improvements in the County's Land Division Ordinance.

If the subdivisions storm runoff mitigation measures are to be constructed as part of a comprehensive drainage plan, then each phase of the development shall be designed to function independently or in conjunction with completed development phases.

403-1.04 Mobile Home/Recreational Vehicle Parks

These standards shall apply to the drainage/floodplain management review of Mobile Home/Recreational Vehicle Parks specified in the County's Zoning Ordinance.

403-1.05 Site Development

These standards shall apply to the drainage/floodplain management requirements specified for site development in the County's Building Code, Grading Code, Floodplain Management Ordinance, and all other pertinent County Ordinances.

CHAPTER IV. ALLUVIAL FAN DEVELOPMENT

Sec. 404-1 Development Policy

Development upon an alluvial fan shall mitigate the effects of the flow at the site of development, which has a one-percent risk of being equaled or exceeded in any given year. Such mitigation shall ensure that the one-percent risk flow will be received into the development site, without causing more than one (1) foot of water surface rise resulting from encroachment at the development site, and discharge the one-percent risk flow in a manner, as close as possible, to the flow pattern existing prior to development of the site.

Sec. 404-2 Flood Control Facility Requirements

The design of structural flood control measures on alluvial fans shall demonstrate that the measures will effectively eliminate alluvial fan flood hazards from the area protected by such measures. The provided analyses must include, but are not limited to, the following:

404-2.01 Engineering analyses that quantify the discharges and volumes of water, debris, and sediment movement associated with the flood that has a one percent probability of being exceeded in any year at the apex under current watershed conditions and under potential adverse conditions (e.g., deforestation of the watershed by fire). The potential for debris flow and sediment movement must be assessed using an engineering method acceptable to the Director and Federal Emergency Management Agency (FEMA). The assessment should consider the characteristics and availability of sediment in the drainage basin above the apex and on the alluvial fan.

404-2.02 Engineering analyses showing that the measures will accommodate the estimated peak discharges and volumes of water, debris, and sediment, as determined in accordance with Section 404-2.01, and will withstand the associated hydrodynamic and hydrostatic forces.

404-2.03 Engineering analyses showing that the measures have been designed to withstand the potential erosion and scour associated with estimated discharges.

404-2.04 Engineering analyses or evidence showing that the measures will provide protection from hazards associated with the possible relocation of flow paths from other parts of the fan.

404-2.05 Engineering analyses that assess the effect of the project on flood hazards, including depth and velocity of floodwaters and scour and sediment deposition, on other areas of the fan.

404-2.06 Engineering analyses demonstrating that flooding from sources other than the fan apex, including local runoff, is either insignificant or has been accounted for in the design.

CHAPTER V. STREET DRAINAGE

Sec. 405-1 Design Flow

405-1.01 The ISDD shall include the evaluation of both on-site and off-site watersheds when applicable.

405-1.02 Street Conveyance

1. For Type "A" subdivisions, the ISDD may exceed the top of a six (6) inch curb by 0.10 feet.

2. For Type "B" subdivisions, the depth of flow contained within the road right of way shall not exceed 0.60 feet for the ISDD.

3. The depth of flow for the CSDD on an Arterial and Collector shall be maintained as not to prohibit reasonable access.

4. For mobile home/recreational vehicle parks, the depth of flow for the ISDD shall not exceed the carrying capacity of the travel way.

5. Where the discharge exceeds the above-mentioned limits, a storm drain or other facilities shall be provided to convey the excess flows.

6. The drainage system shall be free flowing and shall not allow the retention of more than one (1) foot of water measured at the flowline after the flows have subsided.

405-1.03 Sedimentation

In areas suspected of significant sediment yield from an ISDD, the following shall apply:

1. The developer’s engineer shall quantify any sediment yield from on-site or off-site properties based upon the ISDD.

2. Sediment yield shall be independent of the runoff event and is to be mitigated separate from the design discharge.

3. Sediment shall not be deposited on the roadway.

4. Higher levels of mitigation may be required in mudslide-mudflow areas.

405-1.04 Erosion

1. Erosion protection measures based on the ISDD shall be established upstream, downstream and through the project by the developer's engineer subject to approval by the Director.

CHAPTER VI. CULVERTS, BRIDGES AND AT-GRADE-CROSSINGS

Sec. 406-1 General

406-1.01 All publicly maintained crossings of natural channels shall be bridged or culverted. The minimum length of any culvert shall be from toe-of-slope to toe-of-slope. Additional right-of-way may be required for maintenance of these facilities.

406-1.02 Roadways shall be required to bridge a floodway where encroachment of the floodway is prohibited.

406-1.03 Energy losses for bridge piers, interior walls for multiple box culverts, or other obstructions within the channel shall be predicated upon the obstruction width plus two (2) feet of debris allowance for each obstruction.

Sec. 406-2 Culverts

406-2.01 The ISDD for the total upstream watershed under existing conditions shall not exceed soffit of culvert.

406-2.02 The CSDD for the total upstream watershed under existing conditions will be allowed to overtop the roadway until two (2) feet of specific energy is obtained, at which point additional culverts will be required to meet these minimum requirements.

406-2.03 The two (2) feet of specific energy shall be calculated at the crown or high point of the traveled roadway.

406-2.04 The minimum size of any culvert under a publicly maintained roadway shall be 18 inches. For private roads or public access, which are privately maintained, this requirement may be waived.

406-2.05 Culverts shall be designed to have a minimum useful life of 50 years.

Sec. 406-3 Bridges

406-3.01 The lowest portion of the bridge span shall be one (1) foot or 0.2 times the specific energy (whichever is greater) above the water surface elevation when the normal depth of flow for the CSDD is subcritical.

406-3.02 The lowest portion of the bridge span shall be one (1) foot or 0.2 times the specific energy (whichever is greater) above the sequent flow depth when the normal depth of flow for the CSDD is supercritical.

406-3.03 When levee conditions exist, the lowest portion of the bridge span shall also meet the minimum freeboard requirements of the levee.

Sec. 406-4 At-Grade-Crossings

406-4.01 At-grade-crossings shall not be permitted on a publicly maintained roadway and shall not encroach upon a floodway.

CHAPTER VII. CLOSED CONDUIT SYSTEMS, CATCH BASINS

Sec. 407-1 Design

407-1.01 Closed conduit system shall be designed for the total ISDD flow less allowable street flow. (see Chapter V Street Drainage)

407-1.02 A closed conduit system intended to serve on-site lot development shall be designed for the total ISDD originating on-site.

407-1.03 Closed conduit system shall be designed to have a minimum useful life of 50 years.

407-1.04 The minimum size of a closed conduit system within the street right-of-way or intended for public maintenance shall be 18 inches.

407-1.05 The minimum size of a closed conduit system outside of the street right-of-way and intended to be privately maintained shall be eight (8) inches.

407-1.06 The minimum cover over any closed conduit system shall be 24 inches. The minimum cover required within the street right-of-way shall be 30 inches.

407-1.07 Closed conduit system shall be free flowing with no continuous standing water within the pipe.

407-1.08 The designed pipe size shall not be allowed to decrease as the system progresses downstream.

407-1.09 The minimum slope of any closed conduit system shall be .001(.10 percent) unless otherwise approved by the Director.

407-1.10 The hydrologic tie-in design criteria for the closed conduit system shall be based on equal recurrence.

407-1.11 Closed conduit system within the street right-of-way or intended for public maintenance shall be Class III reinforced concrete pipe with rubber gasket joints, or cast-in-place concrete pipe unless otherwise approved or required by the Director.

407-1.12 The developer's engineer shall plot the hydraulic grade line and the energy grade line profiles for the closed conduit system either on a set of, or on the original, street improvement plans. All calculations and related data for these profiles shall be included with the street improvement plans when submitted.

Sec. 407-2 Location

407-2.01 A publicly maintained closed conduit system shall be placed within the road right-of-way or easement unless otherwise approved by the Director.

407-2.02 The alignment of a publicly maintained closed conduit system shall be parallel or perpendicular with the centerline of the road unless otherwise approved by the Director.

Sec. 407-3 Freeboard

Within the closed conduit system, the hydraulic grade line shall be at least 0.5 feet below all inlet flowline elevations, and 0.5 feet below the top of non-pressure manholes.

Sec. 407-4 Manholes

407-4.01 Within the closed conduit system, manholes shall be provided at all junctions, bends, and at intervals prescribed below:

a. Manholes shall be provided at intervals no greater than 300 feet where the conduit diameter is less than or equal to 30 inches.

b. Manholes shall be provided at intervals no greater than 400 feet where the conduit diameter is larger than 30 inches, but smaller than 48 inches.

c. Manholes shall be provided at intervals no greater than 500 feet where the conduit diameter is 48 inches or larger.

407-4.02 A pressure manhole shaft and a pressure cover shall be installed in a closed conduit system whenever the energy grade line is less than 0.50 foot below the top of the manhole.

Sec. 407-5 Losses

In addition to normal friction losses, energy losses due to entrance and exit conditions, bends, junctions, and transitions shall be computed. The engineer shall supply all data and reference material for calculated losses subject to review and approval by the Director.

Sec. 407-6 Erosion

407-6.01 Velocities within the closed conduit system should not exceed 20 feet per second with standard wall RCP, or 10 feet per second for plastic pipe. Where velocities exceed 20 feet per second for RCP, or 10 feet per second for plastic pipe, a special pipe shall be installed as approved by the Director.

407-6.02 Erosion protection against scour velocities shall be provided at the inlet and outlet of the closed conduit system. The engineer shall supply all data and reference material supporting his/her design, subject to approval by the Director.

Sec. 407-7 Catch Basins

407-7.01 The inlet design at closed conduit systems (i.e., location, depression, capacity, structural, etc.) shall be subject to review and approval by the Director.

407-7.02 Grate type inlets to the closed conduit system within the street right-of-way shall be allowed only in conjunction with side curb openings and shall be bicycle safe.

407-7.03 The minimum width of opening for any catch basin intended to be publicly maintained shall be three (3) feet and six (6) inches (3.5').

Sec. 407-8 Rights-of-Way/Easements

407-8.01 A right-of-way sufficient to contain the closed conduit and appurtenances plus a minimum of five feet on each side, measured from the edge of the conduit or drainage structure, shall be provided but in no case shall the right-of-way be less than 15-feet in width. Whenever possible, rights-of-way for conduits shall be adjacent to property lines and outside areas where structures are planned. Under no circumstances shall closed conduits and appurtenances be constructed less than 10-feet from any planned or existing structure.

407-8.02 Easements will be required on all closed conduit systems outside of the street right-of-way, which are intended for public maintenance.

407-8.03 Land rights shall be conveyed to the County in one of the following forms, whichever is appropriate:

1. Separate parcel easement dedicated on a subdivision map.
2. Easement dedicated on a subdivision map as part of adjacent lots.
3. Fee simple or easement offered or granted by separate documents.

CHAPTER VIII. RETENTION BASIN DESIGN

Sec. 408-1 Design Volume

The design volume of storm water retention basins shall be based upon the runoff from the ISDD five-day storm event and a volume of nuisance water determined by the engineer. No runoff generated on site from the design storm or from nuisance flows will be allowed to leave the site unless downstream drainage disposal facilities exist to handle the flow. The retention of upstream off-site flows shall not be considered to reduce the size of the required on-site retention facilities or mitigate the runoff from the proposed development. An evaluation of the runoff volumes associated with the site in its existing condition shall not reduce the size of the required drainage facilities. The runoff volume from the ISDD five-day storm shall be calculated using the formula:

$$\text{Runoff Volume (cu.ft.)} = [(D_{10yr\text{-}5day})/12)]\ (a_i)\ (\text{Area})$$ where;

$D_{10yr\text{-}5day}$ = depth of rainfall (in.) obtained from NOAA Atlas 14, Vol. 6, Ver. 2.0 (Use procedure outlined in Kern County Engineering Bulletin 11-02

a_i = average percentage of impervious area; The 'Actual Impervious Cover for Developed Areas' (Figure C-3---Kern County Hydrology Manual) are based on average conditions which may not

apply to a particular study. The a_i may vary greatly even on comparable study sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area shall always be made, and a review of aerial photos, where available, may assist in estimating the percentage of impervious cover in developed areas.

Area = Drainage area of total development (sq.ft.)

Sec. 408-2 Hydraulic Design

In the absence of a hydrologic volume routing analysis, the storm drain hydraulic grade line calculations shall assume that 50% of the design storm volume and 100% of the nuisance volume is in the basin when the peak flow rates occur.

Sec. 408-3 Freeboard

Freeboard shall be required for all retention basins having a design water depth exceeding 18 inches. Six (6) inches of freeboard will be required when the design ponding depth within the basin is four (4) feet or less. For basins with a design ponding depth greater than four (4) feet the amount of freeboard required shall be one (1) foot. Freeboard shall be measured from the lowest gutter inlet or top of bank, whichever is lower.

Sec. 408-4 Fencing

Retention basins shall be fenced and provided with gated access when the design ponding depth exceeds 18 inches. All retention basins, regardless of ponding depth, that are maintained by the County or an entity administered by the County shall be enclosed by a six (6) foot high masonry block wall. Exceptions may be made, subject to the Director's approval, for certain master planned facilities intended for multi-purpose use.

408-4.01 The fence shall consist of a six (6) foot high chain link fence of 9 gage fabric with redwood slats or a six (6) foot masonry block wall or approved equal. Fence post footings shall have a minimum diameter of 12 inches and a minimum depth of 30 inches. Masonry block walls shall be designed in accordance with accepted engineering practices. Retaining walls used for basin fencing requirements shall have their design approved by the Director. See Plate Nos. R-77 thru R-82.

408-4.02 Fence setbacks measured from the top of slope shall provide a reasonable maintenance way for the equipment outlined in the

maintenance plan. The following minimum setbacks shall apply:

Design ponding depth	Setback
≤ 18 inches	2 feet
> 18 inches but ≤ 4 feet	5 feet
> 18 inches but ≤ 4 feet and Total basin depth >= 5 feet	12 feet
> 4 feet	12 feet
> 8 feet	12 feet (or in accordance with an approved maint-enance plan).

408-4.03 The basin access gate may be chain link, wrought iron, or other as approved by the Director. The double gate is not to be attached directly to the masonry wall. The opening must be sufficient for the 14-foot double gate and anchor posts. If wrought iron is used, a metal mesh privacy screen is to be securely attached to the double gate by rivets or equivalent as approved by the Director. Wrought iron double gates will also require a commercial grade latch or equivalent that can be locked with a County padlock (3/8" shackle diameter). See Plate No. D-11 for specific sizing and material requirements.

Sec. 408-5 Access

An equipment access ramp to the bottom of the retention basin shall be provided when the design depth exceeds 18 inches or when the facility is intended for County maintenance.

408-5.01 The ramp shall be a minimum of 12 feet wide with a maximum slope of 15%. The gate to the access ramp shall be 14 feet wide.

Exception - When the design ponding depth is ≤ 4 feet, the maximum slope on the ramp may be increased to 20%.

408-5.02 Ramps shall not be designed to convey drainage water into the sump.

408-5.03 The ramp alignment shall be no more than 45 degrees from the center of the access gate to facilitate maintenance equipment ingress and egress. Other proposed alignments shall have their design approved by the Director.

Sec. 408-6 Curbing and Rodent Barriers

408-6.01 In conjunction with fencing, a six (6) inch wide, eighteen (18) inch deep continuous concrete curb shall be provided around the top of the sump. The top of the curb shall be 0.5 feet above the highest adjacent grade. When the sump is fronting on a street, the top of the

curbing shall be a minimum of one (1) foot above the top of the street curb. Ramped access across the curb shall be provided at all gated access points to the sump.

408-6.02 Rodent barriers will be required on the sides of the sump in proximity to open space, agricultural areas or lots one (1) acre or larger. The bottom of the rodent barrier shall be a minimum of 42 inches below finish grade.

Exception - Rodent barriers may be omitted when the design water depth is four (4) feet or less.

Sec. 408-7 General Construction Requirements

408-7.01 General construction requirements for retention facilities shall be in accordance with Plate Nos. D-1, D-2, and D-3.

408-7.02 Retention facilities shall have the design volume contained entirely in cut.

408-7.03 Slopes shall be designed no steeper than is safe and no steeper than two (2) horizontal to one (1) vertical. A slope stability analysis will be required when the design water depth exceeds eight (8) feet and side slopes are steeper than 3:1.

408-7.04 The minimum bottom dimension for retention basins with a design depth greater than four (4) feet shall be 20 feet. For design water depths 4 feet or less, the minimum bottom width shall be no less than that required for maintenance equipment specified in the maintenance plan.

408-7.05 The maintenance way shall be sloped away from the top of bank at a minimum 2%.

408-7.06 Drainage basins intended for County maintenance shall be located on a lot dedicated exclusively for drainage/recreational purposes.

Sec. 408-8 Testing

408-8.01 Retention basins shall not be permitted unless it can be demonstrated, to the satisfaction of the Director, that the basin will completely drain the design volume within seven (7) days.

408-8.02 Testing of the proposed retention basin shall be provided by a Soils Engineer and shall include, but need not be limited to, an analysis of the soils boring logs and the establishment of the drainage rates of the

soils encountered. A minimum of one (1) boring shall be logged within the proposed sump location. This boring shall be advanced below the invert of the basin to a depth equivalent to at least three (3) times the design ponding depth. Testing methods used to establish soil drainage rates shall be approved by the Director.

CHAPTER IX. DETENTION BASIN DESIGN

Sec. 409-1 Design Flow

The design flow into the basin shall be the ISDD five-day runoff hydrograph. Hydrograph design and mass ratios shall be in accordance with the Kern County Hydrology Manual. The outflow hydrograph shall not extend beyond five days from the end of the inflow hydrograph. Infiltration effects from the detention facility shall not be included in the calculation of the outflow hydrograph.

Sec. 409-2 Facility Design

Sizing and placement of detention facilities shall not aggravate the potential for downstream flooding.

Requirements for fencing, curbing, setbacks, access, and freeboard shall be in accordance with retention basin design.

409-2.01 Detention basins shall be provided with a concreted low flow bypass, or approved equivalent, for the conveyance of nuisance flows to the outlet.

409-2.02 An emergency spillway will be incorporated in the design of all detention basins.

Sec. 409-3 Sedimentation

Sediment yield shall be determined and mitigation provided by the developer's engineer.

Sec. 409-4 Duplex Pump Station (Wet Well) Design Specifications

Pumps used in conjunction with detention facilities shall have their design approved by the Director. Specific design criteria shall include the use of an automated duplex pump, and an alarm system. The pump system shall be designed to pass a minimum two (2) inch sphere and for reliability and low maintenance. Pump maintenance shall be included in the facility maintenance plan.

409-4.01 Pump station shall be designed to drain the sump in five (5) to seven (7) days with one (1) pump running. However, the minimum flow rate shall be 100 gpm.

409-4.02 Pump station shall be a duplex system which automatically alternates between pumps at the end of each cycle.

409-4.03 The pump station shall either include a lag pump design or automatic controls, which will start the second pump if the first fails to pump.

409-4.04 Pumps shall be minimum one (1) HP.

409-4.05 Pump station shall be designed to allow easy removal of pumps for maintenance, without requiring personnel to enter into a wet well or similar enclosed structure. A “cage” style pump system, where the pump is located in a cage structure at the bottom of the basin, will not be allowed.

409-4.06 Pumps and pump station inlet structure shall be screened to prohibit plugging by debris.

409-4.07 The pump station (including the electrical/control panel) shall be located next to the entrance of the basin outside of the maintenance way.

409-4.08 The receiver wet well shall consist of one 60” diameter concrete precast manhole sections with single offset R-3 rubber gasket joints per ASTM C478, latest edition or approved equal. Duplex pump system shall be equipped with two (2) one (1) HP (minimum), 115V, non-clog, explosion proof, sump pumps with alarm and alarm switch, check valves, ball valves, discharge line, pump lift out assembly, and electrical junction box. Include a traffic-rated 30” x 42” hatch with lockable, steel hinged access with safety grate.

409-4.09 The lifting assembly shall be best suited for the pump arrangement. All cables, etc. are to be stainless steel nylon coated. All slide metal surfaces must be considered non-sparking, by URL, to prevent spark ignition in wet well.

409-4.10 The valve vault shall consist of one 42” diameter concrete precast manhole section (conforming to ASTM C478 with single offset R-3 gasket joints) with gate valves, swing check valves, and adjustable pipe supports or equivalent. Include a 24” x 24” hatch with lockable, hinged steel access door with safety grate.

409-4.11 Sump pump wiring shall be connected to a waterproof electrical control panel in a NEMA (3R) enclosure or equivalent. The splicing of pump leads to the Junction Box and from the Junction Box to the control panel is not allowed.

409-4.12 A four (4) inch thick reinforced concrete pad (minimum cementitious material of 590 lb./cu. yd.) will be required to encompass the precast top slabs, manholes and control panel.

409-4.13 All electrical conduits and connectors shall be sealed water-tight and gas-tight using bitumastic paint.

409-4.14 All pipe or conduit wall penetrations shall be sealed with a neoprene seal.

409-4.15 All exposed steel (pipe, valves, flanges, elbows, and control box exterior) shall be primed with zinc-chromate primer and painted with an epoxy enamel finish. Color to be grey unless otherwise approved.

409-4.16 A water level staff shall be placed in the sump. The staff may be either anchored to the sideslope of the sump or be attached to the outlet structure, as approved by the Director. The bottom portion of the staff shall be painted black and white, alternating at one-foot increments, to an elevation equivalent to the half full-depth of the sump. The top portion of the staff shall be painted red and white, alternating at one-foot increments, to one (1) foot above design water surface.

409-4.17 All controls shall be mounted in a NEMA (3R) metal enclosure or equivalent. The control panel and all electrical components shall bear the Underwriter's Laboratory (UL) Label. All circuit breakers shall have operators extending through the control panel door. All motor starter overload resets, selector switches, push buttons and pilot lights shall be mounted on the control panel door. The control panel shall be enclosed in a vandal resistant enclosure with provisions for locking with a County's lock three-eighths (3/8) inch shank pad lock or approved equal.

409-4.18 The control for each pump shall include a thermal magnetic circuit breaker, rotary hand-off-automatic switch, and magnetic motor starter with ambient compensated overload relays and quicktrip heaters. The pump control circuit shall include a door interlock switch to de-energize the control circuit when the control panel door is open, a control mounted transformer with fused 115 volt secondary, and a door mounted control circuit disconnect switch.

409-4.19 Pump operation shall be controlled by three (3) bulb type liquid level sensors. An intrinsically safe pilot circuit shall be provided for each level sensor to reduce the power to the sensor to a level incapable of

releasing sufficient electrical or thermal energy to ignite explosive gases.

409-4.20 A fourth level sensor, with intrinsically safe circuit, shall be furnished for indication of high-water alarm condition. High water alarm shall be indicated by a panel-mounted pilot light and external audible alarm with silence button.

409-4.21 The controls shall provide for lead/lag sequencing of the pumps, an automatic alternator shall alternate the lead/lag duty on each succeeding pump cycle. An outer pump seal leakage detection system shall be included in the control enclosure. When the motor probes sense the presence of moisture in the oil seal chamber, a relay coil will illuminate a panel mounted indicating alarm lamp to indicate possible outer motor seal failure and the alarm light.

409-4.22 The pump station shall have a Hand-Off-Auto switch and an automatic low water shut-off and have green (run) and red (alarm) indicator lights visible from the road/street.

409-4.23 Control panel shall contain an “hour meter” for each pump.

409-4.24 Control panel shall contain a switched GFI 115-volt duplex electrical outlet.

409-4.25 Control panel shall include an emergency generator hook-up connection.

409-4.26 The discharge piping from the gate valve assembly shall be pressure rated and conform to AWWA C900 and Class 165. The discharge piping shall be pressure tested per ASTM standards, or approved equal. The installation of the discharge piping shall incorporate thrust blocks per Kern County Development Standards Plate Nos. L-7 and S-15.

409-4.27 System Testing—Installed pumps, controls and pipes shall be tested in accordance with recommendations of the manufacturer prior to acceptance by the Kern County Public Works Department.

409-4.28 Prior to acceptance, two (2) complete operation and maintenance manuals, with wiring and interconnect diagrams for all equipment and controls (including power pedestal), model and serial numbers of the sump pumps in binders, one (1) digital copy, one (1) set of as-built drawings on mylar, and one (1) digital copy shall be furnished to the County. The as-built drawings shall show the location of the electrical conduit from the power pedestal to the control panel.

CHAPTER X. CONSTRUCTED CHANNEL DESIGN CRITERIA

Sec. 410-1 Design Flow

Constructed channels shall be designed to carry the CSDD plus freeboard.

Sec. 410-2 Freeboard

410-2.01 The minimum freeboard between the design water surface, and the top of bank of the channel shall be five-tenths (0.50) feet or two-tenths (0.20) of the specific energy, whichever is greater.

410-2.02 If the designed water surface is within the embankment area, the design and construction of the channel shall be in accordance with the levee design criteria, including freeboard requirements.

410-2.03 The minimum freeboard requirements for bridges, culverts, and utility crossings which span open channels and which are existing, planned or projected at the time of channel design shall be in accordance with the requirements specified in Sections 406-2 and 406-3.

410-2.04 Superelevation resultant from directional modification shall be considered prior to computing the required freeboard.

Sec. 410-3 Hydraulic Design

410-3.01 Channels shall be designed with proper allowance for hydraulic losses for all planned and projected future crossings or other obstructions to maintain clearance and freeboard as required.

410-3.02 The water surface and the energy grade line profile shall be computed and plotted for all constructed channels and at locations where natural channels modifications are proposed.

410-3.03 Constructed channels shall not be designed with a slope in the range of ± 20% of critical slope unless freeboard equal to the height for instability waves is added.

410-3.04 A minimum velocity of two (2) feet per second shall be maintained for lined channels to prevent sedimentation.

Sec. 410-4 Structural Design

410-4.01 The minimum bottom width of constructed channels shall be ten (10) feet. A triangular channel may be permitted when the channel side slopes are four (4) to one (1) or flatter.

410-4.02 The minimum centerline radii for curves in constructed channels shall be three (3) times the top width of the design water surface.

410-4.03 Design of slopes shall be predicated upon results of an investigation by a Soil Engineer, subject to the approval of the Director.

410-4.04 Adequate bank protection and drop structures shall be provided where the slopes in the channel are steep and high velocities are present.

410-4.05 Bank protection shall be provided based on the design engineer's recommendations, subject to the approval of the Director. Stress area protection shall extend downstream from the end of the stress area a distance equal to ten (10) times the design water depth, unless the engineer can show that the erosion potential is not excessive.

410-4.06 At drop structures or in other locations where a hydraulic jump may occur, bank protection shall be provided through the hydraulic jump for a minimum distance of six (6) times the sum of the sequent depth and the depth of freeboard. This protection shall cover the invert and extend to the height of the sequent depth plus the height of the freeboard. The protection material may be either concrete, concreted-rock slope protection, sacked concrete, air-blown mortar or other approved alternative.

410-4.07 All channel lining materials and methods shall be specified by the engineer and approved by the Director.

410-4.08 All appurtenant drainage facilities shall be constructed and areas adjacent to channels graded so that erosion will be prevented within the channel right-of-way.

410-4.09 Waterways shall enter the main channel at an angle not exceeding 25 degrees.

Sec. 410-5 Erosion

The engineer shall provide recommendations on all necessary mitigation measures for erosion including bank protection and bottom stabilization of the channel, subject to the approval of the Director.

Sec. 410-6 Fencing

410-6.01 Constructed channels with slopes steeper than four (4) to one (1) with specific energy, at any point, greater than 1.5 feet shall be fenced in its entirety.

410-6.02 A six (6) foot high nine (9) gage chain link fence fabric with tension wire shall be installed on each side of the right-of-way.

410-6.03 At all road intersections, fencing shall be installed to prevent public access to constructed channels.

410-6.04 A 14-foot wide chain link drive gate shall be provided at all points of vehicular access.

Sec. 410-7 Easements/Right-of Ways and Maintenance Ways

410-7.01 Right-of-ways for constructed channels with side slopes steeper than four (4) to one (1) shall be provided as follows:

a. The right-of-way for channels with top widths greater than 50 feet, as measured to the top of freeboard, shall include the top width of the channel, two maintenance ways (one on each side of the channel), slope easements (when applicable), and interceptor ditch area (when applicable). The maintenance ways shall be a minimum of 15 feet wide. Runoff from the maintenance ways shall be mitigated.

b. The right-of-way for channels with top widths of 50 feet or less, as measured to the top of freeboard, shall include the top width of the channel, one maintenance way on either side of the channel, slope easements (when applicable), and interceptor ditch area (when applicable). The maintenance way shall be a minimum of 15 feet wide. Runoff from the maintenance way shall be mitigated.

410-7.02 The right-of-way for constructed channels with side slopes four (4) to one (1) or flatter shall be sufficient to contain the top width of the channel (measured from top of freeboard) plus slope easements as needed. A minimum of five (5) feet on either side of the channel shall be provided for maintenance purposes.

410-7.03 Right-of-way for turn-around: Turn-around distance and radii:

At the terminus and at intervals not to exceed one channel mile, turn around areas shall be provided. The minimum inside radii for maintenance roads shall be 40 feet.

410-7.04 Tributary waterways shall be conveyed under maintenance roads in closed conduits or culverts as applicable. Where open channel tributaries cross a maintenance road, a convenient turn-around area shall be provided for maintenance vehicles. The minimum diameter of a turn-around shall be 40 feet.

410-7.05 Right-of-Way for Channels Intersecting Public Roads:

At intersections of the channel with public roads, sufficient right-of-way shall be provided to permit access from the public road to the maintenance road as approved by the Director.

In the event that the channel right-of-way does not intersect a public road, a turn-around or a 15-foot wide access right-of-way shall be provided from a public road to the channel right-of-way at intervals not to exceed one (1) channel mile.

Sec. 410-8 Sedimentation

The determination of sediment yield and proposed mitigation measures of such shall be prepared and recommended by a qualified registered civil engineer, subject to the approval of the Director.

CHAPTER XI. LEVEE DESIGN

Sec. 411-1 Design Flow

Levees shall be designed to accommodate for the CSDD plus freeboard.

Sec. 411-2 Freeboard

411-2.01 The minimum freeboard between the designed CSDD water surface and the levee's top of bank shall be three (3) feet or two-tenths (0.20) times the specific energy plus one (1) foot, whichever is greater.

411-2.02 An additional one (1) foot, above this minimum of freeboard, shall be required within 100 feet of either side of structures within the levee or whenever the flow is constricted, such as at bridges. An additional five-tenths (0.50) foot above the minimum is also required at the upstream end, tapering to the minimum at the downstream end of the levee.

Sec. 411-3 Hydraulic Design

See Section 410-3 Hydraulic Design for details.

Sec. 411-4 Structural Design

Levees shall be designed in accordance with the latest revision of the Corps of Engineers Design and Construction of Levees, Engineer Manual, EM1110-2-1913.

Sec. 411-5 Erosion

Mitigation measure for erosion protection shall be prepared and recommended by a registered civil engineer, subject to the approval of the Director.

Sec. 411-6 Fencing

Fencing requirements for levees shall be in accordance with the criteria contained in the constructed channel design, Section 410-6.

Sec. 411-7 Easements/Right-Of-Way

Access, easements and right-of-way shall be in accordance with the requirements set forth in Section 410-7. (Constructed Channels).

Sec. 411-8 Sedimentation

Mitigation measures shall be prepared and recommended by a qualified, registered engineer, subject to the approval of the Director.

Sec. 411-9 Maintenance

The County, including a County Service Area (CSA), will not assume the responsibility for a levee. Control and maintenance of a levee shall be provided by an entity with the authority to impose taxes, and/or special assessments for levee matters. To ensure proper compliance, a control and maintenance plan shall be established and said plan shall be subject to the approval of the Director.

CHAPTER XII. NATURAL CHANNELS

Sec. 412-1 Delineation

All natural channels shall be identified and clearly delineated on the plans with the appropriate floodplain designation.

For defined natural channels, the Floodplain and Floodway Boundaries shall be delineated, subject to the approval of the Director.

Sec. 412-2 Setback

The minimum setback from the top of bank of a natural channel with side slopes steeper than two (2) horizontal to one (1) vertical, shall be a two (2) to one (1) slope plus a 10-foot wide buffer strip. The setback shall be measured from the toe of the slope. Where the slopes are flatter than two (2) to one (1), the required setback shall be a minimum of 10 feet from the Floodway limit.

Sec. 412-3 Tie-Ins

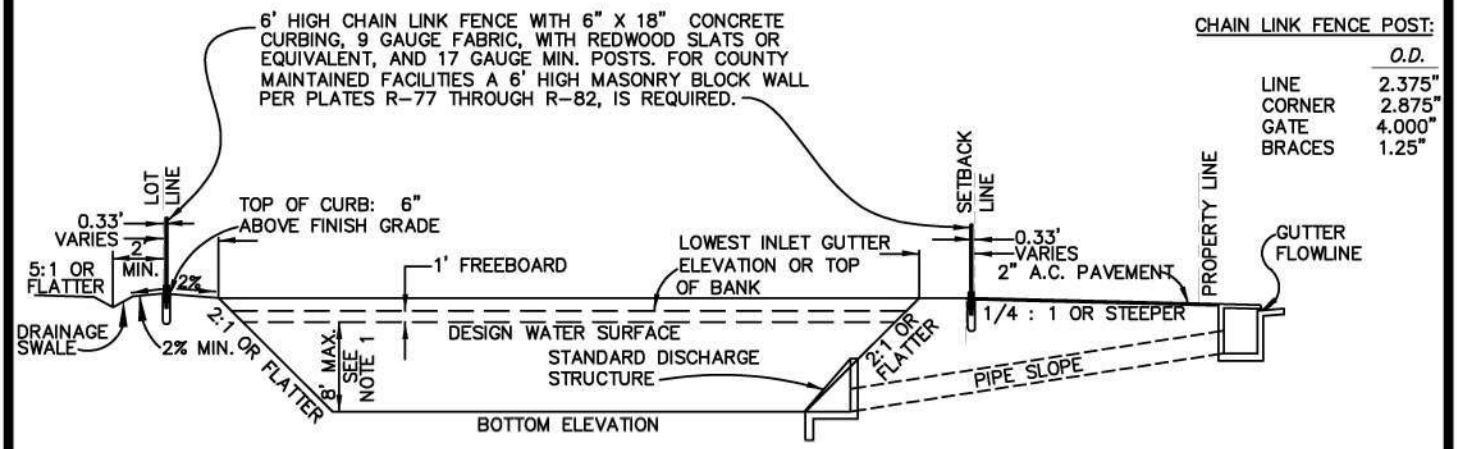
Where natural channels merge into constructed channels, the tie-ins shall be designed in a manner to dissipate energy and protect against erosion. The design for such tie-ins shall be in accordance with acceptable engineering practices and approved by the Director.

Sec. 412-4 Relocation

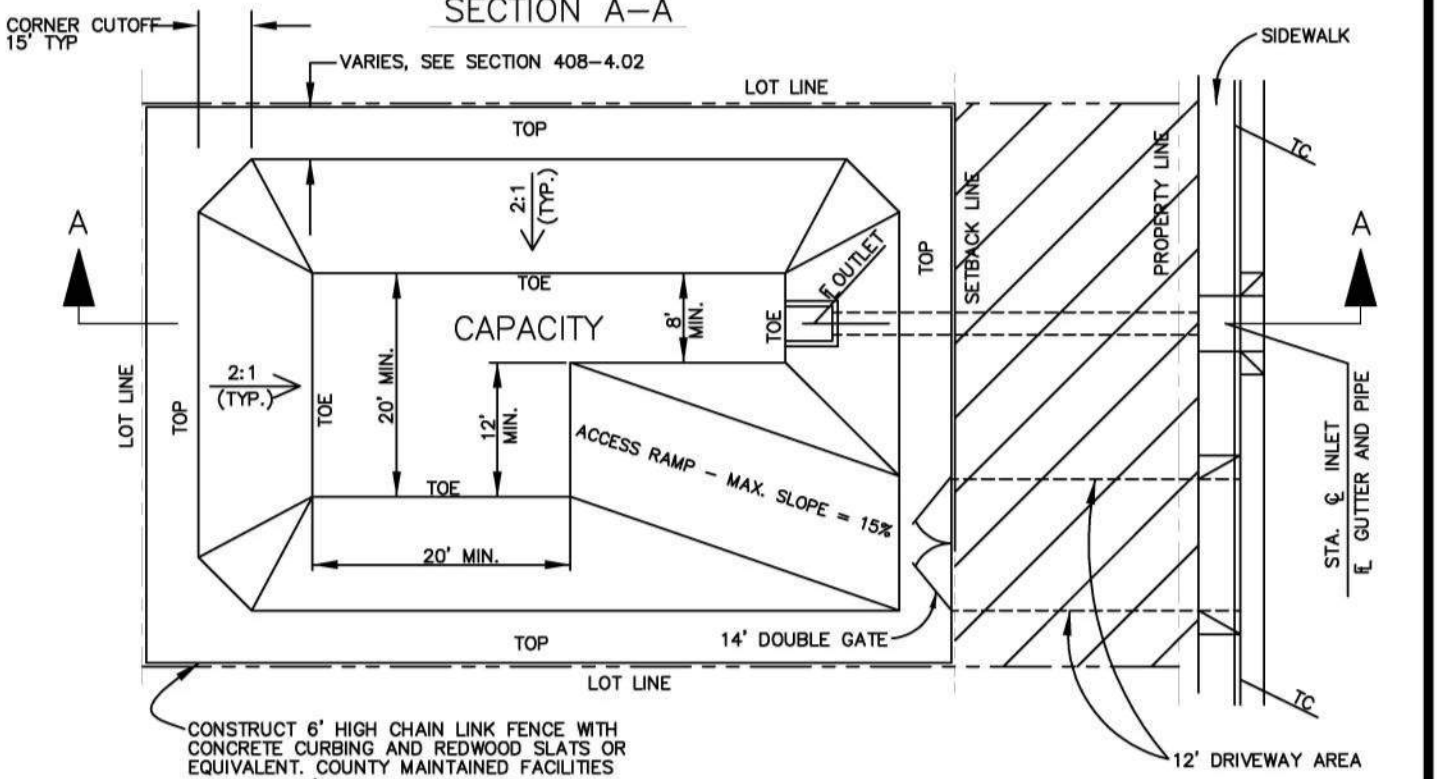
Should an existing natural channel be relocated, the channel shall be designed in accordance with the criteria specified herein for constructed channels.

Sec. 412-5 Use of Natural Facilities

All applicable Federal and State permits and requirements shall be required for any operation that would discharge dredged or fill material in any waters of the United States (normally channels identified with blue lines on the U.S.G.S. maps).



SECTION A–A



SUMP PLAN

LEGEND

TOP	–	TOP OF CURB
FG	–	FINISH GRADE
OG	–	ORIGINAL GROUND

INDICATES 2" A.C. OVER NATIVE SOIL WHICH HAS BEEN TREATED WITH A PERMANENT SOIL STERILANT SUBJECT TO THE APPROVAL OF THE DIRECTOR.

NOTES:

1. MAY EXCEED 8' IF SIDE SLOPES ARE 3:1 OR FLATTER; OR A SLOPE STABILITY ANALYSIS IS PROVIDED.
2. VARIATIONS TO THE DIMENSION MAY BE APPROVED BY THE DIRECTOR.
3. ADDITIONAL REQUIREMENTS MAY BE IMPOSED AS PART OF THE CONDITIONS ISSUED.
4. COMPACT O.G. TO 95% FOR MINIMUM OF SIX (6) INCHES UNDER 2" A.C.
5. WHEN FENCE IS SET ON FRONT R/W LINE SIDEWALK SHALL BE FULL WIDTH.
6. TACK WELD FABRIC AND HARDWARE TO POSTS.
7. TREAT BLOCK WALL WITH ANTI-GRAFFITI PRODUCT SUBJECT TO APPROVAL OF THE DIRECTOR.
8. CONSTRUCT 6" X 18" CONCRETE CURB UNDER GATE W/ TWO (2) #4 REBAR TOP AND BOTTOM.

KERN COUNTY PUBLIC WORKS
GROUNDED · BOUNDLESS

SUMP DETAILS

COUNTY OF KERN
STATE OF CALIFORNIA
DEVELOPMENT STANDARD

REVISIONS DATE	DESC
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DRAFTED BY: R.R.P.
DESIGNED BY: J.R.C.
DATE DRAFTED: 09/30/23
APPROVED BY: J.R.C.

PLATE NO. D–1

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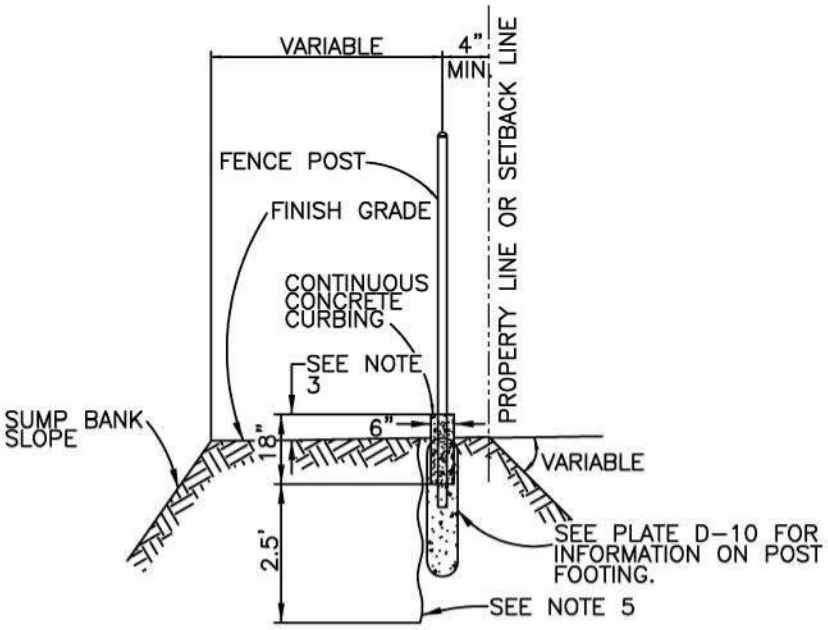
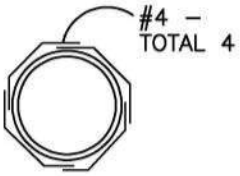


NOTES:

1. CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR MINOR CONCRETE (MIN. CEMENT CONTENT 505 LB/CU.YD.) CONCRETE SHALL CONTAIN NO ADDITIVES UNLESS APPROVED PRIOR APPROVAL IS OBTAINED FROM THE COUNTY ENGINEER.
2. CONCRETE SHALL BE TROWELED SMOOTH AND BRUSH FINISHED.
3. VARIES FROM 3" TO 6" ABOVE FINISH GRADE.
4. SUBGRADE PREP. SHALL BE CONSTRUCTED TRUE TO GRADE AND CROSS SECTION WITH COMPACTION AT 90% TO DEPTH OF 6".
5. RODENT BARRIER – 26 GAUGE CORRUGATED GALVANIZED IRON SHEETING, 3' HIGH, WITH 6" MIN. OVERLAP ON ENDS. CONCRETE SHALL BE USED IN LIEU OF RODENT BARRIER AS APPROVED BY THE ENGINEER.

CURBING AND RODENT BARRIER DETAILS



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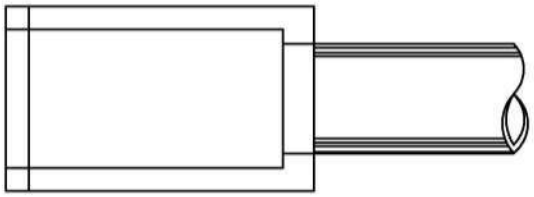
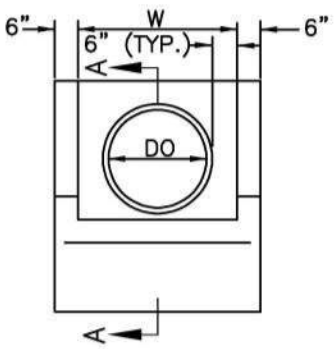
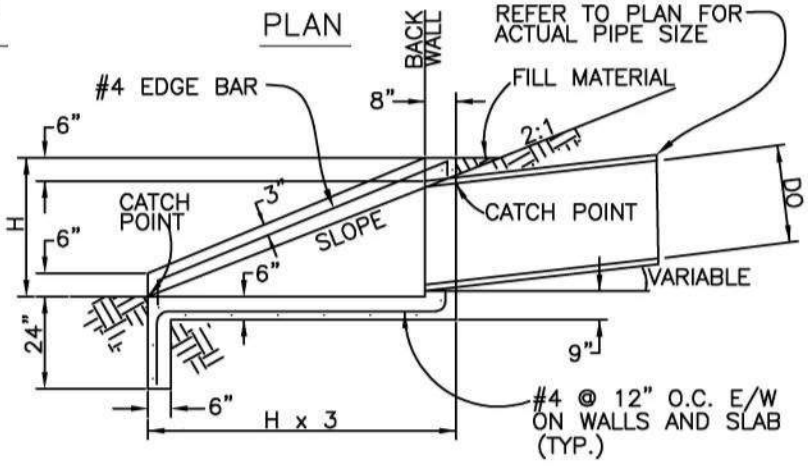


PLAN



FRONT



SECTION A–A

DISCHARGE STRUCTURE

KERN COUNTY PUBLIC WORKS GROUNDED · BOUNDLESS	CURBING, RODENT BARRIER, AND DISCHARGE STRUCTURE DETAILS	REVISIONS DATE – DESC	DRAFTED BY: R.R.P.	PLATE NO. D–2
	COUNTY OF KERN STATE OF CALIFORNIA DEVELOPMENT STANDARD		DESIGNED BY: J.R.C.	
			DATE DRAFTED: 09/30/23	
			APPROVED BY: J.R.C.	

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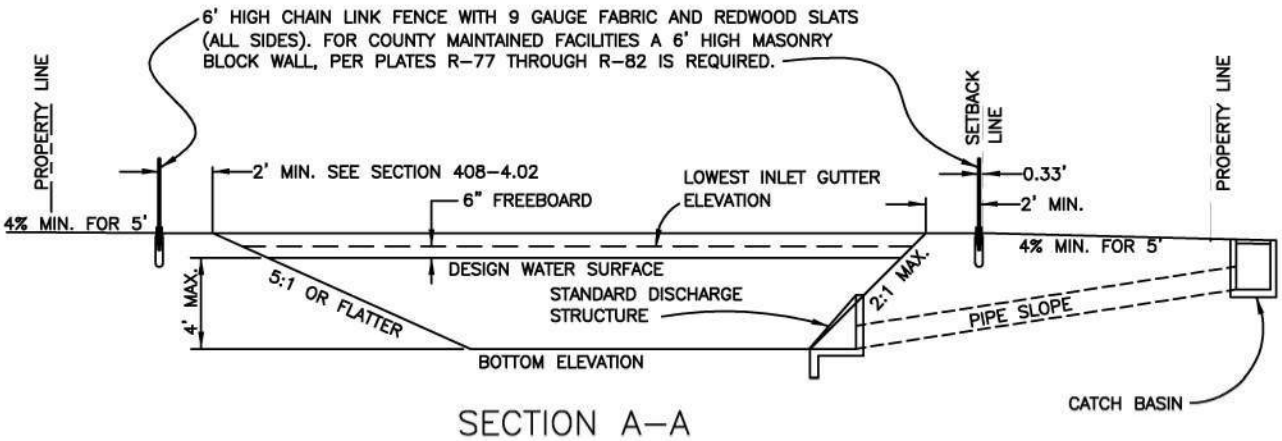
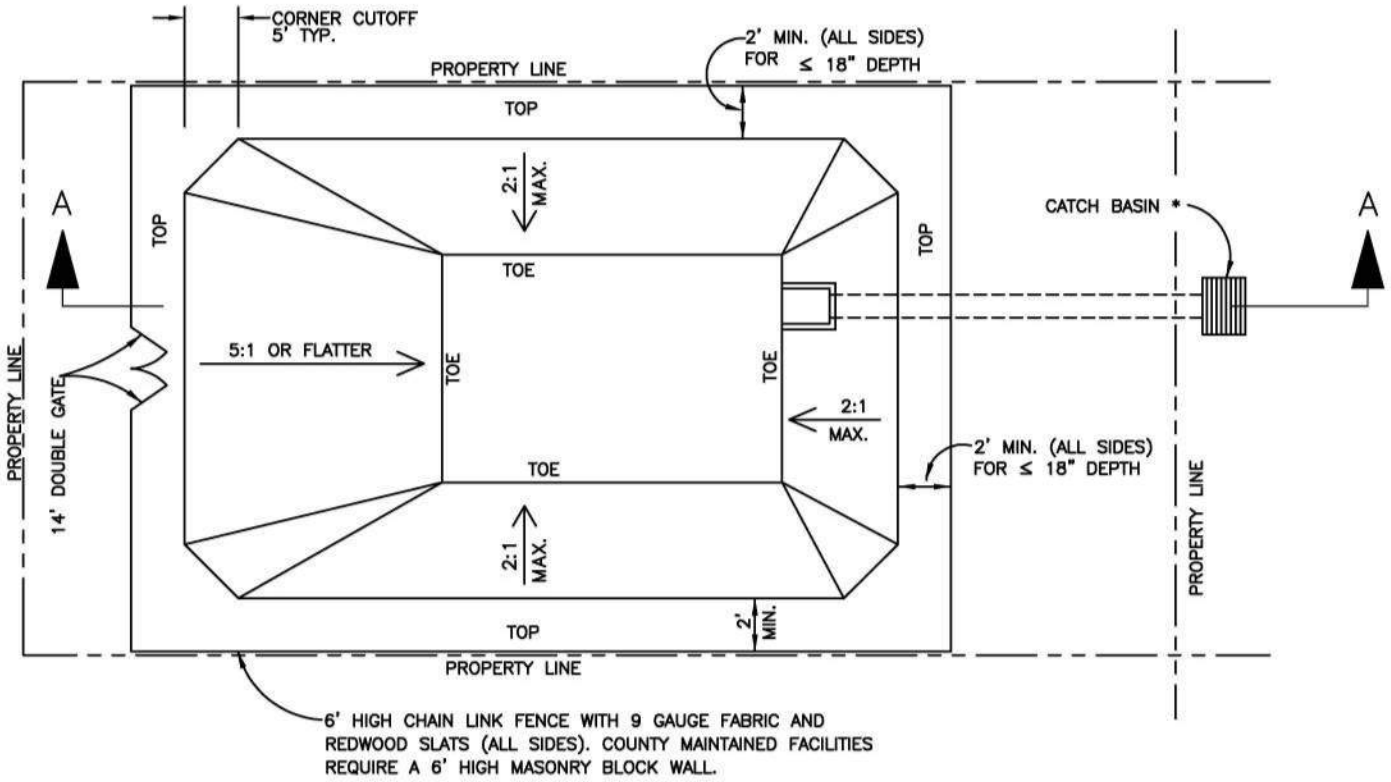


SECTION A-A



SUMP PLAN

* NO CURB AND GUTTER SHOWN

NOTE:

SEE ADDITIONAL NOTES AND REQUIREMENTS FOR CHAIN-LINK FENCES AND MASONRY WALLS ON PLATE D-1

KERN COUNTY PUBLIC WORKS
GROUNDED · BOUNDLESS

SHALLOW SUMP DETAILS

COUNTY OF KERN
STATE OF CALIFORNIA
DEVELOPMENT STANDARD

REVISIONS DATE	DESC
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DRAFTED BY: R.R.P.
DESIGNED BY: J.R.C.
DATE DRAFTED: 09/30/23
APPROVED BY: J.R.C.

PLATE NO. D-3

DWG FILE: K:\BUILDINGDEV\DEVELOPMENT REVIEW\DEV_STD\2023\2023 REVISED DRAWINGS\DRAINAGE\D-3

KERN COUNTY PUBLIC WORKS
GROUNDED: BOUNDLESS

TYPE "B" MINOR STRUCTURE - JUNCTION BOX

COUNTY OF KERN
STATE OF CALIFORNIA
DEVELOPMENT STANDARD

REVISIONS	
DATE	DESC.
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DRAFTED BY: R.R.P.
DESIGNED BY: J.R.C.
DATE DRAFTED: 09/30/23
APPROVED BY: J.R.C.

PLATE NO. D-4

NOTES:

1. CONCRETE SHALL CONFORM TO REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR MINOR CONCRETE (MIN. CEMENT CONTENT 590 LB/CU.YD.) CONCRETE SHALL CONTAIN NO ADDITIVES UNLESS APPROVED PRIOR APPROVAL IS OBTAINED FROM THE COUNTY ENGINEER.
2. WALL REINFORCING NOT REQUIRED WHEN H = 8' OR LESS AND THE UNSUPPORTED LENGTH OF ALL WALLS = 7' OR LESS. WALLS EXCEEDING EITHER LIMIT SHALL BE REINFORCED WITH #4 BARS AT 18" CENTERS PLACED 1 1/2" CLEAR TO INSIDE OF BOX UNLESS OTHERWISE SHOWN.
3. GALAVANIZING – SEE STANDARD SPECIFICATIONS OR SPECIAL PROVISIONS.
4. T = 6" WHEN H = 8' OR LESS AND THE UNSUPPORTED LENGTH OF ALL WALLS = 7' OR LESS. WALLS EXCEEDING EITHER LIMIT SHALL HAVE T = 8".
5. LOCATION OF FRAME AND COVER TO BE DETERMINED BY THE ENGINEER.
6. PRECAST ALTERNATIVE IS OPTIONAL. SEE SECTION 51–1.02 OF STANDARD SPECIFICATIONS.

SECTION A–A

DETAIL A
NO SCALE

TRAFFIC

TRAFFIC FRAME AND COVER SET TO GRADE AS DIRECTED BY THE ENGINEER. COVER AND FRAME MACHINED TO FIT. COVER TO HAVE RADIAL BLOCK TREAD, FRAME TO HAVE FLANGE DOWN, APPROXIMATE WEIGHT–315 POUNDS. SEE NOTE #5

SECTION B–B

PLAN

TYPE "B" MINOR STRUCTURE

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TYPE "C" MINOR STRUCTURE MANHOLE

COUNTY OF KERN
STATE OF CALIFORNIA
DEVELOPMENT STANDARD

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PLATE NO. D-5

DETAIL A
NO SCALE

TYPICAL C.I.P MANHOLE– PLAN VIEW
NO SCALE

MANHOLE COVER AND CONCRETE PAD
NO SCALE

SECTION A–A
NO SCALE

NOTES:

1. MANHOLE CONSTRUCTED ON CONCRETE PIPE OF 36" I.D. OR GREATER SHALL USE 48" SHAFT; CONCRETE PIPE WITH LESS THAN 36" I.D. SHALL USE 36" SHAFT.
2. USE COMBINATION OF CONE AND SHAFT AS DIRECTED BY THE ENGINEER.
3. CONCRETE SHALL CONFORM TO REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR MINOR CONCRETE (MIN. CEMENT CONTENT 590 LB/CU.YD.) CONCRETE SHALL CONTAIN NO ADDITIVES UNLESS APPROVED PRIOR APPROVAL IS OBTAINED FROM THE COUNTY ENGINEER.
4. ALL REINFORCING TO BE NO.4 BARS AT 12" O.C., 1 1/2" CLEAR OF INSIDE FACE UNLESS OTHERWISE NOTED. SEE DETAIL "A" FOR REINFORCING AROUND PIPE.
5. ALL EXPOSED METAL PARTS SHALL BE GALVANIZED AFTER FABRICATION EXCEPT FRAME AND COVER.
6. LOCATION OF FRAME AND COVER TO BE DETERMINED BY T THE ENGINEER.
7. ALL REINFORCEMENT FOR SURFACES IN CONTACT WITH THE GROUND SHALL BE PROTECTED WITH NOT LESS THAN 2" OF CONCRETE.
8. WORDING ON MANHOLE TO READ "STORM DRAIN".

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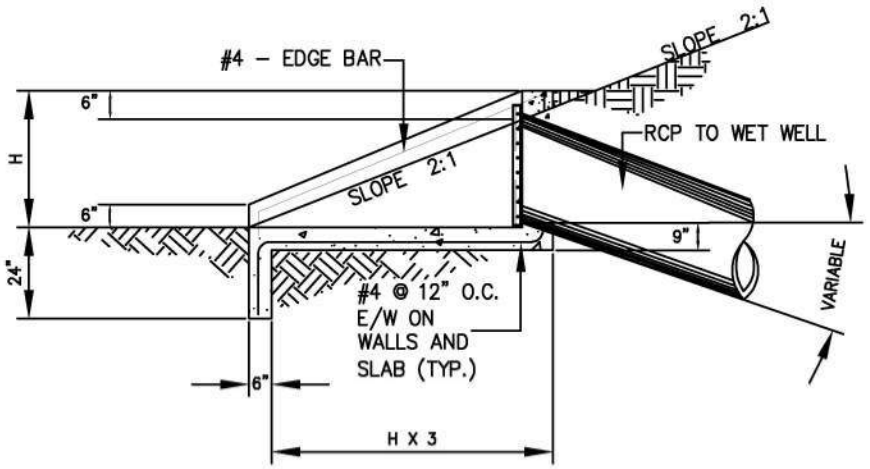
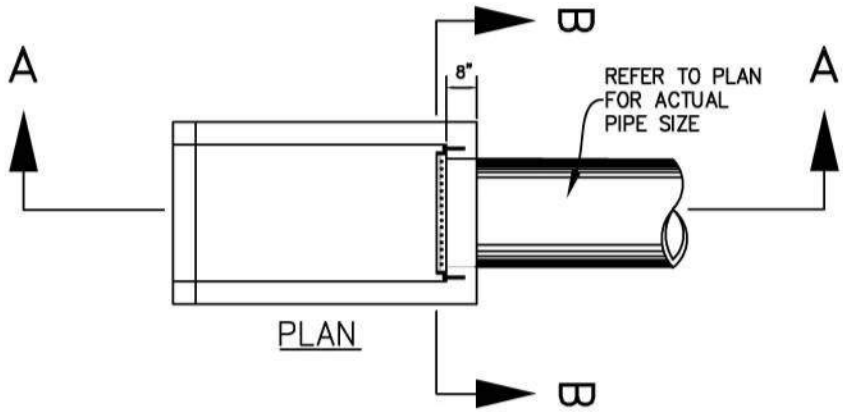


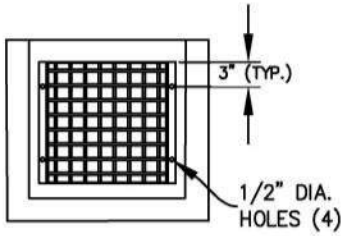
SECTION A–A

NOTE:

1. PIPE DETAIL REFER TO PLATE D–2.



PLAN



SECTION B–B

GRATE NOTES:

1. GRATE FABRICATED OR EQUIVALENT SHELF ITEM–ALL PARTS & PRODUCTS GALVANIZED.
2. FRAME CONSTRUCTED W/ 1/4" X 3/4" X 2" X LENGTH (VARIES TO PIPE SIZE) ANGLE IRON.
3. MIN. FOUR – 3/8" X 3" S.S. RED HEAD ANCHOR BOLTS FLAT LOCK WASHER, 2 EA PER VERTICAL ANGLE 3" FROM TOP & BOTTOM OF FRAME.
4. FOUR – 1/2" DIA. HOLES IN FRAME.
5. GRATE OPENING 1–3/16" X 2" O.C.
6. 1/4" DIA. ROD WELDED TO FRAME ON ALL SIDES.

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PUMP STATION INLET STRUCTURE

COUNTY OF KERN
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PLATE NO. D–6

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NOTES:

1. CONTROL BOX SHALL BE LOCATED OUTSIDE OF MAINTENANCE WAY ALONG BASIN FENCE.
2. WET WELL VAULTS SHALL NOT BE CONSTRUCTED WITHIN THE ACCESS GATE OPENING.
3. NO SPLICING OF ALARM, PUMP FLOATS, OR POWER WIRING, JUNCTION BOX SHALL BE USED.

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DUPLEX PUMP STATION

COUNTY OF KERN
STATE OF CALIFORNIA
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PLATE NO. D-7

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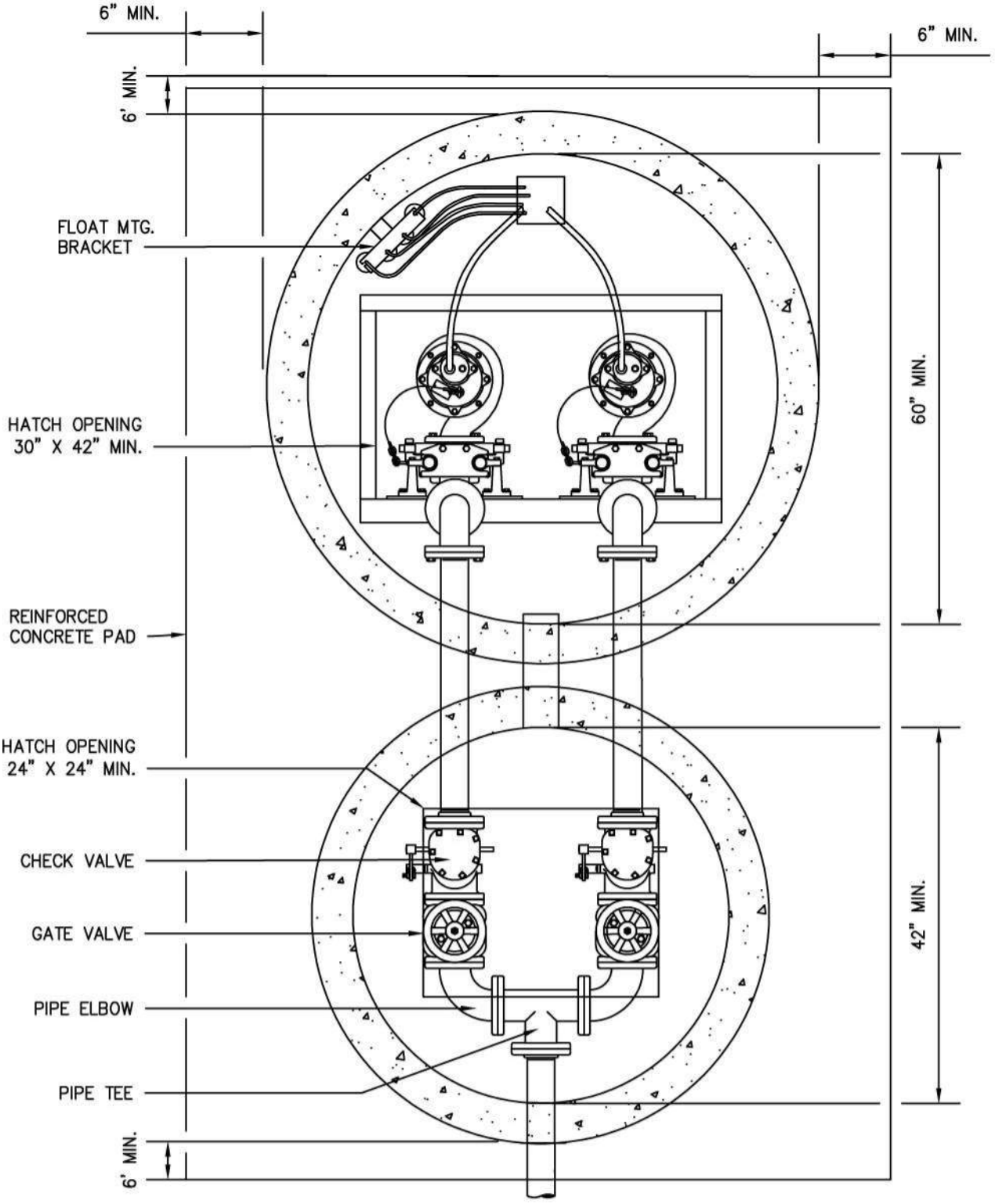

*MODIFIED FROM FEMYERS.COM NON-CLOG, 3" DISCHARGE, DUPLEX PUMP INSTALLATION DRAWING ESS-2228B

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PLAN VIEW
DUPLEX PUMPS

COUNTY OF KERN
STATE OF CALIFORNIA
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PLATE NO.
D-8

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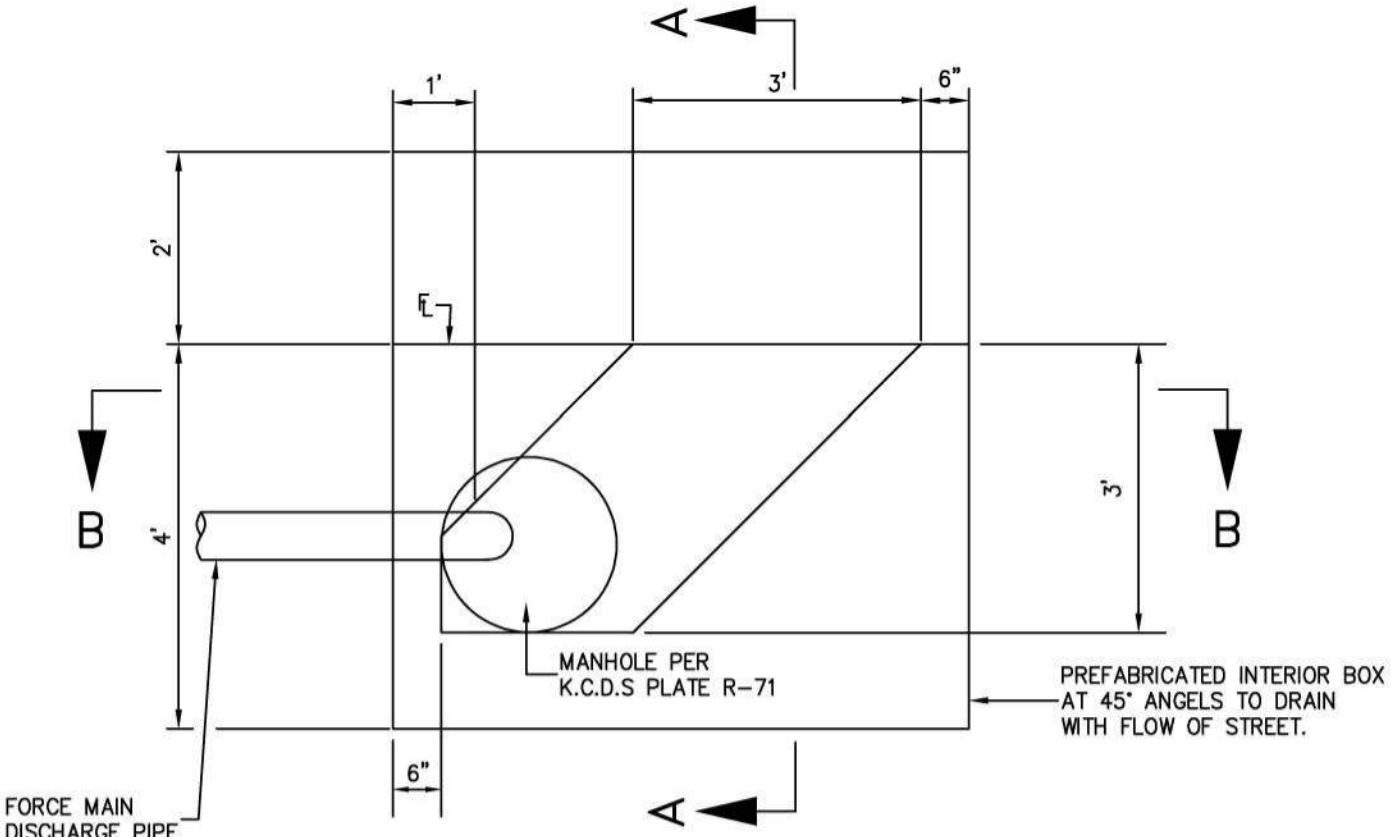
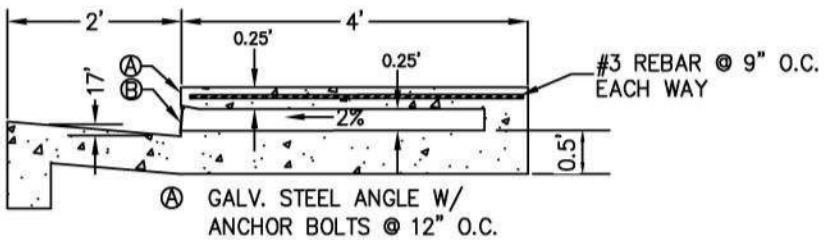


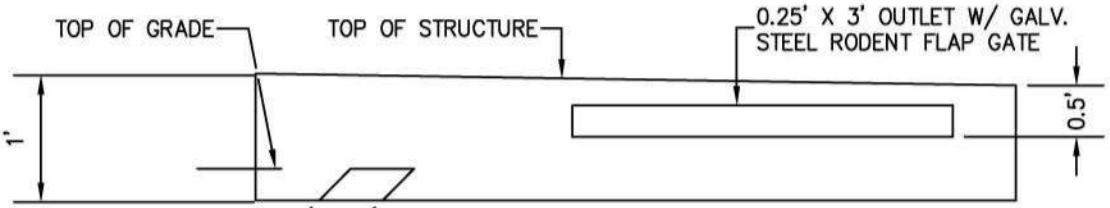
PLAN VIEW



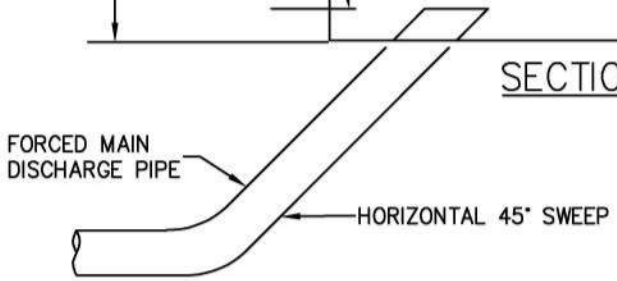
Ⓐ GALV. STEEL ANGLE W/
ANCHOR BOLTS @ 12" O.C.

Ⓑ GALV. STEEL RODENT FLAP
W/ MIN OF 2 HINGES.

SECTION A-A



SECTION B-B



NOTE:
FORCE MAIN DISCHARGE PIPE MUST BE
AWWA C-900 CLASS 165 OR EQUIVALENT

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PUMP STATION DISCHARGE STRUCTURE

COUNTY OF KERN
STATE OF CALIFORNIA
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PLATE NO.
D-9

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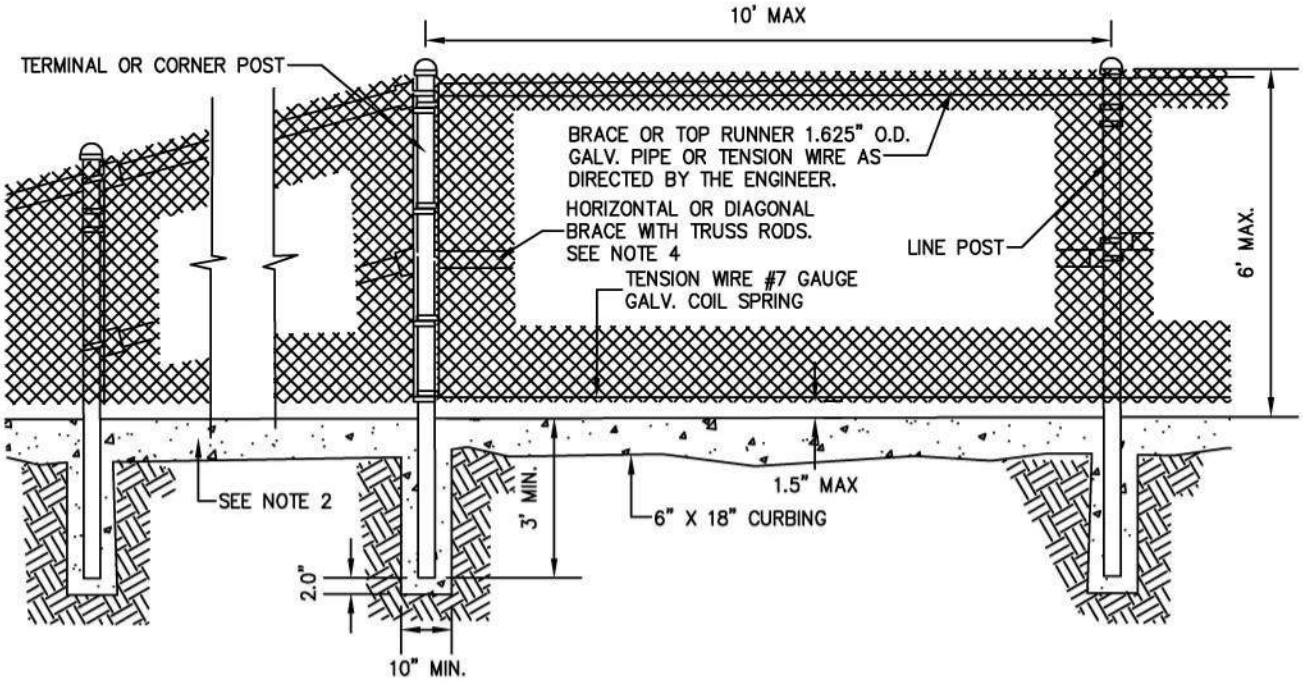
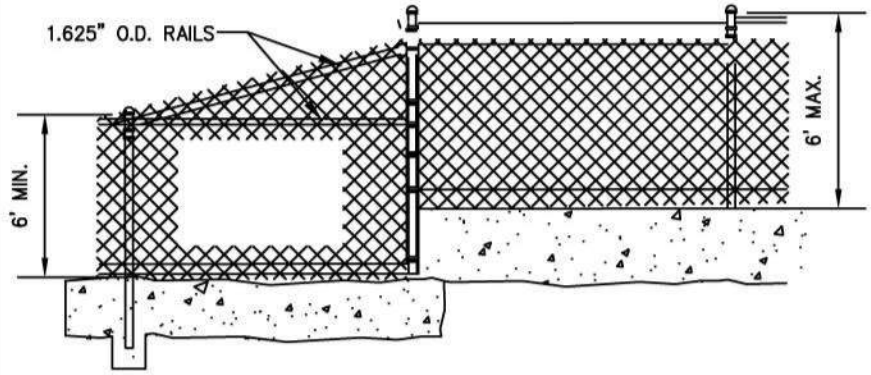


TYPICAL CHAIN LINK FENCE DETAIL



TYPICAL DETAIL AT CULVERT ENDWALLS

FENCING SPECIFICATIONS:

1. FENCING FABRIC SHALL BE 9 GUAGE, 2" MESH, AFTER WEAVING, KNUCKLED TOP AND BOTTOM. 6" HIGH GALV.
2. CORNER POSTS SHALL BE 2-7/8" O.D. GALV. PIPE.
3. LINE POST 2-3/8" O.D. GALV. PIPE.
4. PRIVACY SLATS SHALL BE 2-3/16" X 1/4".

NOTES:

1. INSTALLATION OF FENCING AND GATES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF "STANDARD SPECIFICATION, STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION," APPROVED CURRENT EDITION.
2. CONCRETE CURBING SHALL BE CONSTRUCTED UNDER ALL FENCES. CURBING SHALL BE 6" X 18", MINOR CONCRETE. CONCRETE SHALL CONFORM TO REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR MINOR CONCRETE (MIN. CEMENT CONTENT 505 LB/CU.YD.) CONCRETE SHALL CONTAIN NO ADDITIVES UNLESS APPROVED PRIOR APPROVAL IS OBTAINED FROM THE COUNTY ENGINEER.
3. CORNER POST SHALL BE INSTALLED AT ALL ANGLES IN FENCE LINE IN EXCESS OF 10".
4. END, CORNER, AND GATE POSTS SHALL BE BRACED TO THE NEAREST LINE POST WITH GALV. DIAGONAL OR HORIZONTAL BRACES USED AS COMPRESSION MEMBERS AND GALV. 0.375" STEEL TRUSS RODS WITH TURNBUCKLES OR TRUSS TIGHTERNER USED AS TENSION MEMBERS.
5. FABRIC SHALL BE FASTENED TO GATE POST, TERMINAL POST, OR CORNER POST WITH 3" X 3/4" STRETCHER BAR BONDS AT 8" ON CENTER.
6. FABRIC SHALL BE FASTENED TO LINE POST, LAST RUNNER, AND BOTTOM TENSION WIRES WITH FABRIC BONDS SPACED APPROX. 14" APART.
7. FABRIC SHALL CONFORM TO ASTM A-392, CLASS 1.
8. SUBGRADE PREPARATION SHALL BE CONSTRUCTED TRUE TO GRADE AND CROSS SECTION WITH COMPACTION OF 85% TO A DEPTH OF 0.5".
9. WHEN REDWOOD SUBURBAN SCREEN, OR EQUIVALENT IS REQUIRED IT SHALL BE CONSTRUCTED SO THAT THE SLATS ARE LOCKED INTO POSITION AND CAN ONLY BE REMOVED WITH TOOLS.
10. FENCE FABRIC IS TO BE TACK WELDED TO POSTS IN THREE PLACES (TOP, CENTER, AND BOTTOM). FENCE HARDWARE IS TO BE TACK WELDED AND GROUND SMOOTH. ALL EXPOSED METAL PARTS ARE TO BE GALV. PRIOR TO INSTALLATION.

KERN COUNTY PUBLIC WORKS
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CHAIN LINK FENCING SPECIFICATIONS

COUNTY OF KERN
STATE OF CALIFORNIA
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PLATE NO. D-10

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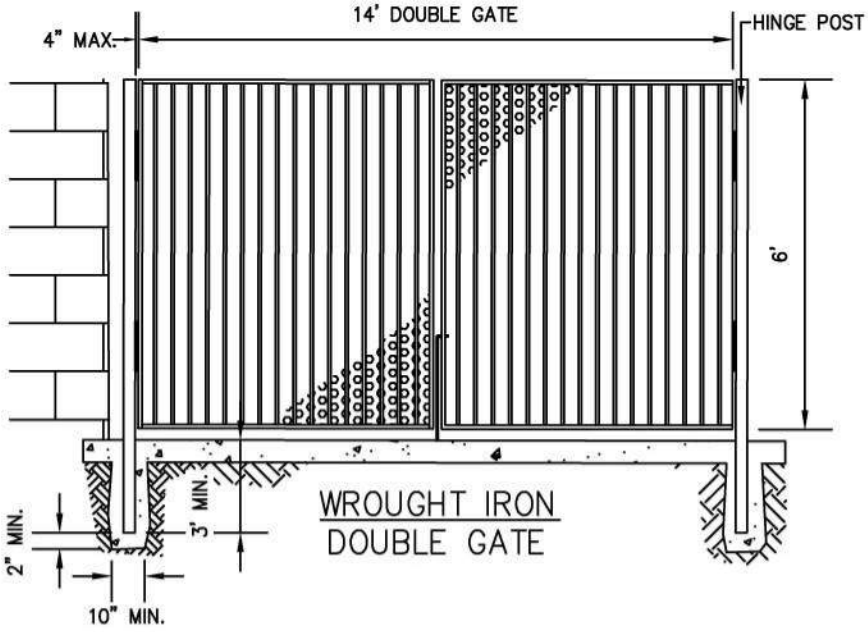
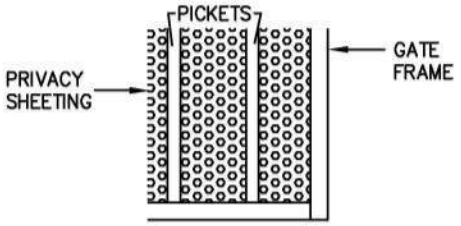
WROUGHT IRON GATE SPECS:

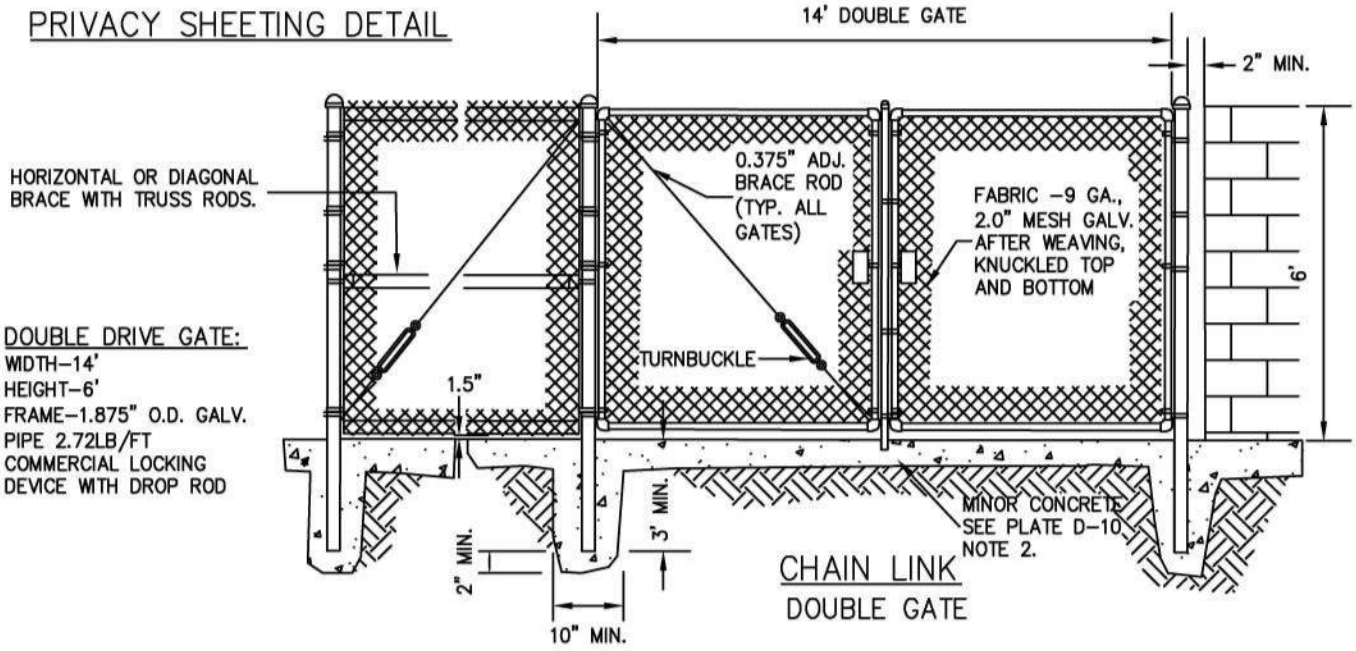
1. HINGE POST SHALL BE A MIN. OF 4X4X3/16" SQ TUBING.
2. GATE FRAME SHALL BE A MIN. 1–1/2" SQ. TUBING.
3. PICKETS SHALL BE A MIN. 3/4" SQ. TUBING WITH 4" MAX. CLEAR DIMENSION.
4. PRIVACY SHEETING SHALL BE PERFORATED SHEET METAL, 24 GAUGE, 1/16" DIM HOLE, 1/8" STAGGERED CENTER.
5. GATE SHALL BE A 14' DOUBLE GATE.
6. GATE LATCH SHALL HAVE COMMERCIAL GRADE LOCKING DEVICE WITH 3/8" PADLOCK SHANK OR A LOCKING DEVICE THAT CAN BE KEYED TO THE STANDARD PUBLIC WORKS KEY–CORE.
7. HINGES SHALL BE COMMERCIAL GRADE AND SIZED APPROPRIATELY FOR THE WEIGHT OF THE GATE AND PRIVACY SHEETING.



WROUGHT IRON
DOUBLE GATE



PRIVACY SHEETING DETAIL



DOUBLE DRIVE GATE:
WIDTH–14'
HEIGHT–6'
FRAME–1.875" O.D. GALV. PIPE 2.72LB/FT
COMMERCIAL LOCKING DEVICE WITH DROP ROD

CHAIN LINK
DOUBLE GATE

NOTES:

1. CURBING AS SPECIFIED BY COUNTY OF KERN DEVELOPMENT STANDARDS, PLATES D–2 AND D–10.
2. END, CORNER, AND GATE POSTS SHALL BE BRACED TO THE NEAREST LINE POST WITH GALV. DIAGONAL OR HORIZONTAL BRACES USED AS COMPRESSION MEMBERS AND GALV. 0.375" STEEL TRUSS RODS WITH TURNBUCKLES OR TRUSS TIGHTENERS USED AS TENSION MEMBERS.
3. WHEN REDWOOD SUBURBAN SCREEN, OR EQUIVALENT, IS REQUIRED IT SHALL BE CONSTRUCTED SO THAT THE SLATS ARE LOCKED INTO POSITION AND CAN ONLY BE REMOVED WITH TOOLS.
4. FRAMES SHALL BE MADE WITH FITTINGS OR WELDS GROUND SMOOTH, AND GALVANIZED.
5. CHAIN LINK FENCE FABRIC SHALL CONFORM TO ASTM: A–392, CLASS 1, AND BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 80–4 OF THE "STANDARD SPECIFICATIONS, STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION," APPROVED CURRENT EDITION.
6. NO THUMB LATCHES.
7. THE POST AND HINGE GAUGE MUST BE APPROPRIATE FOR THE WEIGHT OF THE GATES AND PRIVACY SHEETING.

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DOUBLE GATE SPECIFICATIONS

COUNTY OF KERN
STATE OF CALIFORNIA
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PLATE NO.
D–11

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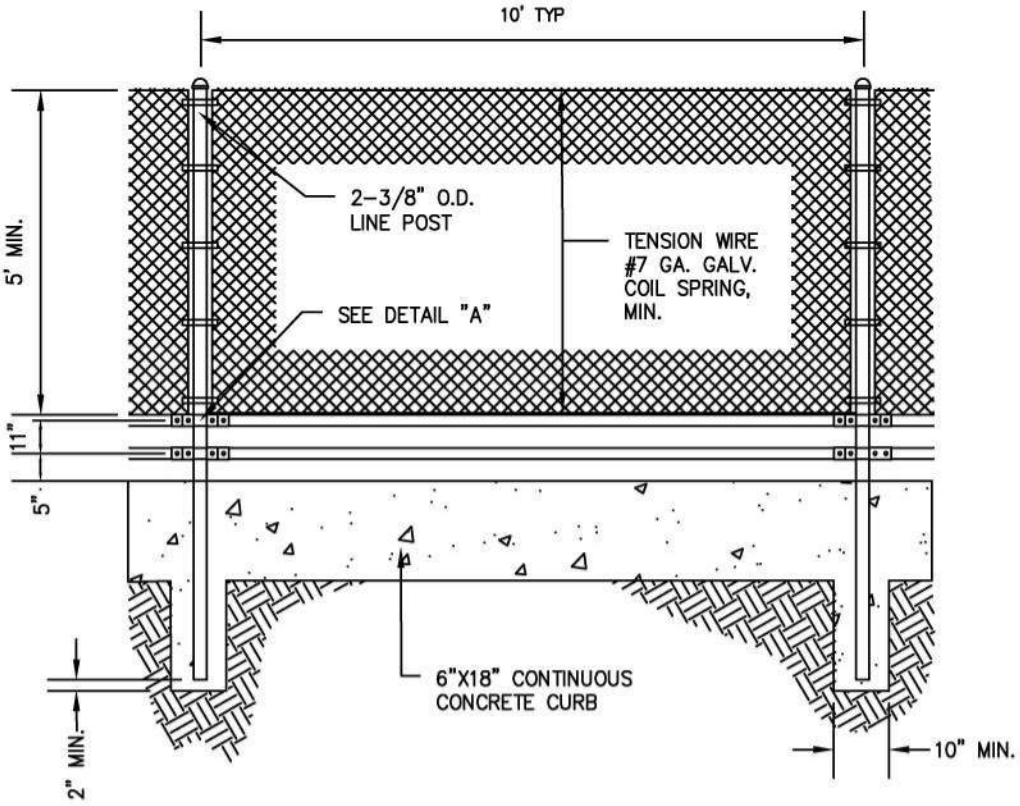
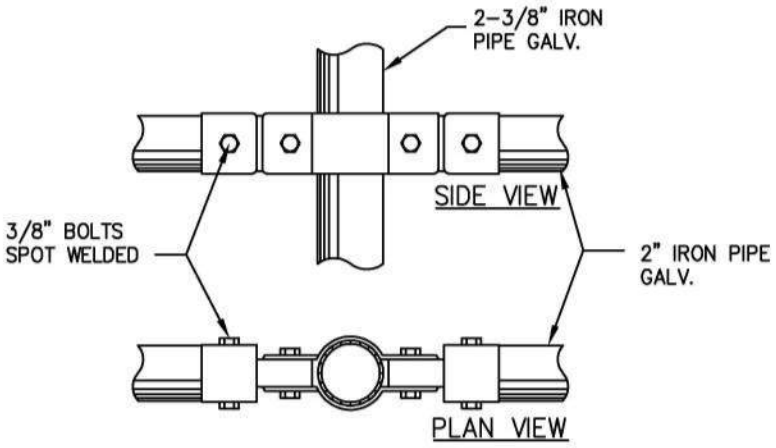


TRANSVERSE PROTECTION BAR



DETAIL "A"

NOTES:

1. CONCRETE SHALL CONFORM TO REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR MINOR CONCRETE (MIN. CEMENT CONTENT 505 LB/CU.YD.) CONCRETE SHALL CONTAIN NO ADDITIVES UNLESS APPROVED PRIOR APPROVAL IS OBTAINED FROM THE COUNTY ENGINEER.
2. SEE PLATE D-10 FOR ADDITIONAL FENCE DETAILS.
3. ALL EXPOSED METAL PARTS ARE TO BE GALVANIZED PRIOR TO INSTALLATION.
4. HARDWARE IS TO BE TACK WELDED AND GROUND SMOOTH AND GALVANIZED. SEE PLATE D-2 FOR RODENT BARRIER DETAILS.

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FLOOD ZONE FENCING SPECIFICATIONS

COUNTY OF KERN
STATE OF CALIFORNIA
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PLATE NO. D-12

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APPENDIX F
KERN COUNTY FLOODPLAIN MANAGEMENT CODE

Chapter 17.48 FLOODPLAIN MANAGEMENT[1]

Article I. General Provisions

17.48.010 Statutory authorization.

The Legislature of the State of California, has in Government Code Sections 65302, 65560, and 65800, conferred upon local government units authority to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.020 Short title.

This chapter may be cited as the Kern County Floodplain Management Ordinance.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.030 Findings of fact.

A. The flood hazard areas of unincorporated Kern County are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.

B. These flood losses are caused by the cumulative effect of obstructions in areas of special flood hazards which increase flood heights and velocities, and when inadequately anchored, damage uses in other areas. Uses that are inadequately flood proofed, elevated, or otherwise protected from flood damage, also contribute to the flood loss.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.040 Statement of purpose.

It is the purpose of this chapter to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed:

A. To protect human life and health;

B. To minimize expenditure of public money for costly flood control projects;

[1]Editor's note(s)—Ord. No. G-8866, § 17, adopted Nov. 5, 2019, repealed the former Ch. 17.48 and enacted a new chapter as set out herein. The former Ch. 17.48, §§ 17.48.010—17.48.500, pertained to similar subject matter and derived from Ord. No. G-8670, § 17, adopted Nov. 15, 2016.

C. To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;

D. To minimize prolonged business interruptions;

E. To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone, and sewer lines, streets and bridges located in areas of special flood hazard;

F. To help maintain a stable tax base by providing for the secondary use and development of areas of special flood hazard so as to minimize future blight areas;

G. To ensure that potential buyers are notified that property is in an area of special flood hazard;

H. To ensure that those who occupy the areas of special flood hazard assume responsibility for their actions; and

I. To comply with the requirements of the National Flood Insurance Program Regulations, Parts 59 and 60 of Title 44 of the Code of Federal Regulations hereinafter referred to as the National Flood Insurance Regulations.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.050 Methods of reducing flood losses.

In order to accomplish its purposes, this chapter includes methods and provisions for:

A. Restricting or prohibiting uses which are dangerous to health, safety, and property loss due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;

B. Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;

C. Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;

D. Controlling filling, grading, dredging, and other development which may increase flood damage; and

E. Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.060 Definitions.

Unless specifically defined below, words or phrases used in this chapter shall be interpreted so as to give them the meaning they have in common usage and to give this chapter its most reasonable application.

1. "Accessory use" means a use which is incidental and subordinate to the principal use of the parcel of land on which it is located.

2. "Agricultural structure" means a walled and roofed structure used exclusively for agricultural purposes or uses in connection with the production, harvesting, storage, raising, or drying of agricultural commodities and livestock, including aquatic organisms. Structures that house tools or equipment used in connection with these purposes or uses are considered to have agricultural purposes or uses.

3. "Apex" means the point of highest elevation on an alluvial fan, which on undisturbed fans is generally the point where the major stream that formed the fan emerges from the mountain front.

4. "Appeal" means a request for a review of the floodplain administrator's interpretation of any provision of this chapter or a request for a variance.

5. "Area of shallow flooding" means an area designated A, AO or AH Zone on the Flood Insurance Rate Map (FIRM), or an area identified by the floodplain administrator. The base flood depths have either not been determined (A Zone), they range from one to three feet (AO or AH Zone), or a depth has been established by the floodplain administrator; a clearly defined channel does not exist; the path of flooding is unpredictable and indeterminate; and velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

6. Area of special flood hazard. See "Special flood hazard area."

7. "Backfill" means the placement of fill material within a specified depression, hole or excavation pit below the surrounding adjacent ground level as a means of improving flood water conveyance or to restore the land to the natural contours existing prior to excavation.

8. "Base flood" means the flood having a one percent (1%) chance of being equaled or exceeded in any one (1) given year (also called the one hundred (100) year flood).

9. "Base flood elevation" means the water surface elevation of the base flood at a given location.

10. "Basement" means any area of the building having its floor subgrade (below ground level) on all sides.

11. "Building." See "Structure."

12. "Building official" means the director of the public works department of the county of Kern or his/her designee.

13. "Certification" by a registered professional engineer or other party does not constitute a warranty or guarantee of performance, expressed or implied. Certification of data is a statement that the data is accurate to the best of the certifier's knowledge. Certification of analyses is a statement that the analyses have been performed correctly and in accordance with sound engineering practices. Certification of structural works is a statement that the works are designed in accordance with sound engineering practices to provide protection from the base flood. Certification of as built conditions is a statement that the structure(s) has been built according to the plans being certified, is in place, and is fully functioning.

14. "Critical feature" means an integral and readily identifiable part of a flood protection system, without which the flood protection provided by the entire system would be compromised.

15. "Curvilinear line" means the border on either a Flood Hazard Boundary Map or Flood Insurance Rate Map that delineates the special flood, mudslide (i.e., mudflow), and/or flood-related erosion hazard areas and consists of a curved or contour line that follows the topography.

16. "Development" means any man-made change to improved or unimproved real estate, including, but not limited to, buildings or other structures, temporary structures, temporary or permanent storage of equipment or materials, mining, dredging, filling, grading, paving, excavation, drilling operations, flood control projects, and other land-disturbing activities.

17. "Encroachment" means the advance or infringement of uses, plant growth, fill, excavation, buildings, permanent structures, or development into a floodplain which may impede or alter the flow capacity of a floodplain.

18. "Erosion" means the process of the gradual wearing away of land masses. This peril is not per se covered under the National Flood Insurance Program.

19. "Existing manufactured home park or subdivision" means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be

affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by a community.

20. "Expansion to an existing manufactured home park or subdivision" means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

21. "Fill" means the placement of fill material at a specified location to bring the ground surface up to a desired elevation.

22. "Fill material" can be natural sand, dirt, soil, or rock. For the purposes of floodplain management, fill material may include concrete, cement, soil cement, brick, or similar material as approved by the floodplain administrator on a case-by-case basis.

23. "Flood, flooding, or flood water" means: (1) a general and temporary condition of partial or complete inundation of normally dry land areas from (a) the overflow of flood waters, (b) the unusual and rapid accumulation or runoff of surface waters from any source, and/or (c) mudslides (i.e., mudflows) which are proximately caused by flooding as defined in paragraph (1)(b) of this definition and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water and deposited along the path of the current; and (2) the collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in paragraph (1)(a) of this definition.

24. "Flood hazard evaluation" means an official report provided by the floodplain administrator that includes, but is not limited to, the elevation requirement, depth of footing requirement, and certification of elevation requirement for any building permits issued by the building official in a special flood hazard area.

25. "Flood Insurance Rate Map (FIRM)" means the official map on which the Federal Emergency Management Agency or Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

26. "Flood Insurance Study" means the official report provided by the Federal Insurance Administration that includes flood profiles, the Flood Insurance Rate Map (FIRM), the Flood Boundary Floodway Map (FBFM), and the water surface elevation of the base flood.

27. "Flood protection system" means those physical structural works for which funds have been authorized, appropriated, and expended and which have been constructed specifically to modify flooding in order to reduce the extent of the area within a community subject to a special flood hazard and the extent of the depths of associated flooding. Such a system typically includes hurricane tidal barriers, dams, reservoirs, levees, or dikes. These specialized flood modifying works are those constructed in accordance with sound engineering standards.

28. "Floodplain administrator" means the individual appointed to administer and enforce the floodplain management regulations.

29. "Floodplain or flood-prone area" means any land area susceptible to being inundated by water from any source (see definition of "flooding").

30. "Floodplain management" means the operation of an overall program of corrective and preventive measures for reducing flood damage, including, but not limited to, emergency preparedness plans,

flood control works, and floodplain management regulations as administered by various federal, state and county agencies.

31. "Floodplain management regulations" mean the zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as the Floodplain Management Ordinance or Grading Code), and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

32. "Flood proofing" means any combination of structural and nonstructural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

33. "Flood-related erosion" means the collapse or subsidence of land caused by the flow of water from a severe storm, or by an unanticipated force of nature, such as a flash flood, or by some similarly unusual and unforeseeable event which results in flooding.

34. "Floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

35. "Floodway encroachment line" means the lines marking the limits of floodways on federal, state, and local floodplain maps.

36. "Floodway fringe" means the area of a floodplain on either side of the designated floodway where encroachment may be permitted.

37. "Freeboard" means a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. Freeboard tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

38. "Habitable floor" means any floor usable for living purposes, which includes working, sleeping, eating, recreation, or a combination thereof. For floodplain management regulation purposes, habitable floor and lowest floor will share the same definition.

39. "High hazard area" means those portions on the alluvial fan subject to active erosional and depositional conditions. These areas are where the flood hazard potential is too severe for standard economic flood protection plans.

40. "Highest adjacent grade" means the highest natural elevation of the ground surface prior to construction, upstream and next to the proposed walls of a structure.

41. "Historic structure" means any structure that is: (1) Listed individually in the National Register of Historic Places (a listing maintained by the Department of the Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register; (2) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district; (3) Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or (4) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either: (a) by an approved state program as determined by the Secretary of the Interior, or (b) directly by the Secretary of the Interior in states with approved programs.

42. "Landfill" means a permitted location for the disposal, placement, or dumping of garbage, trash, debris, junk, or waste material.

43. "Levee" means a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

44. "Levee system" means a flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accord with sound engineering practices.

45. "Lowest floor" means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood-resistant enclosure, usable solely for parking of vehicles, building access, or storage in an area other than a basement area, is not considered a building's lowest floor; provided, that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of this chapter.

46. "Manufactured home" means a structure, transportable in one (1) or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. The term manufactured home does not include a recreational vehicle.

47. "Manufactured home park or subdivision" means a parcel (or contiguous parcels) of land divided into two (2) or more manufactured home lots for sale or rent.

48. "Market Value" shall be determined by estimating the cost to replace the structure in new condition and adjusting that cost figure by the amount of depreciation that has accrued since the structure was constructed. The cost of replacement of the structure shall be based on a square foot cost factor determined by reference to a building cost estimating guide recognized by the building construction industry. The amount of depreciation shall be determined by taking into account the age and physical deterioration of the structure and functional obsolescence as approved by the floodplain administrator, but shall not include economic or other forms of external obsolescence. Use of replacement costs or accrued depreciation factors different from those contained in recognized building cost estimating guides may be considered only if such factors are included in a report prepared by an independent professional appraiser and supported by a written explanation of the differences.

49. "Mean sea level" means, for the purposes of the National Flood Insurance Program, the National Geodetic Vertical Datum (NGVD) of 1929, or other datum, to which base flood elevations shown on a community's Flood Insurance Rate Map are referenced.

50. "Mudslide" (i.e., mudflow) describes a condition where there is a river, flow, or inundation of liquid mud down a hillside usually as a result of a dual condition of loss of brush cover and the subsequent accumulation of water on the ground preceded by a period of unusually heavy or sustained rain.

51. "New construction" means, for floodplain management purposes, structures for which the start of construction commenced on or after the effective date of a floodplain management regulation adopted by this community and includes any subsequent improvements to such structures.

52. "New manufactured home park or subdivision" means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of floodplain management regulations adopted by a community.

53. "Nonresidential building" means and includes, but is not limited to, small business concerns, churches, schools, nursing homes, farm buildings (including grain bins and silos), government buildings, mercantile structures, industrial plants, and warehouses.

54. "Obstruction" means and includes, but is not limited to, any dam, wall, wharf, embankment, levee, dike, pile, abutment, protection, excavation, channelization, bridge, conduit, culvert, building, wire, fence, rock, gravel, refuse, fill, structure, vegetation, or other material in, along, across, or projecting into any watercourse which may alter, impede, retard, or change the direction and/or velocity of the flow of water, or due to its location, its propensity to snare or collect debris carried by the flow of water or its likelihood of being carried downstream.

55. "One hundred year flood" or "100-year flood" means a flood which has a one percent annual probability of being equaled or exceeded in any given year. It is identical to the base flood, which will be the term used throughout this chapter.

56. "Person" means and includes any individual or his agent, firm, group of individuals, partnership, association or corporation, or agent of the aforementioned groups, or any other entity including the state or its agencies or political subdivisions.

57. "Principal structure" means a structure used for the principal use of the property as distinguished from an accessory use.

58. "Recreational vehicle" means a vehicle which is: (1) built on a single chassis; (2) four hundred (400) square feet or less when measured at the largest horizontal projection; (3) designed to be self-propelled or permanently towable by a light duty truck; and (4) designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use. For floodplain management purposes, the term recreational vehicle also includes, but is not limited to, park trailers, travel trailers, and other similar vehicles.

59. "Remedy a violation" means to bring the structure or other development into compliance with state or local floodplain management regulations, or, if this is not possible, to reduce the impacts of its noncompliance. Ways that impacts may be reduced include protecting the structure or other affected development from flood damages, implementing the enforcement provisions of the ordinance or otherwise deterring future similar violations, or reducing state or federal financial exposure with regard to the structure or other development.

60. "Riverine" means relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.

61. "Scour depth" means the distance below prevailing ground resulting from the erosive action of running water which temporarily or permanently excavates and carries away material from the prevailing ground or channel bed during flooding.

62. "Sheet flow area." See "Area of shallow flooding."

63. "Special flood hazard area (SFHA)" means an area having special flood or flood-related erosion hazards, and shown on an FHBM or FIRM as Zone A, AO, A1-30, AE, A99, AH, or identified by the floodplain administrator.

64. "Start of construction" means and includes substantial improvement and other proposed new development, and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement was within one hundred eighty (180) days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slabs or footings, the installation of piles, the construction of columns, or any work beyond the state of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading, and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds, not occupied as dwelling units or not part of the main structure. For a

substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

65. "Structure" means a roofed building with one or more walls, including a gas or liquid storage tank, which is principally above ground, as well as a manufactured home.

66. "Subdivision" means any division of land subject to the Subdivision Map Act (California Government Code Sections 66410 et seq., as implemented by the Kern County Ordinance Code Title 18, Land Division Ordinance).

67. "Substantial damage" means damage of any origin sustained by a structure whereby the cost of restoring the structure by reconstruction, rehabilitation, addition, or other improvement to its before damage condition equals or exceeds fifty percent (50%) of the market value of the structure before the damage occurred.

68. "Substantial improvement" means any repair, reconstruction, rehabilitation, addition, or other proposed new development or improvement the cumulative replacement cost (including but not limited to materials and labor) of which equals or exceeds fifty percent (50%) of the current market value of the structure before the start of construction of the initial improvement. This term includes structures which have incurred substantial damage, regardless of the actual repair work performed. This term does not, however, include any alteration of a historic structure, provided that the alteration will not preclude the structure's continued designation as a historic structure.

69. "Variance" means a grant of relief from the requirements of this chapter which permits construction in a manner that would otherwise be prohibited by this chapter.

70. "Violation" means the failure of a structure or other development to be fully compliant with this ordinance. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in this ordinance is presumed to be in violation until such time as that documentation is provided.

71. "Water surface elevation" means the height, in relation to the National Geodetic Vertical Datum (NGVD) of 1929 (or other datum, where specified) for floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas.

72. "Watercourse" means a lake, river, creek, stream, wash, arroyo, channel, or other topographic feature on or over which waters flow at least periodically. Watercourse includes specifically designated areas in which substantial flood damage may occur.

(Ord. No. G-8866, § 17, 11-5-19; Ord. No. G-9038, §§ 2—5, 9-14-21)

17.48.070 Lands to which this chapter applies.

This chapter shall apply to all areas of special flood hazards, areas of flood-related erosion hazards, and areas of mudslide (i.e., mudflow) hazards within the jurisdiction of unincorporated Kern County.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.080 Basis for establishing the areas of special flood hazard.

The areas of special flood hazard, areas of flood-related erosion hazards, and areas of mudslide (i.e., mudflow) hazards are as listed below:

A. Those identified by the Federal Insurance Administration (FIA) of the Federal Emergency Management Agency (FEMA) in the scientific and engineering report entitled Flood Insurance Study, Kern County, California, Unincorporated Areas dated September 29, 1986, with accompanying Flood Insurance Rate Maps and Flood Boundary and Floodway Maps dated September 29, 1986, and all subsequent amendments and/or revisions.

B. Those included in the Department of Water Resources, Division of Flood Management, State of California, Reclamation Board, Kern River Designated Floodway Maps for the following reaches:

1. Tupman to Golden State Highway, April 19, 1976.

2. Tupman to Tulare Lake, November 12, 1976.

3. Golden State Highway to Lake Isabella Dam, June 20, 1978.

4. Lake Isabella to Tulare County, November 19, 1981.

5. Lake Isabella to Sequoia National Forest, November 19, 1981.

C. Those included on parcel and tract maps within unincorporated Kern County.

D. Those flood hazard studies prepared by, or for, the floodplain administrator.

The flood, erosion, and mudslide hazards identified by the above maps and/or studies are hereby adopted by reference and declared to be a part of this chapter. These maps and/or studies are on file at the office of the floodplain administrator as established in Section 17.48.160. These maps and/or studies may be revised and amended from time to time and shall go into effect thereafter pursuant to the provisions of the applicable federal, state, or local law.

As a basis for establishing areas of special flood, erosion, and mudslide hazards other than those listed above and imposing the flood protection requirements of this chapter, the floodplain administrator, as established in Section 17.48.160, or his authorized agent, shall obtain, review, and reasonably utilize the best flood data available from any source (federal, state, or other), such as high water marks, floods of record, or private engineering studies, maps, and reports.

(Ord. No. G-8866, § 17, 11-5-19; Ord. No. G-9038, § 6, 9-14-21)

17.48.090 Compliance.

No structure or land shall hereafter be constructed, located, extended, converted, altered, or substantially improved nor shall land be graded for development without full compliance with the terms of this chapter and other applicable regulations. Violation of the requirements (including violations of conditions and safeguards established in connection with conditions) shall constitute a misdemeanor. Nothing herein shall prevent the floodplain administrator from taking such lawful action as is necessary to prevent or remedy any violation.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.100 Abrogation and greater restrictions.

This chapter is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this chapter and another ordinance, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.110 Interpretation.

In the interpretation and application of this chapter, all provisions shall be:

A. Considered as minimum requirements;

B. Liberally construed in favor of the governing body; and

C. Deemed neither to limit nor repeal any other powers granted under state statutes.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.120 Warning and disclaimer of liability.

The degree of flood protection required by this chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This chapter does not imply that land outside the areas of special flood hazards, areas of flood-related erosion hazards, and areas of mudslide (i.e., mudflow) hazards, or uses permitted within such areas will be free from flooding or flood damages. This chapter shall not create liability on the part of Kern County, any officer or employee thereof, or the Federal Insurance Administration, Federal Emergency Management Agency, for any flood damages that result from reliance on this chapter or any administrative decision lawfully made thereunder.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.130 Severability.

This chapter and the various parts thereof are hereby declared to be severable. Should any section of this chapter be declared by the courts to be unconstitutional or invalid, such decision shall not affect the validity of the chapter as a whole or any portion thereof other than the section so declared to be unconstitutional or invalid.

(Ord. No. G-8866, § 17, 11-5-19)

Article II. Administration

17.48.140 Establishment of development permit.

A development permit shall be obtained before any construction or other development begins within any area of special flood hazards, areas of flood-related erosion hazards, or areas of mudslide (i.e., mudflow) established in Section 17.48.080. Application for a development permit shall be made on forms furnished by the floodplain administrator and may include, but not be limited to: plans in duplicate drawn to scale showing the nature, location, dimensions, and elevation of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities; and the location of the foregoing. Specifically, the following information is required:

A. Proposed elevation in relation to mean sea level of the lowest floor (including basement) of all structures; in areas of shallow flooding, the elevation of highest adjacent upstream grade and proposed elevation of lowest floor of all structures;

B. Proposed elevation in relation to mean sea level to which any structure will be flood proofed;

C. All appropriate certifications listed in Section 17.48.210 of this chapter; and

D. Description of the extent to which any watercourse will be altered or relocated as a result of proposed development.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.150 Fees.

Subject to approval by the Board of Supervisors, the floodplain administrator may adopt and charge a reasonable schedule of fees for flood hazard evaluations, flood hazard evaluation updates, certification of elevation, variance to flood requirement, appeal to higher authority, and for the performance of special services by the Public Works Department in administering and enforcing this title.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.160 Designation of the floodplain administrator.

The director of the Public Works Department or authorized designee agent acting in the director's behalf is hereby appointed to administer and implement this chapter by granting or denying development permits in accordance with its provisions.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.170 Duties and responsibilities of the floodplain administrator.

The duties and responsibilities of the floodplain administrator shall include, but not be limited to those set out in Sections 17.48.180 through 17.48.230.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.180 Permit review.

A. Review of all permits to determine that the permit requirements of this chapter have been satisfied;

B. All other state and federal permits required to fulfill the purpose of Section 17.48.040 have been obtained;

C. The site, subdivision or other proposed new development is reasonably safe from flooding; and

D. For development activities proposed to be located in a Special Flood Hazard Area (SFHA) where base flood elevations are included in the Flood Insurance Study or on the Flood Insurance Rate Map (FIRM) but floodways have not been designated, hydrologic and hydraulic analyses that demonstrate that the cumulative effect of the proposed development, when combined with all other existing and anticipated flood hazard area encroachments, will not increase the base flood elevation more than one (1) foot at any point with in the community. See also Section 17.48.320 (Floodways).

E. For applications for building permits to improve buildings and structures, including alterations, movement, enlargement, replacement, repair, additions, rehabilitations, renovations, substantial improvements, repairs of substantial damage, and any other improvement of or work on such buildings and structures, the floodplain administrator, in coordination with the building official, shall:

    1. Estimate the market value, or require the applicant to obtain an appraisal of the market value prepared by a qualified independent appraiser, of the building or structure before the start of construction of the proposed work; in the case of repair, the market value of the building or structure shall be the market value before the damage occurred and before any repairs are made.

2. Compare the cost to perform the improvement, the cost to repair the damaged building to its pre-damaged condition, or the combined costs of improvements and repairs, when applicable, to the market value of the building or structure.

3. Determine and document whether the proposed work constitutes substantial improvement or repair of substantial damage.

4. Notify the applicant when it is determined that the work constitutes substantial improvement or repair of substantial damage and that compliance with the flood resistant construction requirements of the building code is required and notify the applicant when it is determined that work does not constitute substantial improvement or repair of substantial damage.

(Ord. No. G-8866, § 17, 11-5-19; Ord. No. G-9038, §§ 8, 9, 9-14-21)

17.48.185 Inspections.

Development within a special flood hazard area where a development permit is required shall be subject to inspection. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of these regulations or the building code. Inspections presuming to give authority to violate or cancel the provisions of these regulations or the building code or other ordinances shall not be valid.

A. The floodplain administrator shall make or cause to be made, inspections of all development other than buildings and structures that is authorized by issuance of a building permit for development in a SFHA under these regulations. The floodplain administrator shall inspect flood hazard areas from time to time to determine when development is undertaken without issuance of a permit.

B. The floodplain administrator shall make or cause to be made, inspections of installation and replacement of manufactured homes in flood hazard areas authorized by issuance of a development permit in a SFHA under these regulations. Upon installation of a manufactured home and receipt of the elevation certification required in these regulations the floodplain administrator shall inspect the installation or have the installation inspected.

C. The building official shall make or cause to be made, inspections for buildings and structures in SFHA authorized by a building permit, in accordance with the building code:

    1. Upon placement of the lowest floor, including the basement, and prior to further vertical construction, certification of the lowest floor elevation shall be provided in accordance with the Kern County Residential Code or the Kern County Building Code. The certification of elevation shall be prepared by a registered professional engineer, architect, or licensed land surveyor, or verified by the building official to be properly elevated. Such certification or verification shall be provided to the floodplain administrator.

    2. Upon completion of the structure, the elevation of the lowest floor, including basement and top of platform of equipment or machinery servicing the building, shall be certified by a registered professional engineer, architect, or licensed land surveyor, or verified by the building official to be properly elevated. Such certification or verification shall be provided to the floodplain administrator.

(Ord. No. G-9038, § 11, 9-14-21)

17.48.190 Use of other base flood data.

When base flood elevation data has not been provided in accordance with Section 17.48.080, the floodplain administrator shall obtain, review, and reasonably utilize any base flood elevation and floodway data available

from a federal, state, or other source, in order to administer Article III. Any such information shall be subject to review and approval by the floodplain administrator.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.200 Notification of Other Agencies.

Whenever a watercourse is to be altered or relocated:

A. Whenever a watercourse is to be altered or relocated:

1. Notify adjacent communities and the California Department of Water Resources prior to such alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Insurance Administration, Federal Emergency Management Agency;

2. Require that the flood carrying capacity of the altered or relocated portion of said watercourse be maintained.

B. Require technical or scientific data to be submitted to FEMA within six (6) months of the date the information becomes available when base flood elevations change due to physical alterations of the Special Flood Hazard Area.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.210 Information to be obtained and maintained.

Obtain and maintain for public inspection and make available as needed:

A. The certification required in Section 17.48.270(A) (floor elevations);

B. The certification required in Section 17.48.270(B) (elevations in areas of shallow flooding);

C. The certification required in Section 17.48.270(C) (elevation or flood proofing of nonresidential structures);

D. The certification required in Section 17.48.270(D) (wet flood proofing standard);

E. The certification required in Section 17.48.290(B) (subdivision standards);

F. The certification required in Section 17.48.320(A) (floodway encroachments);

G. The certification required in Section 17.48.330(A) (high hazard areas);

H. The reports required in Section 17.48.340 (mudslide areas).

I. The information required in Section 17.48.350 (flood-related erosion hazard areas).

(Ord. No. G-8866, § 17, 11-5-19)

17.48.220 Interpretation of hazard boundary locations.

Make interpretations, where needed, as to the exact location of the boundaries of the areas of special flood hazards, areas of flood-related erosion hazards, or areas of mudslide (i.e., mudflow); (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in Article V.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.230 Action to remedy violations.

Take action to remedy violations of this chapter as specified in Section 17.48.090 herein.

(Ord. No. G-8866, § 17, 11-5-19)

Article III. Provisions for Flood Hazard Reduction

17.48.240 Standards of construction.

In all areas of special flood hazard, the following standards set out in Sections 17.48.250 through 17.48.350 are required.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.250 Anchoring.

A. All new construction, substantial improvements and other proposed new development shall be adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.

B. All manufactured homes shall meet the anchoring standards of Section 17.48.300.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.260 Construction materials and methods.

A. All new construction, substantial improvements and other proposed new development shall be constructed with materials and utility equipment resistant to flood damage.

B. All new construction, substantial improvements and other proposed new development shall be constructed using methods and practices that minimize flood damage.

C. All new construction, substantial improvements and other proposed new development shall have electrical, heating, ventilation, plumbing, air conditioning equipment and other service facilities constructed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

D. Require within special flood hazard areas adequate drainage paths around structures on slopes to guide flood waters around and away from proposed structures.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.270 Elevations and flood proofing.

A. Except for areas of shallow flooding, new construction, substantial improvement and other proposed new development of any structure in a special flood hazard area shall have the lowest floor, including basement, elevated one foot above the base flood elevation. Nonresidential structures may meet the standards in Section 17.48.270 (C). Qualifying uninhabitable attached garages or storage rooms and accessory structures

(such as a shed or detached garages) may meet the elevation requirements of Section 17.48.270 (E). Certification of the lowest floor elevation shall be provided in accordance with the Kern County Residential Code or the Kern County Building Code. Upon completion of the structure, the elevation of the lowest floor, including basement and top of platform of equipment or machinery servicing the building, shall be certified by a registered professional engineer, architect, or licensed land surveyor, or verified by the building official to be properly elevated. Such certification or verification shall be provided to the Floodplain Administrator.

B. For areas of shallow flooding, new construction, substantial improvement and other proposed new development of any structure in a special flood hazard area shall have the lowest floor, including basement, elevated at least one (1) foot above the shallow flooding depth or depth number specified in feet on the Flood Insurance Rate Map (FIRM), or at least two (2) feet if no depth number is specified. The elevation is to be measured from the highest adjacent grade upstream of the structure. Nonresidential structures may meet the standards in Subsection 17.48.270(C). Qualifying uninhabitable attached garages or storage rooms and accessory structures (such as a shed or detached garage) may meet the requirements of Subsection 17.48.270(E). Certification of the lowest floor shall be provided in accordance with the Kern County Residential Code or the Kern County Building Code as adopted. Upon the completion of the structure, the elevation of the lowest floor, including basement and top of platform of equipment or machinery servicing the building, shall be certified by a registered professional engineer, architect, or licensed surveyor, or verified by the building official to be properly elevated. Such certification or verification shall be provided to the floodplain administrator.

C. Nonresidential construction shall either be elevated in conformance with Subsections 17.48.270(A) or (B) of this section or, together with attendant utility and sanitary facilities:

1. Be flood proofed one (1) foot above the base flood level so that the structure is watertight with walls substantially impermeable to the passage of water;

2. Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and

3. Be certified by a registered professional engineer or architect that the standards of this subsection are satisfied. Such certifications shall be provided to the floodplain administrator.

D. Require, for all new construction, substantial improvement and other proposed new development, that fully enclosed areas below the lowest floor that are usable solely for the parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of flood water. Designs for meeting this requirement must be either certified by a registered professional engineer or architect or meet or exceed the following minimum criteria:

1. Either a minimum of two (2) openings having a total net area of not less than one (1) square inch for every square foot of enclosed area subject to flooding (as indicated by the elevation requirements of this section) shall be provided, the bottom of the openings shall be no higher than one (1) foot above grade (openings may be equipped with screens, louvers, valves or other coverings or devices provided that they permit the automatic entry and exit of floodwater); or

2. Be certified to comply with a local flood proofing standard approved by the Federal Insurance Administration, Federal Emergency Management Agency.

E. For an uninhabitable attached garage or storage room on a residential structure usable solely for parking of vehicles, building access or storage in an area other than a basement, or for accessory structures (such as a shed or detached garage), not representing a significant investment as determined by the floodplain administrator in exercise of his reasonable discretion, may be allowed to have the finished floor of the attached garage, storage room or accessory structure built below the base flood elevation provided that conditions shall be imposed relating to the construction and use of such accessory structure, as follows:

1. Such structure shall be firmly anchored to prevent flotation, collapse, or lateral movement which may result in damage to other property.
2. Such structure shall be constructed with materials resistant to flood damage.
3. Such structure shall have mechanical, plumbing and electrical systems, including plumbing fixtures elevated to or above the base flood elevation.
4. Such structure shall have flood openings in accordance with the building code and shall be constructed by methods and practices that minimize flood damage. The structure should be constructed and placed on the building site so as to offer the minimum resistance to the flow of flood waters.
5. The structure shall not be used for human habitation, including, but not limited to, placement of laundry facilities, workshops, or other similar uses.
6. The structure shall comply with the requirements found in Section 17.48.270(D) above.
7. Detached garages and accessory storage structures used only for parking or storage are permitted below the base flood elevation provided the garages and accessory storage structures are one story and not larger than six hundred (600) square feet in are when located in a special flood hazard area.

F. Manufactured homes shall also meet the standards in Section 17.48.300.

(Ord. No. G-8866, § 17, 11-5-19; Ord. No. G-9038, § 12, 9-14-21)

17.48.280 Standards for utilities.

A. All new and replacement water supply and sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the system and discharge from systems into flood waters.

B. On-site waste disposal systems shall be designed and located to avoid impairment to them, or contamination from them, during flooding.

C. Other utilities are addressed at Sections 17.48.260 and 17.48.290.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.290 Standards for subdivisions.

A. All preliminary subdivision proposals shall identify the flood hazard areas and the elevation of the base flood consistent with this chapter.

B. All final subdivision plans will provide the elevations of proposed structure(s), and grading for pads. If the site is filled above the base flood elevations, the final pad elevation shall be certified by a registered professional engineer or surveyor and the certification provided to the floodplain administrator.

C. All subdivision proposals shall:

1. Be consistent with the need to minimize flood damage; and
2. Have public utilities and facilities, such as sewer, gas, electrical, and water systems, located and constructed to minimize flood damage; and
3. Provide adequate drainage to reduce exposure to flood hazards.

D. Where any portion of the proposed subdivision, including proposals for manufactured home parks or subdivisions, lies within a flood hazard, the subdivision has more than fifty (50) lots or is larger than five (5)

acres, and base flood elevations are not included on the FIRM, base flood elevations shall be determined in accordance with Section 17.48.190.

(Ord. No. G-8866, § 17, 11-5-19; Ord. No. G-9038, § 14, 9-14-21)

17.48.300 Standards for manufactured homes.

A. All manufactured homes that are placed or substantially improved within a special flood hazard area either outside of a manufactured home park or subdivision, in a new manufactured home park or subdivision, in an expansion to an existing manufactured home park or subdivision or in an existing manufactured home park or subdivision on which a manufactured home has incurred substantial damage as the result of a flood shall:

   1. Be elevated on a permanent foundation such that the top of the steel frame is one (1) foot above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist floatation, collapse, and lateral movement, or

   2. If the manufactured home is to be placed on an earth pad, the finished pad elevation shall be one (1) foot above the base flood elevation and the manufactured home must be securely anchored to an adequately anchored foundation system to resist floatation, collapse, and lateral movement.

B. All manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision in a special flood hazard area that are not subject to the provisions of Subsection 17.48.300(A) shall be securely anchored to an adequately anchored foundation system to resist floatation, collapse, and lateral movement and elevated so that either;

   1. The top of the steel frame, or the top of the finished pad when an earth pad is used to meet the elevation requirements, is one (1) foot above the base flood elevation, or

   2. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than thirty-six (36) inches in height above grade.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.310 Standards for recreational vehicles.

All recreational vehicles placed on sites within areas of special flood hazard will either:

A. Be on site for fewer than one hundred eighty (180) consecutive days;

B. Be fully licensed and ready for highway use; or

C. Meet the permit requirements of Article III of this chapter and the elevation and anchoring requirements for manufactured homes in Section 17.48.300.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.320 Floodways.

Located within areas of special flood hazard, established in Section 17.48.080, are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles, and erosion potential, the following provisions apply:

A. Prohibit encroachments, including fill, new construction, substantial improvements, and other proposed new development unless certification by a registered professional engineer or architect is

provided through hydrologic and hydraulic analyses demonstrating that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge.

B. If Subsection 17.48.320(A) is satisfied, all new construction, substantial improvements, and other proposed new development shall comply with all other applicable flood hazard reduction provisions of this chapter.

(Ord. No. G-8866, § 17, 11-5-19; Ord. No. G-9038, § 16, 9-14-21)

17.48.330 High hazard areas.

Located within areas of special flood hazard on alluvial fans, established in Section 17.48.080, are well-defined watercourses and overflow channels which are designated as severe flood hazard areas. Since the severe flood hazard area is an extremely hazardous area due to the severe and erratic lateral and vertical erosion potential from high velocity flood waters, the following provisions apply:

A. Prohibit encroachments, including fill, new construction, substantial improvements, and other proposed new development unless any flood protection measures are designed and certified by a registered professional engineer or architect as providing adequate slope, scour, and elevation protection, and that any encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge within the severe flood hazard area.

B. If Subsection 17.48.330(A) is satisfied, all new construction, substantial improvements, and other proposed new development shall comply with all other applicable flood hazard reduction provisions of this chapter.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.340 Mudslide (i.e., Mudflow) hazard areas.

A. The floodplain administrator shall review permits for proposed construction or other proposed new development to determine if it is proposed within a mudslide area as known to the community.

B. Permits shall be reviewed to determine that the proposed development is reasonably safe from mudslide hazards. Factors to be considered in making this determination include, but are not limited to:

1. The type and quality of soils;
2. Evidence of groundwater or surface water problems;
3. The depth and quality of any fill;
4. The overall slope of the site; and
5. The weight that any proposed development will impose on the slope.

C. Within areas which have mudslide hazards, the following requirements apply:

1. A site investigation and further review shall be made by persons qualified in geology and soils engineering;
2. Proposed new development shall be adequately designed and protected against mudslide damages;
3. The proposed grading, excavations, new construction, substantial improvements, and other proposed new development do not aggravate the existing hazard by creating either on-site or off-site disturbances; and

4. Drainage, planting, watering, and maintenance shall not endanger slope stability.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.350 Flood-related erosion hazard areas.

A. The floodplain administrator shall review all permits for proposed construction and other proposed new development within all flood-related erosion hazard areas as known to the community.

B. Such permits shall be reviewed to determine whether the proposed site alterations and improvements will be reasonably safe from flood-related erosion and will not cause flood-related erosion hazards or otherwise aggravate the existing hazard.

C. If a proposed improvement is found to be in the path of flood-related erosion or would increase the erosion hazard, such improvement shall be relocated or adequate protective measures shall be taken to avoid aggravating the existing erosion hazard.

(Ord. No. G-8866, § 17, 11-5-19)

Article IV. Variance Procedure

17.48.360 Nature of variances.

The variance criteria set forth in this Article are based on the general principle of zoning law that variances pertain to a piece of property and are not personal in nature. In general, a properly issued variance is granted for a parcel of property with physical characteristics so unusual that complying with the requirements of this chapter would create an exceptional hardship to the applicant or the surrounding property owners. The characteristics must be unique to the property and not be shared by adjacent parcels. The unique characteristic must pertain to the land itself, not to the structure, its inhabitants, or the property owners.

It is the duty of the Board of Supervisors of Kern County and the floodplain administrator to help protect its citizens from flooding. This need is so compelling, and the implications of the cost of insuring a structure built below flood level are so serious that variances from the flood elevation or other requirements in this chapter are quite rare. Therefore, the variance guidelines provided in this chapter are more detailed and contain multiple provisions that must be met before a variance can be properly granted. The criteria are designed to screen out those situations in which alternatives other than a variance are more appropriate.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.370 Authority and conditions to grant variances.

The floodplain administrator is empowered to grant variances from the terms of one or more regulations in this chapter in the following cases:

A. Variances may be issued for new construction, substantial improvements and other proposed new development to be erected on a lot of one-half (½) acre or less in size which is contiguous to and surrounded by lots with existing structures constructed below the regulatory flood elevation, providing that the procedures of Articles II and III of this chapter have been fully considered. As lot size increases beyond one-half (½) acre, the technical justification required for issuing the variance increases.

B. Variances may be issued for the repair or rehabilitation of Historic Structures (as defined in Article I of this chapter) upon determination that the proposed repair or rehabilitation will not preclude the

structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character of the structure.

C. Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.

D. Variances may be issued for new construction, substantial improvement and other proposed new development necessary for the conduct of a functionally dependent use provided that the provisions of Subsections 17.48.370(A) through (C) and Subsection 17.48.390(B) are satisfied and that the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

E. Variances may be issued for the construction or substantial improvement of agricultural structures that are not elevated or dry floodproofed, provided the requirements of this section are satisfied and:

1. A determination has been made that the proposed agricultural structure:

a. Is used exclusively in connection with the production, harvesting, storage, raising, or drying of agricultural commodities and livestock, or storage of tools or equipment used in connection with these purposes or uses, and will be restricted to such exclusive uses.

b. Has low damage potential.

c. Does not increase risks and pose a danger to public health, safety, and welfare if flooded and contents are released, including but not limited to the effects of flooding on manure storage, livestock confinement operations, liquefied natural gas terminals, and production and storage of highly volatile, toxic, or water-reactive materials.

d. Complies with the wet floodproofing construction requirements of Section 17.48.370(E)(2).

2. Wet floodproofing construction requirements.

a. Anchored to resist flotation, collapse, and lateral movement.

b. When enclosed by walls, walls have flood openings that comply with the flood opening requirements of Section 17.48.270(D).

c. Flood damage-resistant materials are used below the base flood elevation.

d. Mechanical, electrical, and utility equipment are elevated above the base flood elevation.

Upon consideration of the factors of Subsection 17.48.390(A) and the purposes of this chapter the floodplain administrator may impose other reasonable conditions on any variance mentioned in this section as deemed necessary to further the purposes of this chapter.

(Ord. No. G-8866, § 17, 11-5-19; Ord. No. G-9038, § 18, 9-14-21)

17.48.380 Special definitions.

For the purpose of this article, certain terms and words are defined as provided in this section:

A. "Applicant" means a person who has applied for a development permit or for approval of a subdivision map, parcel map, or variance.

B. "Application" means an application for a variance under this section.

C. "Board" means the Board of Supervisors of Kern County.

D. "Clerk" means the Clerk of the Board.

E. "Fraud and victimization" means that the variance granted must not cause fraud on or victimization of the public. In examining this requirement, the floodplain administrator will consider the fact that every newly constructed building adds to government responsibilities and remains a part of the community for fifty (50) to one hundred (100) years. Buildings that are permitted to be constructed below the elevation requirements of Section 17.48.260 are subject during all those years to increased risk of damage from floods, while future owners of the property and the community as a whole are subject to all the costs, inconvenience, danger, and suffering that those increased flood damages bring. In addition, future owners may purchase the property, unaware that it is subject to potential flood damage, and can be insured only at very high flood insurance rates.

F. "Hardship" means the hardship that would result from a failure to grant the requested variance. The floodplain administrator requires that the variance be exceptional, unusual, and peculiar to the property involved. Mere economic or financial hardship alone is not exceptional. Inconvenience, aesthetic considerations, physical handicaps, personal preferences, or the disapproval of one's neighbors likewise cannot, as a rule, qualify as exceptional hardships. All of these problems can be resolved through other means, without granting a variance. This is so even if the alternative means are more expensive or complicated than building with a variance, or if they require the property owner to put the parcel to a different use than originally intended, or to build elsewhere.

G. "Minimum necessary" means the minimum necessary to afford relief to the applicant of a variance with a minimum deviation from the requirements of this chapter. In the case of variances to an elevation requirement, this means the floodplain administrator need not grant permission for the applicant to build at grade, for example, or even to whatever elevation the applicant proposes, but only to that level that the floodplain administrator believes will both provide relief and preserve the integrity of this chapter.

H. "Public safety" and "nuisances" means the granting of a variance must not result in additional threats to public safety or create nuisances. This ordinance is intended to help protect the health, safety, well-being, and property of local citizens. This is a long range community effort made up of a combination of approaches such as adequate drainage systems, warning and evacuation plans, and keeping new property above the flood levels. These long-term goals can only be met if exceptions to the requirements of this chapter are kept to a bare minimum.

I. "Responsible authority" means the officer or body with the duty of issuing any permit or rendering any approval required under this chapter which is subject to the regulations as to which a variance is sought.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.390 Grounds for granting variance.

A. In passing upon an application for a variance, the floodplain administrator shall consider all technical evaluations, all relevant factors, standards specified in other sections of this chapter, and:

1. The danger that materials may be swept onto other lands to the injury of others;

2. The danger of life and property due to flooding or erosion danger;

3. The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the existing individual owner and future owners of the property;

4. The importance of the services provided by the proposed facility to the community;

5. The availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;

6. The compatibility of the proposed use with existing and anticipated development;

7. The relationship of the proposed use to the comprehensive plan and floodplain management program for that area;

8. The safety of access to the property in time of flood for ordinary and emergency vehicles;

9. The expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters expected at the site;

10. The costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water system, and streets and bridges.

B. The applicant for a variance shall show at the hearing thereon and before granting a variance, the floodplain administrator shall find:

1. That there is a good and sufficient cause for variance.

2. That failure to grant the variance would result in exceptional hardship to the applicant.

3. That the granting of such variance and any construction, improvement, development, or other action which may be undertaken under it will not:

a. Result in any increased flood heights, additional threats to the public safety, or extraordinary public expense;

b. Create any nuisance;

c. Cause fraud on or victimization of the public; or

d. Conflict with any other ordinance or regulation of the county of Kern.

4. That the extent of the variance is the minimum necessary to afford relief, considering the flood hazard.

C. It is recognized that, under Section 60.6(a)(6) of the National Flood Insurance Program Regulations, the county is required to make a biennial report, or as requested by the Federal Insurance Administrator, and report therein any variances which have been granted, and that said Administrator is empowered to review the findings justifying the granting of variances, and that if said Administrator determines that such variances show a pattern inconsistent with the objectives of sound floodplain management, said Administrator may take action under Section 59.24(b) of said Regulations to suspend eligibility of this County from the National Flood Insurance Program.

D. It is also recognized that, under Section 60.6(a) of said Regulations, the issuance of a variance is only for the purposes of application of the floodplain management regulations in this chapter, and that flood insurance rates are determined by statute according to actuarial risk and will not be modified by the granting of a variance, and that construction of a structure below the regulatory flood elevation, or otherwise inconsistently with the objectives of sound floodplain management, may result in flood insurance premium rates on such structure beyond the means of its owner, which are not modified by the granting of a variance.

E. For the reasons mentioned in Subsections (C) and (D) above, it shall be the policy of Kern County to give the provisions of this chapter a conservative construction and application, with the objective of avoiding, wherever feasible, the granting of any variance which would be inconsistent with the objectives of sound floodplain management or which may result in rendering residents of Kern County ineligible for flood insurance or which might place flood insurance beyond the means of the owner of a structure constructed under such variance.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.400 General provisions for variances.

A. If an application for a variance is filed before the responsible authority has acted on a related application for development permit, subdivision map, or parcel map, it shall not make a decision thereon nor issue such permit or approve such map until the floodplain administrator has made his determination with respect to the variance. By filing such application for variance, the applicant shall be deemed to have consented to extension of the time within which action is required to be taken on such application for permit or map for a period of at least thirty (30) days from and after the date of the floodplain administrator's determination with respect to the variance.

B. An application for a variance may be filed prior to the filing of an application for a development permit or submission of proposed subdivision map or parcel map, but in such case, the applicant for the variance shall furnish with the application for variance such information as the floodplain administrator may deem sufficient, in his reasonable discretion, to permit him to fully understand the application for variance and its effect in the context of the proposed development or subdivision, including, but not confined to, environmental information.

C. If the floodplain administrator determines that insufficient information has been provided to comply with any rules adopted pursuant to subsection (D) below or to permit him to fully understand the application for variance and its effect in the context of the proposed development or subdivision (including, but not confined to, its environmental effect), he is empowered to make an order requiring the applicant to furnish such information and to delay or continue the hearing until a reasonable time after such information has been furnished.

D. The floodplain administrator may, from time to time, adopt reasonable rules relating to the information to be furnished by the applicant for a variance.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.410 Procedure for filing and processing application for variance.

An application shall be filed and processed in the following manner:

A. An application for a variance shall be filed with the floodplain administrator and shall be in writing on such form as the floodplain administrator may, from time to time, approve.

B. An application shall be signed by the applicant or his authorized agent.

C. The application shall identify the regulation or regulations as to which the variance is applicable and shall briefly state the facts which give rise to a good and sufficient cause for the variance. The application shall set forth the address for purposes of giving notice and the telephone number of the applicant or his authorized agent.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.420 Fixing date of hearing; Notice of hearing.

A. The floodplain administrator shall fix a date and time for hearing on such variance which shall be within fifteen (15) days after the filing of such application unless the applicant consents to a delay or continuance.

B. The floodplain administrator shall cause notice to be given of the date, time, and place of the hearing on such application for variance at least one (1) week prior thereto as follows:

1. By mailing a copy of such notice by ordinary U.S. mail to the address set forth in the application;

2. By mailing a copy of such notice to any person who has requested it and who has furnished the floodplain administrator with a stamped, pre-addressed envelope for such purpose;

3. By sending a copy of such notice to any other responsible authority; and

4. By posting a copy of such notice on the bulletin board adjacent to the Chambers of the Board.

C. As an alternative to the notice required by subparagraphs (1), (2), or (3) of this section, the floodplain administrator may give such notice by causing personal delivery of a copy to the person entitled thereto not less than seventy-two (72) hours before the time fixed for hearing.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.430 Conduct of hearing; Decision.

A. The floodplain administrator shall hear the application for variance and consider evidence presented by the applicant, the responsible authority, and any interested person at the time and place fixed in the notice for hearing.

B. With consent of the applicant, the floodplain administrator may continue the hearing from time to time.

C. Within fifteen (15) days after conclusion of the hearing, the floodplain administrator shall declare his findings and decision and shall promptly transmit and post copies of same in the manner provided for notices in Subsection 17.48.420(B) above.

D. If the variance is granted, the floodplain administrator shall also send to the applicant, in the manner mentioned in Section 17.48.420(C) above, a notice over the signature of the floodplain administrator that:

1. The issuance of a variance to construct a structure below the regulatory flood elevation will result in increased premium rates for flood insurance up to amounts as high as twenty-five dollars ($25.00) for one hundred dollars ($100.00) of insurance coverage;

2. Such construction below the regulatory flood elevation increases risk to life and property; and

3. Any other relevant information prescribed by the floodplain administrator; and

4. A copy of such notice shall be maintained with the record of the variance action mentioned in paragraph (E) following.

5. A copy of such notice shall be recorded by the floodplain administrator in the Office of the Kern County Recorder and shall be recorded in a manner so that it appears in the chain of title of the affected parcel of land.

E. The floodplain administrator shall maintain a record of all variance actions by the floodplain administrator or by the Board of Supervisors in connection with any appeal to it relating to a variance. Such record shall include the findings or other justifications for issuance of each variance. The floodplain administrator shall also report each variance issued in the annual report submitted to the Federal Insurance Administration, Federal Emergency Management Agency.

F. Action or non-action of the floodplain administrator on an application for variance shall be subject to appeal under Article V.

(Ord. No. G-8866, § 17, 11-5-19)

Article V. Appeals

17.48.440 Authority to consider appeals.

The Board of Supervisors is empowered to hear appeals and grant relief thereon as provided in this article.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.450 Special definitions.

For the purpose of this article, certain terms and words are defined as provided in this paragraph:

A. "Appeal" means a request for a review of the floodplain administrator's interpretation of any provision of this chapter including the application for a hearing on appeal as well as the appeal process.

B. "Applicant" means a person who has applied for a development permit or for approval of a subdivision map, parcel map, or variance.

C. "Board" means the Board of Supervisors of Kern County.

D. "Responsible authority" means the officer or body with the duty of issuing any permit or rendering any approval or which has a duty, power, or discretion under this chapter, which is subject of the appeal.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.460 Grounds for granting appeal and related policies.

A. The appellant shall show at the hearing thereon, and before granting relief on appeal the Board shall find:

1. Interpretation by the responsible authority of one or more regulations mentioned in this chapter was unreasonable or arbitrary; or

2. Action taken or a decision by the responsible authority under this chapter was unreasonable or arbitrary; or

3. Failure to act by the responsible authority pursuant to this chapter was unreasonable or arbitrary.

B. The Board may refuse to grant relief on appeal with respect to any matter which should have been preliminarily considered under Article IV as a variance application.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.470 Procedure for filing and processing appeal.

A. Any applicant who is dissatisfied with any action, decision, or non-action of a responsible authority may appeal to the Board at any time. Any interested person adversely affected by any decision of a responsible authority may appeal to the Board within fifteen (15) days after such decision.

B. Each appeal shall be filed with the responsible agency and shall be in writing on such form as the Board may, from time to time, approve or if none, then on a form prescribed by the responsible authority.

C. Each appeal shall be signed by the appellant or his authorized agent.

D. The appeal shall identify the application for development permit or the subdivision or parcel map as to which issuance or approval is sought and shall identify the regulation which relates thereto and shall briefly state the facts which give rise to good and sufficient cause for granting relief on appeal. The appellant shall set

forth the address for purposes of giving him notice and the telephone number of the appellant or his authorized agent.

E. If in addition to the responsible authority with which the appeal is filed, the action or non-action of any other responsible authority is also subject to such appeal, the appeal shall identify each such other responsible authority, in which case the one with which such application is filed shall promptly send a copy of it to each such other responsible authority. The Board is empowered to refuse to grant any appeal relating to the action or non-action of a responsible authority if the appeal failed to identify it.

F. The responsible authority shall promptly forward such appeal to the Clerk.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.480 Fixing date of hearing; Notice of hearing.

The Clerk shall fix a date and time for a hearing on such appeal which shall be within fifteen (15) days after the filing of the appeal or at the next succeeding regular meeting of the Board after fifteen (15) days unless the applicant and appellant (if one other than the applicant) join in consent to a delay or continuance. If the Clerk fails to fix a date and time for hearing, the Board shall do so. The Clerk shall cause notice to be given of the date, time, and place of the hearing on the appeal at least one (1) week prior thereto, as follows:

A. By mailing a copy of such notice to the appellant at the address set forth in the appeal, by ordinary U.S. mail;

B. By mailing a copy of such notice to the applicant (if one other than the appellant) by ordinary U.S. mail;

C. By mailing a copy of such notice to any person who has requested it and who has furnished the Clerk with a stamped, pre-addressed envelope for such purposes; and

D. By posting a copy of such notice on the bulletin board adjacent to the Chambers of the Board.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.490 Conduct of Hearing—Decision.

A. The Board shall hear the appeal and consider evidence presented by the appellant, the responsible authority, and any interested person at the time and place fixed in the notice of hearing.

B. With the consent of the appellant, the Board may continue the hearing from time to time.

C. Within fifteen (15) days after conclusion of the hearing, the Board shall declare its findings, if any, and decision. The Clerk shall promptly transmit and post copies of same in the manner provided for notices in Section 17.48.480.

D. If relief on appeal is granted, the floodplain administrator shall send to the applicant, in the manner mentioned in Subsection 17.48.420(C), a notice over the signature of the floodplain administrator that:

1. The issuance of a variance to construct a structure below the regulatory flood elevation will result in increased premium rates for flood insurance up to amounts as high as twenty-five dollars ($25.00) for one hundred dollars ($100.00) of insurance coverage;

2. Such construction below the regulatory flood elevation increases risk to life and property; and

3. Any other relevant information prescribed by the floodplain administrator; and

4. A copy of such notice shall be maintained with the record of the variance action mentioned in subparagraph (D) following.

5. A copy of such notice shall be recorded by the floodplain administrator in the Office of the Kern County Recorder and shall be recorded in a manner so that it appears in the chain of title of the affected parcel of land.

E. The Clerk shall maintain a record of all actions taken by the Board on appeals.

(Ord. No. G-8866, § 17, 11-5-19)

17.48.500 Precedence.

This chapter shall take precedence over less restrictive conflicting ordinances or parts of ordinances. The Board of Supervisors of the county of Kern may, from time to time, amend this chapter to reflect any and all changes in the statutes authorizing the National Flood Insurance Program that are incorporated in 42 U.S.C. Sections 4001 through 4128, or in the National Flood Insurance Program Regulations. The regulations of this chapter are intended to be in compliance with the National Flood Insurance Program Regulations, Parts 59 and 60 of Title 44 of the Code of Federal Regulations.

(Ord. No. G-8866, § 17, 11-5-19)

RB INYOKERN DATA CENTER

Application for Small Power Plant Exemption (SPPE)

Inyokern, Kern County, California

Docket Number - 26-SPPE-01

Supporting Document Appendix E

Subsection(s):

- E.2 - Nitrogen Study

RB Inyokern Data Center

Valley Wide Engineering & Construction, Inc.

82740 Trona Road
Trona, CA 93562

March 2026

Prepared by:

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Nitrogen Deposition Analysis

Nitrogen Deposition Analysis

Prepared for:

RB Inyokern Data Center

Valley Wide Engineering & Construction, Inc.
82740 Trona Road
Trona, CA 93562

March 2026

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Table of Contents

Table of Appendices

List of Figures

List of Tables

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List of Acronyms and Abbreviations

AERMOD	American Meteorological Society (AMS)/ Environmental Protection Agency (EPA) Regulatory Model
AMS	American Meteorological Society
CCR	California Code of Regulations
CEC	California Energy Commission
DEF	Diesel Exhaust Fluid
DPF	Diesel Particulate Filter
EPA	Environmental Protection Agency
ha	Hectare
kg	Kilograms
MW	Megawatt
N	Nitrogen
NH_3	Ammonia
NO_x	Nitrogen oxides
RBIDC	RB Inyokern Data Center
SCR	Selective Catalytic Reduction
SPPE	Small Power Plant Exemption

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Nitrogen Deposition Analysis

1.0 INTRODUCTION

Yorke Engineering LLC prepared this nitrogen deposition analysis for Valley Wide Engineering & Construction, Inc., in conjunction with R&L Capital, Inc. who is proposing the RB Inyokern Data Center (RBIDC), a 99-megawatt (MW) data center located in Inyokern, CA. The RBIDC will be electrically interconnected to the regional transmission grid, but it will also have redundant electrical capacity to operate independently in the event the primary power supply is interrupted.

The facility will include forty (40) 3-MW Caterpillar diesel-fired generators equipped with selective catalytic reduction (SCR) systems, diesel exhaust fluid (DEF), and diesel particulate filters (DPFs) to comply with Tier 3 emissions standards. Under typical backup operation, when all generators are active, the maximum load on each generator will be designed to be 80% of peak capacity.

As the project proposes 99 MW of backup thermal power, the project's environmental impacts will be reviewed by the California Energy Commission (CEC) through a Small Power Plant Exemption (SPPE) application.

The CEC requires SPPE applications include an analysis of the nitrogen deposition and the potential impacts to sensitive habitat or species if there are any within 6 miles of the project site.

This report presents an evaluation of the potential impacts to listed species and associated habitats due to increased nitrogen deposition resulting from the proposed Project. This analysis determined that project related nitrogen emissions from the engines do not cause a significant impact to the nearby sensitive habitat or species.

1.1 Facility Location

The RBIDC project is located to the east of the town of Inyokern surrounded by desert with minimal development to the north, east and south. The Inyokern area is classified as desert based on conditions typical of desert areas, including low precipitation, arid soils, and desert-adapted plants and vertebrate species.

Figure 1-1 shows the areas where sensitive species have been observed during project surveys within 6 miles of the project. Figure 1-2 shows the potential Mohave Ground Squirrel and Desert Tortoise habitat overlap with the facility property. Figure 1-3 shows the vegetation in the surrounding area.

These figures identify that there are sensitive habitats and species such as Le Conte's Thrasher, Mohave Ground Squirrel, and Desert Tortoise in the area immediately surrounding the project site.

Figure 1-4 shows the proposed layout for the site.

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Figure 1-1: Facility Location and Observed Nearby Sensitive Habitat and Species

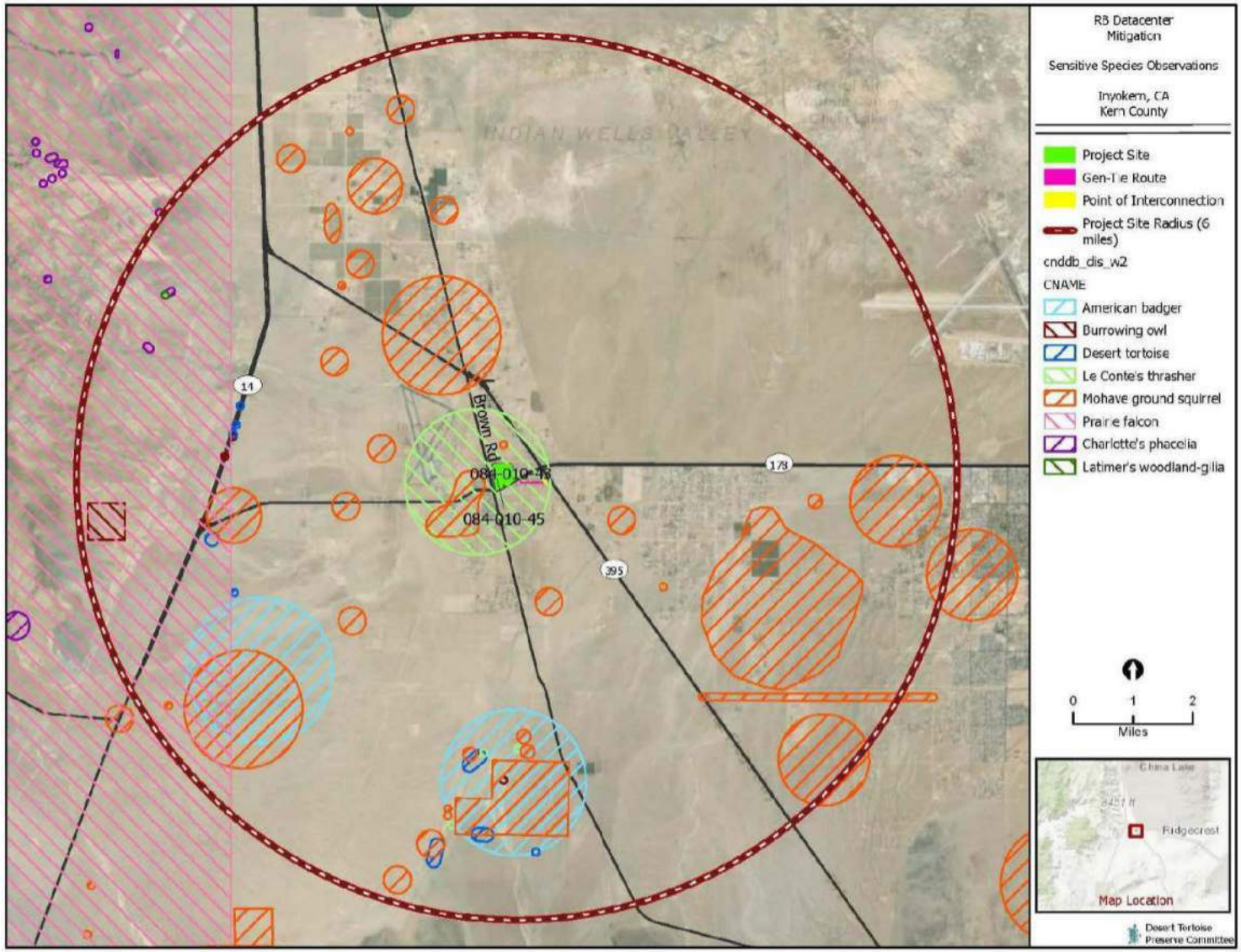

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Figure 1-2: Potential Mohave Ground Squirrel and Desert Tortoise Habitat

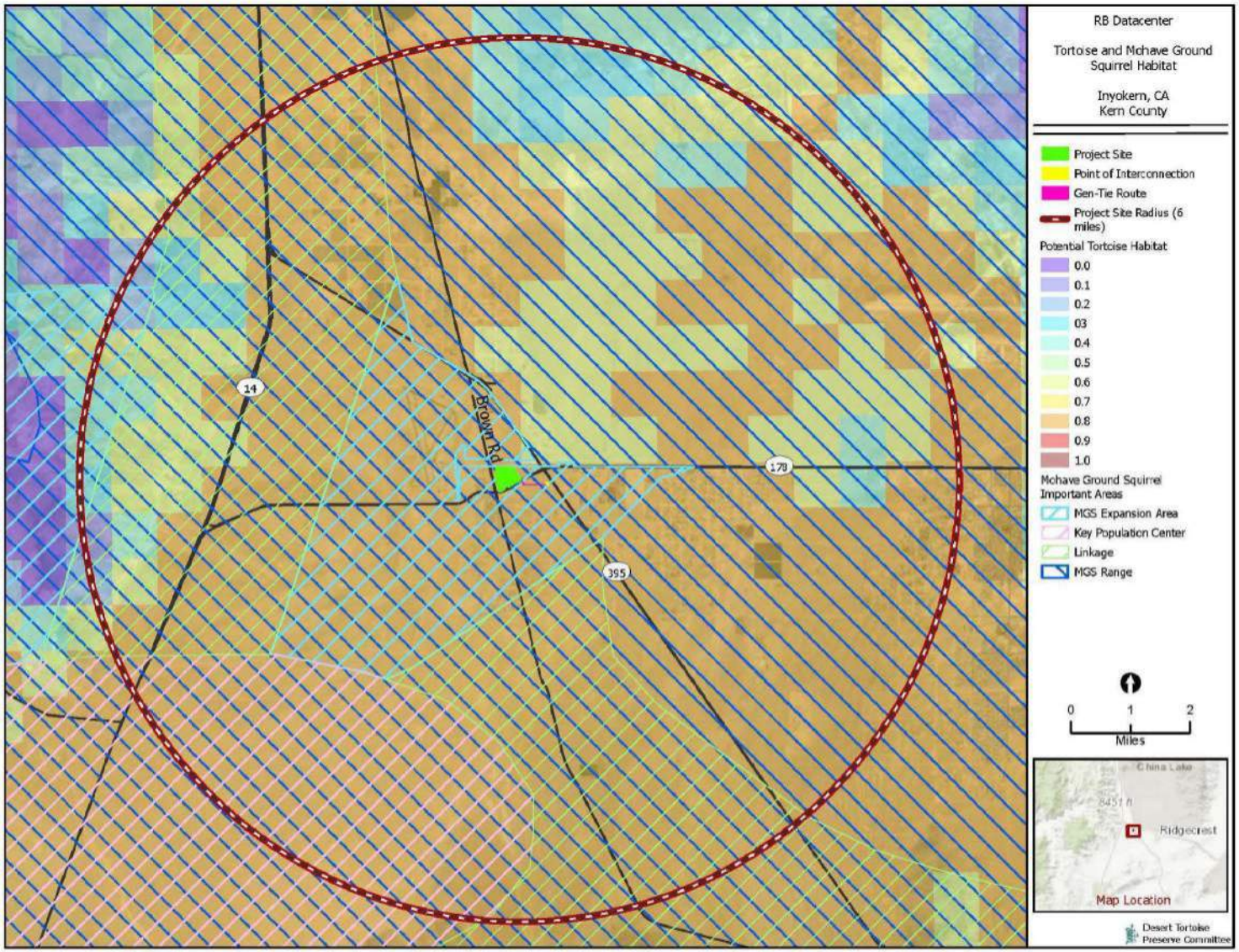

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Figure 1-3: Vegetation Near Project Site

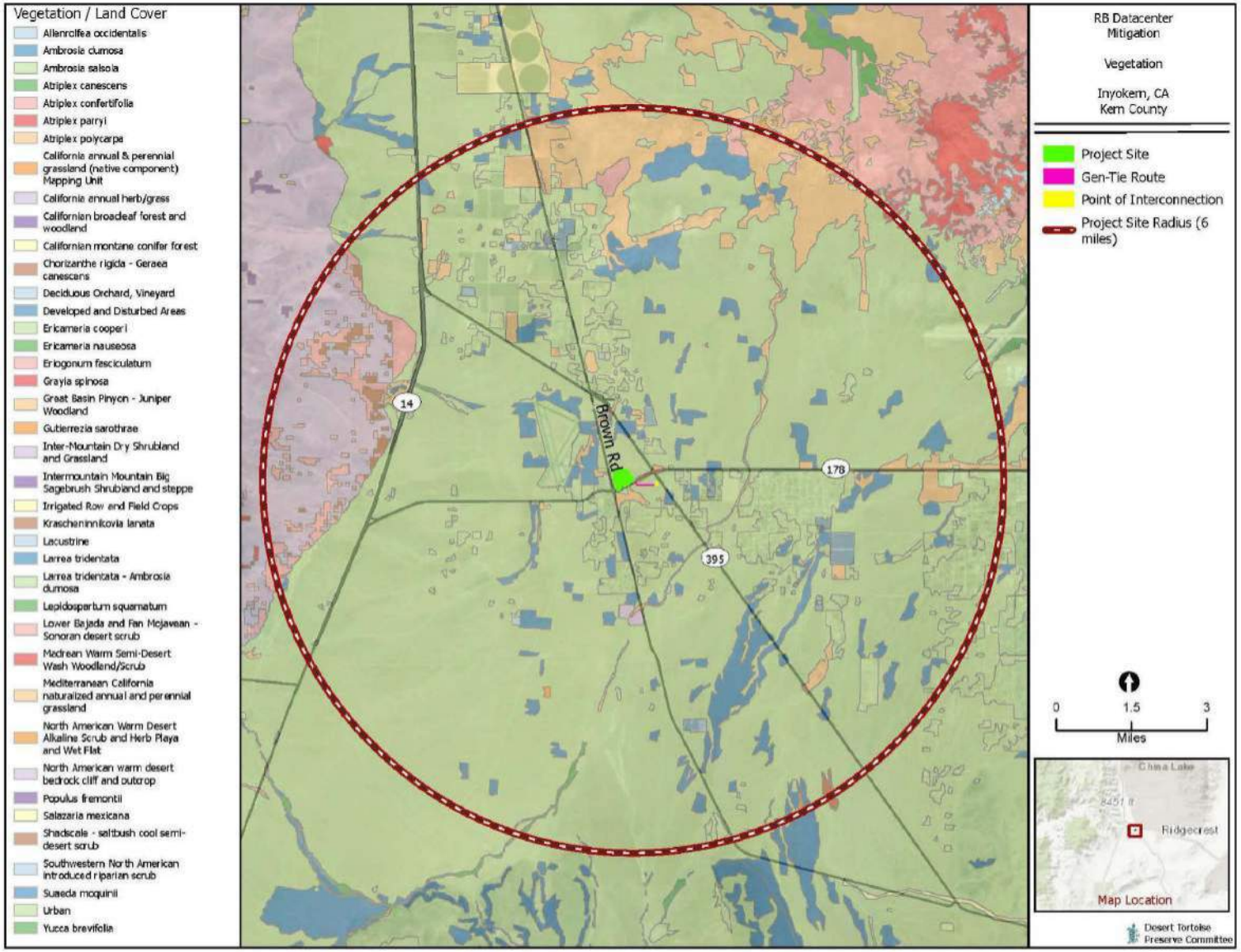

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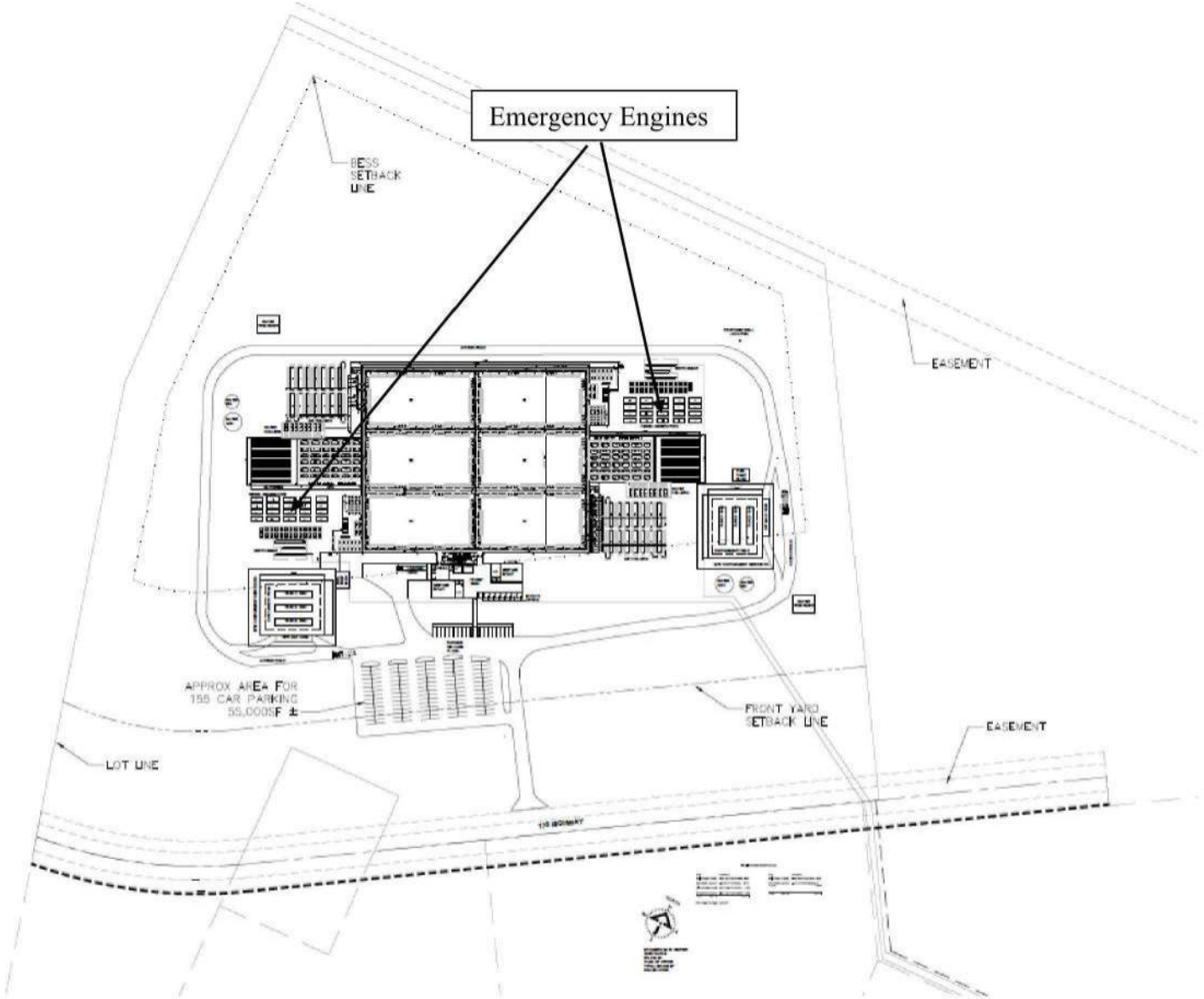
Figure 1-4: Proposed Facility Layout



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2.0 NITROGEN DEPOSITION ANALYSIS

This study examines nitrogen deposition on lands surrounding the Project caused by operational emissions of nitrogen oxides (NO_x) and ammonia (NH_3). Nitrogen deposition is the input of nitrogen from the atmosphere to the biosphere. Excessive nitrogen deposition is strongly correlated with the growth of non-native vegetation and field studies have found that nitrogen fertilization in sites with elevated nitrogen deposition will enhance grass invasion (Brooks 2003). Exotic annual grass invasion is a concern in the desert because these grasses compete with native annuals leading to a loss of diversity and vegetation-type conversion. Another concern of vegetation-type conversion is the increase in fine fuel that promotes fire.

Mechanisms by which nitrogen deposition can lead to impacts on sensitive species include direct toxicity, changes in species composition among native plants, and enhancement of invasive species (Fenn et al 2003; Weiss 2006a). The increased susceptibility of plants (or animal) species to stresses and disturbances, induced by enhanced atmospheric nitrogen loads, is highly dependent upon the major differences in the physiological function of individual species (Bobbink 2009).

The increased dominance and growth of invasive annual grasses is especially prevalent in low-biomass vegetation communities that are naturally nitrogen-limited, such as coastal sage scrub, serpentine grassland, desert scrub, and sand dunes (Weiss 2006a). In these soils, native plant species have adapted to such limiting factors as the salt content and high pH found in alkali desert soils; the introduction of mineralized nitrogen has been shown to result in the establishment and growth of nitrophilic invasive nonnative plants in these nutrient-poor environments (i.e., serpentine endemic plants) (Weiss 1999, 2006b). Soil nitrogen addition increased the dominance of nonnative annual grasses in nutrient-poor soils of the Mojave Desert scrub communities (Brooks 2003).

These studies, especially the desert studies by Brooks, suggest that vegetation communities similar to those present around the Project area can be adversely affected by increased nitrogen deposition through decreases in diversity and increases in susceptibility to non-native annual grass invasion. The land surrounding the Project area is comprised of communities similar to the desert environments described above as susceptible to nitrogen deposition.

2.1 CEC Significance Threshold

Many studies have attempted to quantify the critical load or rate at which nitrogen deposition begins to result in adverse effects on nitrogen-sensitive ecosystems. In previous power plant studies licensed by the Energy Commission, starting in 2007 (CEC 2007) as well as a California-wide study of nitrogen deposition (Weiss 2006a), 5 kg/ha/yr has been used as a benchmark for analyzing nitrogen deposition impacts to plant communities.

For the purpose of this nitrogen deposition modeling, the 5 kg/ha/yr benchmark will be utilized.

2.2 Modeling Methodology

Nitrogen oxides are formed by a series of several complex chemical reaction which occur between different ambient nitrogen compounds and solar radiation in the atmosphere. The formation of these compounds is dependent on the nitrogen species, the original nitrogen source, and the atmospheric conditions. Oxidation may occur within the first kilometer from the source, or tens of kilometers to hundreds of kilometers downwind of the nitrogen source. Nitric acid vapor or nitrate particulates may be formed in the atmosphere as a result of atmospheric reactions. These pollutants

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can be removed by precipitation, which is called wet deposition, or be removed by direct uptake by vegetation and surfaces themselves, which is called dry deposition.

The air dispersion model that was used is the American Meteorological Society (AMS)/ Environmental Protection Agency (EPA) Regulatory Model (AERMOD). AERMOD is a steady-state Gaussian plume dispersion model that incorporates air dispersion calculations based on planetary boundary layer turbulence structure and scaling concepts. AERMOD, like most dispersion models, uses mathematical algorithms to characterize the atmospheric processes that disperse pollutants emitted by a source. Using emission rates, exhaust parameters, terrain characteristics, and meteorological inputs, AERMOD calculates downwind pollutant concentrations at specified receptor locations.

The AERMOD model was used to estimate total nitrogen deposition from the Project emissions. AERMOD does not incorporate chemical transformation into its deposition algorithms. The dispersion model uses deposition algorithms developed by Argonne National Laboratory and subsequent peer review (EPA 2004). AERMOD is a conservative for modeling deposition rates for many reasons, including that the model conserves pollutant mass, which does not account for loss from chemical reaction or plume depletion.

This analysis conservatively assumed that all of the nitrogen from the engines' NO_x and NH_3 emissions convert to nitrogen emissions that would be directly available immediately for deposition. Maximum annual NO_x and NH_3 emissions from the Project area were estimated. Annual NO_x and NH_3 emissions for the 40 diesel-fired generators were calculated based on vendor guaranteed emissions for 50 hours of testing per year. NH_3 emissions are based on a maximum ammonia slip rate of 10 ppm. Based on molecular weight of each pollutant, the nitrogen portion for each nitrogen compound was summed and modeled with AERMOD to obtain predicted nitrogen deposition rates. Detailed emission calculations are presented in Appendix A.

AERMOD calculated dry, wet, and total deposition by calculating the dry and wet flux of nitrogen. Deposition parameters used in AERMOD were based on nitric acid, which of all nitrogen species has the most impact on soils and vegetation, as it is highly soluble in water and has a tendency to deposit more readily than most other compounds. All parameters used in the AERMOD modeling are included in Appendix B, including seasonal categories for each month, land use categories, pollutant deposition parameters, source parameters, and meteorological data.

Figure 2-1 shows the AERMOD configuration of the sources, buildings, and property line, and Figure 2-2 shows the receptor grid extending out to 6 miles, which includes the sensitive habitat areas shown in figures 1-1 and 1-2.

Modeling files will be provided electronically to CEC upon request.

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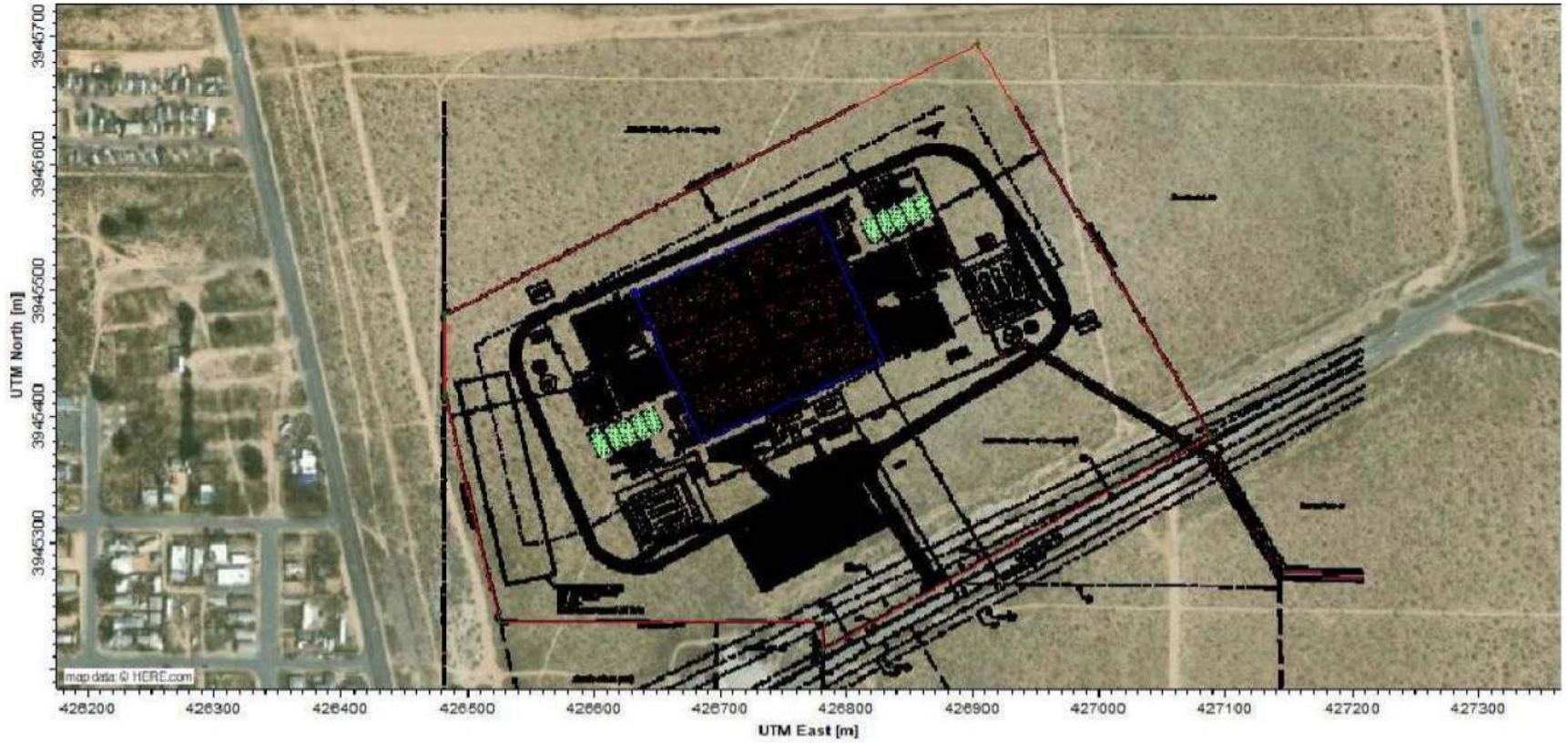
Figure 2-1: Modeling Configuration – Near View



Plant Boundary .....Red Solid Line
Buildings.....Dark Blue Solid Lines
Point Sources .....Light Green Crosses
Fenceline Receptors .....Green Crosses
Receptor Grid .....Light Blue Crosses

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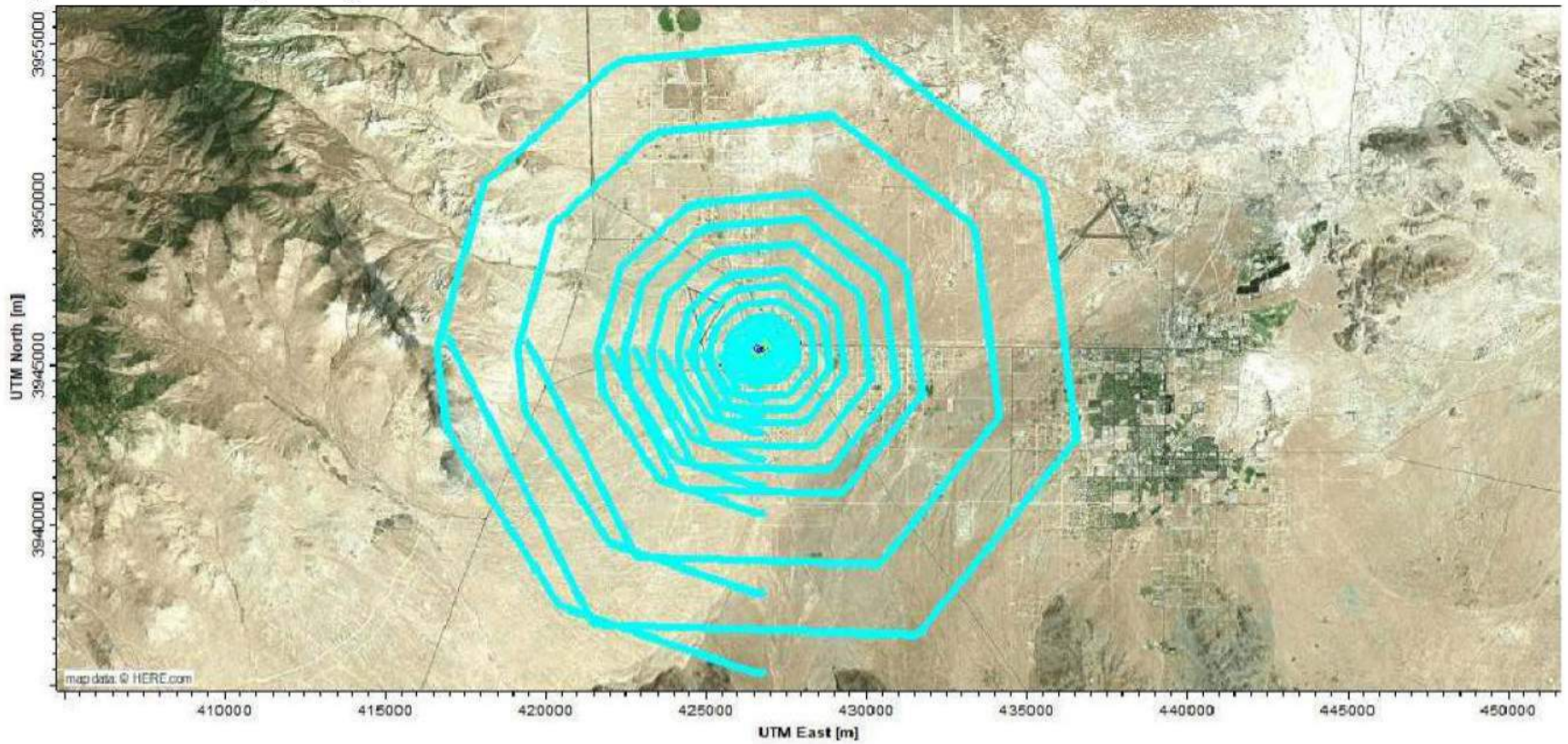
Figure 2-2: Modeling Configuration – Far View



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Buildings.....Dark Blue Solid Lines
Point Sources .....Light Green Crosses
Fenceline Receptors .....Green Crosses
Receptor Grid .....Light Blue Crosses

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2.3 Results

Figure 1-1 shows that the sensitive species, Le Conte's Thrasher, was observed within the project site. Figure 1-2 identifies that there may be sensitive species, such as Mohave Ground Squirrel and Desert Tortoise in the area surrounding the project site.

The peak nitrogen deposition rate was predicted to occur on the northeastern property line, and the deposition rate decreases rapidly. Figure 2-3 presents the nitrogen deposition rate isopleths and the nearby sensitive areas while Figure 2-4 presents a near view image of the nitrogen deposition rate isopleths.

Table 2-1 presents the maximum model predicted dry, wet, and total nitrogen deposition. Since the sensitive species Le Conte's Thrasher, Mohave Ground Squirrel, and Desert Tortoise could be found at the project site, it is assumed that all of these species could be exposed to the maximum predicted nitrogen deposition rate.

Table 2-1: Maximum Predicted Nitrogen Deposition Rates

Sensitive Habitat or Species	Dry Nitrogen Deposition (kg/ha-yr)	Wet Nitrogen Deposition (kg/ha-yr)	Total Nitrogen Deposition (kg/ha-yr)
Le Conte's Thrasher, Mohave Ground Squirrel, and Desert Tortoise	1.76	0.0026	1.76

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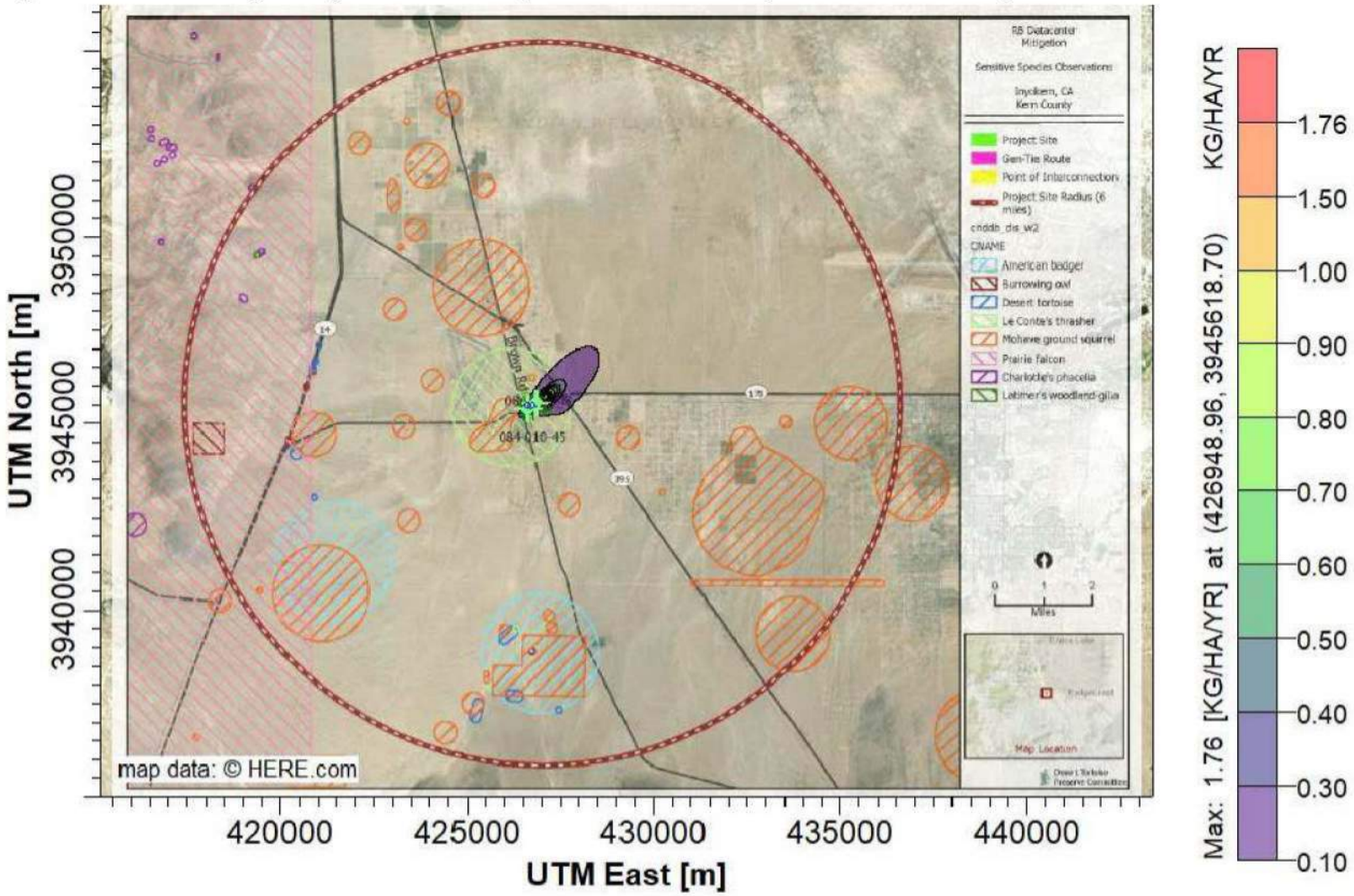
Figure 2-3 Total Nitrogen Deposition Rate Isopleth from RBIDC Operations and Nearby Sensitive Areas



Plant Boundary .....Red Solid Line
Buildings.....Dark Blue Solid Lines
Point Sources .....Green Crosses

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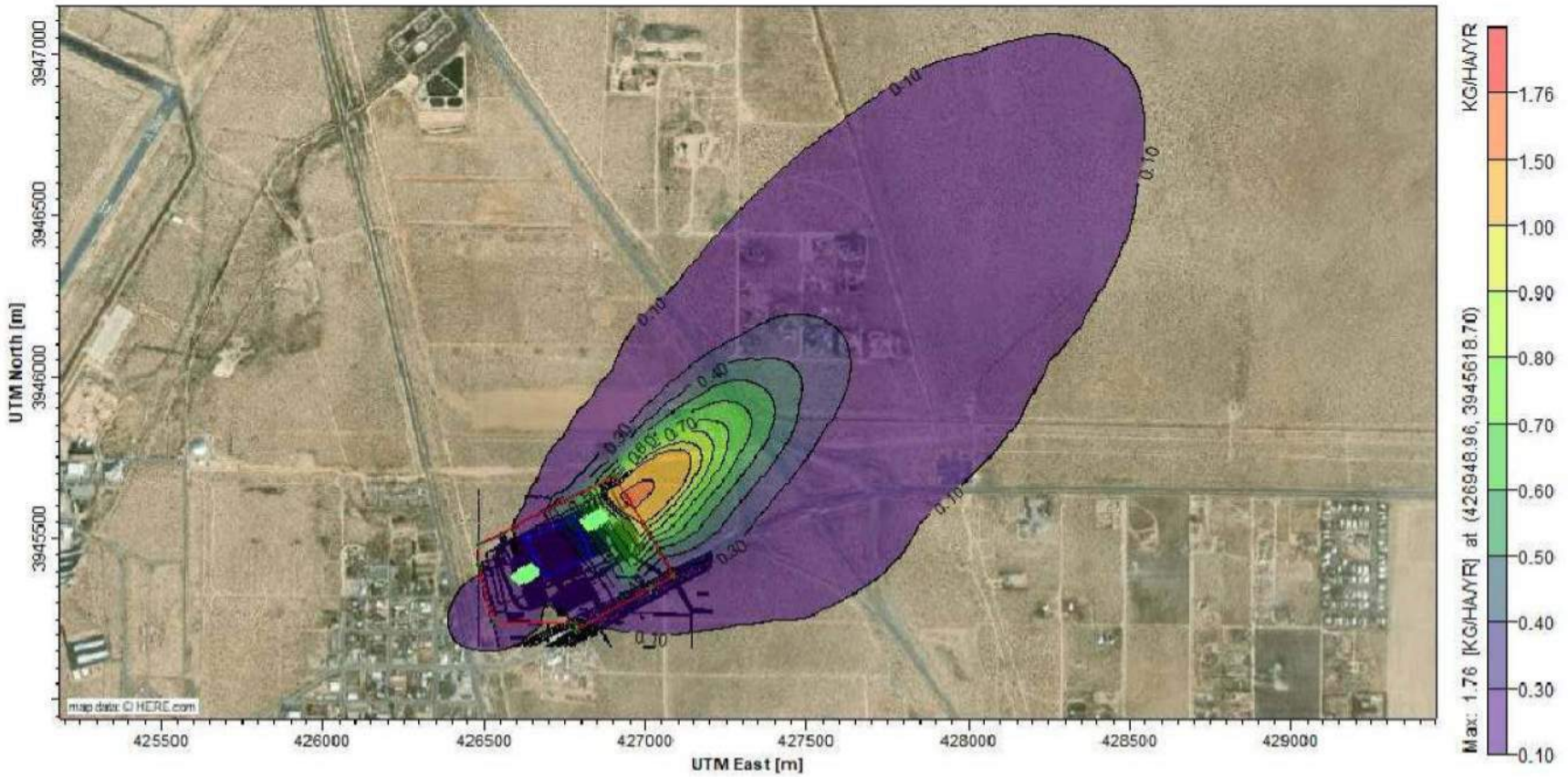
Figure 2-4 Total Nitrogen Deposition Rate Isopleth from RBIDC Operations – Near View



Plant Boundary .....Red Solid Line
Buildings.....Dark Blue Solid Lines
Point Sources .....Green Crosses

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3.0 CEC BIOLOGICAL RESOURCES

To meet the SPPE requirements outlined in California Code of Regulations (CCR) Title 20, Division 2, Chapter 5, Appendix B (g)(13) (CCR 2026), the biological resources analysis needs to include the following aspects related to the nitrogen deposition analysis:

> (B)(ii) Provide an aerial map of the isopleth graphic depicting modeled nitrogen deposition rates. The geographical extent of the nitrogen deposition map(s) should include the entire plume and a radius of 6 (six) miles from the source, specifically identifying acres of sensitive habitat(s) within each isopleth. Modeling parameters and files shall be provided.
>
> (C)(ii) Perform nitrogen deposition modeling including the complete citation for references used in determining deposition rates and location. Specify the amount of total annual nitrogen deposition in kilograms of nitrogen per hectare per year (kg N/ha/yr) in special status species habitats and vegetation types for wet and dry deposition. Describe habitat and species potentially affected.
>
> (E) Impacts discussion of all impacts (direct, indirect, and cumulative) to biological resources from project site preparation, construction activities, plant operation, maintenance, closure, and decommissioning. Discussion shall also address sensitive species habitat impacts from air emissions (i.e., nitrogen deposition).

Figure 2-3 shows the nitrogen deposition isopleths predicted from the modeling analysis and the sensitive species habitat out to 6 miles. The parameters used in the modeling analysis are provided in Appendix B. The electronic modeling files will be provided to CEC staff upon request.

Section 2.4 describes the wet, dry, and total deposition rate as predicted by AERMOD and the areas near the project that could contain sensitive habitat and/or species.

The construction and decommissioning phases are temporary, with NO_x emissions that are significantly less than the operational emissions, due to the use of Tier 4 construction equipment. As such, the operational phase modeling presented in this report represents the worst-case scenario for nitrogen deposition impacts.

Figure 3-1 shows the background nitrogen deposition level (Tonnesen 2007) is less than 3 kg/ha-yr at the project site. The combination of the maximum project-related predicted nitrogen deposition and the background is less than the 5 kg/ha-yr CEC threshold.

Background deposition rates are identified to be 3 to 5 kg/ha-yr (or an average of 4 kg/ha-yr) approximately 2 kilometers northeast of the facility (Figure 3-1), and at this location the project-related nitrogen deposition was predicted to be 0.08 kg/ha-yr. Thus, the combination of the background and modeled nitrogen deposition at this alternative location is less than the 5 kg/ha-yr CEC threshold.

As the deposition rates predicted in each area that could contain a sensitive species are below the CEC significance threshold of 5 kg/ha-yr including background deposition rates, there are zero acres of sensitive habitat that are negatively impacted.

Therefore, the project will have a less than significant nitrogen deposition impact on sensitive habitat and species in the region.

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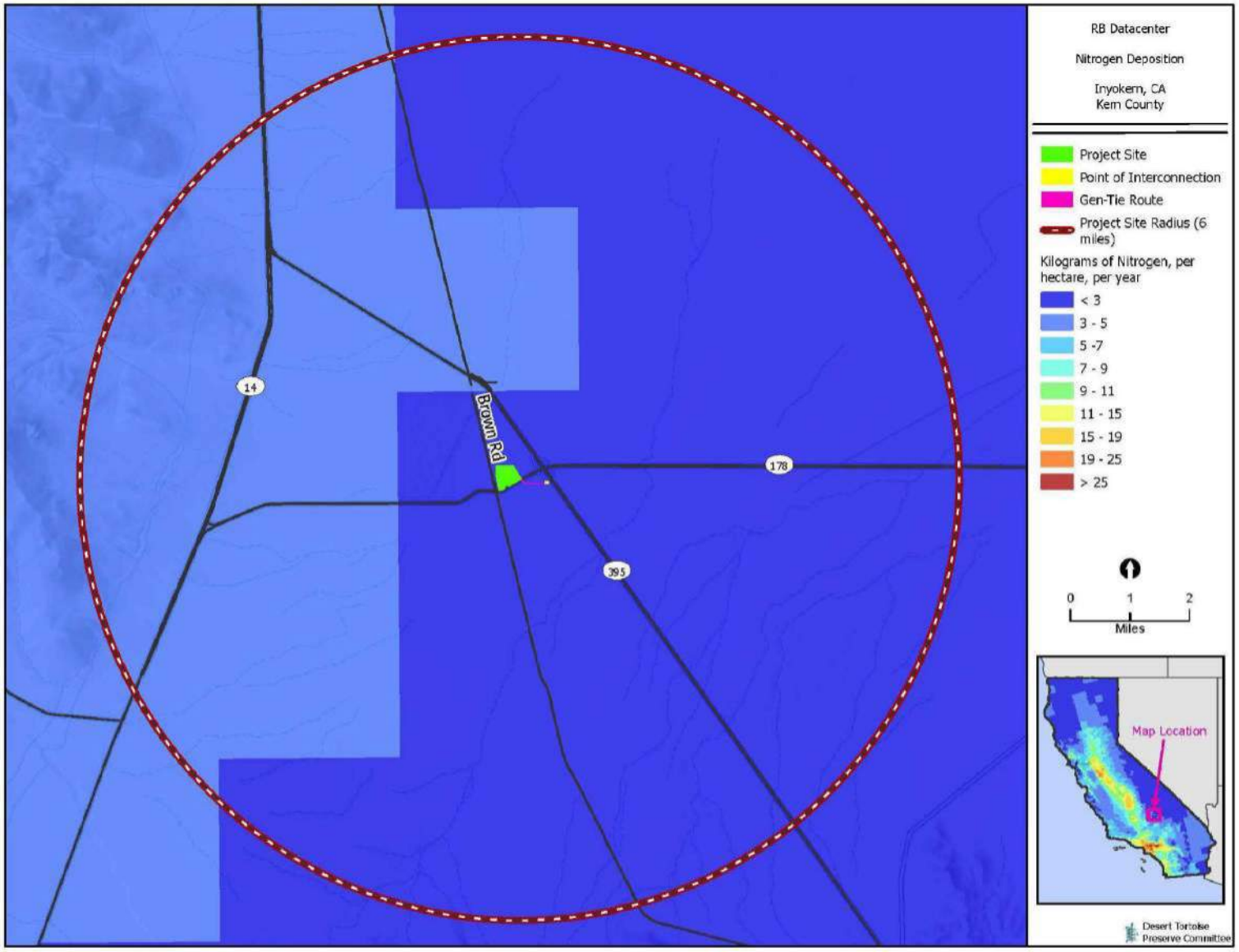
Figure 3-1: Background Nitrogen Deposition Rates



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4.0 CONCLUSIONS

The modeling predicted the nitrogen deposition from the emissions from the RBIDC project plus the background levels are below 5 kg/ha-yr at all offsite locations, thus the nitrogen emissions from the RBIDC project will have a less than significant impact on sensitive habitat and species in the region.

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5.0 REFERENCES

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APPENDIX A – DIESEL ENGINE EMISSIONS

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Valley Wide Construction - RB Inyokern Data Center
Diesel Emergency Generator Emissions Calculations

Operating Parameters	References/Remarks	Value	Units
Annual Throughput	PTE	50	hrs/yr
Total number of engines		40	

Constants	References/Remarks	Value	Units
Diesel Fuel HHV	40 CFR 98 Table C-1	138000	BTU/gal
Heat Rate	AP-42 Table 3.3-1	7000	BTU/BHP-hr

Release Parameters	References/Remarks	Value	Units
Generator Rating (kW)	Client	3000.0	kW
Engine Rating	Calculated from above	4023.0	BHP
Stack Exit Temperature	Client	903	°F
Stack Exit Temperature	Calculated for modeling	757	°K
Stack Gas Oxygen Content	Client	10.00	percent O_2
Stack Gas Moisture Content	Client	8.00	percent H_2O
Standard Temp	Typical	68.00	°F
Stack Flowrate, dry standard	Calculated for percent O_2	8,598	dscf/min
Stack Flowrate, actual	Calculated for stack temp	23,971	wacf/min
Stack Flowrate, actual	Calculated for modeling	11.31	wacm/sec
Stack Height	Client	11.94	feet
Stack Height	Calculated for modeling	3.64	meters
Stack Diameter	Client	12.00	inches
Stack Diameter	Calculated for modeling	0.30	meters
Stack Velocity	Calculated for modeling	155.05	meters/sec

Emissions per Diesel Emergency Generator

Pollutant	Emission Factor	Hourly Emissions	Annual Total		Annual Average
		lb/hr	lb/yr	tons/yr	g/sec
NO_x	0.5 g/hp-hr	4.43	221.73	0.111	3.19E-03
Ammonia	10 ppm @ 15% O2	0.23	11.40	0.006	1.64E-04
Atmospherically Derived Nitrogen	--	1.54	76.87	0.038	1.11E-03

Total Emissions all 40 Diesel Emergency Generators

Pollutant	Emission Factor	Hourly Emissions	Annual Total	
		lb/hr	lb/yr	tons/yr
NO_x	0.5 g/hp-hr	177.38	8,869.05	4.44
Ammonia	10 ppm @ 15% O2	9.12	455.82	0.23
Atmospherically Derived Nitrogen	--	61.50	3,074.86	1.54

lb/hr = ppm/10^6 * MW / Mol Vol * flow (dscfm) * 60 min/hr

Ammonia MW (lb/lb-mol)	17.031
Standard Molar Volume (scf/lb-mol)	385.5
NO2 MW (lb/lb-mol)	46.01
N MW (lb/lb-mol)	14.0067

APPENDIX B – AERMOD MODELING PARAMETERS

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Valley Wide Construction Nitrogen Deposition Modeling
Source Parameters

Point Sources

Stack ID	Source Group	Description	Stack Height H_S (ft)	Stack Diameter D_S (ft)	Stack Velocity V_S (ft/s)	Stack Temp T_S (°F)	Stack Flow (acfm)	Stack Height H_S (m)	Stack Diameter D_S (m)	Stack Velocity V_S (m/s)	Stack Temp T_S (°K)	Emission Rate (g/s)	UTM x NAD83 z10 (m)	UTM y NAD83 z10 (m)	Stack configuration (fixed cap/flapper cap, vertical/horizontal stack)	Data Source	Notes
ENG1	ENG1	Engine No.1: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,602.51	3,945,384.54	vertical	Client provided	
ENG2	ENG2	Engine No.2: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,614.10	3,945,388.89	vertical	Client provided	
ENG3	ENG3	Engine No.3: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,624.27	3,945,392.84	vertical	Client provided	
ENG4	ENG4	Engine No.4: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,634.61	3,945,397.10	vertical	Client provided	
ENG5	ENG5	Engine No.5: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,644.59	3,945,401.39	vertical	Client provided	
ENG6	ENG6	Engine No.6: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,604.24	3,945,380.47	vertical	Client provided	
ENG7	ENG7	Engine No.7: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,615.83	3,945,384.82	vertical	Client provided	
ENG8	ENG8	Engine No.8: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,626.00	3,945,388.76	vertical	Client provided	
ENG9	ENG9	Engine No.9: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,636.13	3,945,393.77	vertical	Client provided	
ENG10	ENG10	Engine No.10: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,646.05	3,945,398.67	vertical	Client provided	
ENG11	ENG11	Engine No.11: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,605.00	3,945,376.85	vertical	Client provided	
ENG12	ENG12	Engine No.12: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,617.19	3,945,381.20	vertical	Client provided	
ENG13	ENG13	Engine No.13: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,627.36	3,945,385.14	vertical	Client provided	
ENG14	ENG14	Engine No.14: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,637.66	3,945,389.97	vertical	Client provided	
ENG15	ENG15	Engine No.15: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,647.31	3,945,395.04	vertical	Client provided	
ENG16	ENG16	Engine No.16: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,607.18	3,945,372.85	vertical	Client provided	
ENG17	ENG17	Engine No.17: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,618.70	3,945,377.49	vertical	Client provided	
ENG18	ENG18	Engine No.18: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,628.90	3,945,381.51	vertical	Client provided	
ENG19	ENG19	Engine No.19: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,639.16	3,945,386.17	vertical	Client provided	
ENG20	ENG20	Engine No.20: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,648.53	3,945,391.07	vertical	Client provided	
ENG21	ENG21	Engine No.21: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,817.58	3,945,554.44	vertical	Client provided	
ENG22	ENG22	Engine No.22: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,828.51	3,945,558.99	vertical	Client provided	
ENG23	ENG23	Engine No.23: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,838.61	3,945,562.34	vertical	Client provided	
ENG24	ENG24	Engine No.24: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,848.64	3,945,567.34	vertical	Client provided	
ENG25	ENG25	Engine No.25: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,859.39	3,945,571.82	vertical	Client provided	
ENG26	ENG26	Engine No.26: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,818.79	3,945,550.11	vertical	Client provided	
ENG27	ENG27	Engine No.27: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,829.80	3,945,554.74	vertical	Client provided	
ENG28	ENG28	Engine No.28: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,840.03	3,945,558.03	vertical	Client provided	
ENG29	ENG29	Engine No.29: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,849.74	3,945,563.22	vertical	Client provided	
ENG30	ENG30	Engine No.30: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,860.24	3,945,567.45	vertical	Client provided	
ENG31	ENG31	Engine No.31: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,820.37	3,945,546.35	vertical	Client provided	
ENG32	ENG32	Engine No.32: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,831.38	3,945,550.98	vertical	Client provided	
ENG33	ENG33	Engine No.33: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,841.04	3,945,554.63	vertical	Client provided	
ENG34	ENG34	Engine No.34: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,851.11	3,945,559.51	vertical	Client provided	
ENG35	ENG35	Engine No.35: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,861.96	3,945,563.13	vertical	Client provided	
ENG36	ENG36	Engine No.36: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,821.96	3,945,542.61	vertical	Client provided	
ENG37	ENG37	Engine No.37: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,832.99	3,945,547.16	vertical	Client provided	
ENG38	ENG38	Engine No.38: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,842.97	3,945,550.88	vertical	Client provided	
ENG39	ENG39	Engine No.39: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,853.02	3,945,555.91	vertical	Client provided	
ENG40	ENG40	Engine No.40: 3-MW Caterpillar diesel-fired generator	11.94	1.00	508.68	903.00	23,970.98	3.64	0.30	155.05	757.04	0.001	426,863.75	3,945,559.01	vertical	Client provided	

Building Parameters

Building	Tier Number	X-Length (m)	Y-Length (m)	Height (m)
BLD_1	1	129.22	198.32	6.71

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Valley Wide Construction Nitrogen Deposition Modeling
AERMOD Dispersion Model Options/Assumptions

Parameter	Value				Comments
AERMOD Version	24142				--
AERMET Version	22112				--
AERMAP Version	24142				--
Lakes Environmental Software; AERMOD View™ Version	13.0.0				--
Control Pathway					
Regulatory Options	Default	☐	Non-Default	☑	Using Gas Deposition Alpha algorithm
Output Type	Concentration	☑	Dry Deposition	☑	--
	Total Deposition	☑	Wet Deposition	☑	--
Depletion Options	Dry Depletion	☐	Wet Depletion	☐	--
	Disable Dry Depletion	☐	Disable Wet Depletion	☐	--
Pollutant	Other				Nitrogen
Averaging Time Options	Annual				--
Dispersion Coefficient	Rural	☑	Urban	☐	--
Terrain Height Options	Elevated		☑		--
	Non-Default Regulatory Options				--
	Flat	☐	Flat & Elevated	☐	--
Receptor Elevations / Hill Heights	Run AERMOD using the AERMAP Receptor Output file (*.ROU)				--
Gas Deposition - Deposition Velocity	Calculated by Model	☑	User Specified	☐	--
Gas Deposition - Deposition Parameters	Default	☑	User Specified	☐	--
Gas Deposition - Seasonal Categories	Winter without snow	☑	January-February, December		--
	Transitional Spring	☑	March-April		--
	Midsummer	☑	May-October		--
	Autumn	☑	November		--
	Winter	☐	--		--
Gas Deposition - Land Use Categories	Land Use Categories		Wind Direction Sector (degree)		--
	8- Barren land, mostly desert	☑	0-185, 275-355		--
	5- Suburban areas, grassy	☑	185-275		--
Source Pathway					
Building Downwash	Include	☑	Exclude	☐	--
Gas and Particle Data	Gas	Parameters			--
		Diffusivity in Air	0.1628	cm^2/s	Parameter assumed for Nitric Acid
		Diffusivity in Water	2.98E-05	cm^2/s	Parameter assumed for Nitric Acid
		Cuticular Resistance	100000	s/cm	Parameter assumed for Nitric Acid
		Henry's law Constant	8.00E-08	$Pa\text{-}m^3/mol$	Parameter assumed for Nitric Acid
	Particle	☐			--
Background Concentrations	Include	☐	Exclude	☑	--
Source Groups	Each exhaust stack is assigned to its own source group.				--
Urban Groups	N/A				--
Variable Emissions	N/A				--
Source emission rate	Set to actual emissions for each source				--
Emission Output Unit	36,000				Conversion to kg/ha/yr

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Valley Wide Construction Nitrogen Deposition Modeling
AERMOD Dispersion Model Options/Assumptions

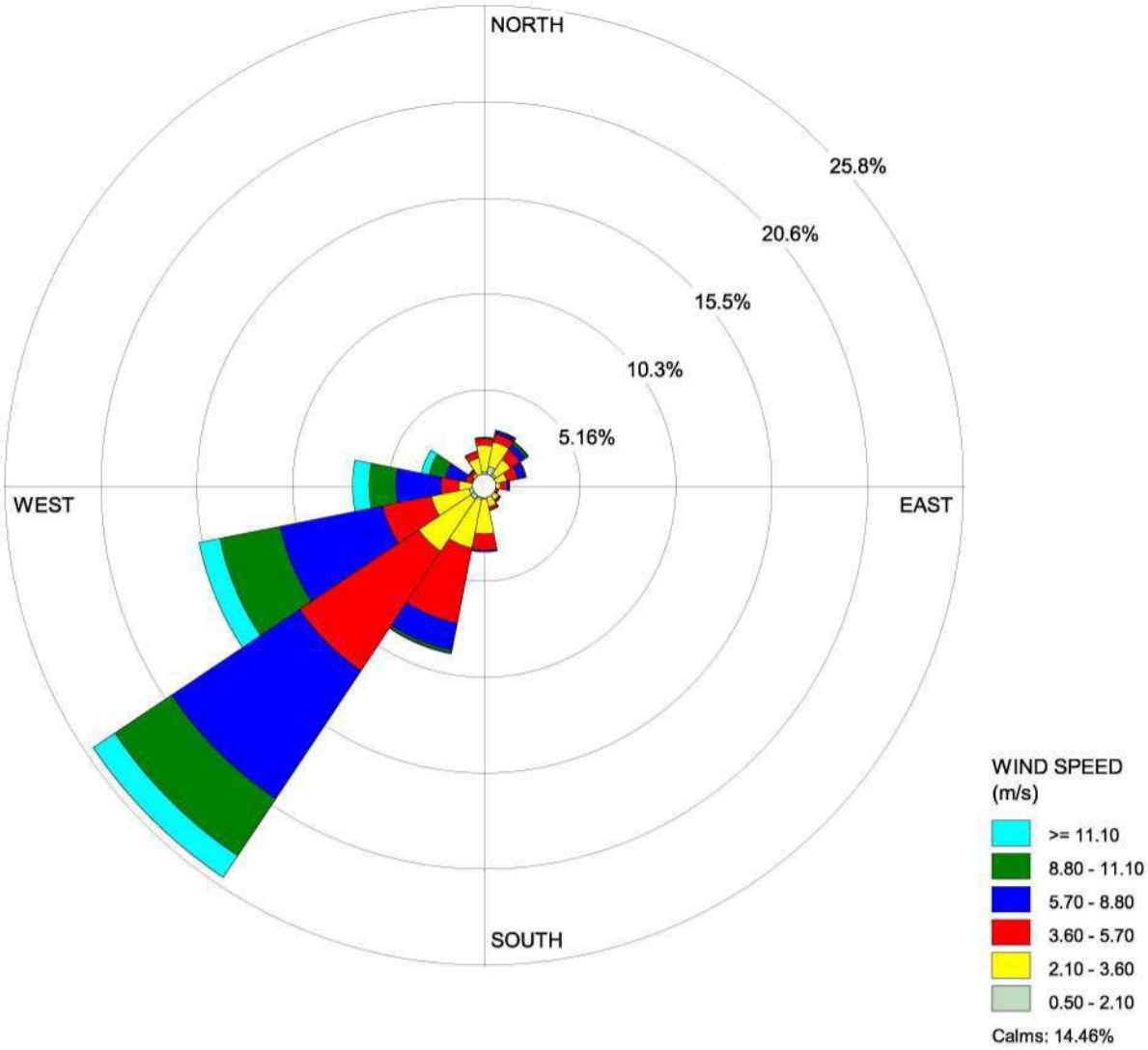
Receptor Pathway					
Flagpole Receptors	Include	☐	Exclude	☑	--
	Fenceline Grid				--
	Tier		Distance from Fenceline (m)	Tier Spacing (m)	--
	1		100	50	--
	2		250	100	--
	3		500	250	--
	4		1500	500	
	5		2500	1000	
	6		5000	4000	
Plant Boundary	Receptor Spacing: 10 m				--
Discrete Cartesian Receptors	Includes residential, sensitive and offsite worker receptors				--
Meteorology Pathway					
Meteorological Station	Edwards Air Force Base (KEDW)				--
Years	2012, 2016, 2017, 2019, 2020				--
Base Elevation of Surface Station	696.0 m				--
Terrain Pathway					
Coordinate System Used	NAD83				--
Data File Type	NED GEOTIFF. Resolution: 1/3-arcsecond (10 meters).				--
AERMAP Domain Options	Not Specified	☐	User-Defined Domain	☑	Elevations and hill heights are calculated from a region measuring approximately 21,000 meters by 21,000 meters centered on the facility.

WIND ROSE PLOT:

Edwards Air Force Base - KEDW 723810

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Processed years: 2012, 2016, 2017, 2019, 2020	**Start Date: 1/1/2012 - 00:00** **End Date: 12/31/2020 - 23:59**	MODELER:	
	CALM WINDS: **14.46%**	TOTAL COUNT: **42591 hrs.**	
	AVG. WIND SPEED: **4.65 m/s**	DATE: **3/22/2022**	PROJECT NO.: