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DOCKET
08-AFC-2
DATE JUL 17 2008
RECD. JUL 17 2008

July 17, 2008

BY HAND DELIVERY

Bill Pfanner
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Re: Beacon Solar Energy Project, Docket No. 08-AFC-2

Dear Bill:

Pursuant to your conversations with Jane, enclosed please find:

- 1 hard copy of the Streambed Alteration Agreement (4 more hard copies will follow later today).
- 5 hard copies of the Draft Raven Monitoring, Management and Control Plan.
- 5 hard copies of the letter to California Department of Fish & Game regarding the SSA package.
- 5 hard copies of a letter to you regarding the Raven Monitoring, Management and Control Plan.
- 5 hard copies of the signature page on the "Notification of Lake or Streambed Alteration".
- 10 cds with pdf versions of all these documents.

CDs of these documents will be docketed with the docketing office and served on all parties on the proof of service list today.

If you need anything additional, please don't hesitate to contact me.

Very truly yours,

DOWNEY BRAND LLP

Lois Navarrot
Assistant to Jane Luckhardt

LN:ln

Enclosures

July 16, 2008

Ms. Julie Means
California Department of Fish and Game
San Joaquin Valley and Southern Sierra Region
1234 East Shaw Avenue
Fresno, California 93710

Subject: Beacon Solar Energy Project Streambed Alteration Agreement

Dear Ms. Means:

Enclosed is the Section 1602 Streambed Alteration Agreement (SAA) package for the Beacon Solar Energy Project ("the Project"). As described in the attached Biological Technical Report (BTR) prepared for the Project, unavoidable impacts to state-regulated waters (e.g., ephemeral wash) will occur from Project development. This SAA includes updated calculations for impacts to state-regulated waters to reflect the addition of 80-acres to the Plant Site. These changes will be reflected in an addendum to the BTR that will be prepared separately. The Project includes a 2,012-acre power plant site (solar array, power generating equipment, support facilities, evaporation ponds, a cooling tower, and access roads [Plant Site]) and Project linear facilities (transmission line and natural gas supply pipeline). Only components located within the Plant Site boundary will impact waters of the state and are subject to the SAA. The Project's linear features will not impact state-regulated waters.

This package includes the Notification of Lake or Streambed Alteration, required by the California Department of Fish and Game (CDFG), that summarizes the Project's impacts, as well as supplemental information that provides additional detail on how the impacts were calculated, maps and photographs to depict existing conditions and where impacts would occur, Project design information, and the proposed mitigation approach. Specifically, this package includes the following:

- Notification of Lake or Streambed Alteration form (FG 2023)
- Attachment 1 – Figures 1 through 6 depicting the Plant Site, site design, and proposed impacts
- Attachment 2 – Project Description
- Attachment 3 – Delineation of Jurisdictional Waters of the State within the Plant Site
- Attachment 4 – Special Status Plant and Animal Species within the Plant Site (Question 11C)
- Attachment 5 – Biological Technical Report
- Attachment 6 – Drainage Study
- Attachment 7 – Drainage, Sediment, and Erosion Control Plan
- Attachment 8 – Mitigation Plan
- Notification Fee ($4,000)

The SAA application and supplemental materials are attached for your review and approval. An Application for Certification for the Beacon Solar Energy Project was submitted to the California Energy Commission (CEC) on March 14, 2008. It is expected that the CEC will provide the Final Staff Assessment for the Project in December 2008, with a license decision issued in May 2009. Under the Warren-Alquist Act, the CEC process is a California Environmental Quality Act-equivalent process for all state permits issued for the Project, including the SAA. Please call me at (916) 474-5698 if you have any questions or comments.

Sincerely,

Michael Argentine
Beacon Solar, LLC

cc: Ryan O'Keefe, Beacon Solar, LLC
Kenneth Stein, Beacon Solar, LLC
Bill Pfanner, CEC
Judy Hohman, USFWS
Jennifer Guigliano, EDAW

7FOR DEPARTMENT USE ONLY				
Date Received	*Amount Received*	*Amount Due*	*Date Complete*	*Notification No.*
	$	$		

STATE OF CALIFORNIA

DEPARTMENT OF FISH AND GAME

NOTIFICATION OF LAKE OR STREAMBED ALTERATION

Complete EACH field, unless otherwise indicated, following the enclosed instructions and submit ALL required enclosures. Attach additional pages, if necessary.

1. APPLICANT PROPOSING PROJECT

Name	Michael Argentine		
Business/Agency	Beacon Solar, LLC		
Street Address	1465 Oak Hill Way		
City, State, Zip	Roseville, California 95661		
Telephone	(916) 474-5698	Fax	(561) 691-7049
Email	Michael.Argentine@fpl.com		

2. CONTACT PERSON *(Complete only if different from applicant)*

Name	Kenneth Stein, Beacon Solar, LLC		
Street Address	700 Universe Boulevard, MS JES/JB		
City, State, Zip	Juno Beach, FL 33408		
Telephone	(561) 691-2216	Fax	(561) 691-7049
Email	Kenneth.Stein@fpl.com		

3. PROPERTY OWNER *(Complete only if different from applicant)*

Name	Beacon Solar, LCC (except for one parcel, APN 469-022-08, owned by Union Pacific Railroad Company; refer to Attachment 1, Figure 1)		
Street Address	700 Universe Boulevard		
City, State, Zip	Juno Beach, FL 33408		
Telephone		Fax	
Email			

4. PROJECT NAME AND AGREEMENT TERM

A. Project Name	Beacon Solar Energy Project
B. Agreement Term Requested	☒ Regular *(5 years or less)*
	☐ Long-term *(greater than 5 years)*

C. Project Term		D. Seasonal Work Period		E. Number of Work Days
Beginning *(year)*	Ending *(year)*	Start Date *(month/day)*	End Date *(month/day)*	
2009	2011	09/01	10/01	Initial site preparation (i.e., grading), including work within waters of the state, is anticipated to take approximately 90 days at the onset of Project construction. Once initial work is complete, construction of the facility is anticipated to last an additional 22 months. The operation lifetime of the Project is anticipated to be up to approximately 30 years.

5. AGREEMENT TYPE

Check the applicable box. If box B, C, D, or E is checked, complete the specified attachment.		
A.	☒ Standard *(Most construction projects, excluding the categories listed below)*	
B.	☐ Gravel/Sand/Rock Extraction *(Attachment A)*	*Mine I.D. Number:* _____
C.	☐ Timber Harvesting *(Attachment B)*	*THP Number:* _____
D.	☐ Water Diversion/Extraction/Impoundment *(Attachment C)*	*SWRCB Number:* _____
E.	☐ Routine Maintenance *(Attachment D)*	
F.	☐ DFG Fisheries Restoration Grant Program (FRGP)	*FRGP Contact Number:* _____
G.	☐ Master	
H.	☐ Master Timber Harvesting	

6. FEES

Please see the current fee schedule to determine the appropriate notification fee. Itemize each project's estimated cost and corresponding fee. *Note: The Department may not process this notification until the correct fee has been received.*

		B. Project Cost	C. Project Fee
1	Grading and compacting for construction of a solar array field, power generating facilities, and support facilities	> $500,000.00	$4,000.00
2			
3			
4			
5			
		D. Base Fee *(if applicable)*	
		E. TOTAL FEE ENCLOSED	$4,000.00

7. PRIOR NOTIFICATION OF ORDER

A. Has a notification previously been submitted to, or a Lake or Streambed Alteration Agreement previously been issued by, the Department for the project described in this notification?

☐ Yes *(Provide the information below)* ☒ No

Applicant: _____ Notification Number: _____ Date: _____

B. Is this notification being submitted in response to an order, notice or other directive ("order") by a court or administrative agency (including the Department)?

☒ No ☐ Yes (*Enclose a copy of the order, notice, or other directive. If the directive is not in writing, identify the person who directed the applicant to submit this notification and the agency he or she represents, and describe the circumstances relating to the order)*

☐ *Continued on additional pages(s)*

8. PROJECT LOCATION

A. Address or description of project location.

(Include a map that marks the location of the project with a reference to the nearest city or town, and provide driving directions from a major road or highway)

The proposed Beacon Solar Energy Project is located along California State Route 14 (SR-14), approximately 10 miles north-northwest of California City, approximately 15 miles north of the Town of Mojave, and approximately 24 miles northeast of the City of Tehachapi, in Kern County, California (Attachment 1, Figure 1). The 2,012-acre plant site (solar array, power generating equipment, support facilities, evaporation ponds, a cooling tower and access roads), which would result in impacts to state-regulated waters (ephemeral wash), occurs at the intersection of four U.S. Geological Survey 7.5" quadrangles: Mojave NE, Cinco, Cantil, and California City North. The plant site is almost completely vacant and significantly disturbed from past agricultural activities that occurred up to the mid-1980s.

The proposed plant site can be reached by driving north on SR-14 from Mojave, California, approximately 15 miles. Turn right from SR-14 and drive east for approximately one mile.

See Attachment 1, Figures 1 and 2.

☒ *Continued on additional pages(s)*

B. River, stream, or lake affected by the project.	Pine Tree Creek Wash and an unnamed desert wash
C. What water body is the river, stream or lake tributary to?	Koehn Lake (see Attachment 1, Figure 3)
D. Is the river or stream segment affected by the project listed in the state or federal Wild and Scenic Rivers Acts?	☐ Yes ☒ No ☐ Unknown
E. County	Kern

F. USGS 7.5 Minute Quad Map Name	G. Township	H. Range	I. Section	J. ¼ Section
Mojave NE, Cinco, Cantil, and California City North	Township 31 S	Range 37 E	Sections 4, 9	na

☐ *Continued on additional pages(s)*

K. Meridian *(check one)*	☐ Humboldt ☐ Mt. Diablo ☒ San Bernardino		
L. Assessor's Parcel Number(s)			
Refer to Attachment 1, Figure 1 ☒ *Continued on additional pages(s)*			
M. Coordinates *(If available, provide at least latitude/longitude or UTM coordinates and check appropriate boxes)*			
Latitude/Longitude	*Latitude:*	*Longitude:*	
	☐ Degrees/Minutes/Seconds ☐ Decimal Degrees ☐ Decimal Minutes		
UTM	*Easting:* 407081	*Northing:* 3901842	☐ Zone 10 ☒ Zone 11
Datum used for Latitude/Longitude or UTM	☒ NAD 27 ☐ NAD 83 or WGS 84		

9. PROJECT CATEGORY AND WORK TYPE *(Check each box that applies)*

PROJECT CATEGORY	NEW CONSTRUCTION	REPLACE EXISTING STRUCTURE	REPAIR/MAINTAIN EXISTING STRUCTURE
Bank stabilization – bioengineering/recontouring	☐	☐	☐
Bank stabilization – rip-rap/retaining wall/gabion	☐	☐	☐
Boat dock/pier	☐	☐	☐
Boat ramp	☐	☐	☐
Bridge	☐	☐	☐
Channel clearing/vegetation management	☐	☐	☐
Culvert	☐	☐	☐
Debris basin	☐	☐	☐
Dam	☐	☐	☐
Diversion structure – weir or pump intake	☐	☐	☐
Filling of wetland, river, stream, or lake	☒	☐	☐
Geotechnical survey	☐	☐	☐
Habitat enhancement – revegetation/mitigation	☐	☐	☐
Levee	☐	☐	☐
Low water crossing	☐	☐	☐
Road/trail	☐	☐	☐
Sediment removal – pond, stream, or marina	☐	☐	☐

Storm drain outfall structure	☐	☐	☐
Temporary stream crossing	☐	☐	☐
Utility crossing: Horizontal Directional Drilling	☐	☐	☐
Jack/bore	☐	☐	☐
Open trench	☐	☐	☐
Other *(specify):*	☐	☐	☐

10. PROJECT DESCRIPTION

A. Describe the project in detail. Photographs of the project location and immediate surrounding area should be included.

- Include any structures (e.g., rip-rap culverts, or channel clearing) that will be placed, built, or completed in or near the stream, river, or lake
- Specify the type and volume of materials that will be used.
- If water will be diverted or drafted

Enclose diagrams, drawings, plans and/or maps that provide all the following: site specific construction details; the dimensions of each structure and/or extent of each activity in the bed, channel, bank or floodplain; and overview of the entire project area (I.e., "birds-eye view") showing the location of each structure and/or activity, significant area features, and where the equipment/machinery will benter and exit the project area.

Project Description

Beacon Solar, LLC, proposes to develop approximately 2,012 acres for a 250-megawatt solar energy facility called the Beacon Solar Energy Project (the Project). A California Energy Commission (CEC) Application for Certification (AFC) for the Project was submitted on March 14, 2008. The construction phase of this Project is estimated to take approximately 25 months, while the operational lifetime of the Project is anticipated to be up to approximately 30 years. Initial site preparation (i.e., grading), including work within waters of the state, is anticipated to take approximately 90 days (three months) at the onset of the project. Once initial work is complete, construction of the facility is anticipated to last an additional 22 months, for a total construction phase of approximately 25 months. The solar array field and related power plant facilities will be located east of California State Route 14 (SR-14), while a relatively small area west of the highway is proposed to be used for interconnection with an existing Los Angeles Department of Water and Power (LADWP) high voltage transmission line at LADWP's existing Barren Ridge Switching Station.

The Project will utilize parabolic trough solar thermal technology based on the technology in use at existing Solar Electric Generating System facilities located at Harper Lake, Kramer Junction, and Daggett in the Mojave Desert. This technology involves a modular solar array field comprising many parallel rows of solar collectors normally aligned in a north-south axis. Each solar collector has a linear parabolic-shaped reflector that focuses the sun's direct beam radiation on a receiver located at the focal point of the parabola. This linear receiver contains a heat transfer fluid (HTF), a synthetic oil that heats up to approximately 740 degrees Fahrenheit as it circulates through the receiver and returns to a series of heat exchangers where the fluid is used to generate steam that drives a steam turbine to generate electrical power. A wet cooling tower is proposed to provide cooling for the power generating equipment.

The Project includes the 2,012-acre plant site (solar array, power generating equipment, support facilities, evaporation ponds, a cooling tower, and access roads) and the Project's linear facilities (transmission line,

switchyard, and natural gas supply pipeline) (Attachment 1, Figures 1 and 2). As indicated previously, it has been determined that only the plant site will impact waters of the state (i.e., dry desert wash); therefore, only the plant site will be discussed further in this application. For a complete description of the other Project components, see Attachment 2, Project Description.

Plant Site

The currently undeveloped plant site contains sheet drainage/runoff into drainages (typically dry) associated with an existing dry desert wash known as Pine Tree Creek Wash. Development of the plant site to contain the solar array, power block area, cooling tower, and onsite support facilities will require rerouting Pine Tree Creek Wash around the plant site. Pine Tree Creek Wash traverses the site for 10,900 linear feet (approximately 14.96 acres of jurisdictional state waters) and will be rerouted by creating an open creek bed adjacent to and outside the security fence (which includes desert tortoise exclusion fencing), but within the plant site boundary (Attachment 1, Figure 2). A description of the rerouted wash design is included in Attachment 8, the Mitigation Plan.

A portion of a smaller, unnamed dry desert wash that traverses the southwestern portion of the plant site for 2,150 linear feet (approximately 1.04 acres of jurisdictional state waters) will also be rerouted and a channel created to transport water north and then west to east across the site, joining with Pine Tree Creek Wash at the eastern boundary of the site. During infrequent large precipitation events, runoff from the site may reach Koehn Lake, which is approximately six miles to the northeast. Representative photos of state jurisdictional waters within the plant site are included in Attachment 1, Figures 6a and 6b, and Attachment 3, Delineation of Jurisdictional Waters of the State within the Plant Site.

The existing topographic conditions of the plant site show an average slope of 1 to 3 percent toward the northeast. The plant site will be graded generally following the existing contours of the site to maintain a maximum slope of 1.5 percent. Runoff from the plant site will drain by sheet flow to shallow diversion swales running in the east-west direction to the rerouted Pine Tree Creek Wash that will extend adjacent to the eastern edge of the solar facilities.

The proposed power block area is centrally located within the solar field at the plant site and includes the cooling tower. The power block area will drain to the south and east away from equipment foundations, by means of sheet flow and swales, as needed. The runoff will then flow through ditches to relocated Pine Tree Creek Wash to the south. Local area containments will be provided around locations, such as oil-filled transformers and chemical storage areas. The water from these areas and from other plant drains will be sent to an onsite oil-water separator and then added to the plant cooling water.

Evaporation ponds are planned in a highly disturbed area in the western portion of the plant site. The evaporation ponds will use the sun's energy to remove water from the cooling system waste stream. Although the ponds will be designed to contain the total amount of concentrated, dewatered cooling system wastes from the Project's 30-year operational life, the dewatered pond residuals will eventually be transported off site for disposal as a nonhazardous waste in an appropriately permitted facility.

Existing site elevations range from approximately 2,050 to 2,260 feet above mean sea level. Mass grading of the plant site will occur at the beginning of the Project construction period, lasting for approximately three months. The grading will result in six to seven terraces, each sloping, on average, 1.5 percent downward from the southwest to the northeast. No import or export of soil from the site will be required. Earthwork associated with the proposed Project will include excavation for foundations and underground systems. The Project's power block and solar field areas will be graded to allow for a balanced distribution of material, so there is no requirement to truck large quantities of earth materials to or from the site. The cut and fill grading necessary to create suitable conditions for Project construction will result in an elevation of approximately 2,050 to 2,250 feet above mean sea level.

Adjustments will be made to provide engineered fill as required for stabilization under equipment and structure foundations per the Project geotechnical report. Only soil materials approved by a geotechnical engineer for structural fill will be used. Additionally, specialized granular materials may need to be imported to the proposed site for road base and possible use below foundations.

B. Specify the equipment and machinery that will be used to complete the project.

Heavy equipment such as bulldozers and backhoes will be employed during plant site preparation for construction of the proposed Project. During earth movement activities it is anticipated that between 100 and 250 construction personnel may be on site at any given time. This would include equipment and machinery operators, construction management personnel, surveyors, and qualified construction monitors.

☐ *Continued on additional pages(s)*

C. Will water be present during the proposed work period (specified in box 4.D) in the stream, river, or lake (specified in box 8.B)	☒ Yes ☐ No *(Skip to box 11)* The Project plans to conduct initial site preparation and construction of the rerouted washes when Pine Tree Creek Wash and the unnamed wash are dry; however, the Project would prefer to have the option to conduct work any time of year.
D. Will the proposed project require work in the wetted portion of the channel?	☒ Yes *(Enclose a plan to divert water around work site)* ☐ No The Project will require work within the wash as part of rerouting the existing channel. This wash is only wet when a storm event results in surface flow; therefore, work in the wetted portion of the channel would only occur if work is being performed during a storm event that results in surface flow. Attachment 1, Figure 4, illustrates the plan to permanently divert water around the site by rerouting Pine Tree Creek Wash to the south and eastern borders of the plant site and rerouting the unnamed wash to the north and then west to east across the plant site, joining with Pine Tree Creek Wash to the northeast of the plant site.

11. PROJECT IMPACTS

A. Describe impacts to the bed, channel, and bank of the river, stream or lake, and the associated riparian habitat. Specify the dimensions of the modifications in length (linear feet) and area (square feet or acres) and the type and volume of material (cubic yards) that will be moved, displaced, or otherwise distributed, if applicable.

The proposed impacts occur in two dry desert washes within the plant site – the primary wash, Pine Tree Creek Wash, crosses the plant site from south to north, and a smaller, unnamed wash crosses the southwestern portion of the plant site from west to east. Approximately 10,900 linear feet and 14.96 acres of streambed will be impacted at Pine Tree Creek Wash and approximately 2,150 linear feet and 1.04 acres of streambed will be impacted at the unnamed wash. As described earlier, the proposed plan is to reroute these two features to allow flow during storm events and restore the function of the rerouted wash.

Overall it is estimated that a total of 13,050 linear feet and approximately 16.00 acres of dry desert wash will be permanently impacted by the proposed Project (Attachment 1, Figures 6a and 6b, and Attachment 3, Delineation of Jurisdictional Waters of the State within the Plant Site). Of the total 13,050 linear feet and 16.00 acres of permanent impact to dry desert wash (e.g., state jurisdictional water), approximately 2,990 linear feet and 2.40 acres are vegetated with southern alluvial fan scrub dominated by scale-broom (*Lepidospartum squamatum*). The remaining

10,060 linear feet and 13.60 acres are unvegetated. For a complete description of the jurisdictional features within the Project property boundary, see Attachment 3, Delineation of Jurisdictional Waters of the State within the Plant Site.

B. Will the project affect any vegetation? ☒ Yes *(Complete the tables below)* ☐ No

Vegetation Type	Temporary Impact	Permanent Impact
Southern Alluvial Fan Scrub (vegetated desert wash)	Linear feet: none	
Total area: none	Linear feet: 2,990 linear feet	
Total area: 2.4 acres		
Riverine Unconsolidated Bottom (unvegetated channel)	Linear feet: none	
Total area: none	Linear feet: 10,060 linear feet	
Total area: 13.60 acres		

Tree Species	Number of Trees to be Removed	Trunk Diameter (range)
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A

☐ *Continued on additional pages(s)*

C. Are any special status animal or plant species, or habitat that could support such species, known to be present on or near the project site?

☒ Yes *(List each species and/or describe the habitat below)* ☐ No ☐ Unknown

☒ *Continued on additional pages(s)*

D. Identify the source(s) of information that supports a "yes" or "no" answer above in Box 11.C.

Please see :

- Attachment 4, Special Status Plant and Animal Species (Question 11C), and
- Attachment 5, Beacon Solar Energy Project Biological Technical Report (February 2008)

☒ *Continued on additional pages(s)*

E. Has a biological study been completed for the project site?

☒ Yes *(Enclose the biological study)* ☐ No

Please see Attachment 5, Beacon Solar Energy Project Biological Technical Report (February 2008)

Note: A biological assessment or study may be required to evaluate potential impacts on biological resources.

F. Has a hydrological study been completed for the project or project site?

☒ Yes *(Enclose the hydrological study)* ☐ No

Please see Attachment 6, Drainage Study

Note: A hydrological study or other information on the site hydraulics (e.g., flows, channel characteristics, and/or flood recurrence intervals) may be required to evaluate potential project impacts on hydrology.

12. MEASURES TO PROTECT FISH, WILDLIFE, AND PLANT RESOURCES

A. Describe the techniques that will be used to prevent sediment entering watercourses during and after construction.

A preliminary Drainage, Sediment, and Erosion Control Plan (DSECP), the California Energy Commission's equivalent of a Storm Water Pollution Prevention Plan (SWPPP), was submitted to the CEC as part of the Project's Application for Certification. This document is included as Attachment 7. SWPPPs also will be prepared for Project construction and operation. Both the DSECP and SWPPPs identify project design features and Best Management Practices (BMPs) that will be used to effectively manage drainage-related issues (e.g., erosion and sedimentation) during construction grading and for long-term operations. These BMPs will include:

- Employee Training Program
- Erosion and Sediment Control
- Good Housekeeping Programs
- Preventative Maintenance Programs
- Structural BMPs
- Equipment and Vehicle Management Practices
- Spill Prevention and Response Programs
- Inspection Programs

B. Describe project avoidance and/or minimization measures to protect fish, wildlife, and plant resources.

Chapter 6 of Attachment 5, Biological Technical Report, describes the avoidance and minimization measures to protect Special Status Plant and Animal Species in detail. Of the species with potential to occur on site, as described in Attachment 4, Special Status Plant and Animal Species, potential impacts are anticipated to desert tortoise *(Gopherus agassizii)*, Mojave Desert population; Mohave ground squirrel *(Spermophilus mohavensis)*; and western burrowing owl *(Athene cunicularia)*. Project design features that avoid and minimize impacts to these species include:

- Employee Training Program
- Pre-Construction Clearance Surveys for Sensitive Species
- Tortoise Proof Fencing Around Perimeter of Project
- Biological Monitoring During Construction by Qualified Biologists
- Trash Abatement Program
- Established Parking and Staging Areas
- Spill Prevention and Response Programs
- Seasonally Dependent Avoidance Measures for Occupied Burrowing Owl Burrows
- Testing and Reporting Program for Evaporation Ponds

Note that this SAA does not address potential impacts to desert tortoise or Mohave ground squirrel. This is being addressed through the Section 2081 process with CDFG for which an application was submitted on March 28, 2008 with a revision in progress.

C. Describe any project mitigation and/or compensation measures to protect fish, wildlife, and plant resources.
The Project has developed compensation measures to address impacts to waters of the state (unvegetated waters and southern alluvial fan scrub). A Mitigation Plan for the proposed approach to compensate for impacts to waters of the state is included as Attachment 8. This plan provides details for creating waters of the state on site for mitigation. In addition, compensation for potential impacts to desert tortoise, Mohave ground squirrel, and western burrowing owl is described in detail in Chapter 6 of the Biological Technical Report (Attachment 5) and in the Section 2081 draft application submitted to CDFG (March 28, 2008, revision in progress). ☒ *Continued on additional pages(s)*

13. PERMITS

List any local, state, and federal permits required for the project and check the corresponding box(es). Enclose a copy of each permit that has been issued.		
A. CFG Code Section 2081- CESA requires issuance of a take authorization for species listed by the state as endangered or threatened	☒ Applied	☐ Issued
B. ESA 10(a)(1)(B) permit allows for the incidental take of listed species during the course of construction and project operations.	☒ Applied	☐ Issued
C. CEC License to Construct and Operate	☒ Applied	☐ Issued
D. Unknown whether ☐ local, ☐ state, or ☐ federal permit is needed for the project. *(Check each box that applies)*		
☐ *Continued on additional pages(s)*		

14. ENVIRONMENTAL REVIEW

A. Has a draft or final document been prepared for the project pursuant to the California Environmental Quality Act (CEQA), National Environmental Protection Act (NEPA), California Endangered Species Act (CESA) and/or federal Endangered Species ACT (ESA)?		
☐ Yes *(Check the box for each CEQA, NEPA, CESA, and ESA document that has been prepared and enclose a copy of each)* ☒ No *(Check the box for each CEQA, NEPA, CESA, and ESA document that will be or is being prepared)*		
☐ Notice of Exemption ☐ Initial Study	☐ Mitigated Negative Declaration ☐ Environmental Impact Report	☐ NEPA document *(type):* _____ ☒ CESA document *(type):* *Section 2081 application submitted to CDFG on March 28, 2008 (revision in progress).*
☐ Negative Declaration	☐ Notice of Determination *(Enclose)*	☒ ESA document *(type):* *ESA 10(a)(1)(B) permit – Low-effect Habitat Conservation Plan in process; categorical exclusion from NEPA requirements*
☐ THP / NTMP	☒ Mitigation, Monitoring, Reporting Plan	☒ Other *(type):* *California Energy Commission (CEC) Application for Certification submitted March 14, 2008. The CEC power plant licensing process is a CEQA-equivalent process under California law (Warren-Alquist Act)*

B. State Clearinghouse Number *(if applicable)*			
C. Has a CEQA lead agency been determined?	☒ Yes *(Complete boxes D, E, and F)*	☐ No *(Skip to box 14.G)*	
D. CEQA Lead Agency	California Energy Commission		
E. Contact Person	Bill Pfanner	F. Telephone Number	(916) 654-4206

G. If the project described in this notification is part of a larger project or plan, briefly describe that larger project or plan.
Beacon Solar, LLC, proposes to develop approximately 2,012 acres to accommodate a 250-megawatt solar power plant (power generating facilities, solar array, access roads, and support facilities. An Application for Certification (AFC) was submitted to CEC on March 14, 2008. ☐ *Continued on additional pages(s)*
H. Has an environmental filing fee (Fish and Game Code section 711.4) been paid?
☒ Yes *(Enclose proof of payment)* ☐ No *(Briefly explain below the reason a filing fee has not been paid)* *Note: If a filing fee is required, the Department may not finalize a Lake or Streambed Alteration Agreement until the filing fee is paid.*

15. SITE INSPECTION

Check one box only.
☐ In the event the Department determines that a site inspection is necessary, I hereby authorize a Department representative to enter the property where the project described in this notification will take place at any reasonable time, and hereby certify that I am authorized to grant the Department such entry. ☒ I request the Department to first contact *Kenneth Stein* to schedule a date and time to enter the property where the project described in this notification will take place. I understand that this may delay the Department's determination as to whether a Lake or Streambed Alteration Agreement is required and/or the Department's issuances of a draft agreement pursuant to this notification.

16. DIGITAL FORMAT

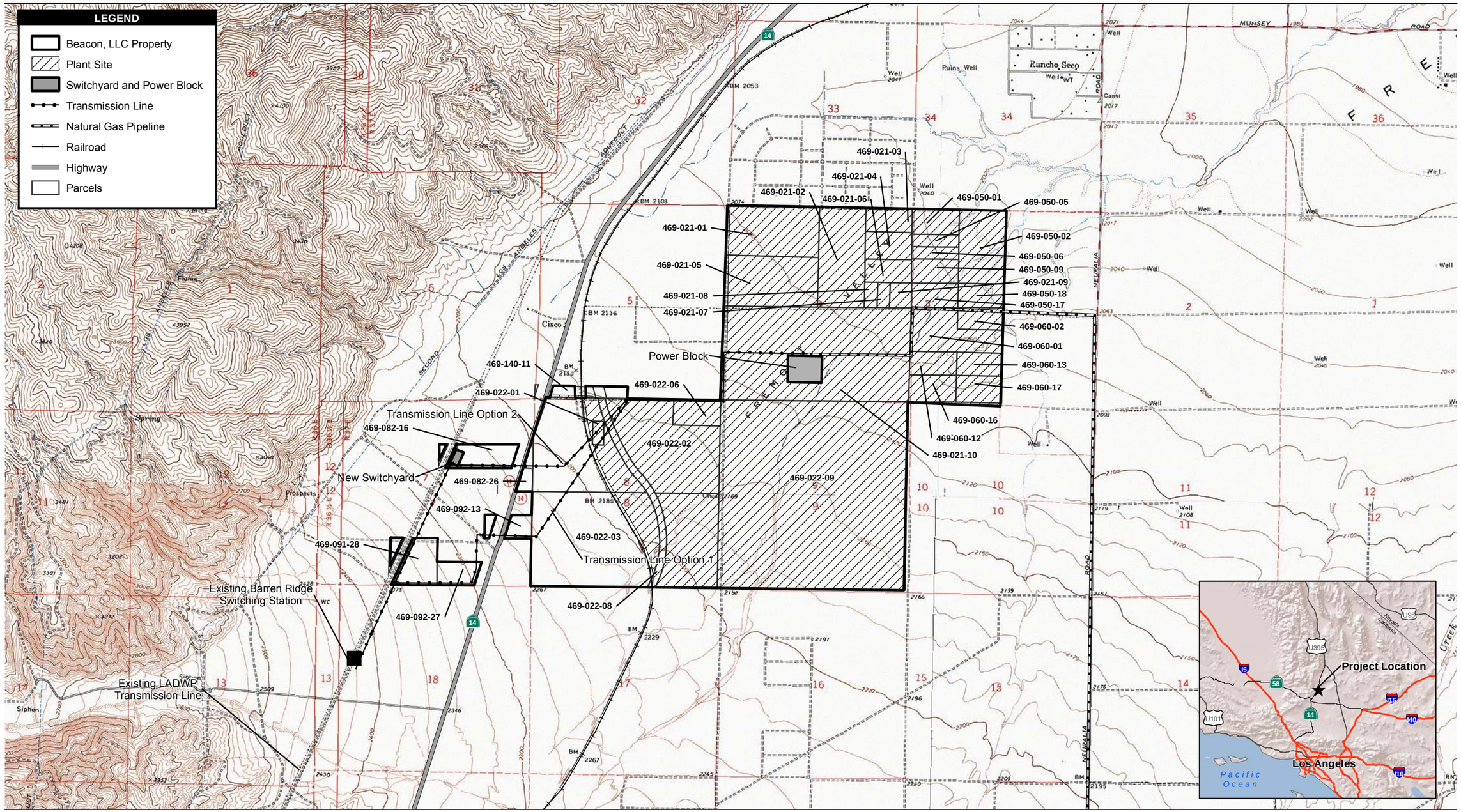
Is any of the information included as part of the notification available in digital format (i.e., CD, DVD, etc.)?
☒ Yes (Please enclose the information via digital media with the completed notification form) ☐ No

17. SIGNATURE

I hereby certify that to the best of my knowledge the information in this notification is true and correct and that I am authorized to sign this notification as, or on behalf of, the applicant. I understand that if any information in this notification is found to be untrue or incorrect, the Department may suspend processing this notification or suspend or revoke any draft or final Lake or Streambed Alteration Agreement issued pursuant to this notification. I understand also that if any information in this notification is found to be untrue or incorrect and the project described in this notification has already begun, I and/or the applicant may be subject to civil or criminal prosecution. I understand that this notification applies only to the projects(s) described herein and that I and/or the applicant may be subject to civil or criminal prosecution for undertaking any project not described herein unless the Department has been separately notified of that project in accordance with Fish and Game Code section 1602 or 1611.
Signature of Applicant or Applicant's Authorized Representative Date Michael Argentine Print Name

ATTACHMENT 1

FIGURES 1 through 6



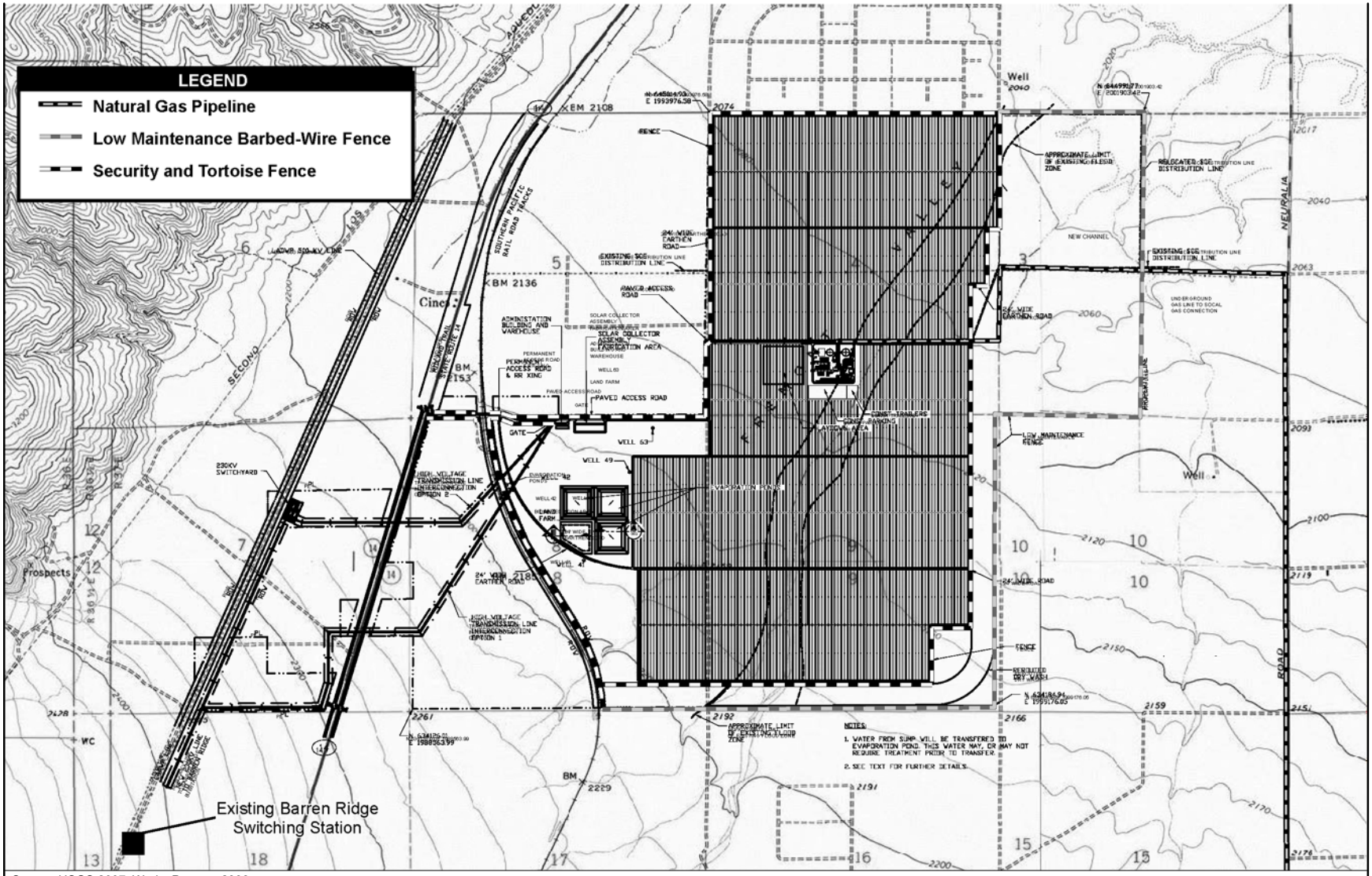
Source: TetraTech 2007; Kern County 2007; USGS 2007; WorleyParsons 2007

2,750 1,375 0 2,750 Feet

Scale: 1:33,000; 1 inch = 2,750 feet

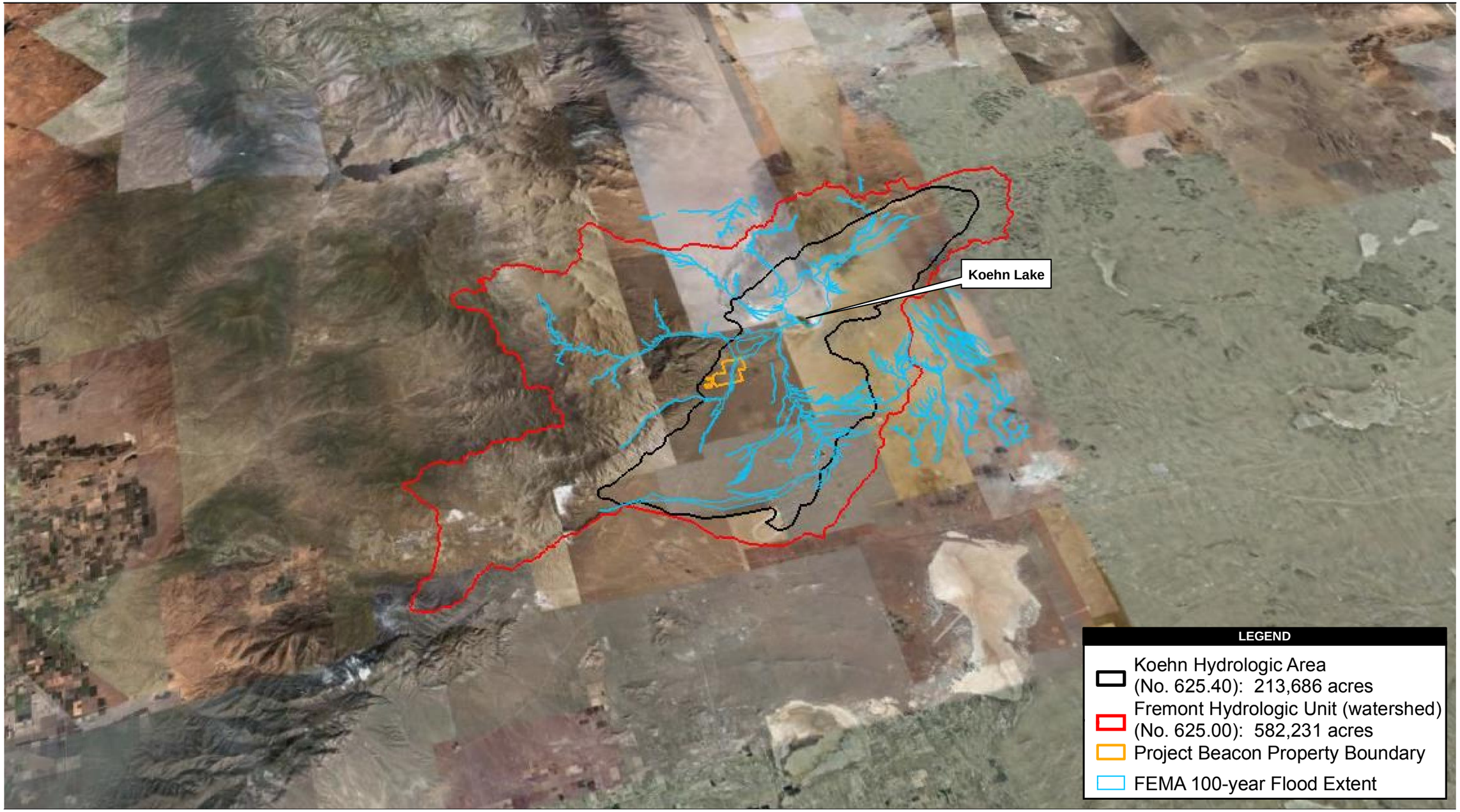
Figure 1
Property Boundary and Plant Site with Parcels

Path: P:\2008\08080001 Beacon Solar\5GIS\MXD\Streambed Alteration Agreement Package\Vicinity Map with Parcels_rev20080624.mxd, 06/25/08, LeeJ



Source: USGS 2007; WorleyParsons 2008

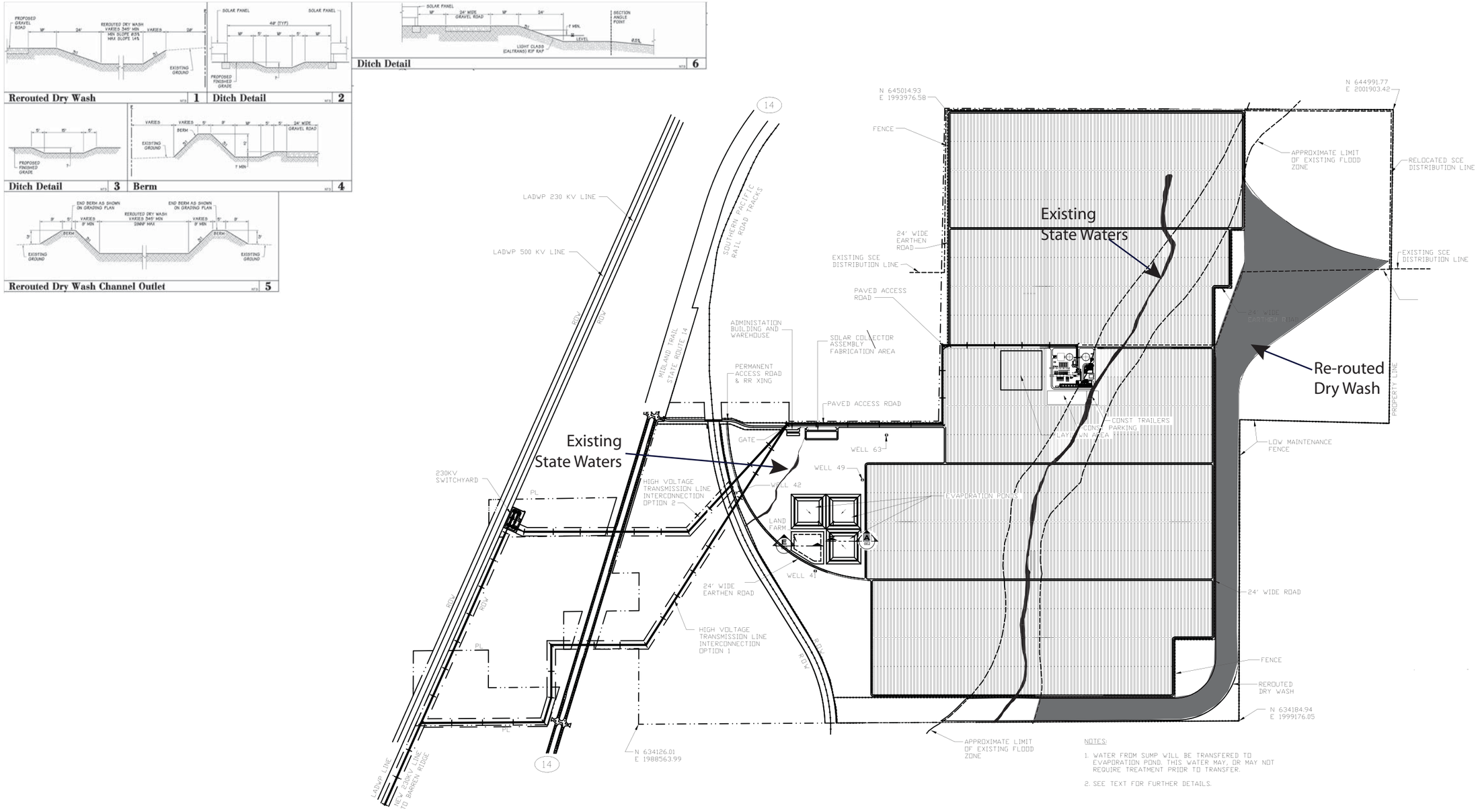
Figure 2
Facilities Layout



Source: GoogleEarth 2007

Not to Scale

Figure 3
Watershed and Drainage

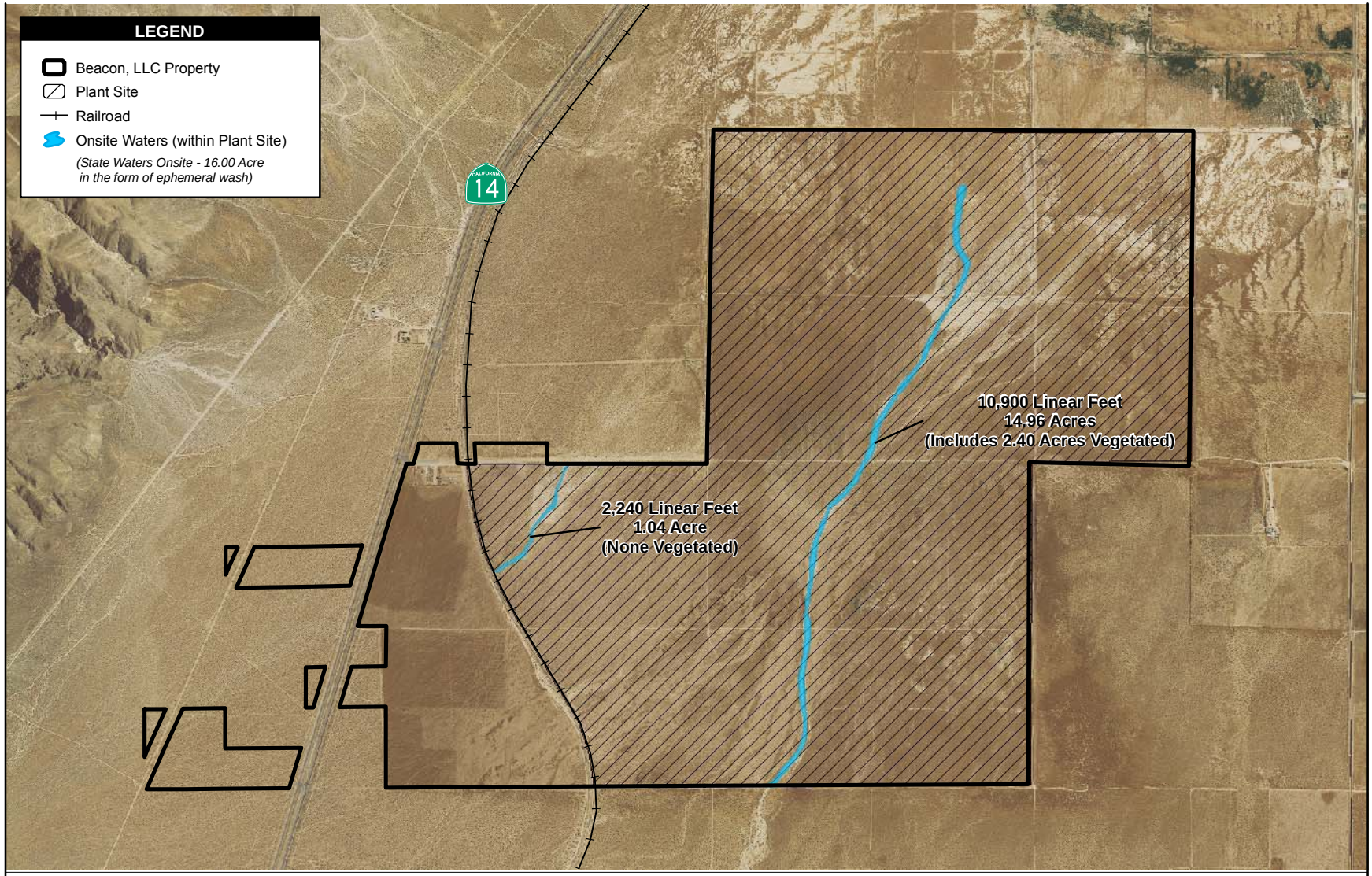


Source: Worley Parsons Resources & Energy 2007

1,800 900 0 1,800 Feet

Scale: 1 inch = 1,800 feet

Figure 4
Facilities Layout and Re-routed Wash



Source: NAIP 2005; EDAW 2007; WorleyParsons 2007

2,500 0 2,500 Feet

Scale: 1:30,000; 1 inch = 2,500 feet

Figure 5
Jurisdictional Waters of the State

Beacon Solar Energy Project Attachment 1 - SAA Application

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Photograph 1: Looking northwest at terminus of defined bed and bank of wash

Photograph 2: Looking northeast anastomosed channel morphology

Figure 6a
Representative Photographs 1 and 2

Photograph 3: Looking northeast, southern alluvial fan scrub occupying channel

Photograph 4: Looking southwest, recent sand deposition within channel

Figure 6b
Representative Photographs 3 and 4

ATTACHMENT 2

PROJECT DESCRIPTION

ATTACHMENT 2

Project Description

Beacon Solar, LLC, proposes to develop approximately 2,012 acres for a 250-megawatt solar energy facility called the Beacon Solar Energy Project ("the Project"). An Application for Certification for the Project was submitted to the California Energy Commission in March 2008. The construction phase of this Project is estimated to take approximately 25 months, while the operational lifetime of the Project is anticipated to be up to approximately 30 years. The solar array field and related power plant facilities will be located east of California State Route 14 (SR-14), while a relatively small area west of the highway is proposed to be used for interconnection with an existing Los Angeles Department of Water and Power (LADWP) high voltage transmission line at LADWP's existing Barren Ridge Switching Station.

The Project will utilize parabolic trough solar thermal technology based on the technology in use at existing Solar Electric Generating System facilities located at Harper Lake, Kramer Junction, and Daggett in the Mojave Desert. This technology involves a modular solar array field comprising many parallel rows of solar collectors normally aligned in a north-south axis. Each solar collector has a linear parabolic-shaped reflector that focuses the sun's direct beam radiation on a receiver located at the focal point of the parabola. This linear receiver contains a heat transfer fluid (HTF), a synthetic oil that heats up to approximately 740 degrees Fahrenheit as it circulates through the receiver and returns to a series of heat exchangers where the fluid is used to generate steam that drives a steam turbine to generate electrical power. A wet cooling tower is proposed to provide cooling for the power generating equipment.

The Project includes the power plant site (solar array, power generating equipment, support facilities, evaporation ponds, and access roads), rerouted channel, and the Project's linear facilities (transmission line, access road, and natural gas supply pipeline).

Plant Site

The layout of the Project's plant site includes the solar array and power block area (i.e., the location of the steam turbine generator), and onsite support facilities (e.g., administration building and warehouse). Onsite facilities also include three evaporation ponds in a highly disturbed area of the plant site to handle the waste stream from the Project's cooling water system. Three evaporation ponds, used to manage the cooling tower blowdown stream, are planned within a highly disturbed portion of the survey area. The three evaporation ponds will have a nominal surface area of 8.3 acres each for a

total of 25 acres. If waste needs to be removed for pond maintenance, it would be transported off site for disposal as nonhazardous waste in accordance with applicable laws and regulations.

Natural Gas Pipeline

A 17.6-mile, eight-inch natural gas pipeline will be constructed to provide fuel for power plant startup and HTF freeze protection. Approximately 1.3 miles of the natural gas pipeline will be constructed within the plant site, and the remaining 16.4 miles will occur outside the plant site. The pipeline will connect to an existing Southern California Gas pipeline in the California City area, be routed east along California City Boulevard, turning north up Neuralia Road and then west for 1.8 miles (of which 1.3 miles is within the plant site) into the plant site along an existing distribution line and through a cleared, ruderal area. This pipeline will be constructed within a 15- to 20-foot right-of-way (ROW), entirely within previously disturbed road shoulders and along disturbed access roads, thereby avoiding native vegetation and State waters. A small amount of native vegetation may be disturbed along approximately 0.25 mile of degraded habitat in the segment entering the plant site from Neuralia Road.

Transmission Line and Tower Structures

LADWP's 230-kilovolt (kV) Barren Ridge Substation is located across SR-14, approximately 1.5 miles southwest of the plant site. Two options are being considered for interconnecting the Project to the existing Barren Ridge facility.

Option 1 would involve constructing a new, approximately 3.5-mile 230-kV transmission line (of which approximately 1.6 miles will be within the 2,012-acre plant site boundary), that would run west and southwest from the power block across SR-14 and south along an expanded LADWP ROW to the Barren Ridge Substation.

Option 2 would involve constructing a new, approximately 3.5-mile 230-kV transmission line (of which approximately 1.6 miles will be within the plant site boundary). This line would consist of approximately 2.4 miles of line to a new switching station to be constructed at the location where the Project's transmission line first meets LADWP's existing transmission ROW west of SR-14. A second segment of the 230-kV transmission line, approximately 1.1-miles long, would then be constructed within the expanded LADWP ROW to the Barren Ridge Substation.

Under either transmission option, each of the 36 pole locations would require construction of a 50-foot by 50-foot pole pad. Pole height would range from 79 to 110 feet, depending on terrain and span length. Span length would range between 440 to 560 feet, averaging about 500 feet. During construction of the transmission line, pole

site work areas and pull/splicing sites would be required. The pole site work areas measure 50 feet by 50 feet. The pull sites for the transmission lines average 50 feet by 140 feet each. The splicing site for the transmission line measures 95 feet by 200 feet. There will be no grading at the pole site work areas or the pull and splicing site; rather, vegetation will be crushed.

Under either transmission option, the new Project transmission line would tie into the existing Inyo-Rinaldi 230-kV transmission line at the existing Barren Ridge Switching Station; however, under Option 2, a new electrical switchyard would be built in association with the Project. The switchyard is accessed from the existing graded patrol road that runs along the Inyo-Rinaldi line. Periodic maintenance activities for the transmission line could include cleaning of the line conductors and repair of equipment damaged by wind, dust, or accident. Activities could also include road and drainage structure repairs. Such activity would occur infrequently, perhaps once per year.

Access and Spur Roads

An existing dirt road off SR-14 will be upgraded (paved) to provide access to the solar array, power block, and support facilities on the plant site. Existing dirt roads west of SR-14 would provide construction and operation and maintenance access to transmission line structures whenever possible. Potential new access roads created under Option 1 (14 feet by 1.9 miles) would affect up to 3.2 acres; Option 2 (14 feet by 1.0 mile), would affect up to 1.7 acres. Additionally, spur roads (averaging 12 feet by 110 feet) to seven pole sites would be created under Option 1 (up to 0.2 acre) and 17 pole sites under Option 2 (up to 0.5 acre). Tortoise-proof security gates will be installed where access roads leave SR-14 and enter the plant site. These gates will be compatible with the tortoise-proof fencing installed around the plant site.

ATTACHMENT 3

DELINEATION OF JURISDICTIONAL WATERS OF THE STATE

BEACON SOLAR ENERGY PROJECT
JURISDICTIONAL DELINEATION REPORT FOR WATERS OF THE STATE OF CALIFORNIA WITHIN THE PLANT SITE

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July 2008

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2.0 REGULATORY FRAMEWORK 1

3.0 DELINEATION PURPOSE 2

4.0 DELINEATION METHODOLOGY 2

5.0 RESULTS OF DELINEATION 4

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1 USACE Jurisdictional Determination
2 Expanded Regulatory Framework

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1.0 INTRODUCTION

On February 5, 2008, the U.S. Army Corps of Engineers (USACE) determined that the aquatic features occurring within the Beacon Solar Energy Project (BSEP or Project) are not jurisdictional waters of the United States (Attachment 1). On October 16, 2007, February 27, March 16 and 17, 2008, site visits occurred to conduct a formal delineation of jurisdictional waters of the state of California within the Plant Site.

The Project is located within an unincorporated area of Kern County, California, approximately 10 miles northwest of California City, directly east of State Route 14 (Figure 1). The area where impacts to jurisdictional state waters (i.e., dry wash) would occur includes the 2,012-acre plant site (solar array, power generating equipment, support facilities, evaporation ponds, a cooling tower, and access roads), but does not include the Project's linear facilities (transmission line, switchyard, and natural gas supply pipeline) where there are no jurisdictional waters that could be impacted. Therefore, this jurisdictional delineation only reports on findings within the plant site (Figure 1).

The currently undeveloped plant site is almost completely vacant and has been significantly disturbed from past agricultural activities that occurred up to the mid-1980s. Based on this jurisdictional delineation for waters of the state of California, it has been determined that 16.00 acres of jurisdictional waters of the state occur within the limits of the plant site.

2.0 REGULATORY FRAMEWORK

Wetland and other aquatic environments/habitats occurring within California are regulated under the following state laws, as applicable to the project.

1. Under California Fish and Game Code (CFGC) Section 1600 et seq.,[1] the California Department of Fish and Game (CDFG) is the agency authorized to regulate activities that would substantially alter jurisdictional waters of the state. Jurisdictional waters of the state include the channel, bed, or bank of a lake, river, or stream to the continuous edge of its riparian extent.
2. Under Section 13263 of the 1969 Porter-Cologne Water Quality Act (Porter-Cologne), the Regional Water Quality Control Board (RWQCB) is the agency authorized to

[1] CCR Title 14.

regulate discharges of waste and fill material to waters of the state, including "isolated" waters and wetlands.

An expanded regulatory framework concerning jurisdictional waters of the state germane to the Project is located in Attachment 2.

3.0 DELINEATION PURPOSE

The delineation of jurisdictional waters of the state will describe the amount and type of water(s) present within the plant site at the time of the delineation. The proposed construction and operation of the BSEP have the potential to result in the temporary and/or permanent loss of jurisdictional waters of the state. The results of this jurisdictional delineation report provide the necessary information for Beacon Solar, LLC to achieve compliance with CFGC Section 1600 et seq. and the Porter-Cologne Act if it is determined that the Project will result in impacts (both temporary and/or permanent) to state-regulated jurisdictional waters. If impacts occur to jurisdictional waters of the state, regulatory compliance will also necessitate identifying adequate and appropriate compensatory mitigation based on the extent of those impacts.

4.0 DELINEATION METHODOLOGY

Drainage from the southern range of the Sierra Nevada Mountains has resulted in two washes being present within the plant site:

1. The main dry desert wash occurring within the plant site, Pine Tree Creek Wash, is approximately 10,900 linear feet and bisects the plant site (Figure 2).
2. The smaller, unnamed dry wash occurring within the plant site is approximately 2,150 linear feet and crosses under the railroad (Figure 2).

The delineation of jurisdictional waters of the state was conducted within the plant site by an EDAW, Inc. ecologist. The boundaries of jurisdictional waters delineated within the plant site were recorded on site using sub-foot Global Positioning System (GPS) equipment. ESRI geographic information system (GIS) software was employed to define the presence, location, amount, and extent of state waters occurring within the plant site. Boundaries for xeric riparian waters of the state were determined (and recorded) by the presence of shelving and/or scour

resulting in an established bank, bed, and channel of an ephemeral wash feature and its associated riparian areas (where applicable).[2]

In specific areas within the ephemeral wash channels (between areas of distinct shelving and scour), where evidence of shelving or scour was absent, subsurface investigations were undertaken to identify established channel banks. Although some portions of the shelving have smooth-toe transitions, these features are composed of friable sand and are evidence of recent sand deposition covering the bank features. The extent of state waters was considered and recorded for these areas within the wash feature where the association of scale-broom (*Lepidospartum squamatum*) ended, which was usually at the head of the ephemeral washes and/or where mixed saltbush scrub becomes established at more than 5 percent absolute cover.[3]

For wetlands and other aquatic habitats occurring in California, CDFG essentially relies on the U.S. Fish and Wildlife Service (USFWS) wetland definition and classification system, which is based upon *Classification of Wetland and Deepwater Habitats of the United States* (Cowardin et al. 1979). The jurisdictional delineations within the plant site have been conducted based upon the one-criterion[4] method outlined in CDFG/USFWS guidance documents and classification manual(s) to define their presence and state jurisdictional extent. Based on this method, there was no observed presence of any one wetland criterion within the plant site. Rather, jurisdictional waters in the form of nonvegetated waters (e.g., ephemeral wash) persist within the plant site.

To ascertain relative cover of established scale-broom occurring within (or dependent on) the ephemeral washes, seven random reaches (totaling 2,990 linear feet) in the Pine Tree Creek Wash were mapped using sub-foot GPS equipment (Figure 3). A weighted arithmetic mean was calculated by taking into account the differences of sampling effort of scale-broom occurring in Pine Tree Creek Wash. The results were then extrapolated to estimate total cover for nonmapped areas resulting in an overall estimate of scale-broom occurring within both washes. The results of the scale-broom sampling for Pine Tree Creek Wash are located in Table 1.

[2] Ephemeral wash can also be described as "xeric riparian."

[3] Scale-broom is only present within the ephemeral washes demonstrating its dependence on this aquatic feature.

[4] For federal jurisdictional a determination for the presence of wetland is based on the presence of three criteria occurring simultaneously at the area of investigation and study. These three criteria are (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology. Therefore, for state-regulated wetlands, only one of these three wetland criteria is required to be present for the state to consider an aquatic feature a wetland.

Table 1
Pine Tree Creek Wash Vegetative Cover Sampling

Reach	Reach Length (ft)	% Absolute Cover	Weighted Mean
1	430	14	0.027
2	310	10	0.026
3	175	6	0.007
4	780	26	0.034
5	200	7	0.046
6	475	16	0.014
7	620	21	0.008
Total	**2,990**	**100**	**0.16**

5.0 RESULTS OF DELINEATION

The extent and distribution of the collective area of state waters occurring within the plant site, based upon the presence of bed and bank, for Pine Tree Creek Wash is 14.96 acres. The extent and distribution of the collective area of state waters occurring within the plant site, based upon the presence of bed and bank, for the unnamed dry railroad wash is 1.04 acres, for a total area of 16.00 acres for both washes (Table 2 and Figure 4). Of the total 16.00 acres of state waters, the extent and distribution of scale-broom occurring within Pine Tree Creek Wash is 2.4 acres.[5] The remaining 13.60 acres of state waters are riverine unconsolidated bottom (i.e., unvegetated waters of the state) (Table 2). Collective jurisdictional acreage is listed for each aquatic habitat and feature observed (Figure 3). Below is an assessment of the type and habitat of these state waters delineated within the plant site.

Table 2
Jurisdictional Waters of the State in the Form of Aquatic Features and Habitat Occurring within the Study Area[a]

Type of Jurisdictional Water of the State	Type of Habitat	Area of Aquatic Resource (Acres)[a]
Ephemeral Wash	Riverine Unconsolidated Bottom (temporarily flooded) (Cowardin et al. 1979)	13.60 [a]
Ephemeral Wash	Southern Alluvial Fan Scrub (63330) (Holland 1986)	2.40 [b]
Total		**16.00**

[a] The washes encompass the scale-broom.
[b] Scale-broom is a component of the aquatic wash features.

[5] Total area of the main wash is 14.96 acres assuming that there is 16 percent total coverage of scale-broom (14.96 * 0.16= 2.4 acres).

The plant site is within the 910-square-mile Fremont Hydrological Unit (No. 625.00). Draining down from the foothills of the Sierra Mountains are seasonal waters that have formed the ephemeral washes, which are coincident with the 100-year floodplain. Small and large wash features transpose the survey site and continue eventually to Koehn Lake (Figure 5). No jurisdictional waters of the state in the form of wetland features (e.g., wetland indicator vegetation) were observed within the plant site. However, jurisdictional waters of the state were identified in the form of ephemeral washes, which include areas of recent sand deposition.

The washes occurring within the plant site are occupied primarily by monotypic stands of scale-broom with a limited understory composed primarily of patchy extents of redstem stork's bill (*Erodium cicutarium*) and small dead patches (at the time of the delineation fieldwork) of Mediterranean grass (*Schismus barbatus*). Dead Russian thistle (*Salsol*a *tragus*) occupies large portions of the washes (the dead thistle is impounded by the concave wash feature). The plant has been significantly disturbed from past agricultural activities that occurred up to the mid-1980s. These past activities have degraded the banks of the wash, reducing the quality of the habitat within the wash.

The vegetation community type of the wash features is best represented by Southern Alluvial Fan Scrub (Holland Code 63330). Southern Alluvial Fan Scrub is primarily restricted to floodplain habitats containing riverine cobbles, boulders, and sand. These areas apparently flood only occasionally (e.g., every 5 to 10 years); therefore, many upland species become established in the streamside habitat. The occasional flooding and sediment reworking, however, is the driving force that maintains this vegetation type.

Typically, this vegetation community type is an open to moderately dense, broad-leaved phreatophyte evergreen scrub that attains a height of 3 to 6 feet. It is dominated by scale-broom, which is primarily restricted to floodplain habitats although it occurs rarely in other habitats such as in the Badlands of Riverside County and Kern County. The open understory areas are typically dominated by ruderal herbaceous species (native and nonnative) usually associated with grassland communities (Holland 1986). The time required for Desert Wash habitats to progress through successional stages is not known but probably depends on water availability (e.g., precipitation, ground water). Stand development ultimately depends on water supply and other site characteristics. In very dry areas, stands may persist as underdeveloped stages (e.g., medium tree/shrub stage) rather than progressing to the large tree stage (CDFG 2008).

The extent of the channel boundaries are characterized by anastomosed scouring, in which small multiple channels interface each other and terminate at the outer banks of the larger channel

encompassing them. By virtue of the anastomosed microchannels being contained by the larger main channel, the delineation collectively includes these smaller channels into a single linear feature of state waters, which is exhibited by the larger channel. Desert pavement and drift lines overwhelmingly occupy the innermost portions of the channels.

Within the northern extent and terminus of the wash all traces of scale-broom and evidence of scour and shelving abate. Small alluvial fans and channels remain visible in the recent aerial map of the plant site. However, when ground-truthed, all evidence of banks, shelving, and scouring has been eliminated by erosion and therefore these may be considered relic features and not jurisdictional waters of the state. Additionally, the channel dependent (with regard to the plant site) scale-broom becomes absent supporting the conclusions of the wash terminus based upon field observation and ground-truthing (Figure 6 and Figures 7a through 7g).

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2008 California Wildlife Habitat Relationships System California Department of Fish and Game California Interagency Wildlife Task Group. http://www.dfg.ca.gov/biogeodata/cwhr/pdfs/DSW.pdf. Accessed March 2008.

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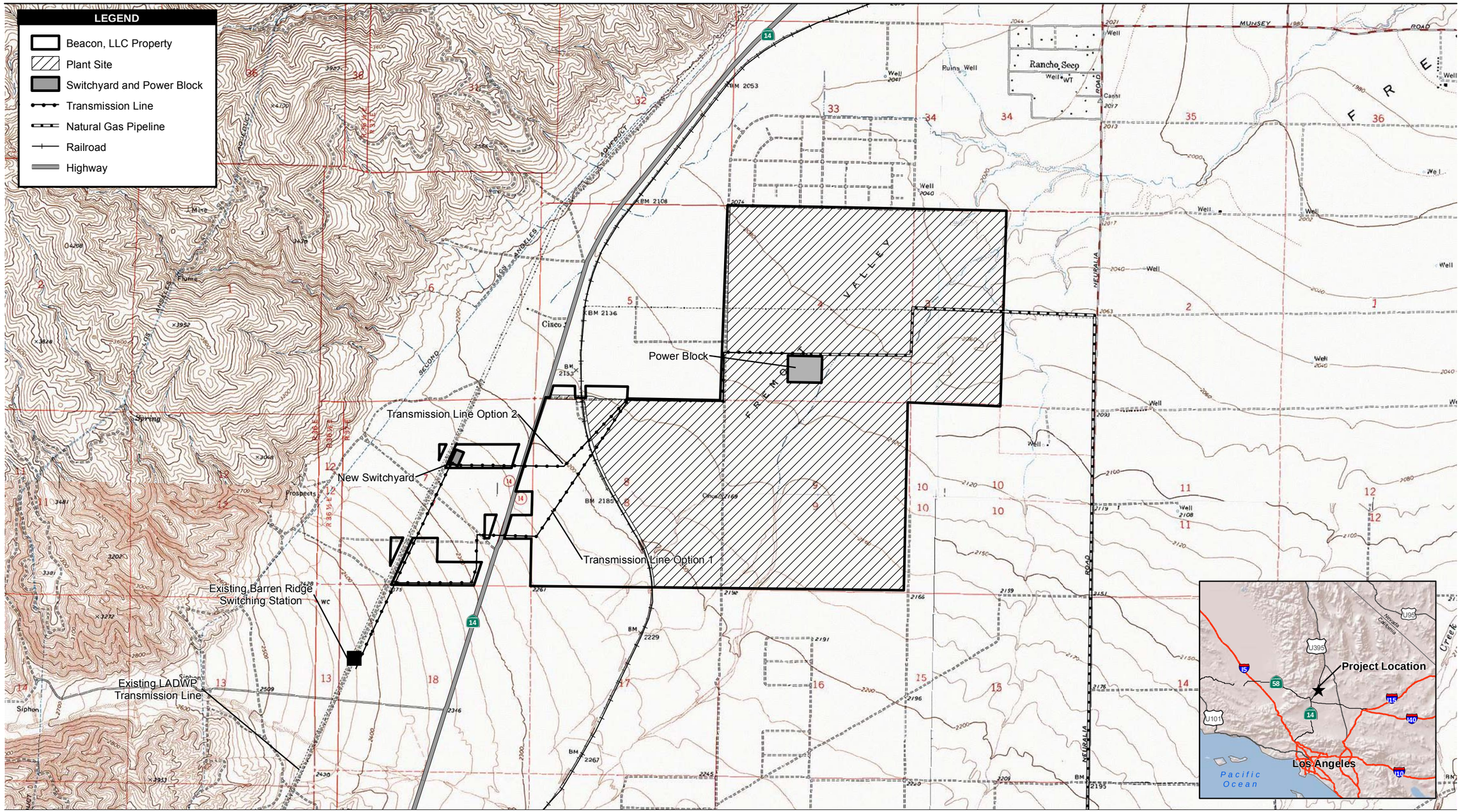

Source: TetraTech 2007; Kern County 2007; USGS 2007; WorleyParsons 2007

2,750 1,375 0 2,750 Feet

Scale: 1:33,000; 1 inch = 2,750 feet

Figure 1
Property Boundary and Plant Site

Beacon Solar Energy Project Jurisdictional Delineation for Waters of the State

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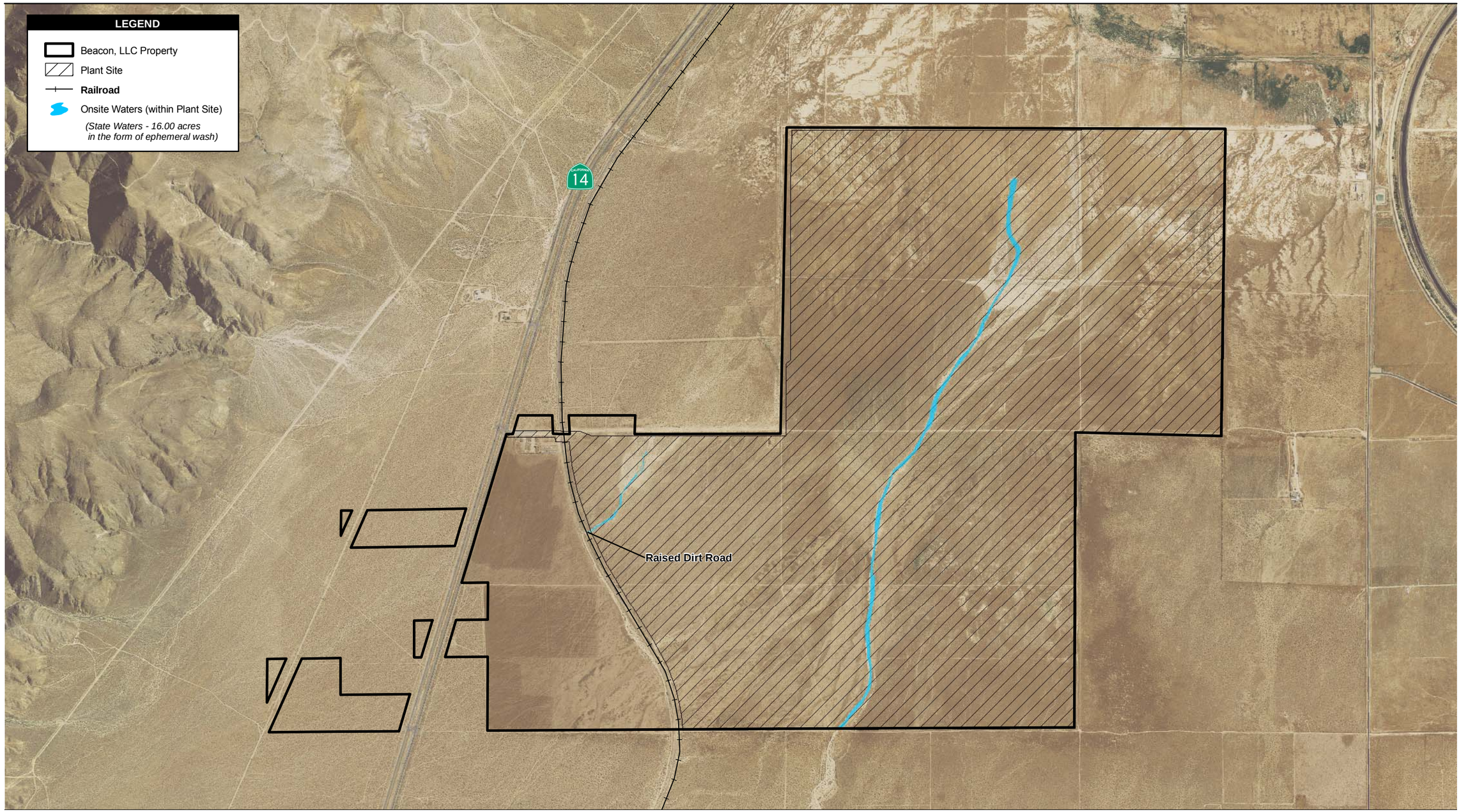

Source: NAIP 2005; EDAW 2007; WorleyParsons 2007

1,750 875 0 1,750 Feet

Scale: 1:21,000; 1 inch = 1,750 feet

Figure 2
Jurisdictional Waters of the State

Beacon Solar Energy Project Jurisdictional Delineation of Waters of the State

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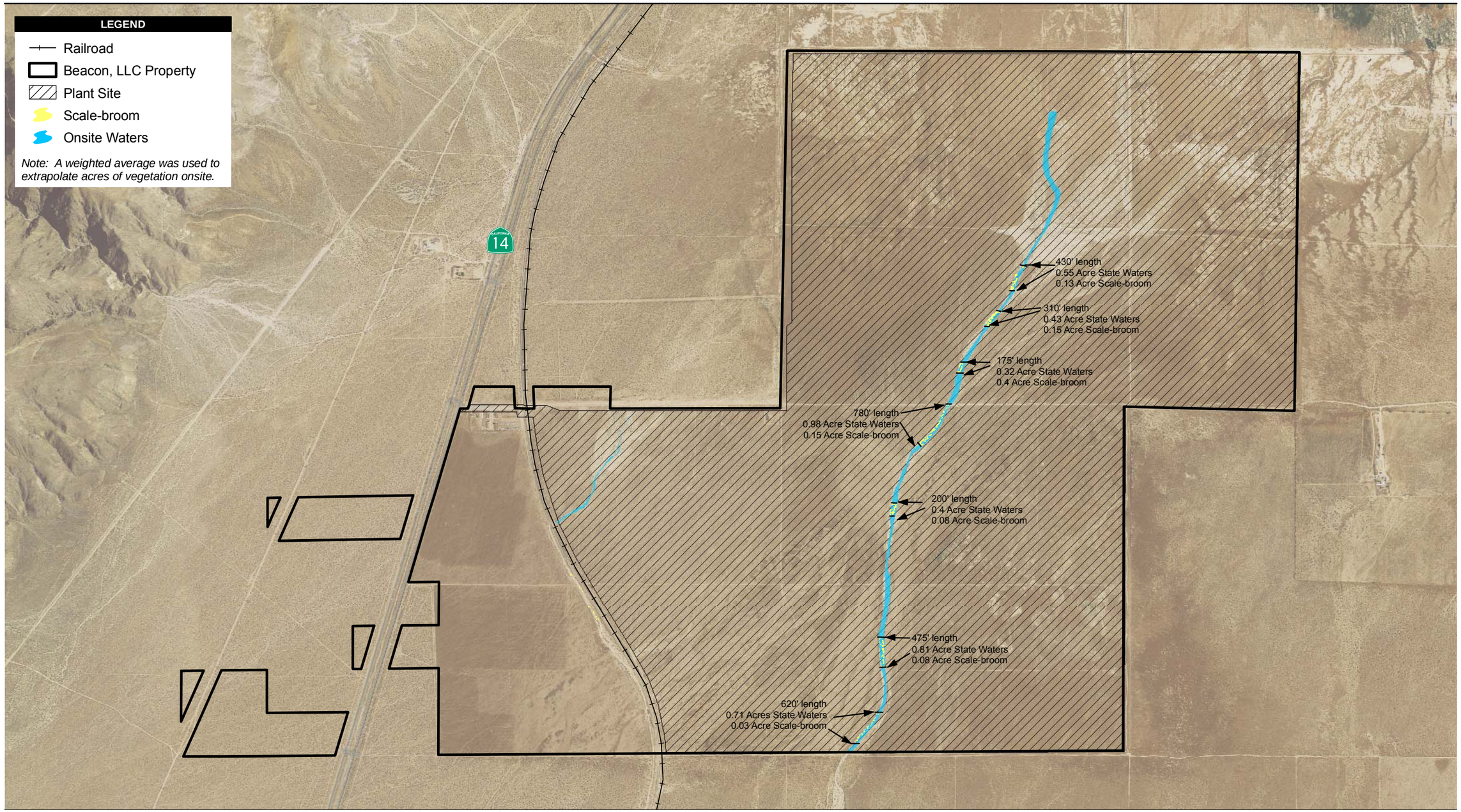

Source: NAIP 2005, Worley Parsons 2007

1,500 750 0 1,500 Feet

Scale: 1:18,000; 1 inch = 1,500 feet

Figure 3
Scale-broom Survey

Beacon Solar Energy Project Jurisdictional Delineation for Waters of the State

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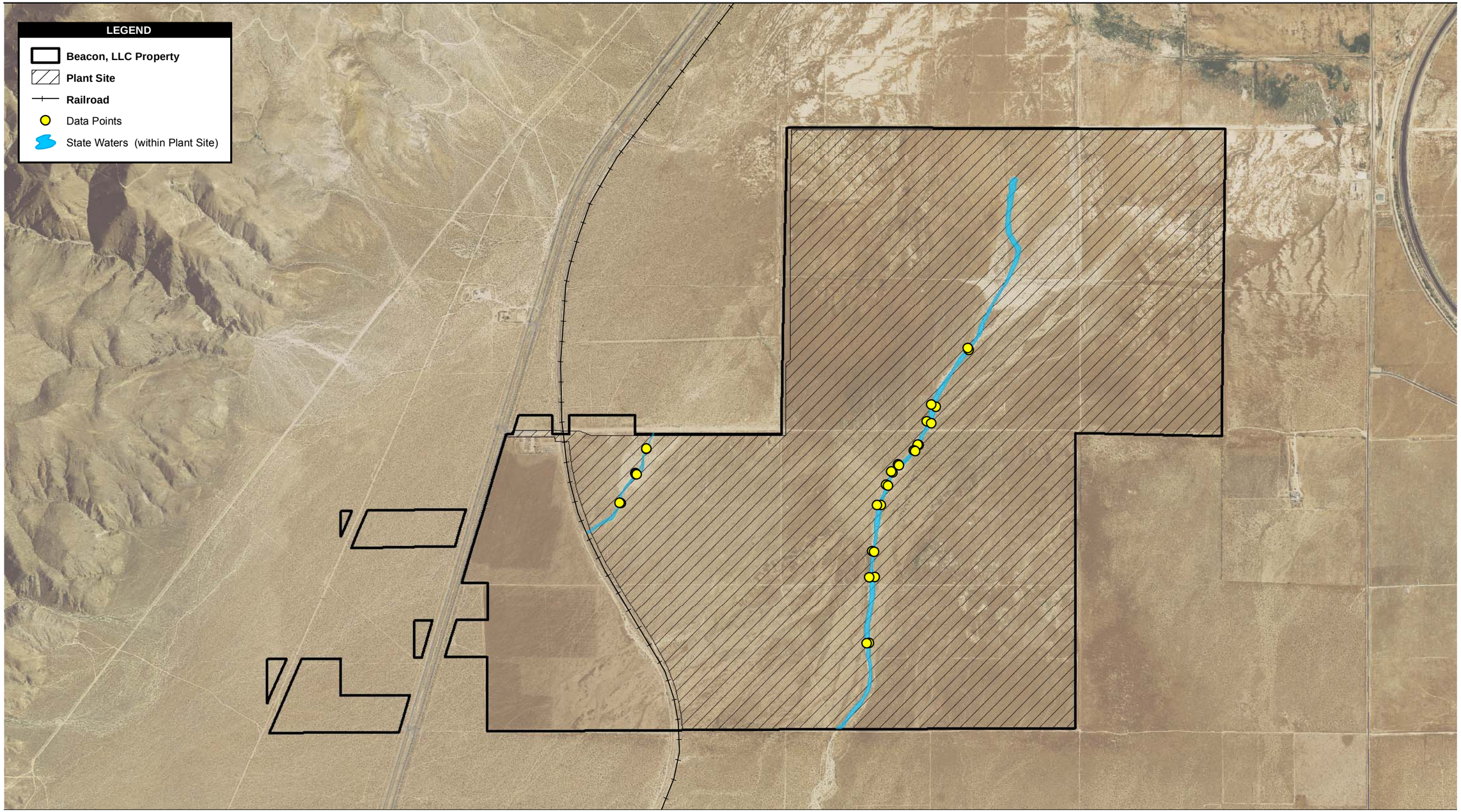

Source: NAIP 2005; EDAW 2007; WorleyParsons 2007

1,750 875 0 1,750 Feet

Scale: 1:21,000; 1 inch = 1,750 feet

Figure 4
Jurisdictional Delineation
Field Map with Data Points

Beacon Solar Energy Project Jurisdictional Delineation for Waters of the State

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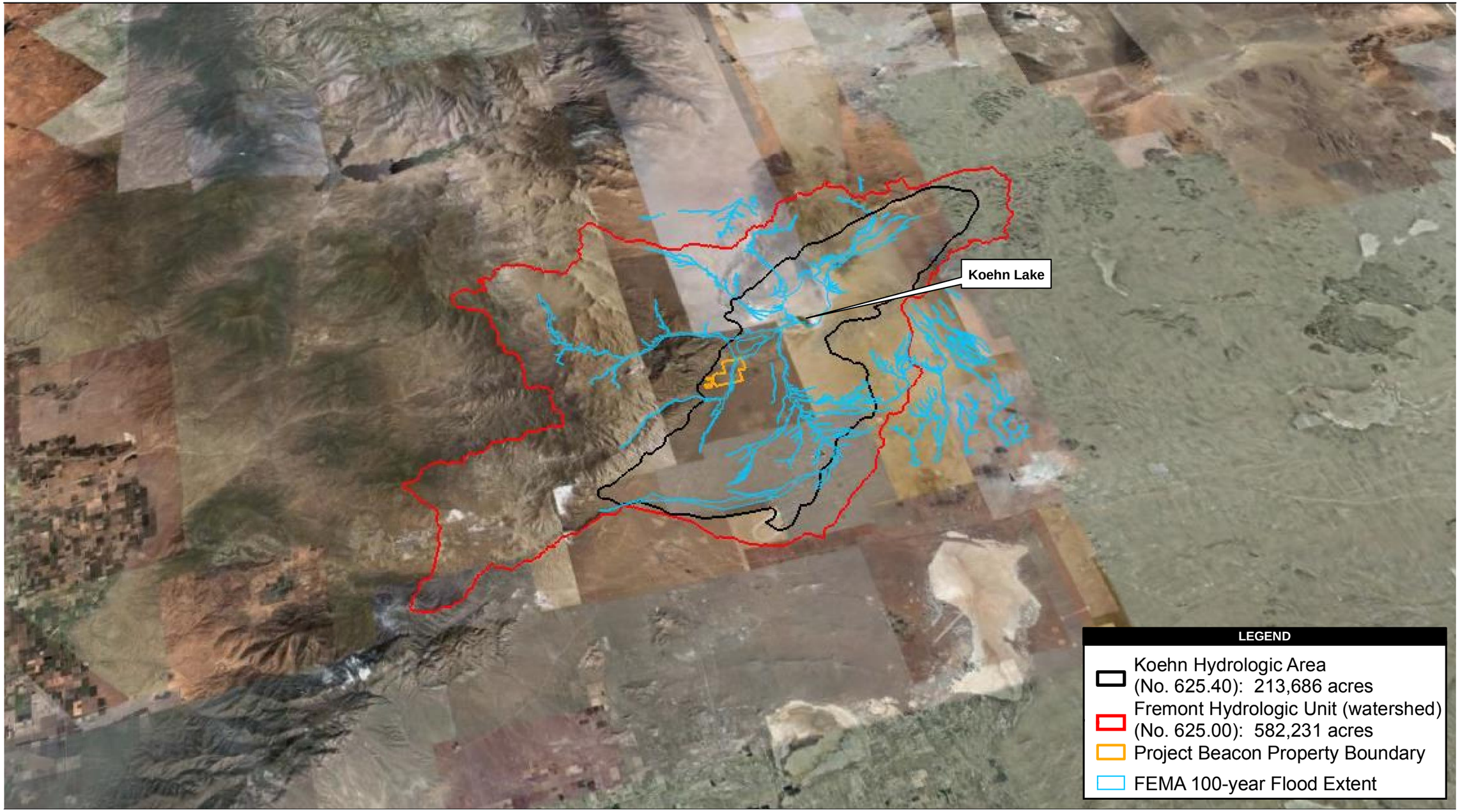

Source: GoogleEarth 2007

Not to Scale

Figure 5
Watershed and Drainage

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Beacon Solar Energy Project Jurisdictional Delineation for Waters of the State

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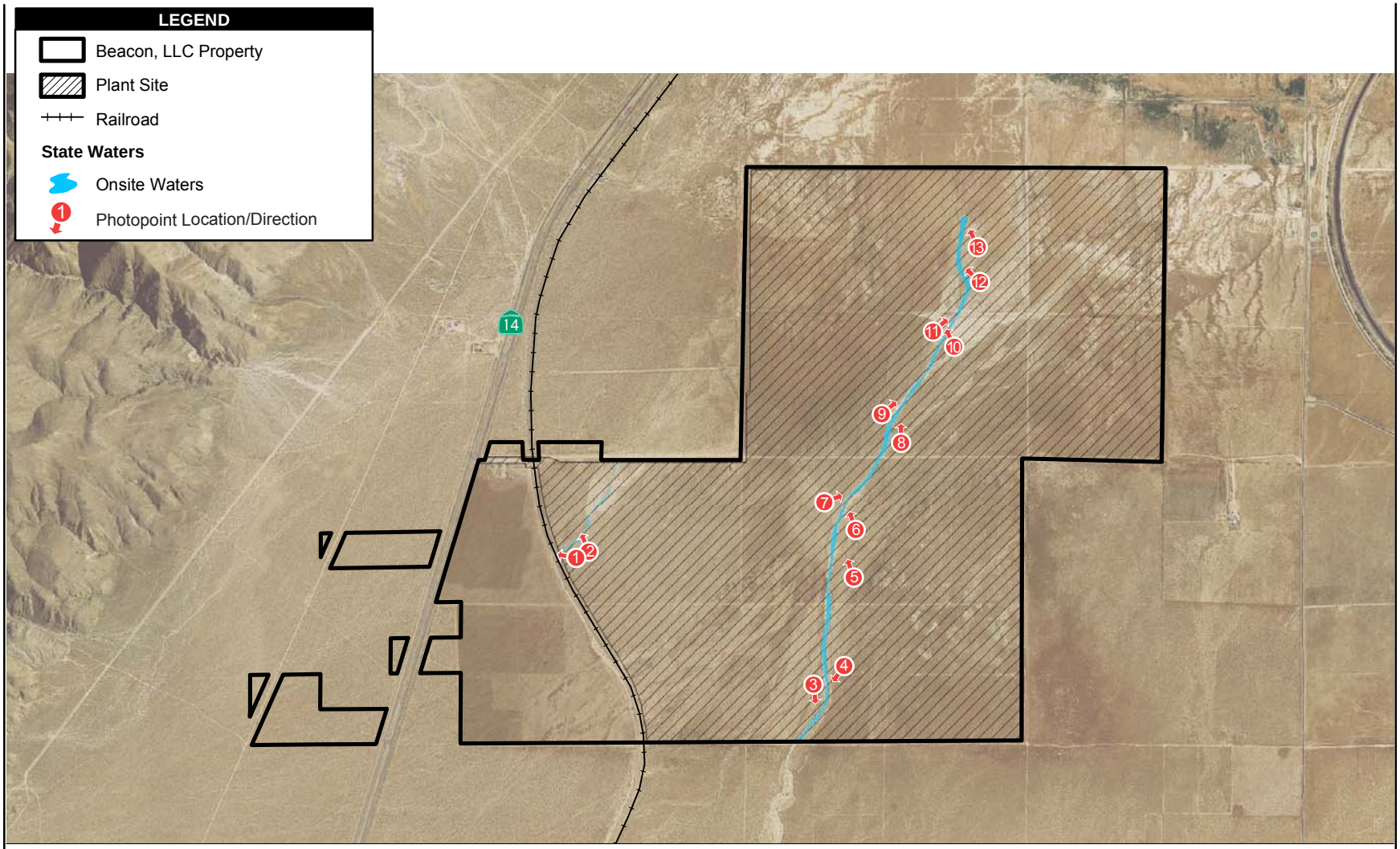

Source: NAIP 2005; EDAW 2007; WorleyParsons 2007

2,450 1225 0 2,450 Feet

Scale: 1 inch = 2,450 feet

Figure 6
Photopoint Map

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Photograph 1: Looking west at trestle over wash (note dirt filled embankment in wash)

Photograph 2: Looking northwest at 3.5 foot high wash shelf (relic)

Figure 7a
Representative Photographs 1 and 2

Photograph 3: Looking south at wash

Photograph 4: Looking south at wash

Figure 7b
Representative Photographs 3 and 4

Photograph 5: Looking north at anastomosed channel morphology

Photograph 6: Looking northeast at wash; Note wash filled in by thistle

Figure 7c
Representative Photographs 5 and 6

Photograph 7: Looking northeast, southern alluvial fan scrub occupying channel

Photograph 8: Looking north, recent sand deposition within channel

Figure 7d
Representative Photographs 7 and 8

Photograph 9: Looking northeast at wash

Photograph 10: Looking northwest at abating wash

Figure 7e
Representative Photographs 9 and 10

Photograph 11: Looking northeast at service road crossing wash

Photograph 12: Looking north at abating wash

Figure 7f
Representative Photographs 11 and 12

Photograph 13: Looking northwest at terminus of defined bed and bank of wash

Figure 7g
Representative Photograph 13

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ATTACHMENT 1

USACE JURISDICTIONAL DETERMINATION

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
VENTURA FIELD OFFICE
2151 ALESSANDRO DRIVE, SUITE 110
VENTURA, CALIFORNIA 93001

REPLY TO
ATTENTION OF:

February 5, 2008

Office of the Chief
Regulatory Division

Kenneth Stein
Beacon Solar, LLC
700 Universe Boulevard
Juno Beach, Florida 33408

Dear Mr. Stein:

Reference is made to your letter (Corps File No. 2007-1414-CLM), dated November 5, 2007 for a Department of the Army Jurisdictional Determination to construct a wind power generation project in unnamed tributaries to Koehn Dry Lake within an unincorporated area of Kern County, California.

Based on the information furnished in your letter, we have determined that Kohn Dry Lake does not exhibit any evidence of navigation. Using the criteria at 33 CFR Part 328.3, the Corps has determined that Koehn Dry Lake exhibits insufficient evidence of interstate commerce to meet the requirements of 33 CFR Part 328.3(a)(3)(iii) and does not meet the requirements for navigability at 33 CFR Part 328.3 (a)(1). Based on the above information and the Solid Waste Agency of Northern County Supreme Court Decision, your project does not discharge dredged or fill material into a water of the United States or an adjacent wetland. Therefore, the project is not subject to our jurisdiction under Section 404 of the Clean Water Act and a Section 404 permit is not required from our office.

Please be aware that our determination does not preclude the need to comply with Section 13260 of the California Water Code (Porter/Cologne) and we recommend that you contact the California Regional Water Quality Control Board to insure compliance with the above regulations. Furthermore, our determination does not obviate the need to obtain other Federal, state, or local authorizations required by law.

This letter contains an approved jurisdictional determination for the Beacon Street Solar Energy Project. If you object to this decision, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet (Appendix C) and Request for Appeal (RFA) form. If you request to appeal this decision you must submit a completed RFA form to the Corps South Pacific Division Office at the following address:

Tom Cavanaugh
Administrative Appeal Review Officer,
U.S. Army Corps of Engineers
South Pacific Division, CESPD-PDS-O, 2042B
1455 Market Street, San Francisco, California 94103-1399

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 C.F.R. Part 331.5, and that it has been received by the Division Office within 60 days of the date on the NAP. Should you decide to submit an RFA form, it must be received at the above address by April 6, 2008. It is not necessary to submit an RFA form to the Division Office if you do not object to the decision in this letter.

This verification is valid for five years from the date of this letter, unless new information warrants revision of the determination before the expiration date. If you wish to submit new information regarding the approved jurisdictional determination for this site, please submit this information to Crystal L. Marquez at the letterhead address by April 6, 2008. The Corps will consider any new information so submitted and respond within 60 days by either revising the prior determination, if appropriate, or reissuing the prior determination. A revised or reissued jurisdictional determination can be appealed as described above.

A courtesy copy of this letter has been sent to Mr. Joshua Zinn, EDAW Inc., 1420 Kettner Boulevard, Suite 500, San Diego, CA 92101. If you have any questions regarding this matter, please contact Crystal L. Marquez at (805) 585-2143. Please be advised that you can now comment on your experience with Regulatory Division by accessing the Corps web-based customer survey form at: http://per2.nwp.usace.army.mil/survey.html.

Sincerely,

Antal Szijj
Senior Project Manager
North Coast Branch

Enclosures

ATTACHMENT 2

EXPANDED REGULATORY FRAMEWORK

EXPANDED REGULATORY FRAMEWORK[1]

Wetland and other aquatic environments/habitats occurring within California are regulated under the following state laws, as applicable to the project. All parties proposing an action that will result in a discharge or fill that could affect waters of the state must legally abide by the following:

Porter-Cologne Water Quality Control Act

Through a programmatic agreement between the federal government and the states, the RWQCB[2] has primary authority for permit and enforcement activities under the rubric of Porter-Cologne[3] and the Clean Water Act (CWA). Under Porter-Cologne, the RWQCB regulates the "discharge of waste" to waters of the state.[4] The definition of waters of the state is broader than that for waters of the U.S. in that all waters occurring within the state of California are considered to be a water of the state regardless of circumstances or condition. The term "discharge of waste" is also broadly defined in Porter-Cologne, such that discharges of waste include fill, any material resulting from human activity, or any other "discharge" that may directly or indirectly impact "waters of the state" relative to implementation of Section 401 of the CWA.

Porter-Cologne authorizes the RWQCB to regulate discharges of waste and fill material to waters of the state, including "isolated" waters and wetlands, through the issuance of waste discharge requirements (WDRs).[5] Under Porter-Cologne, all parties proposing to discharge waste that could affect waters of the state must file a report of waste discharge (ROWD) with the appropriate RWQCB. The RWQCB will then respond to ROWD by issuing a WDR in a public hearing, or by waiving WDRs (with or without conditions) for that proposed discharge.

---

[1] 40 CFR Part 122 applies to this project. This provision prohibits point source discharges of storm water associated with construction activity to water bodies of the United States without a National Pollutant Discharge Elimination System (NPDES) storm water construction general permit prior to commencement of construction on any site that will result in the disturbance of the land. This project will be eligible for coverage under the reissued NPDES Storm Water Construction General Permit for Storm Water Discharge from construction sites, which was published in the Federal Register Volume 68, No. 126 on Tuesday July 1, 2003. Other provisions of the General Permit require a Storm Water Pollution Prevention Plan to be prepared, implemented, kept current, and maintained on the project site along with inspection reports, as required by NPDES.

[2] This study area occurs in RWQCB Region 7 (Colorado River Basin).

[3] California Water Code (CWC) Section 13000-13999.10.

[4] "Waters of the state" is defined in CWC Section 13050(e).

[5] Section 13263 of Porter-Cologne.

Therefore, all parties proposing to discharge waste that could affect waters of the state, but does not affect federal waters must file an ROWD with the appropriate RWQCB.[6] California Water Code Section 13260(a) requires that any person discharging waste or proposing to discharge waste within any region that could affect the quality of the waters of the state, other than into a community sewer system, shall file with the appropriate regional water board an ROWD containing such information and data as may be required by the RWQCB.

The RWQCB will then respond to the ROWD by issuing a WDR and NPDES permits, or by waiving the WDR (with or without conditions) for that proposed discharge into jurisdictional waters in a public hearing. The RWQCB has a statutory obligation to prescribe WDRs except where the RWQCB finds that a waiver of WDRs for a specific type of discharge is in the public interest.[7]

Sections 1600-1616 of the California Fish and Game Code

Under Section 1600 et seq. of the CFGC, the CDFG regulates activities that would alter the flow, bed, channel, or bank of streams and lakes. The limits of CDFG jurisdiction are defined in the code as the "bed, channel or bank of any river, stream or lake designated by the department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit." The California Code of Regulations (Title 14 CCR 1.72) defines a stream as:

> "[A] stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation."

Title 14 CCR 1.56 defines a lake that:[8]

> "Includes natural lakes or man-made reservoirs."

Title 14 Designation Waters of CDFG Interest, Section 720 states:

> "For the purpose of implementing Sections 1601 and 1603 of the Fish and Game Code which requires submission to the Department of general plan sufficient to

[6] CWC Section 13260.
[7] CWC Section 13269.
[8] This definition is listed for the purpose of state regulatory understanding of nearby Kohen Lake.

> indicate the nature of any project…which will use material from the streambeds or will divert, obstruct or change the natural flow or bed of any river, stream or lake designated by the Department,…all rivers, streams, lakes, and streambeds in the State of California, including all rivers, streams, and streambeds which may have intermittent flows of water, are hereby designated for such purposes."

In practice, CDFG usually extends its jurisdictional limit to the top of a stream, the bank of a lake, or outer edge of the riparian vegetation, whichever is wider. Riparian habitats do not always have identifiable hydric soils, or clear evidence of wetland hydrology as defined by the USACE. Therefore, CDFG wetland boundaries often extend beyond USACE wetland boundaries, which sometimes include only portions of the riparian habitat adjacent to a river, stream, or lake. Jurisdictional boundaries under CFGC Section 1600 et seq. (CDFG's Lake and Streambed Alteration Program) may encompass an area that is greater than that under the federal jurisdiction of Section 404 of the CWA.

CFGC Section 1602 requires any person, governmental agency, state, local, or public utility who proposes a project that will substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake or use materials from a streambed to notify the CDFG before beginning the project.

Under CFGC Section 1602, any project proponent needs to provide CDFG with written notification before construction begins on any project that will:

1. Substantially divert or obstruct the natural flow of any river, stream, or lake;
2. Substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or
3. Deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into any river, stream, or lake.

Notification is generally required for any project that will take place in or in the vicinity of a river, stream, lake, or their tributaries. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks and support fish or other aquatic life, and watercourses having a surface or subsurface flow that supports or has supported riparian vegetation.[9]

[9] CDFC Section 1602.

If CDFG determines that the project will need a Lake or Streambed Alteration Agreement (SAA), project construction within jurisdictional waters may not begin until CDFG develops a Draft SAA and the project described in that agreement is environmentally reviewed under the California Environmental Quality Act (CEQA) or an equivalency to CEQA.[10] By working with CDFG to develop a Draft SAA, the project applicant can modify the project features to avoid or lessen potential impacts on fish and wildlife resources. This approach would simplify environmental review of the project and expedite the issuance of a final agreement.[11]

[10] CDFC Section 1603.

[11] Projects licensed by the California Energy Commission are environmentally reviewed under the Application for Certification process to ensure compliance with all applicable state laws.

ATTACHMENT 4

SPECIAL STATUS PLANT AND ANIMAL SPECIES
(Question 11C)

ATTACHMENT 4
SPECIAL STATUS SPECIES (QUESTION 11C)

For the purposes of this Streambed Alteration Agreement Application, information on special status species associated with the Beacon Solar Energy Project (the Project) is summarized here from the *Beacon Solar Energy Project Biological Technical Report* (BTR) (EDAW, 2008) (Attachment 5) , with updates based on results of 2008 surveys to be summarized in an addendum to the BTR, and the California Endangered Species Act (CESA) Section 2081 permit application (submitted March 28, 2008 and undergoing revision).

Beacon Solar, LLC (Beacon) proposes to develop a 250 megawatt (MW) solar energy facility on 2,012 acres. The Plant Site includes the solar array, power generating equipment, support facilities, evaporation ponds, a cooling tower and access roads. The Project also includes linear facilities (access road, transmission line and natural gas supply pipeline) which do not affect waters of the State and therefore are not included in this SAA application. The BTR describes in detail the special status species that occur or have potential to occur in or within the vicinity of the Plant Site. The BTR is based on biological resources studies for Beacon performed by EDAW, Inc. in 2007 and 2008. The BTR was prepared to support the Application for Certification, which was submitted to the California Energy Commission (CEC) on March 14, 2008. The CEC power plant licensing process is a California Environmental Quality Act-equivalent process under California law (Warren-Alquist Act).

Two special status wildlife species were identified as having potential to occur within the Plant Site boundary, desert tortoise, Mojave population (*Gopherus agassizii*; DT) and Western burrowing owl (*Athene cunicularia;* WBO). DT is listed as threatened under the federal Endangered Species Act (ESA) and CESA, and WBO is a California Department of Fish and Game (CDFG) Special Status Species. Mohave ground squirrel (*Spermophilus mohavensis*), listed as threatened by CDFG, does not have potential to occur within the Plant Site boundary, but suitable habitat for this species and for DT was identified outside of the Plant Site boundary, associated with the project's linear features. Additional species detected within the Plant Site boundary are summarized below. A complete list of species that may be present in the Project Area is provided in the BTR

Surveys to map vegetation communities and waters of the state and determine presence or absence of special status plant and wildlife species were conducted within the Plant Site boundary. Protocol surveys were conducted for DT and WBO, and a general wildlife inventory was also conducted.

Five vegetation communities were mapped within the Plant Site boundary: Mojave Creosote Bush Scrub, Mojave Desert Wash Scrub, Developed, Fallow Agriculture –

Ruderal, and Fallow Agriculture - Disturbed Atriplex Scrub. The majority of vegetation within the Plant Site boundary is composed of both classes of Fallow Agriculture, with two dry desert washes running across sections of the Plant Site.

No sensitive plant communities occur in the Plant Site, although the dry desert washes were mapped as jurisdictional waters of the state of California. No rare plant species were detected within the Plant Site boundary during rare plant surveys in May 2007 or March, April, May, and July 2008.

No live tortoises or recent DT sign have been found within the Plant Site boundary. One WBO was observed within the Plant Site boundary during protocol surveys, as well as one WBO detected within the Plant Site boundary in 2007 (not during a protocol survey). WBO burrows (active and inactive) and sign were observed throughout the Plant Site during protocol surveys, indicating that observed individuals are residents. One California-listed American peregrine falcon was observed in the biological survey area boundary; however, because the survey does not contain nesting habitat for this species, this individual is likely a transient. Three other CDFG Species of Special Concern were observed within the Plant Site boundary: loggerhead shrike (*Lanius ludovicianus*), California horned lark (*Eremophila alpestris actia*), and Le Conte's thrasher (*Toxostoma lecontei*).

No USFWS designated critical habitat for any plant or wildlife species occurs in the Project Area.

ATTACHMENT 5

BIOLOGICAL TECHNICAL REPORT

BEACON SOLAR ENERGY PROJECT
BIOLOGICAL TECHNICAL REPORT
KERN COUNTY, CALIFORNIA

Prepared for:

Beacon Solar, LLC
700 Universe Boulevard
Juno Beach, Florida 33408

Prepared by:

EDAW, Inc.
1420 Kettner Boulevard, Suite 500
San Diego, California 92101
Phone: (619) 233-1454
Fax: (619) 233-0952

February 2008

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EXECUTIVE SUMMARY

EDAW, Inc. performed biological resources studies for Beacon Solar, LLC at the site of the proposed Beacon Solar Energy Project (also referred to as "Project") near California City, California. Beacon Solar, LLC proposes to develop a 250 megawatt (MW) solar energy facility on 2,012 acres (hereafter referred to as the plant site) within a 2,317.2-acre area defined for the biological resources study (hereafter referred to as the survey area). This Biological Technical Report (BTR) was prepared to support an Application for Certification (AFC) submitted to the California Energy Commission (CEC), which must license all thermal power plants over 50 MW in California. This BTR will also support permits required for the Project from California and federal biological resource agencies.

The Beacon Solar Energy Project will use parabolic trough solar thermal technology to concentrate the sun's energy on a linear receiver located at the center point of each parabolic solar subarray. Energy collected in the array is used to generate steam, driving a turbine which generates electricity. This solar array would be located east of the railroad tracks, which run parallel to and east of SR-14. Two options are under consideration for a short transmission line which will be constructed from the solar array across SR-14 to interconnect with the Los Angeles Department of Water and Power's (LADWP) existing transmission system west of the site. Three evaporation ponds, used to manage the cooling tower blowdown stream, are planned within a highly disturbed portion of the survey area. A 17.6-mile, eight-inch natural gas line will be constructed, connecting an existing Southern California Gas pipeline in California City with the Project, to provide fuel for startup and emergency operations.

No other linear facilities are currently proposed for the Project. The Project intends to use ground water as its cooling water supply source and septic tanks for sanitary waste water disposal, which would eliminate the need for the installation of off-site water supply and sewer pipelines to the site.

Several special status plant and wildlife species were identified as having potential to occur at the survey area. Two species with potential to occur are listed under the federal Endangered Species Act (ESA) and/or California Endangered Species Act (CESA): Mojave desert tortoise (*Gopherus agassizii* [DT]), listed as threatened under the ESA and CESA; and Mohave ground squirrel (*Spermophilus mohavensis* [MGS]), listed as threatened under the CESA. Seven species with the potential to occur have been given special status by the California Department of Fish and Game (CDFG) or the California Native Plant Society (CNPS): Red Rock poppy

(*Eschscholzia minutiflora* ssp. *twisselmannii*), CNPS List 1B; alkali mariposa lily (*Calochortus striatus*), CNPS List 1B; Red Rock tarplant (*Deinandra arida*), CNPS List 1B, CDFG rare; creamy blazing star (*Mentzelia tridentata*), CNPS List 1B; Charlotte's phacelia (*Phacelia nashiana*), CNPS List 1B; western burrowing owl (*Athene cunicularia* - WBO), CDFG Species of Special Concern (SSC); and American badger (*Taxidea taxus*), CDFG SSC.

Surveys to map vegetation communities and waters of the state and determine presence or absence of special status plant and wildlife species were conducted within the large survey area encompassing the proposed plant site and within a one-mile buffer surrounding the survey area, per CEC regulations and in accordance with established survey protocols for various special status species. Protocol surveys were conducted for Mojave desert tortoise and western burrowing owl, and a general wildlife inventory was also conducted within the survey area and the one-mile buffer.

Seven vegetation communities were mapped within the survey area and one-mile buffer: Mojave Creosote Bush Scrub, Mojave Desert Wash Scrub, Mojave Mixed Woody Scrub, Tamarisk Scrub, Developed, Fallow Agriculture – Ruderal, and Fallow Agriculture - Disturbed Atriplex Scrub. The majority of the survey area is composed of both classes of Fallow Agriculture, with two dry desert washes running across sections of the survey area. Some small patches of Mojave Creosote Bush Scrub also occur in the survey area, although the majority of the Mojave Creosote Bush Scrub occurs offsite, west, south, and east of the survey area within the one-mile buffer.

No sensitive plant communities occur in the survey area, although the dry desert washes were mapped as waters of the state. While no rare plant species were detected during rare plant surveys in May, conditions (low winter rainfall) were less than satisfactory for performing these surveys. Therefore, the absence of these species cannot be confirmed at this time. Additional surveys will be performed during the spring of 2008.

Five federally listed adult DT were encountered outside of the survey area but within the one-mile buffer during tortoise surveys. Multiple burrows and fresh sign indicate that these adults are residents. Two additional live DT were detected during subsequent site visits for other purposes -- one likely transient inside the survey area and one outside the survey area but within the one-mile buffer.

One California-listed American peregrine falcon was observed on the survey area boundary; however, because the survey does not contain nesting habitat for this species, this individual is

likely a transient. At least six CDFG SSC western burrowing owls (WBO) were observed within the Project vicinity, two within the survey area and the others (one pair plus one to two individuals) in the one-mile buffer. Recent owl sign and nearby burrows indicate that these individuals are residents. Four other CDFG Species of Special Concern were observed within the survey area or in the one-mile buffer: northern harrier (*Circus cyaneus*), loggerhead shrike (*Lanius ludovicianus*), California horned lark (*Eremophila alpestris actia*), and Le Conte's thrasher (*Toxostoma lecontei*).

No USFWS designated critical habitat for any plant or wildlife species occurs in the survey area.

In addition to the CEC license, permits will also likely be required from the CDFG for impacts to waters of the state. The Project will also comply with relevant portions of the California Fish and Game Code and will consult with CDFG on potential effects to CESA-listed species. The Project has received concurrence from the U.S. Army Corps of Engineers that the waters (i.e., desert washes) within and surrounding the survey area are not under federal jurisdiction and, therefore, the Project does not require a Clean Water Act Section 404 permit. A permit will be obtained from the U.S. Fish and Wildlife Service under Section 10 of the ESA for minor impacts to Mojave desert tortoise, a federally listed species, and will involve preparation of a Low Effect Habitat Conservation Plan.

This report addresses permanent, temporary, direct, and indirect impacts to biological resources in the survey area. The Project is not expected to result in direct or indirect, permanent or temporary impacts to sensitive vegetation communities due to lack of such communities in the survey area. Project development would directly affect two dry desert washes that traverse the survey area; however, these impacts would be minimized to the greatest extent possible by re-routing the channels and restoring the native vegetation to the rerouted channel on the southern and eastern edge of the project site. Direct and/or indirect impacts to Mojave desert tortoise, Mohave ground squirrel, and western burrowing owl will be reduced to a level of insignificance by implementation of impact avoidance, minimization, and mitigation measures.

CHAPTER 1
INTRODUCTION

EDAW, Inc. (EDAW) has been retained by Beacon Solar, LLC to provide biological resources support as a subcontractor to ENSR for the proposed Beacon Solar Energy Project (also referred to as "Project"), a 250-megawatt (MW) solar thermal electrical generation facility. This Biological Technical Report (BTR) was prepared to support an Application for Certification submitted to the California Energy Commission (CEC), which must license all thermal power plants over 50 MW proposed in California. This BTR will also support permits required for the Project from California and federal biological resource agencies. The BTR describes existing biological conditions in a large survey area that encompasses the proposed plant site and analyzes how the Project potentially impacts threatened, endangered, or special status species or vegetation communities. The survey area was defined by identifying suitable property that was available under the terms of an option to purchase the parcels.

1.1 PROJECT LOCATION

The proposed Project is located along California State Route 14 (SR-14), approximately 10 miles north-northwest of California City, approximately 15 miles north of the Town of Mojave, and approximately 24 miles northeast of the City of Tehachapi, in Kern County, California (Figure 1). The site occurs at the intersection of four U.S. Geological Survey quadrangles: Mojave NE, Cinco, Cantil, and California City North. Landmarks in the area include Red Rock Canyon State Park to the north, Koehn Lake to the east-northeast, and the Desert Tortoise Natural Area to the east.

1.2 SITE AND PROJECT DESCRIPTION

1.2.1 Site Description

The primary solar energy facilities and associated construction and operations footprint are located within the 2,012-acre plant site east of the Union Pacific railroad tracks, which run parallel to and east of SR-14 (Figure 1). Two options are under consideration for the proposed transmission line from the plant site and to the existing Los Angeles Department of Water and Power (LADWP) transmission line (Figure 2). Both options involve the construction of a new, approximately 3.5 mile transmission line, 1.6 miles of which would occur within the plant site. Option 1 would extend from the solar array southwest to interconnect with the Barren Ridge

Switching Station. Option 2 would extend west from the solar array to a new, Project associated switching station at its junction with the existing LADWP transmission line, then continue approximately 1 mile south to the Barren Ridge Switching Station.

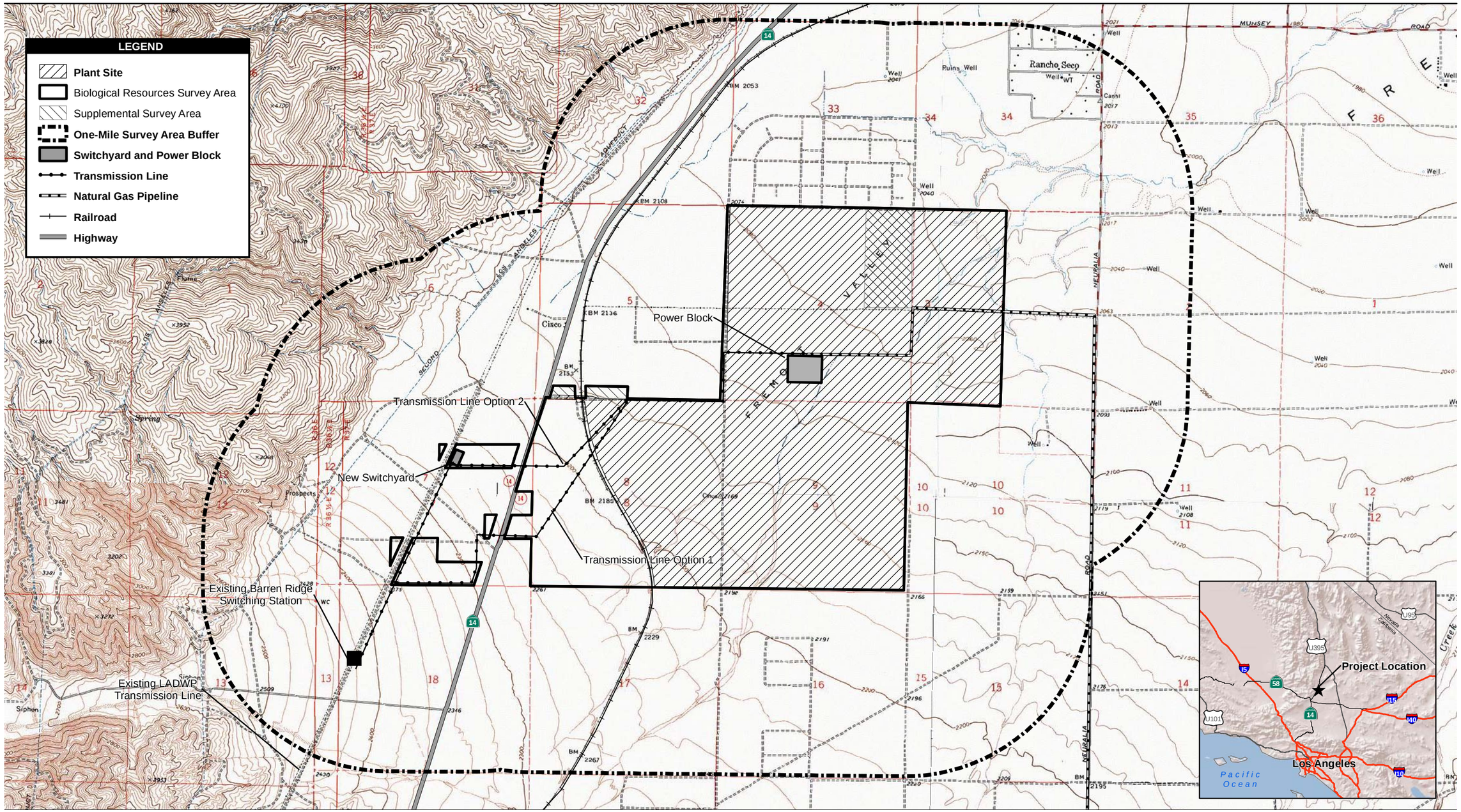
Topography in the survey area is generally flat with elevations ranging from approximately 2,020 feet to approximately 2,340 feet. Soils within the survey area consist primarily of Arizo Gravelly Loamy Sand (2 to 9 percent slopes), Cajon Loamy Sand (0 to 5 percent slopes), Rosamond Clay Loam-Saline-Alkali, and Cajon Gravelly Loamy Sand (0 to 9 percent slopes). These soils are generally found in alluvial fans and floodplains and are well drained to excessively drained. The Rosamond Clay Loam, which occurs in the northern section of the survey area, is slightly to moderately saline. The survey area has been heavily disturbed by past agricultural activities, and parts of the area are in the process of re-colonization with desert saltbush vegetation. Abandoned buildings, along with one occupied residence, occur at the northwestern portion of the site that abuts the east side of SR-14, immediately south of the proposed access road to the plant site.

1.2.2 Project Description

Beacon Solar, LLC proposes to develop 2,012 acres for a 250 MW solar energy facility called The Beacon Solar Energy Project. The Project will use parabolic trough solar thermal technology, based on the technology that has been successfully used for nearly 20 years at the nine existing Solar Energy Generating System (SEGS) facilities located at Harper Lake, Kramer Junction, and Daggett in the Mojave Desert. This technology involves a modular solar array field composed of many parallel rows of solar collectors normally aligned in a north-south horizontal axis. Each solar collector has a linear parabolic-shaped reflector that focuses the sun's radiation on a receiver located at the focal point of the parabola.

The solar collectors track the sun from east to west during the day to ensure that the sun is continuously focused on the linear receiver. The linear receiver contains a heat transfer fluid (HTF), a synthetic oil that heats up to approximately 740 degrees Fahrenheit (°F) as it circulates through the receiver and returns to a series of heat exchangers where the HTF is used to generate steam that drives a turbine, which generates electrical power.

Figure 2 shows a conceptual layout of the proposed Project. This preliminary plant layout, prepared by engineering contractor Worley Parsons, shows two options for a new 230 kV transmission line crossing the small area west of SR-14, connecting the Project to the regional

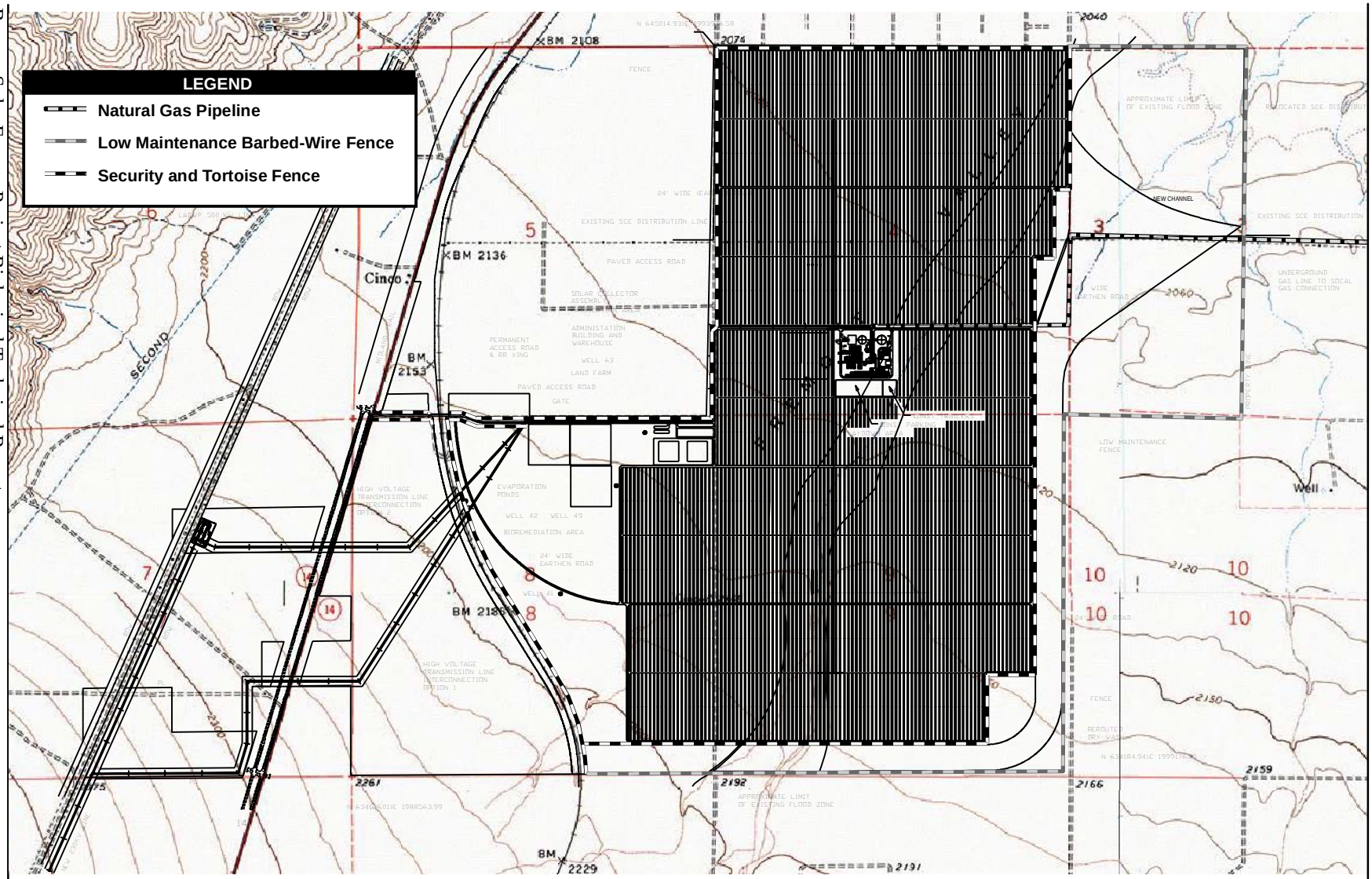


Source: TetraTech 2007; Kern County 2007; USGS 2007; WorleyParsons 2007

2,750 1,375 0 2,750 Feet

Scale: 1:33,000; 1 inch = 2,750 feet

Figure 1
Project Site Boundary and Survey Area



Source: USGS 2007; WorleyParsons 2007

Figure 2
Facilities Layout

electrical grid. Option 1 would extend from the power block within the plant site east of the railroad tracks, southwest across SR-14, and continue west and southwest for approximately 0.7 mile to the existing Barren Ridge Switching Station. Option 2 would extend from the power block within the plant site east of the railroad tracks, across the highway and continue west for approximately one-half mile to meet the existing LADWP transmission line at a new Project-associated electrical switching yard, then run southwest parallel to the LADWP transmission line for approximately 1 mile to the existing Barren Ridge Switching Station. The Project's short (approximately 3.5 miles under both options) transmission line is expected to be constructed using the existing LADWP transmission line access roads where possible to reduce land disturbance, with potential construction of new stub access roads from the existing access roads to each of the new transmission tower locations.

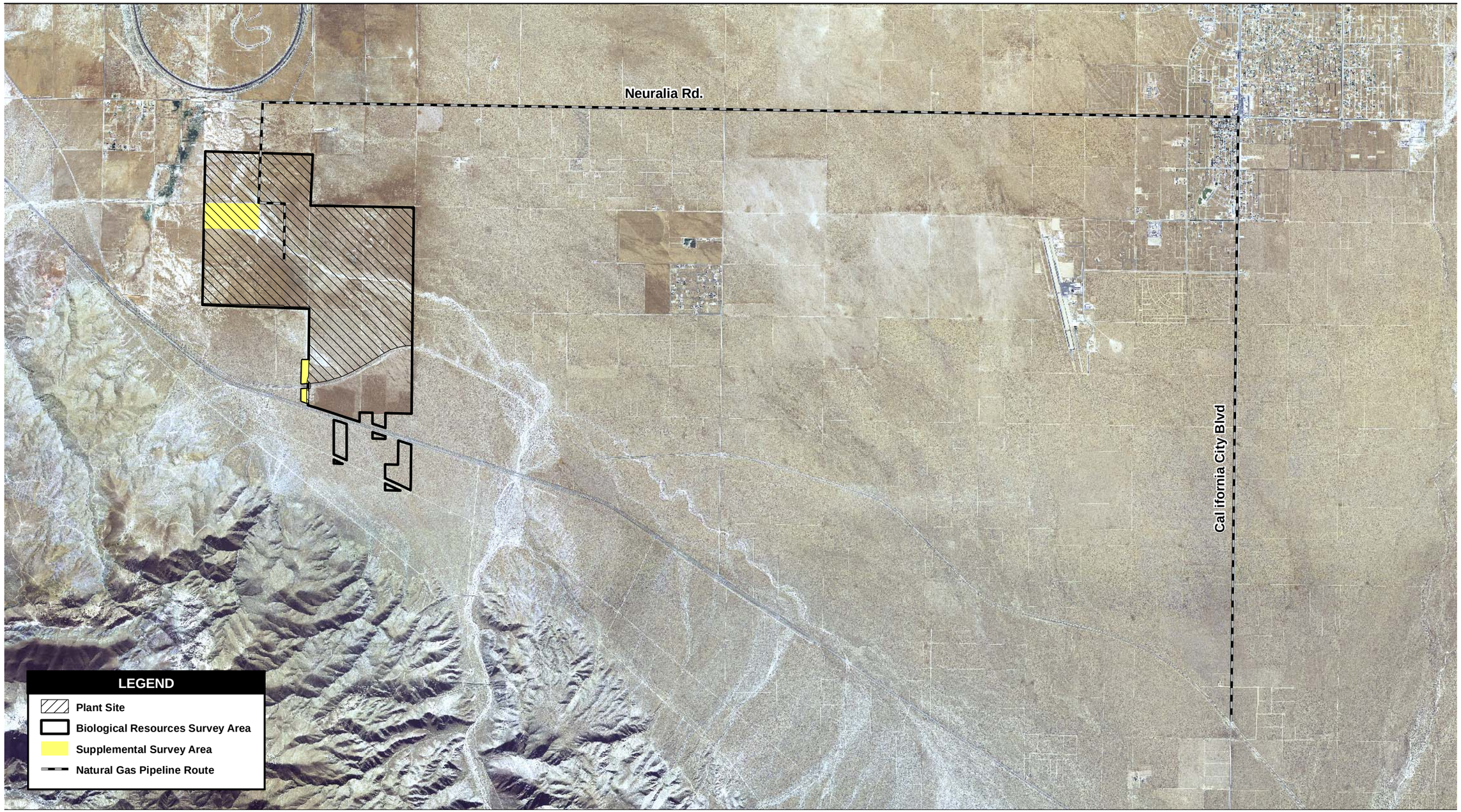
The Project proposes to use a wet cooling tower for power plant cooling. Water for cooling tower makeup, process water makeup, other industrial uses such as mirror washing, and domestic and potable uses will be supplied from onsite groundwater wells. Sanitary wastewater will be disposed by a sanitary septic system and leach field.

Project cooling water blowdown will be piped to three lined, onsite evaporation ponds in the highly disturbed western portion of the survey area. The evaporation ponds will use the sun's energy to remove water from the cooling system waste. The three evaporation ponds will have a nominal surface area of 8.3 acres each for a total of 25 acres. Each pond will have enough surface area so that the evaporation rate exceeds the cooling tower blowdown rate at maximum operating conditions and at annual average conditions. Pond depth will be selected so that the ponds will not need to have residual solids removed during the life of the plant. However, the pond water will be tested periodically (e.g., for selenium) throughout the life of the solar plant.

The ponds will have multiple layers. If one of the ponds is taken out of service, dewatered residues from the pond will be sent to an appropriate offsite landfill as non-hazardous waste. No offsite backup cooling water supply is planned at this time; the use of multiple onsite water supply wells and redundancy in the well equipment provides an inherent backup in the event of outages affecting one of the onsite supply wells.

The Project will utilize a natural gas-fired boiler for startup and emergency operations. Natural gas would also be used to fuel the HTF heaters which are used for freeze protection during nighttime hours because of the relatively high freezing point (54 degrees F) of the HTF. A new, approximately 17.6-mile, eight-inch natural gas pipeline will be constructed to serve the Project (Figure 3). A map of the natural gas pipeline route, at a more detailed scale of 1:12,000 is

included as Attachment A. This pipeline will connect with an existing Southern California Gas pipeline that terminates in California City. The pipeline will be constructed by digging the trench, laying the pipe, and backfilling the trench immediately to ensure that open trenches will always be attended during daylight hours or covered with steel plate at night. The Project would have a diesel-fueled firewater pump for fire protection.



Source: NAIP 2005; Worley Parsons 2007

5,000 2,500 0 5,000 Feet

Scale: 1:60,000; 1 inch = 5,000 feet

Figure 3
Natural Gas Pipeline Route

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CHAPTER 2
METHODOLOGY

2.1 DATABASE RESEARCH

2.1.1 Special Status Biological Resources

Prior to beginning field surveys, EDAW biologists consulted the California Department of Fish and Game (CDFG) California Natural Diversity Database (CNDDB) (RareFind Version 3.1.0; CDFG 2007), California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (CNPS 2007), and the Natural Resources Conservation Service Web Soil Survey (USDA 2007). These resources were consulted to determine historic occurrence of special status plant and wildlife species and other natural resources within the proposed Beacon Solar Energy Project survey area and a surrounding one-mile buffer, as required by the CEC (Figure 4). Additionally, the U.S. Fish and Wildlife Service (USFWS) provided a letter listing special status species that they require to be considered. Species were considered to have special status if they are covered under the federal or California Endangered Species Act (ESA and CESA, respectively), a CDFG species of special concern (SSC), CDFG fully protected species, species that are covered under the Bald and Golden Eagle Protection Act (BGEPA) (USFWS 2007), or species listed by the CNPS as List 1A (presumed extinct in California), 1B (rare, threatened, and endangered in California and elsewhere), or 2 (rare, threatened, or endangered in California, but more common elsewhere). CNPS List 1A, 1B, and 2 species are considered special status plant species if they meet the definitions of Sec. 1901, Chapter 10 (Native Plant Protection Act) or Sections 2050 through 2098 (CESA).

Habitat conditions for special status species were evaluated with respect to conditions in the survey area, and surveys were initiated to determine presence/absence of species with the potential to occur on or near the survey area. The following special status species were identified as having the potential to occur on or near the survey area. These species are discussed in detail in the Existing Conditions section of this BTR.

Federal or State Listed (ESA or CESA)

- Mojave tarplant (*Deinandra mojavensis*) – CNPS List 1B, CESA endangered
- Mojave desert tortoise (*Gopherus agassizii*) – ESA and CESA threatened
- American peregrine falcon (*Falco peregrinus anatum*) – CESA endangered
- Mohave ground squirrel (*Spermophilus mohavensis*) – CESA threatened

CDFG Species of Special Concern or CNPS List 1A, 1B, or 2

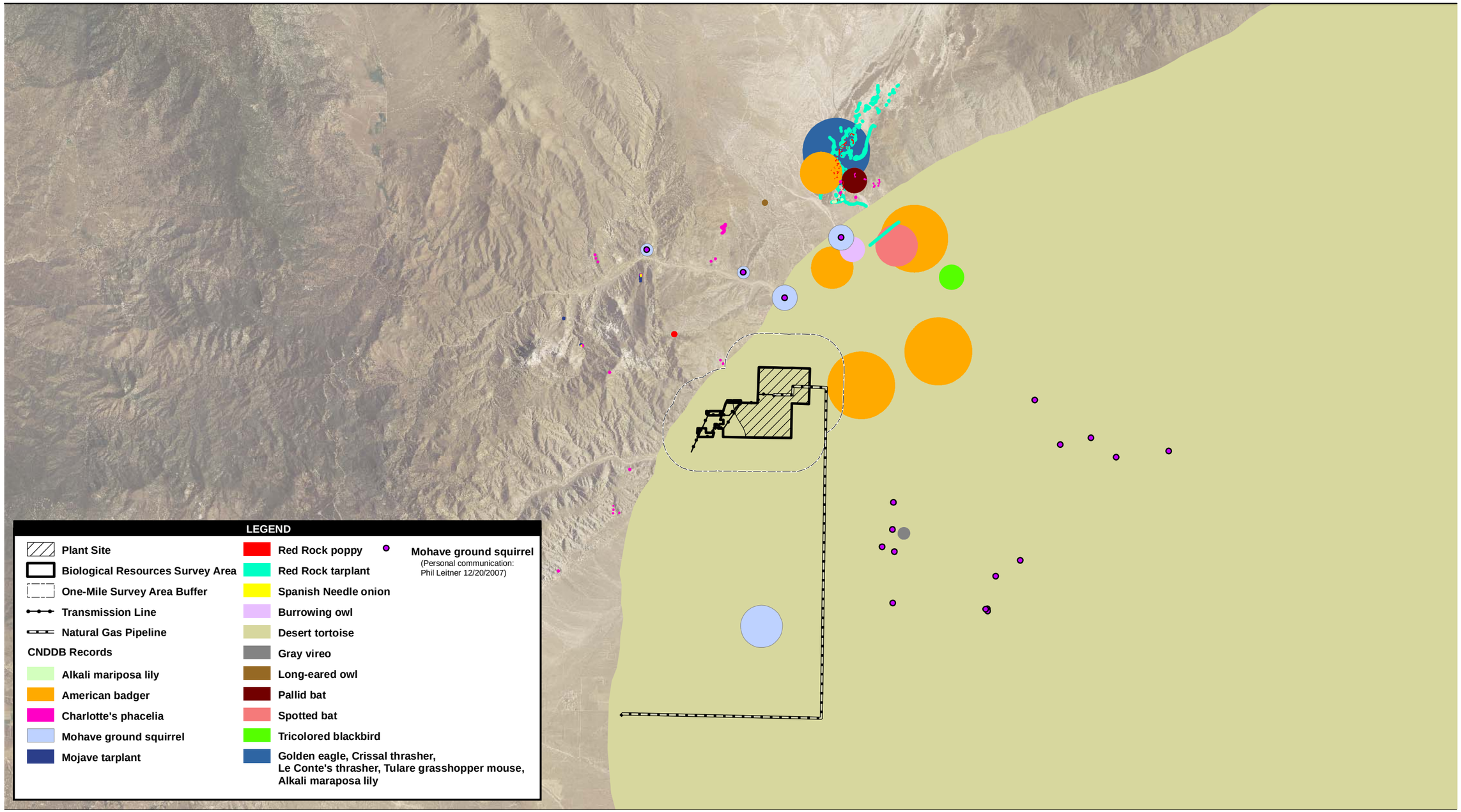
- Red Rock tarplant (*Deinandra arida*) – CNPS List 1B, CDFG rare
- Alkali mariposa lily (*Calochortus striatus*) – CNPS List 1B
- Red Rock poppy (*Eschscholzia minutiflora* ssp. *twisselmannii*) – CNPS List 1B
- Creamy blazing star (*Mentzelia tridentata*) – CNPS List 1B
- Charlotte's phacelia (*Phacelia nashiana*) – CNPS List 1B
- Northern harrier (*Circus cyaneus*) – CDFG SSC
- Western burrowing owl (*Athene cunicularia*) – CDFG SSC
- Loggerhead shrike (*Lanius ludovicianus*) – CDFG SSC
- California horned lark (*Eremophila alpestris actia*) – CDFG SSC
- Le Conte's thrasher (*Toxostoma lecontei*) – CDFG SSC
- American badger (*Taxidea taxus*) – CDFG SSC

Two special status wildlife species listed under the federal ESA were erroneously documented in the CNDDB as occurring on or near the survey area. Locations of western snowy plover (*Charadrius alexandrinus nivosus*) and San Joaquin kit fox (*Vulpes macrotis mutica*) near the site are misrepresented and/or misidentified within the CNDDB and likely were individuals from nonsensitive populations of these species (inland snowy plover and desert kit fox [*Vulpes macrotis arsipus*]) (pers. comm., Annette Tenneboe, CDFG). Therefore, protocol surveys for these two species were not considered necessary.

The West Mojave Plan (U.S. Bureau of Land Management [BLM] 2005) was consulted for maps of lands designated for the Mohave Ground Squirrel Conservation Area, documentation of sensitive vegetation communities, and to generate a base vegetation layer to be refined in the field. No working Natural Communities Conservation Plan is currently available for private lands in this area.

2.2 SURVEY PROTOCOLS

Comprehensive biological resource surveys designed to meet all applicable CEC, CDFG and USFWS requirements were conducted in the spring of 2007 and are summarized, below. Because the plant site was still being refined at the time that biological resources surveys were initiated in the spring of 2007, Beacon Solar, LLC chose to survey a large area including all property currently available for purchase that was intended to incorporate all potential facilities designs. This 2,317.2-acre survey area is generally depicted in Figure 1 as the Biological Resources Survey Area. However, after completion of those surveys, a a number of areas were added to the Project and, therefore, were not subject to 100 percent survey coverage during the



Source: Tetra Tech 2007; Kern County 2007; CNDDB 2007; NAIP 2005

15,000 7,500 0 15,000 Feet

Scale: 1:180,000; 1 inch = 15,000 feet

Figure 4
Historic Biological Resources

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2007 surveys, but are included within the Biological Survey Area boundary and noted as Supplemental Survey Areas. These are:

- An approximately 80-acre parcel in the north-central portion of the plant site and a narrow, approximately 30-ft wide strip of land along the northeast boundary of the plant site; and

- Approximately 0.5 mile of the gas pipeline route, between the eastern edge of the plant site, extending west to Neuralia Road

The 80-acre parcel and the narrow strip of land, both within the plant site boundary, are being subject to all of the same required biological resource-related surveys in the spring of 2008 that were conducted in the spring of 2007. Like the rest of the plant site, these areas are highly disturbed from past agricultural activities and the surveys are not expected to reveal any new information that would materially affect environmental impact analyses. While neither area was subject to the same 100 percent survey coverage as the rest of the plant site in 2007, several of the required 2007 zone of influence (ZOI) transects crossed the areas and generated sufficient information to suggest that the 2008 spring surveys will yield results similar to the 2007 surveys for the rest of the plant site.

The gas pipeline will be constructed entirely within the disturbed shoulders of existing roads (or within the road bed), except for the last 1.8 miles (1.3 miles within the plant site, and 0.5 between the plant site and Neuralia Road) where the pipeline is proposed to be installed within an already-disturbed SCE distribution line right of way. Spring 2008 surveys will include that segment of the gas pipeline.

Beacon Solar believes that the areas within which the two transmission line options occur were adequately during the 2007 spring surveys since much of the land was either included in the 100 percent coverage survey area or was crossed multiple times by ZOI transects. Nevertheless, because the centerlines/footprints of those options have been more accurately defined since the 2007 spring surveys were conducted, both transmission line option routes will also be surveyed in spring 2008.

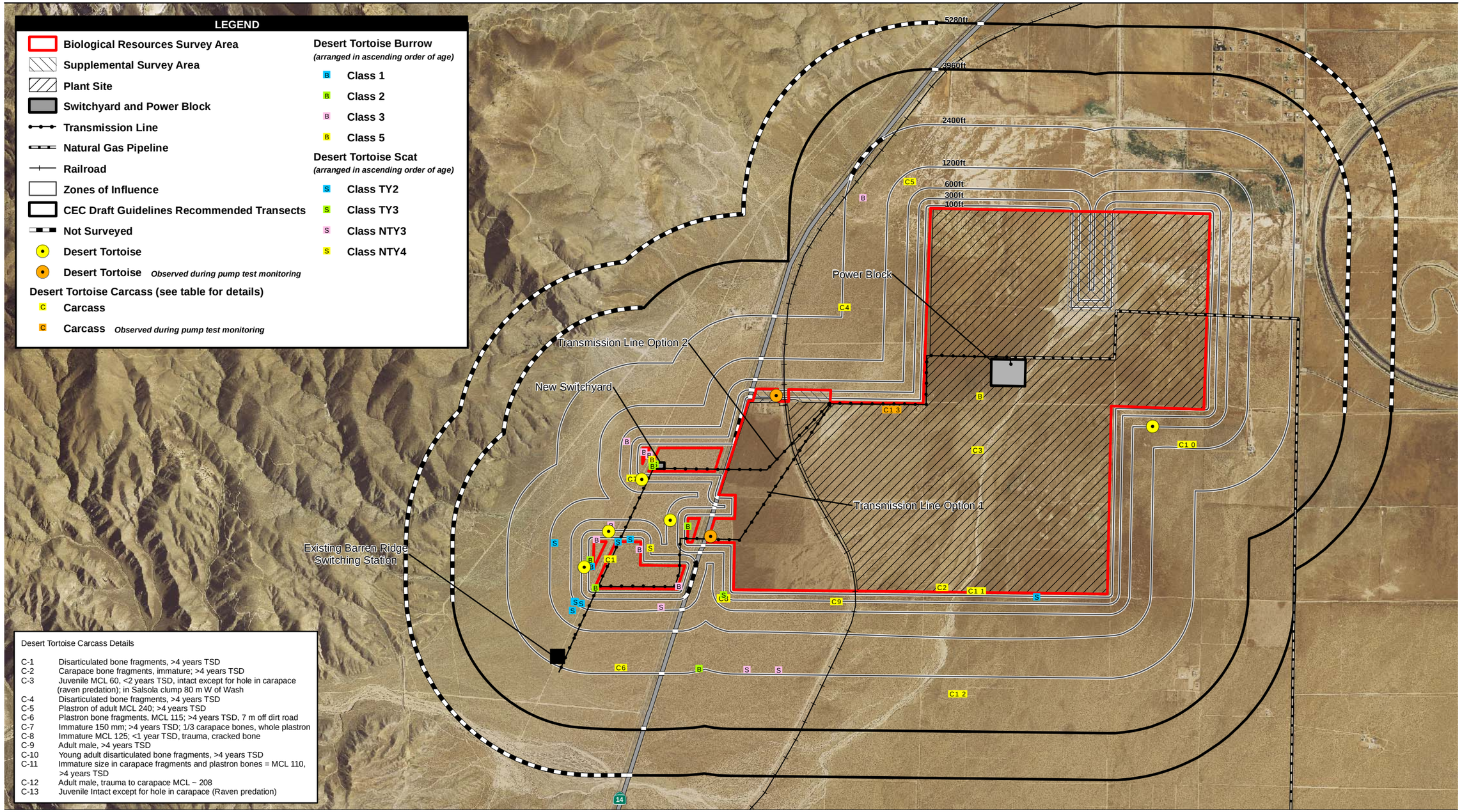
2.2.1 California Energy Commission Survey Guidelines

On May 8, 2007 at a pre-application meeting, the CEC provided Beacon Solar, LLC with Draft Recommended Biological Resources Field Survey Guidelines for Large Solar Projects, dated

May 8, 2007, (hereafter referred to as CEC Draft Guidelines). The CEC Draft Guidelines recommend that biological surveys be conducted according to established protocols within and around the proposed plant site, and additional surveys be conducted as necessary in order to ultimately cover a one-mile buffer around the plant site to evaluate suitable habitat and record occurrence and sign of special status species in this area. The CEC Draft Guidelines were also intended to evaluate potential wildlife habitat and corridors in the Project vicinity that may be disrupted as a result of Project implementation.

Because the plant site was still being refined at the time that biological resource surveys were initiated in the spring of 2007, Beacon Solar, LLC chose to survey a large area including all property currently available for purchase that was intended to incorporate all potential facilities designs. This 2,317.2-acre survey area is depicted in Figure 2 and most of the other figures in this report. Because this survey area would be subject to USFWS protocol desert tortoise surveys, including surrounding zone of influence (ZOI) transects out to 2,400 feet, the CEC agreed in the pre-application meeting that two additional transects – one at ¾ mile and one at one mile – would be appropriate for meeting the CEC Draft Guideline one-mile buffer requirement. These two additional CEC-recommended transects are depicted in Figure 5. After surveys for this report were completed, two small, (84.2 acre and 14.3 acre) parcels were added to the plant site. Although initial surveys did not entirely encompass these new parcels, they were originally included in the one-mile buffer and surveyed accordingly.

As shown in Figure 5 with dashed lines, certain sections of the ¾-mile and one-mile CEC-recommended transects were not surveyed either because the area was completely disturbed (e.g., roadways or privately-developed land), terrain was difficult to traverse, or because access to private lands was not available. In these areas, the biological resources are expected to be similar to those already documented along the completed sections of the CEC transects in the same vegetation communities. Surveys were not performed in the mountainous areas because permission to access was not granted by the owner. It was determined that any biological resources information obtained from surveying these areas is not likely to contribute materially to impact analysis. Furthermore, much of the unsurveyed area is to the west of SR-14, which is across the highway from the area where the bulk of Project facilities and activities will occur. Qualifications of field biologists involved in the Project are presented in Attachment B.



Desert Tortoise Carcass Details

C-1	Disarticulated bone fragments, >4 years TSD
C-2	Carapace bone fragments, immature; >4 years TSD
C-3	Juvenile MCL 60, <2 years TSD, intact except for hole in carapace (raven predation); in Salsola clump 80 m W of Wash
C-4	Disarticulated bone fragments, >4 years TSD
C-5	Plastron of adult MCL 240; >4 years TSD
C-6	Plastron bone fragments, MCL 115; >4 years TSD, 7 m off dirt road
C-7	Immature 150 mm; >4 years TSD; 1/3 carapace bones, whole plastron
C-8	Immature MCL 125; <1 year TSD, trauma, cracked bone
C-9	Adult male, >4 years TSD
C-10	Young adult disarticulated bone fragments, >4 years TSD
C-11	Immature size in carapace fragments and plastron bones = MCL 110, >4 years TSD
C-12	Adult male, trauma to carapace MCL ~ 208
C-13	Juvenile Intact except for hole in carapace (Raven predation)

Source: TetraTech 2007; Kern County 2007; USGS 2007; CNDDB 2007; Peggy Wood 2007; EDAW 2007; NAIP 2005; WorleyParsons 2007

2,750 1,375 0 2,750 Feet

Scale: 1:33,000; 1 inch = 2,750 feet

Figure 5
Desert Tortoise and Sign

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2.2.2 Vegetation Communities and Flora

EDAW biologists Bruce Hanson, Scott McMillan, Linnea Spears-Lebrun, Josh Corona-Bennett, Jesper Pietsch, Jeannette Duffels, and Katie Hall conducted field assessments and surveys on five days (21 person-days) from May 4 through June 1, 2007 (EDAW 2007a; see Attachment C for photographic documentation). Surveys were conducted by walking or driving dirt access roads throughout the entire survey area focusing on plant species inventory, community characterization, and vegetation community mapping. Areas of native habitat, including Mojave Creosote Bush Scrub, Mojave Desert Wash Scrub, and areas of Fallow Agriculture-Disturbed Atriplex Scrub, were surveyed by pedestrian transects, with biologists walking 5 meters apart searching for rare plant occurrences. Areas of agricultural and ruderal vegetation were surveyed by walking some areas and driving the dirt access roads with emphasis on vegetation community mapping and plant species inventory. Vegetation communities are used to describe species assemblages and patterns of plants across the landscape. Vegetation communities were classified based on Holland (1986), and Sawyer and Keeler-Wolf (1995). Additionally, when necessary, vegetation community names were assigned based on characteristics observed in the field that did not readily fit into the existing nomenclature. Where appropriate, percent shrub/canopy cover was estimated for each vegetation community.

While surveying, the area was also assessed for sensitive vegetation and rare plant potential. Vegetation communities were mapped on a 1" = 200' scale aerial photo. Although very large, most of the site is dominated by just a few vegetation/cover types, so no minimum mapping unit was used in the vegetation community analysis. All botanical surveys follow the rare plant and vegetation survey guidelines provided by CNPS (CNPS 2001). Vegetation mapping was conducted out to the one-mile buffer boundary from strategic vantage points whenever direct access was not feasible.

A preliminary evaluation of the proposed 17.6-mile natural gas pipeline was performed by car on November 13, 2007 by EDAW biologist Lyndon Quon. During this survey, the width of the right-of-way (road shoulder) and surrounding vegetation was noted.

2.2.3 State Waters Streambed Delineation

On October 16, 2007 and February 27, 2008 EDAW ecologist Joshua Zinn and EDAW biologist Lance Woolley visited the site to formally delineate the boundaries of jurisdictional “waters of the state” (jurisdictional waters) within the survey area. Delineation at the site involved recording the boundaries of jurisdictional waters with a sub-foot accuracy Global Positioning

System (GPS) unit. Field data were processed using ESRI, Inc., Geographic Information Systems (GIS) software to define the location and extent of jurisdictional waters within the survey area. Features used to determine the extent of riverine jurisdictional waters include the presence of shelving and/or scour resulting in an established bank, bed, and channel of the ephemeral wash and its associated vegetation (Cowardin et al., 1979). At sites within the ephemeral wash where no diagnostic surface features occurred, subsurface characteristics were investigated to identify hydric features.

2.2.4 General Wildlife Surveys

General wildlife surveys were conducted concurrently with protocol wildlife surveys and vegetation mapping during May and June 2007 (see Attachment C for photos). All wildlife sign and sightings were recorded and special status species were mapped using Global Positioning System (GPS) units.

2.2.5 Special Status Wildlife Surveys

Surveys conducted for the Mojave desert tortoise (DT), the western burrowing owl (WBO), and the Mohave ground squirrel (MGS) are described below. Surveys for all other special status species (American peregrine falcon, northern harrier, loggerhead shrike, California horned lark, Le Conte's thrasher, and American badger) were incorporated into these protocol surveys.

Mojave Desert Tortoise

USFWS-approved biologists Andrea CurryLow, Peggy Wood, and Lindsey Spenceley conducted presence/absence surveys for DT between May 1 and May 21, 2007 (EDAW 2007b). EDAW biologist Katie Hall assisted with DT surveys for training purposes. The survey followed the guidelines published in the USFWS *Field Survey Protocol for any Non-Federal Action That May Occur within the Range of the Desert Tortoise* (protocol) (USFWS 1992), which includes five ZOI transects outside of and parallel to the site boundary at 100, 300, 600, 1,200, and 2,400 feet (Figure 5). In addition, to comply with the recommendations of the CEC Draft Guidelines, additional transects were surveyed at 3,960-foot (3/4-mile) and 5,280-foot (one-mile) intervals from and parallel to the edge of the survey area boundary. While these additional transects are more broadly focused than the DT protocol transects and are not a formal part of the tortoise survey, they provide information on DT presence as well as on other biological resources in the area around the survey area.

The entire survey area (100 percent coverage) was surveyed according to protocol by spacing transects 10 meters apart. The survey was conducted by slowly and systematically walking linear transects while surveyors visually searched for tortoise and sign. Particular emphasis was placed on searching around the bases of shrubs and along the banks of shallow washes. The USFWS ZOI transects were surveyed in suitable and accessible off-site desert scrub habitat and therefore were not surveyed on SR-14 or at the Honda Test Track east of Neuralia Road to the east of the site. All sign was recorded. Tortoises observed were measured at middle carapace length and evaluated for health. Carcasses were aged, measured (if possible), and classed using Dr. Alice Karl's *Key to Sign Classes* classification system (Attachment D; EDAW 2007b). The height and width of burrow openings were measured and burrow depth was recorded. Sign of recent use of burrows was recorded and the burrows were classed using Dr. Karl's classification system. Scat was measured and classed using Dr. Karl's classification system. All sign locations were recorded using GPS.

On August 10, 2007, Dr. Alice Karl also evaluated the survey area to characterize the habitat for its suitability for DT. Dr. Karl focused on the survey area east of SR-14 because the western side of the property is known DT habitat (i.e., DT were observed there during Project protocol surveys and the vegetation community is relatively undisturbed). During the site visit, Dr. Karl photographed and mapped habitat types within and around the survey area (Attachment E).

Mohave Ground Squirrel

A habitat field assessment was considered appropriate to determine the potential for MGS to occur in the survey area. Dr. Philip Leitner, a well known MGS expert, conducted a field assessment of habitat conditions for MGS on August 10, 2007 and October 15, 2007 (Attachment E). The entire survey area was surveyed by driving dirt access roads and walking through selected areas, focusing on the species composition and physical structure of the vegetation, soil conditions, and evidence of rodent activity. Habitat conditions immediately adjoining the survey area were also observed.

Western Burrowing Owl

Burrowing owl surveys were performed according to the protocol established by the California Burrowing Owl Consortium (CBOC) (1993) and accepted by the CDFG. In addition to the 500-foot buffer surrounding the survey area required by CBOC protocol, as noted earlier, the CEC requires a habitat evaluation within a one-mile buffer surrounding the survey area.

On May 8, 2007, EDAW biologist Lyndon Quon assessed the survey area for WBO habitat (Phase I of the CBOC protocol). A burrow survey (Phase II of the CBOC protocol) was conducted in conjunction with DT protocol surveys, during which the entire survey area was surveyed by line transects with 10-meter spacing between transects. Additionally, five transects circumnavigating the survey area, plus two additional CEC-recommended transects within the one-mile buffer, were surveyed for burrows. All burrows with potential WBO sign (white-wash, pellets, feathers, bones) were mapped using GPS units.
EDAW biologists Suellen Lynn, Barbra Calantas, Andrea CurryLow, Kyle Harper, and Katie Hall conducted four WBO burrow and presence/absence surveys between May 9 and August 3, 2007 (Phase III of the CBOC protocol; EDAW 2007c). EDAW geographic information systems (GIS) specialist Jessie Lee also assisted with data collection during surveys for post-field GIS data processing.

To locate WBOs, surveyors drove established paved and dirt roads, stopping at observation points that provided a wide view and scanned for owls and burrows with 8 to 10 power binoculars and a 20 to 40 power, 60 mm spotting scope. Vehicles were used as blinds, when possible, to minimize disturbance to owls. If burrows with sign were not visible from established roads, surveyors approached the burrows on foot, carefully verifying presence or absence of WBOs at the burrows. All WBO locations were mapped using GPS units.

CHAPTER 3
EXISTING CONDITIONS

These existing conditions represent findings within the survey area and one-mile buffer. The actual permanent impacts will be limited to the solar array/power block in the eastern section of the survey area (and east of the railroad tracks) and the transmission line corridor.

3.1 VEGETATION COMMUNITIES

A total of seven vegetation communities were mapped within the survey area and the one-mile buffer (Figure 6; see Attachment C for representative photos). The acreage of each vegetation community within the survey area and surrounding buffer area is provided in Table 1. Vegetation types are described in detail below, incorporating observations from Dr. Karl's DT habitat evaluation (Figure 7). Dr. Karl's habitat evaluation map is presented at a more detailed scale of 1:12,000 as part of Attachment E.

Table 1
Vegetation Communities and Cover Types

Vegetation Communities and Other Cover	Survey Area Acres	One-Mile Buffer Acres
Mojave Creosote Bush Scrub	111.5	5,302.1
Mojave Desert Wash Scrub	57.8	164.4
Mojave Mixed Woody Scrub	0.0	604.6
Tamarisk Scrub	0.0	1.8
Developed	70.3[1]	253.5
Fallow Agricultural-Ruderal	1,785.0	3,233.1
Fallow Agricultural-Disturbed Atriplex Scrub	352.6	1,355.9
Total acres	**2,377.2**	**10,915.4**

[1] Includes 60 acres of natural gas pipeline right-of-way.

3.1.1 Mojave Creosote Bush Scrub

Mojave Creosote Bush Scrub is an open shrub community dominated by the creosote bush (*Larrea tridentata*). While dominated by shrubs (approximately 18 percent shrub cover), this vegetation community also has a perennial and herbaceous layer apparent in years with sufficient rainfall. Other important shrubs in this community include white bursage (*Ambrosia dumosa*), box thorn (*Lycium andersonii*), silver cholla (*Opuntia echinocarpa*), and occasional Joshua trees (*Yucca brevifolia*). This community typically occurs on well-drained soils in alluvial fans,

bajadas, and upland slopes. It is one of the most widely distributed desert plant communities in the Mojave Desert from the desert floor up to about 3,500 feet, extending into northwestern Arizona and southern Utah. It is the primary habitat type in the undisturbed areas in the one-mile buffer. A total of 122.1 acres of Mojave Creosote Bush Scrub was mapped within the survey area and 5,291.5 acres in the one-mile buffer (Table 1; Figure 6).

3.1.2 Mojave Desert Wash Scrub

Mojave Desert Wash Scrub is an open shrubby community with scattered microphyllous trees and shrubs on well-drained sandy soils. This vegetation community is found in washes, arroyos, and canyons of intermittent streams throughout the Mojave Desert. The dominant plant in this community is the scale broom (*Lepidospartum squamatum*). Other shrubs occurring in this community are box thorn, bladderpod (*Isomeris arborea*), rubber rabbitbush (*Chrysothamnus nauseosus*), bladder sage (*Salazaria mexicana*), and Mormon tea (*Ephedra nevadensis* and *E. californica*).

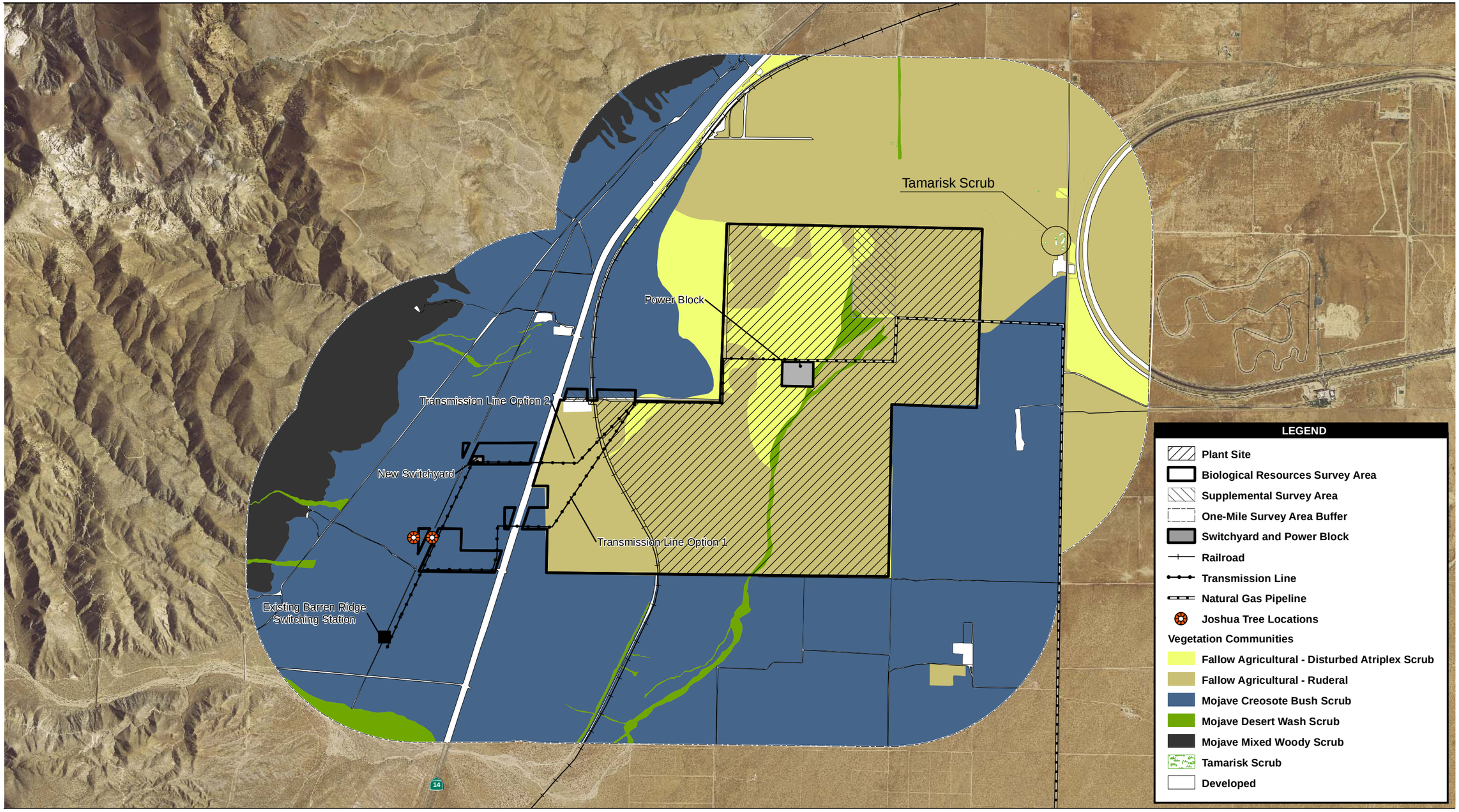
There is one main wash that trends southwest to northeast on the eastern two sections of the survey area that supports gradually reestablishing Mojave Desert Wash Scrub community. A total of 57.8 acres of Mojave Desert Wash Scrub was mapped within the survey area and 164.4 acres in the one-mile buffer (Table 1; Figure 6).

3.1.3 Mojave Mixed Woody Scrub

The Mojave mixed woody scrub occurs in areas characterized by steep, overly drained soils with extremely low water-holding capacity. The most common species of this plant community are spiny hopsage (*Grayia spinosa*), goldenhead (*Acamptopappaus sphaerocephalus*), cheesebush (*Ambrosia* [*Hymenoclea*] *salsola*), winter fat (*Kraschennikiovia lanata*), Mormon tea, and white bursage. This community is found on the western edge of the buffer where the area begins to rise in elevation. No Mojave Mixed Woody Scrub was mapped within the survey area and 604.6 acres was mapped in the one-mile buffer (Table 1; Figure 6).

3.1.4 Tamarisk Scrub

This community is dominated by tamarisk (*Tamarix ramosissima*), a nonnative shrub to small tree from Central Asia. The plant was originally introduced for erosion control and windbreak



Source: NAIP 2005; EDAW 2007; TetraTech 2007; WorleyParsons 2007; Kern County 2007

3,000 1,500 0 3,000 Feet

Scale: 1:36,000; 1 inch = 3,000 feet

Figure 6
Vegetation Communities

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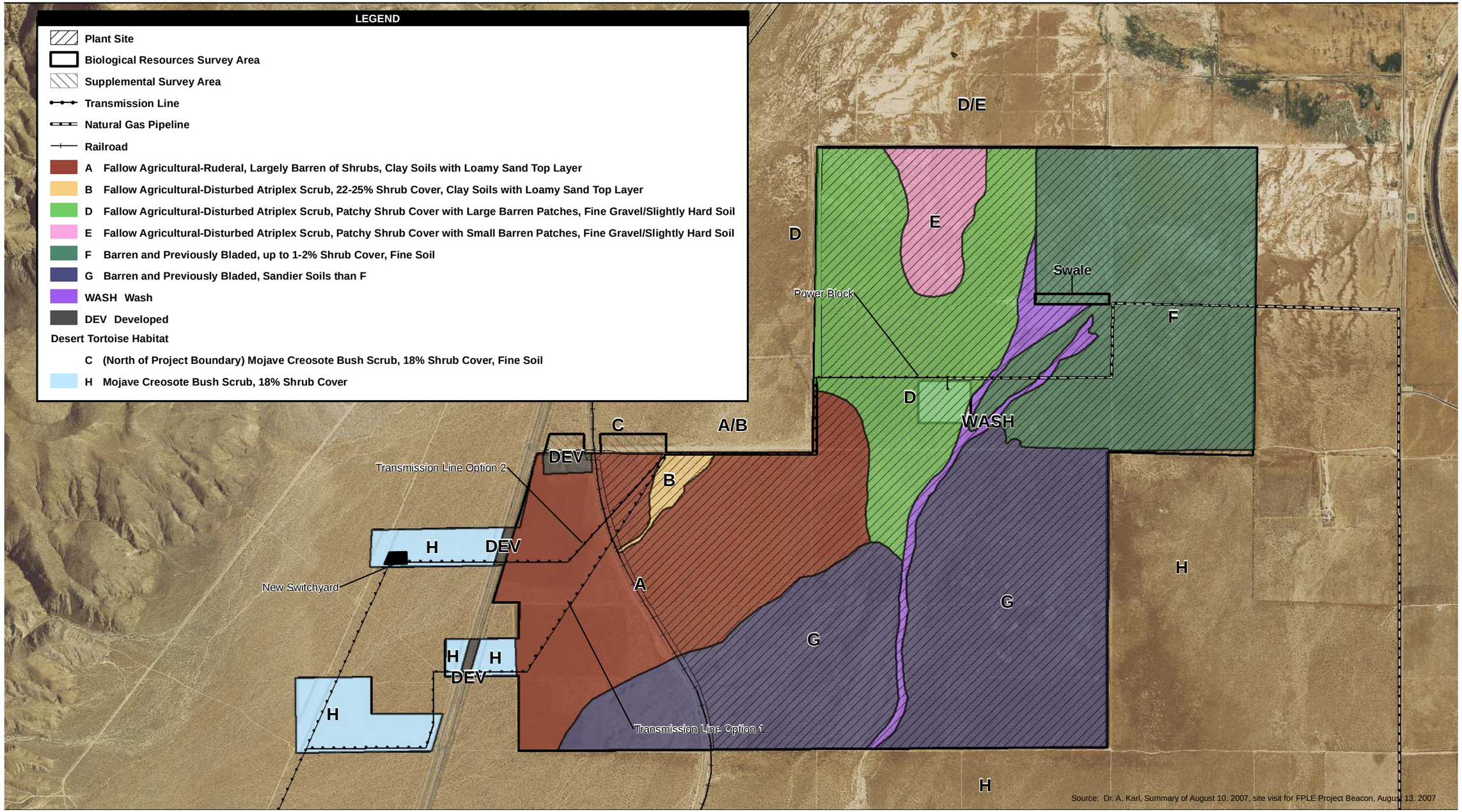

Source: NAIP 2005; EDAW 2007; WorleyParsons 2007

1,750 875 0 1,750 Feet

Scale: 1:21,000; 1 inch = 1,750 feet

Figure 7
Habitat Types in the Survey Area

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purposes. It has become highly invasive of native habitats and can cause many detrimental effects especially in riparian communities. No Tamarisk Scrub was mapped within the survey area and 1.8 acres was mapped in the one-mile buffer (Table 1; Figure 6).

3.1.5 Developed

The areas mapped as developed include unpaved and paved roads, a rail line, canals, and other areas cleared for residential uses (Table 1). A total of 13.2 acres of Developed land was mapped within the survey area and 310.6 acres was mapped in the one-mile buffer. Additionally, 60.0 acres of Developed land was mapped in the proposed natural gas pipeline right-of-way.

3.1.6 Fallow Agricultural-Ruderal

The Fallow Agricultural-Ruderal vegetation community covers the majority of the survey area. The land was formerly used for agricultural purposes and is dominated by ruderal nonnative plants. This plant community occurs in areas that are now unable to effectively retard soil loss through wind and water erosion. Vegetation cover within this community ranges from 0 to 2 percent. The dominant plant species are Russian thistle (*Salsola tragus*), Sahara mustard (*Brassica tournefortii*), and Mediterranean schismus (*Schismus arabicus*). A total of 1,785.8 acres of Fallow Agricultural-Ruderal was mapped within the survey area and 3,232.3 acres in the one-mile buffer (Table 1; Figure 6).

3.1.7 Fallow Agricultural-Disturbed Atriplex Scrub

The Disturbed Atriplex Scrub community occurs on areas previously used for agricultural purposes but that have now become occupied with several atriplex shrub species. The dominant species is the allscale (*Atriplex polycarpa*), which is particularly effective at reoccupying abandoned agricultural lands. Other plants occurring together are shadscale (*Atriplex confertifolia*), Russian thistle, and salt heliotrope (*Heliotropium curassavicum*). Shrub cover in this vegetation community is approximately 22 to 25 percent. A total of 352.6 acres of Fallow Agricultural-Disturbed Atriplex Scrub was mapped within the survey area and 1,355.9 acres in the one-mile buffer (Table 1; Figure 6).

3.1.8 Sensitive Vegetation Communities

Sensitive vegetation communities are those that are considered rare in the region, support special status plant or animal species, or receive regulatory protection (e.g., waters, which includes

wetlands as defined by the U.S. Army Corps of Engineers [USACE] and CDFG). In addition, vegetation communities listed on the CNDDB as having the highest inventory priorities are considered sensitive (CDFG 2003). There are no sensitive vegetation communities in the survey area or in the one-mile buffer.

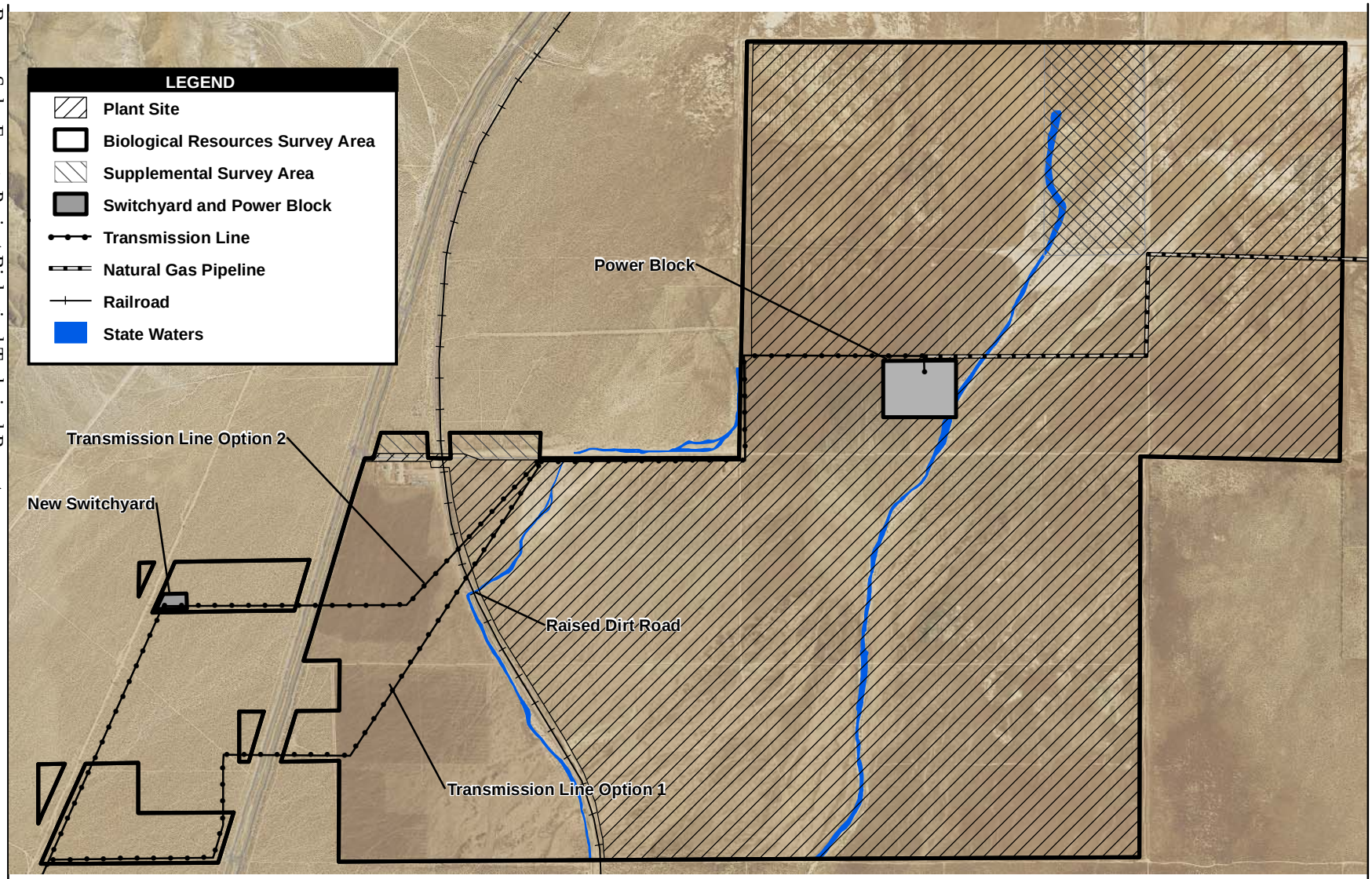
Although there were a few scattered Joshua tree individuals within and immediately adjacent to the survey area, these individuals were not numerous or dense enough to be considered as Joshua tree woodland.

3.2 WATERS OF THE STATE

Two dry desert washes within the survey area were delineated as waters of the state (Figure 8). The western wash flows approximately 6,200 feet across the survey area, south to north, parallel to and west of the railroad tracks, passing under the railroad tracks to enter the plant site and flow southwest to northeast approximately 1,800 feet to the plant site boundary. This wash is mostly unvegetated. The eastern wash flows approximately 8,150 linear feet across the survey area, from southwest to northeast, and then continues in a more dispersed pattern to Koehn Lake (Figure 8). The total area of waters of the state encompasses approximately 18.4 acres within the survey area, 13.7 acres of which occur within the plant site.

3.3 FLORA

Thirty-three plant species were documented within the survey area, eight of which are nonnative introduced species (Attachment F). No special status plant species were detected within the survey area, although three CNPS List 1a plant species (alkali mariposa lily, creamy blazing star, and Charlotte's phacelia) have a moderate potential to occur, and two other plant species (Red Rock tarplant, CDFG rare and CNPS List 1B; Red Rock poppy, CNPS List 1B) have a low potential to occur.



Source: NAIP 2005; EDAW 2007; WhorleyParsons 2007

2,000 0 2,000 Feet

Scale: 1:24,000; 1 inch = 2,000 feet

Figure 8
State Waters

3.3.1 State Rare Plant Species

Prior to the 2007 surveys, no rare plant species had been documented as occurring within the survey area or in the surrounding vicinity. Based on site-specific habitat evaluations, one state rare plant species, Red Rock tarplant, was considered to have a low potential to occur within the survey area and surrounding one-mile buffer, and one state-listed plant species, Mojave tarplant, is not expected to occur due to elevational restrictions (Table 2). Red Rock tarplant is discussed below.

Red Rock Tarplant

Red Rock tarplant was listed by CDFG as rare in 1972. The plant species has no federal listings but is recognized as List 1B by the CNPS (2007). Red Rock tarplant, an annual plant species growing to approximately 7 to 40 inches tall, is a severely restricted endemic species known only from 10 small populations within the boundaries of Red Rock Canyon State Park (Faull 2004). This species occupies seeps, springs, and seasonally moist alluvium within the Creosote Bush Scrub community.

Red Rock tarplant was not detected on-site, although low rainfall in 2007 produced conditions that were less than satisfactory for detecting this species. Red Rock tarplant is considered to have a very low potential to occur within the survey area because of its restricted endemism to the geologic substrates in combination with the mesic conditions present in Red Rock Canyon State Park. The survey area is located approximately 5.5 miles south of Red Rock Canyon; however, the topography of the survey area does not support the characteristic substrate and mesic conditions where Red Rock tarplant is found. Furthermore, the survey area lacks the preferred clay soil washes that the plant inhabits.

3.3.2 Other State Special Status Plant Species

Three species included on the CNPS List 1B (alkali mariposa lily, creamy blazing star, and Charlotte's phacelia) have a moderate potential to occur in the survey area, although they were not detected during 2007 spring surveys (Table 2). These species are most likely to be found in Mojave Creosote Bush Scrub, Mojave Desert Wash Scrub, and Fallow Agricultural-Disturbed Atriplex Scrub (Figure 6), across the central section of the survey area and surrounding the survey area to the west, south, and east. One additional species included on the CNPS List 1B, Red Rock poppy, has a low potential to occur within the survey area. Due to low annual rainfall

Table 2
Potentially Occurring Special Status Plant Species Relevant to The Beacon Solar Energy Project

Common Name Scientific Name	Sensitivity Status[1]	General Habitat Description (CNPS 2007)	Flowering Period	Probability of Occurrence[2]
Alkali mariposa lily *Calochortus striatus*	CNPS: List 1B	Chaparral, Chenopod scrub, Mojavean desert scrub, meadows and seeps, in mesic soils. Grows at elevations of 230-5,235 feet.	Geophyte that flowers April-June	Moderate potential of occurrence on-site. A small population occurs in Red Rock Canyon State Park nearby. Survey area has Chenopod scrub and Mojavean desert scrub, which are suitable habitat.
Red Rock tarplant *Deinandra arida*	CDFG: Rare CNPS: List 1B	Mojavean desert scrub in clay, volcanic tuff. Grows at elevations of 984-3,117 feet.	Annual that blooms April-November	Low potential to occur on-site due to unsuitable soils and lack of mesic conditions. Less than 10 occurrences are known from the Red Rock Canyon State Park and Last Chance Canyon in Kern County, approximately 5.5 miles north of the survey area (CDFG 2007).
Mojave tarplant *Deinandra mohavensis*	CDFG: Endangered CNPS: List 1B	Chaparral (mesic), riparian scrub. Grows at elevations of 2,790-5,250 feet.	Annual that blooms July-October	Not expected to occur on-site due to unsuitable habitat and low elevation. Four known populations occur in natural springs northeast of the survey area, characterized by mesic conditions and suitable elevations (CDFG 2007).
Red Rock poppy *Eschscholzia minutiflora* ssp. *twisselmannii*	CNPS: List 1B	Mojavean desert scrub in volcanic tuff. Grows at elevations of 2,230-4,035 feet.	Annual that flowers March-May	Low potential of occurrence on-site due to lack of suitable soils in the survey area. Possibly could occur in drainages that drain slopes from the west. Known populations are located from the Rand and El Paso mountains in Kern County.
Creamy blazing star *Mentzelia tridentata*	CNPS: List 1B	Mojavean desert scrub. Grows at elevations of from 2,297-3,806 feet.	Annual that flowers March-May	Moderate potential of occurrence on-site due to suitable habitat and range in elevation on-site. One occurrence in nearby Red Rock State Park and six occurrences in San Bernardino County (CDFG 2007).
Charlotte's phacelia *Phacelia nashiana*	CNPS: List 1B	Joshua tree woodland, Mojavean desert scrub, pinyon and juniper woodland. Grows at elevations of 1,969-7,218 feet.	Annual that blooms March-June	Moderate to high potential of occurrence on-site in suitable habitat. Known populations occur approximately 1 mile northwest and 2.25 miles southwest of the survey area in suitable habitat (CDFG 2007).

[1] **Sensitivity Status Key**
State California Department of Fish and Game (CDFG)
Other California Native Plant Society (CNPS)
1B: Considered rare, threatened, or endangered in California and elsewhere.

[2] No populations of rare plants were observed on-site during the focused survey periods, although low annual rainfall in 2007 produced less than satisfactory conditions to detect these plants if present.

in 2007, conditions to adequately assess the site for these species were less than satisfactory. Therefore, the presence or absence of these species may be determined by a future survey when suitable conditions allow for average seed germination. If drought conditions persist such that rare plant survey results would not be considered valid, the potential for these species to occur in the survey area will be estimated by evaluating known habitat associations in the survey area

3.4 FAUNA

Forty-three wildlife species were detected during general reconnaissance and protocol wildlife surveys (Attachment G). Ten of these species were reptiles, 26 were bird species, and 7 were mammal species.

Several wildlife species, including Le Conte's thrasher and flat-tailed horned lizard, were observed using the dry desert wash, which runs northeast to southwest across a large portion of the survey area. However, this wash disperses at the northern boundary of the site where the Mojave Desert Wash Scrub community gives way to Fallow Agricultural-Ruderal vegetation, thereby terminating the continuity of usable wildlife habitat that would constitute a wildlife corridor connecting to areas north of the survey area (Figure 6).

Several species of migratory birds were observed using the Disturbed Atriplex Scrub in May. Although the mountains to the west are a known flyway for migratory raptors and passerines, the survey area is located at a lower elevation and does not support the vegetation and topography that typically characterize areas that are attractive to these species during migration. The survey area occurs along a known inland shorebird migration route, connecting California's Central Valley with the Gulf of California. Although the Project's evaporation ponds have the potential to attract migratory birds, monitoring and, if necessary, mitigation measures will ensure impacts are less than significant.

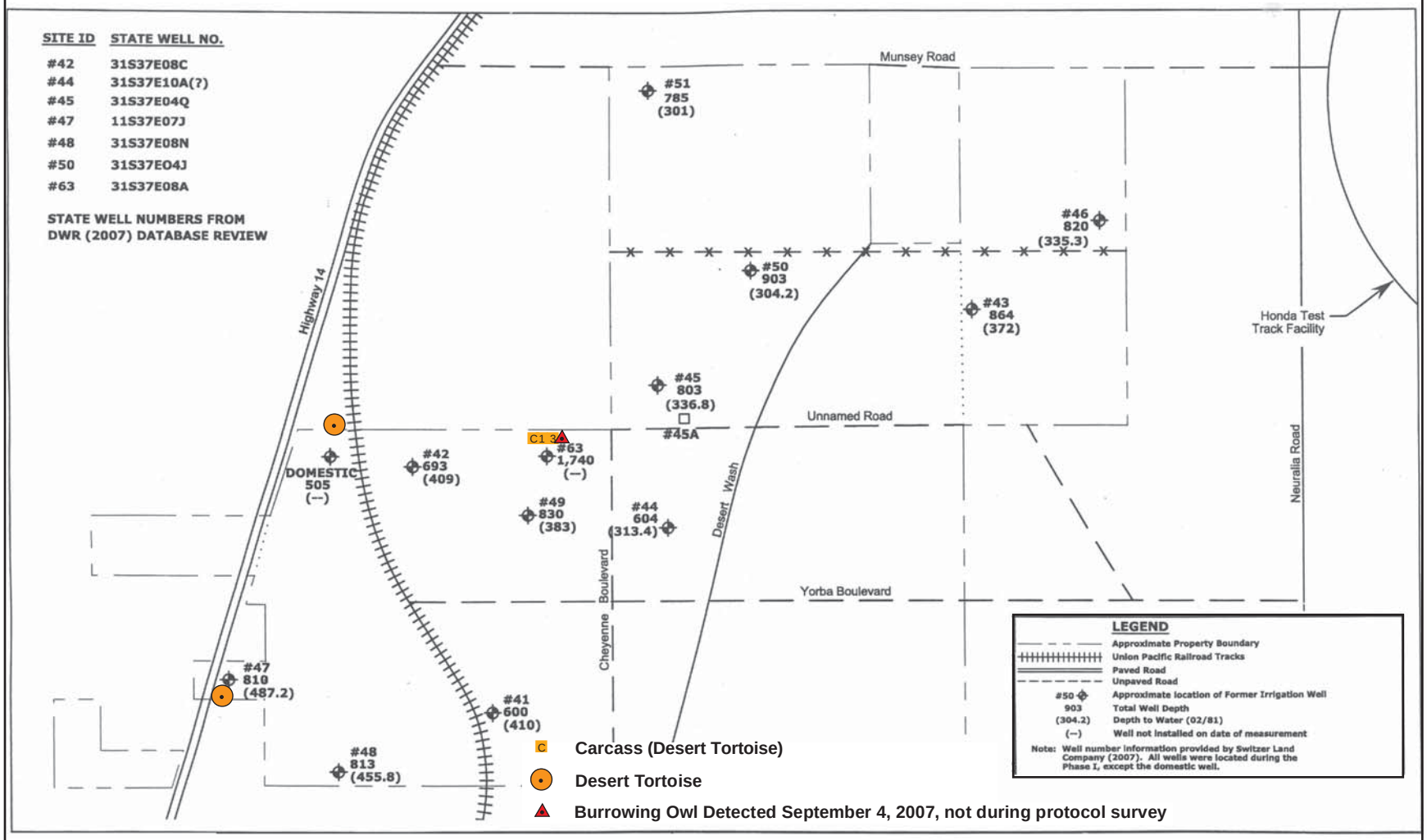
Two federally and/or state listed wildlife species were detected on-site (DT and American peregrine falcon), and another has the potential to occur (MGS). All three of these species are discussed below. Six other special status wildlife species with potential to occur on-site (northern harrier, WBO, California horned lark, Le Conte's thrasher, loggerhead shrike, and American badger) are described in Table 3.

Table 3
Potentially Occurring Special Status Wildlife Species Relevant to The Beacon Solar Energy Project

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Probability of Occurring On-site
Reptiles			
Desert tortoise *Gopherus agassizii*	ESA: Threatened CESA: Threatened	Various desert scrubs and desert washes up to about 5,000 feet, but not including playas.	Detected in native habitat, in the ZOI west and east of the survey area and in the vicinity of the proposed transmission line route in May 2007. One potential burrow, one shell fragment, and one juvenile carcass were observed within the eastern section of the survey area. Two live, probable transient adult tortoises were observed during groundwater pump tests at well #47 and #48 (Figure 9).
Birds			
Northern harrier *Circus cyaneus*	CDFG: Species of Special Concern	Occurs in grasslands and agricultural fields during migration and in winter.	Detected. Two individuals were observed in the one-mile buffer northeast of the survey area during May 2007 surveys.
American peregrine falcon *Falco peregrinus anatum*	CESA: Endangered CDFG: Fully Protected	Open habitats from tundra, moorlands, steppe, and seacoasts to mountains, and open forested regions, especially where there are suitable nesting cliffs.	Detected. One individual was observed perched on a utility pole at the eastern border of the survey area during May 2007 surveys.
Western burrowing owl *Athene cunicularia*	CDFG: Species of Special Concern	Found mainly in grassland and open scrub from the seashore to foothills. Strongly associated with ground squirrel burrows.	Detected. Two individuals were observed in the survey area, one in the northeastern section and one in the western section in native habitat, and at least three other individuals were observed in the one-mile buffer during May, July, and August 2007 surveys. One additional individual was observed during a groundwater pump test at well #63 (Figure 9). Active burrows were observed near all individual observations.
California horned lark *Eremophila alpestris actia*	CDFG: Species of Special Concern	Often occurs in fields, grasslands, shores, and tundra habitats.	Detected. Multiple individuals of this species were observed frequently throughout the survey area and within the one-mile buffer within barren areas during May 2007 surveys, and were therefore not mapped.
Le Conte's thrasher *Toxostoma lecontei*	CDFG: Species of Special Concern	Inhabits areas with sparse desert scrub and uses cholla cactus for nesting.	Detected. Two individuals were observed in the eastern section of the survey area and one individual was observed in the one-mile buffer southwest of the survey area during May 2007 surveys.

Common Name Scientific Name	Sensitivity Status[1]	Habitat Requirements	Probability of Occurring On-site
Loggerhead shrike *Lanius ludovicianus*	CDFG: Species of Special Concern	Occurs in semiopen country with utility posts, wires, and trees to perch on.	Detected. Several individuals were observed throughout the eastern section of the survey area and the one-mile buffer during May 2007 surveys.
Mammals			
Mohave ground squirrel *Spermophilus mohavensis*	CESA: Threatened	Mojave desert scrub, alkali scrub, and Joshua tree woodland between 1,800 and 5,000 feet. Sandy to gravelly soils.	Moderate. Mojave Creosote Bush Scrub in the western portion of the survey area is suitable for this species. The remainder of the site does not provide suitable habitat. Mohave ground squirrels were detected approximately 2 miles north of the survey area in 1985. The species is assumed to be present in the survey area.
American badger *Taxidea taxus*	CDFG: Species of Special Concern	Coastal sage scrub, mixed chaparral, grassland, oak woodland, chamise chaparral, mixed conifer, pinyon-juniper, desert scrub, desert wash, montane meadow, open areas, and sandy soils.	Moderate. Although this species has been detected within one mile of the eastern edge of the survey area, no sign of the species was detected during surveys in May 2007. This species is considered relatively common in native habitats of the area (A. Karl, pers. comm.)

[1] **Sensitivity Status Key**
Federal Endangered Species Act (ESA)
State California Department of Fish and Game (CDFG)
California Endangered Species Act (CESA)



Source: ENSR 2007

NO SCALE

Figure 9
Incidental Special Status Species Observations During Onsite Pumping Tests

3.4.1 Federally Listed Wildlife Species

Desert Tortoise

The DT is federally listed as threatened under the ESA, with critical habitat designated by the USFWS (USFWS 1994a). The listing was initially made on August 4, 1989, by emergency rule (USFWS 1989) and by final rule on April 2, 1990 (USFWS 1990). This listing status applies to the entire population of DT, except in Arizona south and east of the Colorado River, and in Mexico. An approved recovery plan has been published by the USFWS (1994b). The DT was listed as threatened under CESA on June 22, 1989 (CFGC 1989).

The DT is widely distributed in the deserts of California, southern Nevada, extreme southwestern Utah, western and southern Arizona, and throughout most of Sonora, Mexico. Habitat consists of firm but not hard ground, usually soft sandy loams and loamy sands to allow for burrow construction. The flattened forelimbs of the DT and other gopher tortoises are capable tools for burrow construction. The species has also been found on rocky slopes. Optimal habitat consists of Creosote Bush Scrub vegetation, supporting a variety of moisture-rich ephemeral vegetation on which the species feeds. Annual precipitation within DT habitat averages between 2 and 8 inches per year. The DT is not found in areas of very cobbly soil, soil too soft for burrow construction, or in dry lakes. The species generally occurs below 4,000 feet elevation although it can be found up to 5,000 feet (Stebbins 1985). DT are usually most active early March through early June and again between September and early November. The species is herbivorous and is most active when plants are available for forage or when pooled water is available for drinking.

The DT reaches an average length of 6 to 14.6 inches, with males growing larger than females. A DT matures at approximately 15 to 18 years of age and can live 50 to 100 years. DTs normally construct nests and lay eggs from May through June. The clutch size varies from 2 to 14 eggs with an average of 3 to 5, although some eggs may not be fertile (Lawler 2000).

DTs typically have home ranges from 27 to 130 acres and these figures probably underestimate the actual area familiar to the tortoise. A home range is the area in which a DT travels, feeds, sleeps, courts, and has its burrows. Individuals commonly traverse 1,500 to 2,600 feet per day within their home range and males have been recorded to travel 0.75 square mile within their home range. The range of individual DT depends on factors such as density of food plants, size, age, and sex of the tortoise, and may extend no more than two miles from where it hatched (Lawler 2000). DTs are also known to disperse extended distances such as 2.0 miles in 16 days and 4.5 miles in 15 months (Stebbins 1985).

A single DT and several tortoise burrows, scat, and eggshells were observed at the outlet of Pine Tree Canyon, southwest of the survey area but within the assessment area for the proposed transmission line, during 2003 biological surveys in support of Barren Ridge Switching Station for the Pine Tree Wind Development project (EDAW 2004). This live tortoise was translocated. No other live DT were discovered in this area during 2003 protocol DT surveys for that project.

Five live DT were encountered during The Beacon Solar Energy Project ZOI transect surveys, all within 630 feet of the survey area where native habitat remains (Figure 5). Four of the five live tortoises found were encountered west of SR-14, in the southwest corner of the survey area. The fifth tortoise was encountered approximately 600 feet outside the eastern edge of the survey area. All were adult tortoises with middle carapace length ranging from approximately 200 to 235 millimeters. Most of the observed tortoise sign (burrows, carcasses, and scat) were also found in the southwest section of the survey area, west of SR-14. Only two recent tortoise sign were found in the eastern section of the survey area: an intact juvenile carcass that had been depredated by a raven (C3 in Figure 5) and a deteriorated adult burrow. Two other sets of old (greater than four years since death) bone and carapace fragments were found near the southern edge of the survey area (C2 and C11 in Figure 5). There was no evidence that DT currently inhabit the survey area.

Subsequent to protocol DT surveys in 2007, a DT carcass and two live DT were detected in or adjacent to the survey area. A juvenile DT carcass, preyed upon by a raven, was documented within the survey on September 4, 2007 by a biologist monitoring a groundwater pump test. Two additional live adult tortoises were detected within survey area during subsequent groundwater pump tests. One was detected on the northwest edge of the survey area along the main access road, and is likely a transient from adjacent habitat. The second live tortoise was detected at the western edge of the survey area, approximately 350 feet east of SR-14 (Figure 5).

Dr. Alice Karl's assessment of DT habitat within the survey area concluded that the survey area east of SR-14 has no value for DT conservation. This analysis was based on: habitat quality within the survey area (vegetation [species, cover, patchiness], soil characteristics, and hydrology); habitat quality in adjacent areas; geographic extent and type of existing disturbance; and temporal (long-term) extent of disturbance in the survey area.

Figure 7 presents a graphic representation of Dr. Karl's DT habitat assessment. The majority of the plant site has no potential to host tortoises because it is either devoid of vegetation or shrub cover is less than 2 percent. In areas where shrubs are regrowing, the Disturbed Atriplex Scrub is unlike the native community adjacent to the plant site. Portions of the surrounding area are

native Creosote Bush Scrub, whereas the regrowth area is a nearly monotypic allscale stand. This area is patchy with broad barren areas, has poor soil friability (i.e., fine, slightly hard soils), and shows evidence of periodic inundation by water, which is hazardous to DT. While there is potential that a DT would be observed in these shrub patches or in the wash that cross the survey area, the use of these areas would be attributable to the proximity of the adjoining native habitat outside of the plant site, and is likely to be temporary due to the poor habitat quality within the plant site. Additionally, even the Creosote Bush Scrub north of the plant site is poor-to-fair quality DT habitat, and consequently, DT density is expected to be low in these areas.

The wash that crosses the eastern-central section of the plant site is characterized by poor shrub diversity and low shrub cover, and is mostly bordered by barren land. The northern terminus (swale; Figure 7) is dominated by stands of exotic Russian thistle. Poor quality DT habitat in the wash also limits the wash's utility as a movement corridor. Furthermore, while good DT habitat occurs south of the plant site, little habitat occurs within the plant site to define a corridor that would connect with this. Areas north, east, and west of the wash are entirely devoid of vegetation as a consequence of long-term agricultural use of the area, and are therefore not considered DT habitat. The only shrub cover within the plant site occurs northwest of the wash and is discussed above.

In addition to currently containing large contiguous areas that lack DT habitat, the entire area within the plant site has been inappropriate DT habitat for decades as a consequence of agriculture-related disturbance. Therefore, the area has had no value for DT population persistence or recovery for many years. DT's have also been excluded from the allscale-dominated regrowth community within the northern portion of the plant site by a chicken-wire perimeter fence that was originally erected to exclude rabbits from the agricultural fields. Long segments of this chicken-wire fence are intact and effectively block much of the DT movement into the plant site.

In support of this analysis, no fresh sign and only one Class 5 (deteriorated) adult tortoise burrow were seen within the plant site, east of SR-14, during DT surveys. All carcasses, three of which were within the plant site and three of which were juvenile or small immature DT, could have been transported to the site (A. Karl, pers. comm.).

To ensure that no DT would be harmed by the Project in case a DT has temporarily moved into the plant site, a full clearance survey will be conducted following installation of perimeter fencing, prior to construction (see Conservation Measures; Section 6.2.5).

3.4.2 State Listed Wildlife Species

The federally listed DT is also listed as threatened under CESA. The Mohave ground squirrel (MGS), also listed as threatened under CESA, has the potential to occur in the survey area.

Mohave Ground Squirrel

The MGS was listed as threatened under CESA in 1983. It inhabits desert areas, including alluvial fans, basins, and plains with deep sandy or gravelly friable soils with an abundance of native herbaceous vegetation. This species is typically associated with a variety of habitats, e.g., Mojave Creosote Bush Scrub, shadscale desert scrub, alkali scrub, and Joshua Tree Woodland. The species feeds on green vegetation and seeds but may also eat carrion. The MGS remains underground from August through February or March and is active during the spring and summer.

The CNDDB includes nine records of MGS occurrence within 10 miles of the survey area (Figure 4). Three locations are in Jawbone Canyon, from just west of SR-14 to Blue Point. A fourth occurrence is near the southern edge of Red Rock Canyon State Park on the west side of SR-14. Two records are from Cache Creek near the western boundary of the Desert Tortoise Natural Area. Three records document occurrences of MGS further east, within the Desert Tortoise Natural Area. Ten additional records, not yet included in the CNDDB, occur within 12.4 miles of the survey area within the Desert Tortoise Natural Area. All lands to the west of SR-14 in the vicinity of the survey area are included in the Mohave Ground Squirrel Conservation Area proposed in the West Mojave Plan (BLM 2005). However, the protections associated with the Mohave Ground Squirrel Conservation Area apply only to public lands managed by the BLM.

There is an extensive area of Mojave Creosote Bush Scrub to the east and south of the survey area. It appears to provide suitable habitat for the MGS, although there are no occurrence records and no evidence of any trapping attempts. To the north and northeast of the survey area is a wide strip of fallow agricultural land that does not provide MGS habitat. North of the survey area and east of SR-14 is a small patch of Mojave Creosote Bush Scrub. Vegetative cover here is sparse and there is very little plant diversity. At best, this area is marginal habitat for the MGS.

To the west of SR-14, overlapping with a small portion of the survey area, a wide strip of Mojave Creosote Bush Scrub occurs on the alluvial fans reaching down from the mountains. This area is characterized by vegetation and soil conditions that are suitable for MGS (Figure 6).

The dominant shrub species are creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). Because of disturbance from periodic surface water flows, desert senna (*Senna armata*) and cheesebush (*Hymenoclea salsola*) are also abundant. No winterfat (*Krascheninnikovia lanata*) or spiny hopsage (*Grayia spinosa*), two shrubs that provide important food resources for MGS (Leitner and Leitner 1998), were observed. This relatively undisturbed habitat has moderately diverse vegetation that could provide adequate forage and cover for MGS. The habitat on this portion of the survey area (approximately 116 acres) appears suitable for the species, but is not of high quality.

The remainder of the survey area is unsuitable as habitat for MGS. The survey area was used for irrigated agriculture some years ago and has since been abandoned. Much of the property (1,785 acres) is barren (Fallow Agricultural-Ruderal) and does not support any native vegetative cover. Other portions of the survey area contain patches of native allscale shrubs (Fallow Agricultural-Disturbed Atriplex Scrub) that have become established since agricultural operations ceased. In these patches, allscale makes up almost 100 percent of the low density existing shrub cover. The herbaceous layer is sparse and consists almost entirely of a few non-native species, including filaree (*Erodium cicutarum*). MGS occasionally consume *Atriplex* foliage and filaree seeds, but these plants do not provide the full range of food resources necessary for the species (Leitner and Leitner 1998). The narrow strip of Mojave Desert Wash Scrub that runs through the center of the survey area does not provide suitable MGS habitat. The vegetation here is very open and sparse, plant diversity is low, and there is little shrub cover, and forage plants utilized by MGS are almost entirely absent. In general, the wash vegetation community appears disturbed with shrubs widely separated and damaged and extensive bare ground.

With the exception of the Mojave Creosote Bush Scrub areas on the western edge of the survey area (west of SR-14), the area has no value as a movement corridor for the MGS. Although dispersing juveniles might attempt to enter from adjoining creosote bush habitat, the wide bands of barren fallow agricultural land would serve as a dispersal barrier. Studies in the Coso area of Inyo County have shown that a small playa acted as a barrier to the dispersal movements of radiocollared juveniles (Harris and Leitner 2005). This species is assumed to be present in suitable habitat west of SR-14 where Project transmission facilities will be constructed.

American Peregrine Falcon

The American peregrine falcon (*Falco peregrinus anatum*) was listed as endangered under CESA in 1971 and is a California state Fully Protected species (Table 3). In the past, the species primarily nested on cliffs, although recent nesting has been documented in old common raven

(*Corvus corax*) nests, electric utility poles, and buildings (White et al. 2002), among other unconventional sites. Peregrine falcons are frequently found along shorelines and large bodies of water, and they forage in open landscapes, often foraging up to five miles from the nest site and ranging widely during migration (White et al. 2002). Home range for this species can be up to 582 square miles. The peregrine falcon is not known to breed in the vicinity of the Beacon Solar Energy Project survey area. One American peregrine falcon was detected on the survey area boundary, perched on a utility pole, on May 11, 2007, during WBO surveys (Figure 10). Because no large bodies of water or suitable breeding structures occur near the survey area and no other sightings of this species have been recorded in this area, this individual was likely a transient or at most may use the area in the vicinity of the survey area as a peripheral and occasional part of its home range.

3.4.3 Nonlisted, Special Status Wildlife Species

In addition to the federally and state listed species discussed above, six CDFG SSC have the potential to occur within the survey area and surrounding one-mile buffer. Those species are northern harrier, WBO, California horned lark, Le Conte's thrasher, loggerhead shrike, and American badger. Results of focused surveys for WBO and American badger are presented below.

Western Burrowing Owl

The WBO is considered a SSC by the CDFG due to intensive development pressure on the species' habitat. WBO habitat consists of annual and perennial grasslands, deserts, and scrublands, characterized by low-growing vegetation (Zarn 1974; CBOC 1993). Suitable WBO habitat may also include trees and shrubs if the canopy covers less than 30 percent of the ground surface. Burrows are the essential component of WBO habitat and both natural and artificial burrows provide protection, shelter, and nests for WBO. WBOs typically use burrows made by mammals, such as ground squirrels or badgers, but also may use man-made structures, such as cement culverts; cement, asphalt or wood debris piles; or openings beneath cement or asphalt pavement.

WBOs in California are generally nonmigratory and occur mostly in the Central and Imperial Valleys, primarily in agricultural areas. Small, scattered populations occur in the Mojave desert. The West Mojave Plan documents 53 records of burrowing owls in the east Mojave desert (Campbell 2004), only 5 of which are confirmed breeding pairs. Population density seems to be correlated with prey availability, particularly small mammals (Klute et al. 2003).

The entire survey area and one-mile buffer were considered suitable WBO habitat, as assessed per Phase I of the CBOC protocol. During Phase II of the CBOC protocol surveys, a total of 27 burrows with WBO sign were identified within the survey area one-mile buffer. Fourteen burrows were detected within the survey area, including five burrows with recent WBO sign. Thirteen burrows with sign were detected within the one-mile buffer, including five burrows with recent WBO sign.

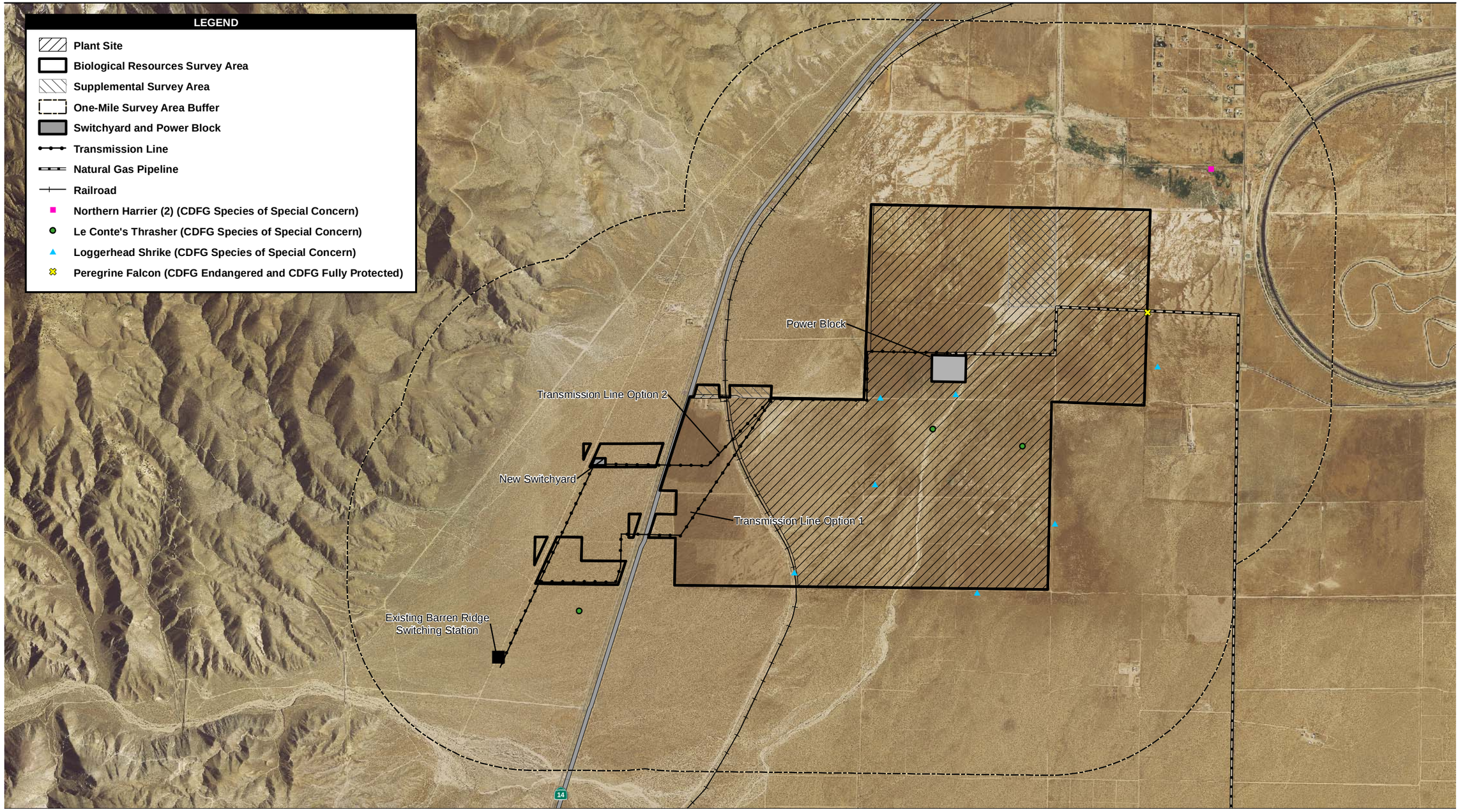
At least six WBOs were detected during focused surveys, two of which were within the survey area (Figure 11). All WBOs detected were seen within 10 meters of a burrow with recent sign. Evidence of predation was observed at two of the locations where WBOs had been detected on earlier surveys, one within the survey area. In addition to the data collected during the protocol survey, a WBO was observed on September 4, 2007, during a groundwater pump test on-site.

Northern Harrier

Northern harriers breed in open wetlands, including marshy meadows, wet lightly grazed pastures, old fields, freshwater and brackish marshes, and dry uplands including upland prairies, mesic grasslands, drained marshlands, croplands, cold desert shrub-steppe, and riparian woodland. The densest populations of northern harriers are typically associated with large tracts of undisturbed habitat dominated by thick vegetation growth (Macwhirter and Bildstein 1996). Harrier prey includes small and medium-sized mammals (primarily rodents), birds, reptiles, and frogs. Suitable habitat for this species occurs throughout the survey area. A pair of harriers was detected in the one-mile buffer northeast of the survey area during DT surveys (Figure 10).

Loggerhead Shrike

Loggerhead Shrikes inhabit edges between habitat types, grasslands, and other open habitats (Yosef 1996). Prey includes invertebrates and small vertebrates, including small mammals, birds, and reptiles. In the southern part of its range, including the survey area, loggerhead shrikes are resident and remain on permanent territories throughout the year. Outside of the breeding season, males and females defend neighboring territories which coalesce at the beginning of the nesting period. Suitable habitat for loggerhead shrike occurs throughout the survey area. Loggerhead shrikes were observed frequently during biological surveys of the survey area (Figure 10).



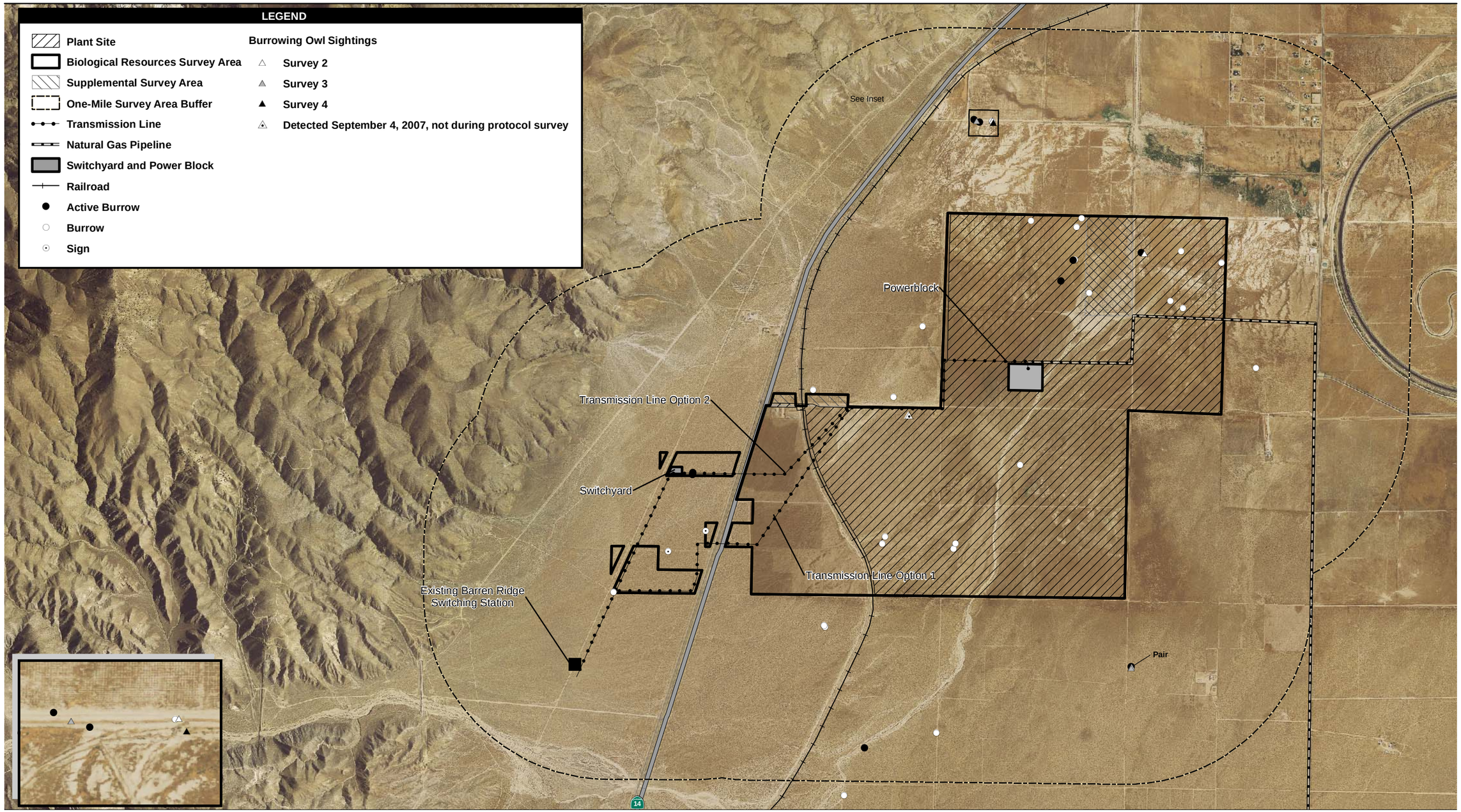
Source: TetraTech 2007; Kern County 2007; USGS 2007; CNDDB 2007; Peggy Wood 2007; EDAW 2007; WorleyParsons 2007; NAIP 2005

2,750 1,375 0 2,750 Feet

Scale: 1:33,000; 1 inch = 2,750 feet

Figure 10
Other Special Status
Biological Resources Observed

Path: P:\2008\08080001 FPLE Proj Beacon Solar\5GIS\MXD\Bio Technical Report\Figure 10 OtherSensitiveSpecies.mxd, 02/27/08, KochertE



Source: TetraTech 2007; Kern County 2007; USGS 2007; CNDDB 2007; Peggy Wood 2007; EDAW 2007; WorleyParsons 2007; NAIP 2005

2,750 1,375 0 2,750 Feet

Scale: 1:33,000; 1 inch = 2,750 feet

Figure 11
Burrowing Owls and Sign

Path: P:\2008\08080001 FPLE Proj Beacon Solar\5GIS\MXD\Bio Technical Report\Figure 11 Burrowing Owl Resources.mxd, 02/26/08, KochertE

California Horned Lark

The horned lark is a widespread bird of the open country, preferring short, sparsely vegetated prairies, deserts, and agricultural lands (Beason 1995). Adults eat primarily weed and grass seeds but they feed insects to their young. During the non-breeding season, horned larks form nomadic foraging flocks which move over a large area searching for food. During the breeding season, pairs are uniformly dispersed by territory. The species nests in shallow depressions, often lined with fine plant material, on bare ground such as plowed or fall-planted fields. The most significant threat to this subspecies is habitat destruction and fragmentation. Suitable habitat for horned lark occurs throughout the survey area. California horned larks were detected in flocks throughout the survey area in 2007 but was not mapped.

Le Conte's Thrasher

Le Conte's thrasher is an uncommon resident of the American southwest and northwestern Mexico deserts. Typical habitat consists of sparsely vegetated desert flats, dunes, alluvial fans, or gently rolling hills having a high proportion of saltbush or shadscale (*Atriplex* spp.) and/or cylindrical cholla cactus (*Opuntia* spp.) (Sheppard 1996). Shrubs are well scattered with contiguous or closed cover usually <15 m in any direction; the ground underneath is bare or with sparse patches of grasses and annuals as low ground cover. The species feeds exclusively on arthropods that it digs from litter under desert shrubs. Surface water rarely exists within several kilometers of most territories, except temporarily following infrequent rains. The species is not migratory and pairs remain together year-round. Suitable habitat for this species occurs throughout the survey area. Le Conte's thrasher was observed several times in the survey area (Figure 10).

American Badger

The badger is a resident of level, open areas in grasslands, agricultural areas, and open shrub habitats. It digs large burrows in dry, friable soils and feeds mainly on fossorial mammals: ground squirrels, gophers, rats, mice, etc. Badgers are primarily active during the day, but may become more nocturnal in close proximity to humans. The home range of male badger has been measured to be 1,327 to 1,549 acres for males and 338 to 751 acres for females in Utah (Lindzey 1978) and 400 to 600 acres in Idaho (Messick and Hornocker 1981). Mating occurs in late summer or early fall and 2 to 3 young are born 183 to 265 days later in March or April (Long 1973). Badgers are known to live 11 to 15 years (Messick and Hornocker 1981).

The American badger was not detected during surveys but has a moderate potential to occur in the survey area. This species is considered relatively common in native habitats of the area (A. Karl, pers. comm.).

3.5 CRITICAL HABITAT

The survey area does not include any designated critical habitat for any special status plant or wildlife species.

3.6 WILDLIFE MOVEMENT CORRIDORS

Wildlife movement corridors, also referred to as dispersal corridors or landscape linkages, are generally defined as linear features along with animals can travel from one habitat or resource area to another. A wildlife corridor study was not conducted as part of the BSEP since extensive, long-term species ecology, movement patterns, and dispersal behavior would be required to conclusively demonstrate if a particular site or feature of a site served as an important movement corridor. This type of data is unavailable for most of the species occurring or potentially occurring in the survey area. However, drainages, ridgelines, and other natural and manmade linear features and barriers often serve as areas that wildlife routinely use to access essential natural resources. It is assumed that wildlife species would use such features for movement if they occurred within the survey area.

The vegetated wash within the eastern section of the plant site has the potential to serve as a wildlife movement corridor. However, the wash and accompanying vegetation disperses at the northern boundary of the plant site, thus limiting the utility of this feature for cross-site movement of wildlife. No other existing linear features occur within the plant site that would provide a corridor for wildlife movement. Additionally, an existing somewhat degraded chicken-wire fence currently encompasses most of the plant site, providing a barrier to wildlife movement through the site.

CHAPTER 4
IMPACTS

In this section, Project-related impacts to vegetation communities and special status plant and animal species are analyzed. Biological resources may be either directly or indirectly impacted by a project. Direct and indirect impacts may be either permanent or temporary in nature. These impact categories are defined below.

- Direct: Any alteration, disturbance, or destruction of biological resources that would result from Project-related activities is considered a direct impact. Examples include clearing vegetation, encroaching into wetlands, diverting natural surface water flows, and the loss of individual species and/or their habitats.

- Indirect: As a result of Project-related activities, biological resources may also be affected in a manner that is not direct. Examples include elevated noise and dust levels, soil compaction, increased human activity, decreased water quality, and the introduction of invasive wildlife (domestic cats and dogs) and plants.

- Permanent: All impacts that result in the long-term or irreversible removal of biological resources are considered permanent. Examples include constructing a building or permanent road on an area containing biological resources.

- Temporary: Any impacts considered to have reversible effects on biological resources can be viewed as temporary. Examples include the generation of fugitive dust during construction; or removing vegetation for underground pipeline trenching activities and either allowing the natural vegetation to recolonize or actively revegetating the impact area. Surface disturbance that removes vegetation and disturbs the soil is considered a long-term temporary impact because of slow natural recovery in arid ecosystems. Therefore, all such impacts in the survey area are considered permanent.

Significance criteria are defined in the general context of CEQA and the National Environmental Policy Act (NEPA). Potentially significant impacts to biological resources include, but are not limited to, the following:

- Substantial impact to plant species considered by the CNPS to be rare, threatened, or endangered in California (CNPS 2007) or with strict habitat requirements and narrow

distributions; substantial impact to a sensitive natural community (i.e., community that is especially diverse; regionally uncommon; or of special concern to local, state, and federal agencies).

- Any impact to wildlife species that are federally or state listed or proposed to be listed; a substantial impact to wildlife species of special concern to CDFG, candidates for state listing, or animals fully protected in California.

- Substantial impact to habitats that serve as breeding, foraging, nesting, or migrating grounds and are limited in availability, or that serve as core habitats for regional plant and wildlife populations.

- Any impact to important riparian habitats or wetlands and any other "waters of the U.S." or "waters of the state."

4.1 ASSUMPTIONS

Assumptions employed for the calculation of direct impacts to biological resources are described below. Indirect impacts are described separately, specific to each biological resource.

4.1.1 Permanent Impacts

Solar Array, Access Roads, and Maintenance Facilities

2,012 acres of the proposed Beacon Solar Energy Project survey area east of the railroad tracks will be permanently developed to accommodate the solar array field, power generating facilities, access roads, and maintenance facilities. The entire footprint of the solar array will be graded level with a slight slope and compacted.

Transmission Line Structures

New conductor wires would transmit electrical power generated at the site to an interconnection point with the LADWP regional system west of SR-14. Two options are under consideration for interconnecting the Project to the existing LADWP Barren Ridge Switching Station.

Option 1 would involve constructing a new, approximately 3.5-mile 230-kV transmission line (of which approximately 1.6 miles will be within the plant site boundary), that would run west and southwest from the power block across SR-14 and south along an expanded LADWP right-of-

way (ROW) to the Barren Ridge Switching Station. Under Option 1, 0.9 mile of the transmission line (ten poles) are located in desert tortoise and potential Mohave ground squirrel habitat.

Option 2 would involve constructing a new, approximately 3.5-mile 230-kV transmission line (of which approximately 1.6 miles will be within the plant site boundary) to a new switching station to be constructed at the location where the Project's transmission line first meets LADWP's existing transmission ROW west of SR-14. A second, approximately one-mile 230kV transmission line would then be constructed within the expanded LADWP ROW to the Barren Ridge Switching Station (Figure 2). Under Option 2, approximately 1.5 mile of the transmission line (17 poles) are located in desert tortoise and potential Mohave ground squirrel habitat.

Under either transmission option, each pole location would require construction of a 50-foot by 50-foot pole pad. Pole height would range from 75 to 110 feet, depending on terrain and span length. Span length would range between 440 to 560 feet, averaging about 500 feet. During construction of the transmission line, pole site work areas and pull/splicing sites would be required. The pole site work areas measure 50 feet by 50 feet. The pull sites for the transmission lines average 50 feet by 140 feet each. The splicing site for the transmission line measures 95 feet by 200 feet. There will be no grading at the pole site work areas or the pull and splicing site; rather, vegetation will be crushed. The pole site work areas, pull sites, and splicing sites within desert tortoise and potential Mohave ground squirrel habitat would result in temporary disturbance that would be considered permanent based on slow recovery time of habitats in desert ecosystems. Under Option 1, up to 5.0 acres would be disturbed, which includes the access and spur roads, described below; under Option 2 (including a new switchyard), up to 5.8 acres would be disturbed (Table 1).

Under either transmission option, the new Project transmission line would tie into the existing Inyo-Rinaldi 230-kV transmission line at the existing Barren Ridge Switching Station; however, under Option 2, a new electrical switchyard would be built in association with the Project. Up to 1.7 acres of desert tortoise and potential Mohave ground squirrel habitat would be impacted by construction and Operations and Management (O&M) activities associated with the construction of the Option 2 switchyard and associated electrical tie-in. The switchyard is accessed from the existing graded patrol road that runs along the Inyo-Rinaldi line. Periodic maintenance activities for the transmission line could include cleaning of the line conductors and repair of equipment damaged by wind, dust, or accident. Activities could also include road and drainage structure repairs. Such activity would occur infrequently, perhaps once per year.

Anticipated impacts associated with the transmission line structures are summarized in Table 4.

Table 4
Estimated Natural Desert Tortoise and Mohave Ground Squirrel Habitat Acreage West of SR-14 Potentially Impacted by Transmission Line Interconnection Route

Feature	Quantity	Impact Dimensions per Feature	Square Feet	Acres
Option 1				
Pole Pad Construction	10	50' x 50'	25,000	0.6
Pull Property	3	50' x 140'	21,000	0.5
Splice Property	1	95' x 200'	19,000	0.4
Spur Roads	10	12' x 115'	13,800	0.3
Access Road	1	14' x 10,032'	140,400	3.2
Total Impact			**219,200**	**5.0**
Option 2				
Pole Pad Construction	17	50' x 50'	42,500	1.0
Pull Property	3	50' x 140'	21,000	0.5
Splice Property	1	95' x 200'	19,000	0.4
Spur Roads	17	12' x 115'	23,460	0.5
Access Road	1	14' x 5,280'	73,920	1.7
New Switchyard	1		74,052	1.7
Total Impact			**242,932**	**5.8**

New Switchyard

Under option 2, an electrical switchyard is proposed for interconnection with the existing LADWP transmission lines that cross the surveyed area west of SR-14. This switchyard will require a 1.7-acre pad. Anticipated impacts at the new switchyard are shown in Table 4.

Access

An existing dirt road off SR-14 will be upgraded (paved) to provide access to the solar array, power block, and support facilities on the plant site. Existing dirt roads west of SR-14 would provide construction and O&M access to transmission line structures whenever possible, with potential new access roads created under Option 1 (14 feet by 1.9 miles) would affect up to 3.2 acres; Option 2 (14 feet by 1.0 mile), would affect up to 1.7 acres. Additionally, spur roads (averaging 12 feet by 115 feet) to 10 pole sites under Option 1 (up to 0.3 acre) and 17 pole sites under Option 2 (up to 0.5 acre). Tortoise-proof secure gates will be installed where access roads leave SR-14 and enter the plant site.

Rerouted Desert Washes

Two existing desert washes that cross sections of the plant site will be rerouted in new, constructed channels (Figure 2). For the eastern wash, the new, revegetated channel will have an earthen bottom and will run immediately outside of the southern and eastern security fences of the plant site but inside the low-maintenance barbed-wire property fence and terminate northeast of the plant site where the existing wash currently disperses toward Koehn Lake. This new channel was designed to convey the volume and energy currently conveyed by the existing desert wash. The western, mostly unvegetated wash will be earthen bottom, and will be rerouted to pass west of the proposed evaporation ponds, follow the northern and western boundaries of the plant site, then turn east to pass through the plant site between solar arrays and terminate in the outflow of the eastern wash. The new channels will be constructed entirely within the permanent impact area within the plant site and therefore would not incur further permanent impacts.

4.1.2 Temporary Impacts

Natural Gas Pipeline

A natural gas pipeline will be constructed from California City to the solar block along California City Boulevard, Neuralia Road, and an existing dirt road that accesses the eastern edge of the plant site. This approximately 17.6-mile pipeline will occur entirely within the disturbed and developed shoulders of the existing roads and will avoid native habitat. Approximately 60.0 acres of disturbed habitat will be temporarily disturbed for the natural gas pipeline.

Construction Disturbance Areas

In addition to roads, a number of other areas associated with Project construction and operations must be cleared and graded. During the construction of the transmission line, pole site work areas (three at 50 feet x 140 feet) and splicing site work areas (one at 95 feet x 200 feet) would be required. While these are typically considered temporary impacts, they were considered permanent in calculating mitigation for the Project due to the slow recovery of native communities in desert ecosystems.

4.2 VEGETATION COMMUNITIES

4.2.1 Direct Impacts

Project-related activities would not result in significant direct impacts to sensitive vegetation communities because no sensitive vegetation communities occur in the survey area. All non-sensitive vegetation communities in the solar array area, areas associated with transmission structure footprints, access roads, equipment laydown areas, transmission line, and pipeline installation would be directly and permanently impacted (Table 5).

Table 5
Anticipated Permanent and Temporary Impacts to Plant Communities and Waters of the State in the Proposed Beacon Solar Energy Project Site

Vegetation Communities and Other Cover	Total Permanent Impact Acreage	Total Temporary Impact Acreage	Total Impact Acreage
Mojave Creosote Bush Scrub			
Option 1	4.1	0.9	5.0
Option 2	4.9	0.9	5.8
Mojave Desert Wash Scrub	59.0	0.0	59.0
Developed	7.2	60.0	67.2
Fallow Agricultural-Ruderal	1,573.8	0.9	1,574.7
Fallow Agricultural-Disturbed Atriplex Scrub	371.9	0.0	371.9
Waters of the State[1]	13.7	0.0	13.7
Total Option 1 Acres	**2,016.0[1]**	**61.8**	**2,077.8[1]**
Total Option 2 Acres	**2,016.8[1]**	**61.8**	**2,078.6[1]**

[1] Acreage of waters of the state not added to total as area is counted within other vegetation communities.

4.2.2 Indirect Impacts

Project-related activities would not result in significant indirect impacts to sensitive vegetation communities because there are no sensitive vegetation communities in the vicinity of the survey area. Potential indirect impacts to the vegetation communities surrounding the survey area would occur as a result of grading activities creating air-born dust and potential off-site sedimentation. Potential permanent, indirect impacts include spreading of exotic species in native vegetation communities such as those in transmission line corridors, wildfires caused by new transmission wires destroying or disturbing native vegetation communities, and alteration of drainage patterns. Because Project design includes rerouting the desert wash that traverses the survey area by creating an open channel along the eastern side of the site that would direct flow to an existing drainage basin northeast of the site, potential indirect impacts to downstream

vegetation communities would be minimized. However, potential wildfires and sitewide ground-disturbing activities could adversely affect vegetation communities by altering adjacent vegetation boundaries and creating disturbed areas that are more conducive to invasion of exotic species. The introduction and invasion of exotic species could potentially reduce native population growth, dispersal, and recruitment. Project design will include efforts to avoid the increase in exotic vegetation, thereby reducing the impacts to surrounding vegetation communities to a level of insignificance.

Potential temporary, indirect impacts resulting from grading include sedimentation and erosion. While detailed evaluation of these impacts will occur following completion of a more refined Project layout, a Storm Water Pollution Prevention Plan (SWPPP) and a Drainage, Erosion, and Sedimentation Control Plan (DESCP) will be prepared to comply with Regional Water Quality Control Board (RWQCB) and CEC recommendations. The SWPPP and DESCP will identify the Project design features and BMPs that will be used to effectively manage drainage-related issues (e.g., erosion and sedimentation) during construction grading and for long-term operations.

4.3 JURISDICTIONAL WATERS

4.3.1 Direct Impacts

The waters of the state that traverse the site, approximately 13.7 acres within the plant site, would be directly affected by Project development; however, these impacts would be minimized to the greatest extent feasible by re-routing the washes around Project features, revegetating the eastern new channel, and terminating both channels at the original outflow of the eastern wash. The dry desert washes extending across the survey area likely would be considered state waters.

4.3.2 Indirect Impacts

No significant indirect impact to waters of the state would occur as a result of Project-related activities because these effects would be reduced to insignificance by impact avoidance, minimization, and mitigation measures outlined in the mitigation section of this document. Potential indirect impacts to state waters surrounding the survey area would occur as a result of grading activities creating air-born dust and potentially off-site sedimentation. Potential permanent, indirect impacts include alteration of drainage patterns. Because Project design includes rerouting the desert wash that traverses the survey area by creating an open channel along the southern and eastern side of the site that would direct flows to an existing drainage basin northeast of the site, potential indirect impacts to downstream waters would be minimized.

4.4 PLANT SPECIES

4.4.1 Direct Impacts

Potential permanent, direct impacts to special status plant species, if present, may arise from implementation of the proposed Project by permanent development of the solar array, power generation and support facilities, transmission structure locations, and access roads.

Federally and State Listed Plant Species

No federally or state listed plants are considered to have the potential to occur within the survey area; therefore, no direct impacts to listed plant species would result from either Project construction or operation.

Nonlisted, Special Status Plant Species

Habitat conditions within the survey area create a moderate potential for Alkalai mariposa lily, Charlotte's phacelia, and creamy blazing star to occur within the Mojave Creosote Bush Scrub, Mojave Desert Wash Scrub, and Fallow Agricultural-Disturbed Atriplex Scrub vegetation communities (Figure 6). Red Rock tarplant and Red Rock poppy are considered to have a low potential to occur within the site. Due to low annual rainfall in 2007, conditions to adequately assess the site for these species were less than satisfactory, and therefore their absence from the site cannot be confirmed. If required, further surveys to assess the presence of these species in the survey area may be completed at a later date if average seed germination occurs in response to winter precipitation. With implementation of the impact avoidance, minimization, and mitigation measures outlined in the mitigation section of this document, the Project's direct impacts on nonlisted, special status plant species, if any, would be reduced to a level of insignificance.

4.4.2 Indirect Impacts

Potential permanent, indirect impacts to special status plant species, if present, may arise from population fragmentation and introduction of nonnative weeds. Population fragmentation could affect pollinator activity and hence gene flow. Introduction and establishment of invasive weeds within, or adjacent to, special status plant populations can adversely affect native species by

reducing growth and recruitment. Such impacts would be avoided through implementation of Project avoidance and minimization measures.

Potential temporary, indirect impacts could arise from runoff and sedimentation, erosion, fugitive dust, and unauthorized access by construction workers. Runoff, sedimentation, and erosion can adversely affect plant populations by damaging individuals or by altering site conditions sufficiently to favor other species that could competitively displace the special status species. Construction-generated fugitive dust can adversely affect plants by reducing the rates of metabolic processes such as photosynthesis and respiration. Unauthorized access by construction workers and their vehicles can trample and destroy individuals outside of, but immediately adjacent to, the proposed construction area. These impacts will be avoided, however, through implementation of Project avoidance and minimization measures.

Federally and State Listed Plant Species

Because no federally or state-listed plants have the potential to occur within the survey area, no indirect impacts to listed plant species would result from either Project construction or operation.

Nonlisted, Special Status Plant Species

As discussed above, habitat conditions within the survey area create a moderate potential for Alkalai mariposa lily, Charlotte's phacelia, and creamy blazing star to occur within the Mojave Creosote Bush Scrub, Mojave Desert Wash Scrub, and Fallow Agricultural-Disturbed Atriplex Scrub vegetation communities (Figure 6). Red Rock tarplant and Red Rock poppy are considered to have a low potential to occur within the site. Due to low annual rainfall in 2007, conditions to adequately assess the site for these species were less than satisfactory, and therefore their absence from the site cannot be confirmed. If required, further surveys to assess the presence of these species in the survey area may be completed at a later date if average seed germination occurs in response to winter precipitation. With implementation of the impact avoidance, minimization, and mitigation measures outlined in the mitigation section of this document, the Project's direct impacts on nonlisted, special status plant species, if any, would be reduced to a level of insignificance.

4.5 WILDLIFE SPECIES

4.5.1 Direct Impacts

The proposed Project could potentially result in direct impacts to special status wildlife species. For example, direct impacts could result from mortality of wildlife by crushing or vehicle collisions during construction and subsequent maintenance activities.

Federally Listed Wildlife Species – Desert Tortoise

No impacts to DT are expected within the plant site area due to lack of suitable habitat, although it is recognized that a low possibility exists that one or few transient tortoises may be found in regrowth habitats that connect to native habitat off-site (e.g., in the wash or in saltbush scrub). The vegetation regrowth community within the survey area is not DT habitat that could support the persistence or recovery of the DT population, even if one or a few tortoises are found on the site. Direct permanent and temporary impacts to the DT could potentially occur as a result of the installation of an electrical substation facility and transmission structures, which cumulatively could impact 5.0 acres (transmission Option 1) to 5.8 acres (transmission Option 2) of habitat associated with construction of these features. Temporary direct impacts to the DT could result from an increase in vehicle traffic while the Project is under construction and, consequently, an increase in vehicular strikes while tortoises are attempting to cross roads near the survey area.

Project mitigation, especially site fencing and a preconstruction DT clearance, will minimize any potential impacts to DT as a result of Project activities. Implementation of the impact avoidance, minimization, and mitigation measures outlined in the mitigation section of this document will reduce the Project's impacts on DT to a level of insignificance.

State Listed Wildlife Species - Desert Tortoise and Mohave Ground Squirrel

See above for discussion of impacts to the federally and state-listed DT. No impacts to MGS are expected to occur within the plant site due to lack of suitable habitat. However, the development of a substation facility, transmission line, access road to the plant site, and spur access roads in Mojave Creosote Bush Scrub west of SR-14 could potentially result in direct permanent and temporary impacts to 5.0 to 5.8 acres of suitable MGS habitat.

Implementation of the impact avoidance, minimization, and mitigation measures outlined in the mitigation section of this document will reduce the Project's impacts on MGS to a level of insignificance.

Nonlisted, Special Status Wildlife Species

Direct impacts to other non-listed, special status wildlife species could result from the installation of the transmission line, the establishment of work areas on-site, and wildlife mortality by crushing or vehicle collisions during Project construction and subsequent operations and maintenance activities. Direct impacts to the WBO and other birds listed under the Migratory Bird Treaty Act (MBTA) will be avoided by implementation of Project avoidance and minimization measures.

Direct impacts to WBO and other non-listed special status wildlife species could result from crushing of occupied burrows and destruction of nests; collisions with construction and maintenance vehicles; and taking of breeding and wintering habitat as a result of development of the solar array, power generation and support facilities, access roads, maintenance facilities, and transmission line and substation. Based on WBO survey data, the Project locations of the power generation and support facilities, transmission structures, access roads, and electrical substation would permanently impact three pairs of WBO. Implementation of the impact avoidance, minimization, and mitigation measures outlined in the mitigation section of this document will reduce the Project's impacts on WBO and other non-listed, special status wildlife species to a level of insignificance.

4.5.2 Indirect Impacts

The proposed Project could potentially result in temporary and permanent indirect impacts to special status wildlife species. These impacts would be reduced to insignificance by implementation of Project avoidance, minimization, and mitigation measures outlined in the mitigation section of this document. Temporary indirect impacts could result from dust accumulation on surrounding vegetation; increased ambient noise levels in adjacent plant communities; use of unnatural lighting during dawn, dusk, or nighttime construction; wildfires caused by new transmission wires destroying or disturbing habitat; accumulation of waste material in evaporation ponds; or changes in surface drainage patterns following precipitation events.

Dust accumulation on surrounding vegetation, increased ambient noise levels adjacent to construction areas, and wildfires could potentially lead to temporary, indirect impacts to special status avian species that may use the adjacent plant communities by disrupting their natural foraging patterns and destroying foraging habitat. If construction activities are conducted at night, the use of unnatural lighting could temporarily indirectly impact special status wildlife

species adjacent to construction areas by increasing possible detection by predators. Accumulated waste material in evaporation ponds could adversely affect shorebirds that stop over and use the pond during migration. Groundwater at the plant site was tested for toxic pollutants such as selenium and concentrations were found to be below accepted thresholds. If necessary, waste material will be removed and disposed of at an appropriate facility. Potential indirect impacts associated with changes in drainage patterns would be reduced to insignificance by implementation of the SWPPP and DESCP, which will include flood management procedures.

Permanent indirect impacts to special status wildlife species resulting from the proposed Project could also include: (1) habitat fragmentation, where removal of habitat elements results in separation of formerly connected habitat patches; (2) increased raptor predation on reptiles, songbirds, and small mammals resulting from an increase in perch sites provided by support structures such as transmission line towers; and (3) alteration of surface drainage patterns, which may cause differential senescence and death of plant species used by special status wildlife species. Indirect impacts from habitat fragmentation are expected to be less than significant due to the previously disturbed nature of the majority of the site, and the relatively small and discontinuous areas of native habitat that would be affected by the Project. The effects of potentially increased raptor predation on small animals and changes in surface drainage patterns on special status wildlife species are discussed further below.

Federally Listed Wildlife Species – Desert Tortoise

Indirect impacts to the DT could occur from increased common raven predation associated with the installation of new evaporation ponds and the introduction of new elevated perching sites (e.g., new transmission line towers). Biologists monitoring one groundwater pump test in September 2007 noticed 15 to 20 common ravens using the temporarily ponded water, an increase from two to five common ravens seen daily prior to the groundwater pump test. While this attraction is not within DT habitat, the movement of common ravens throughout the area and over potential DT habitat at the western edge of the survey area (e.g., between open water and transmission line perches) could increase the chances of a raven encountering and depredating a DT. Those impacts will be avoided or minimized, however, by implementation of a raven management plan. Indirect impacts to the DT from potential deposition of sediment loads during heavy rain events and flooding downstream of the site, which could impact existing DT burrows outside of the survey area, would be minimized by Project design (i.e., rerouting the desert wash and connecting to an off-site channel and grading and compacting the entire footprint of the solar array, thereby reducing on-site erosion). Similarly, indirect impacts to DT habitat by changes in

drainage patterns potentially altering off-site vegetation communities would be minimized by Project design. Implementation of the impact avoidance, minimization, and mitigation measures outlined in the mitigation section of this document will reduce the Project's indirect impacts on DT to a level of insignificance.

State Listed Wildlife Species – Desert Tortoise and Mohave Ground Squirrel

The potential indirect impacts on desert tortoise are discussed above. Indirect impacts to the MGS could occur from increased raptor and common raven predation associated with the installation of new evaporation ponds in addition to elevated perching sites, including the tower structures, the transmission lines, and support structures, as discussed above for DT. Indirect impacts to the MGS from potential deposition of sediment loads during heavy rain events and flooding downstream of the site, which could impact existing MGS habitat, would be minimized by Project design (i.e., rerouting the desert wash and connecting to an off-site channel and grading and compacting the entire footprint of the solar array, thereby reducing on-site erosion). Similarly, indirect impacts to MGS habitat by changes in drainage patterns potentially altering off-site vegetation communities would be minimized by Project design. Implementation of the impact avoidance, minimization, and mitigation measures outlined in the mitigation section of this document will reduce the Project's indirect impacts on MGS to a level of insignificance.

Nonlisted, Special Status Wildlife Species

Indirect impacts could result from increased common raven and raptor predation associated with the installation of new evaporation ponds, in addition to new elevated perching sites, including the tower structures, the transmission lines, and support structures, as discussed above for DT. Indirect impacts from potential deposition of sediment loads during heavy rain events and flooding downstream of the site, which could impact existing habitat outside of the survey area, would be minimized by Project design (i.e., rerouting the desert wash and connecting to an off-site channel and grading and compacting the entire footprint of the solar array, thereby reducing on-site erosion). Similarly, indirect impacts to habitat by changes in drainage patterns potentially altering off-site vegetation communities would be minimized by Project design. Implementation of the impact avoidance, minimization, and mitigation measures outlined in the mitigation section of this document will reduce the Project's indirect impacts on non-listed, special status wildlife species to a level of insignificance.

Direct impacts could result from mortality of wildlife by crushing or vehicle collisions during operation and maintenance activities. Project mitigation, especially site fencing, will minimize

any potential impacts to DT as a result of Project activities. Implementation of the impact avoidance, minimization, and mitigation measures outlined in Chapter 6.2 will reduce the Project's impacts on listed and special status wildlife species to a level of insignificance.

Operation of the Project may result in impacts to special status wildlife species by destruction of habitat due to wildfires caused by new transmission wires, accumulation of waste material in evaporation ponds, and attraction of avian predators, such as common ravens that are known to prey on juvenile desert tortoises, by evaporation ponds and other Project components. Depending on constituent concentrations in evaporation ponds, accumulated waste material could potentially adversely affect shorebirds that stop over and use the pond during migration.

During ongoing coordination with the USFWS and CDFG, a request was made to address the potential adverse effects of selenium levels in the evaporation pond discharge water, on wildlife species (in particular, on migratory waterfowl). The selenium discharge concentration within the evaporation ponds has been calculated at 0.0028 milligrams per liter (mg/L). Measuring the levels at which adverse effects are observable in birds is highly variable, and depends on several factors, such as species, body weight, and length of exposure, type of exposure (e.g., ingestion vs. dermal contact), the bioavailability of the compound (i.e., the ability of an organism to take up and store the compound), as well as the exposure concentration.

The U.S. Environmental Protection Agency (EPA) has published Ecological Soil Screening Levels (Eco-SSL) for selenium (2007). Although the screening levels are based on soil concentrations, the units of measure used are mg/kg, or parts per million (ppm), whereas the BSEP waste constituent concentrations are in units of mg/L (also equivalent to ppm). The Eco-SSL provides toxicology test results for bird species at a "no observable adverse effect level," (NOAEL) and at a "lowest observable adverse effect level" (LOAEL). Based on the use of surrogate species (i.e., selecting migratory birds such as the mallard [*Anas platyrhyncos*] and black-crowned night heron [*Nycticorax nycticorax*] from the Eco-SSL list of target test species), the NOAEL ranged from 0.055 ppm to 4.16 ppm (for mallard in both test cases), while the LOAEL ranged from 0.11 ppm to 8.46 ppm (for mallard in both test cases). The waste constituent concentrations that have been calculated as being discharged into the evaporation pond are 0.0028 ppm for selenium, which would be approximately 20 times lower that the most sensitive NOAEL receptor response published by the EPA (2007). Therefore, it is not anticipated that the selenium concentrations in the evaporation pond would pose an adverse condition to migratory birds. Ongoing monitoring of the evaporation ponds, as described in Section 5.3.4, would track the waste constituent concentrations of any compound of concern, and

the implementation of those pertinent mitigation measures will reduce the effects of those compounds on wildlife species to a level of insignificance.

Overall, implementation of the impact avoidance, minimization, and mitigation measures outlined in Chapter 6.2 will reduce the Project's indirect impacts on special status species to a level of insignificance.

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CHAPTER 5
REGULATORY SETTING

5.1 STATE AND LOCAL JURISDICTIONS

The Project requires biological resource-related approvals from the CEC and CDFG. The CEC licensing process is a CEQA-equivalent process under the Warren-Alquist Act. It is anticipated that CDFG will take jurisdiction over any waters associated with the Project and a CDFG Streambed Alteration Agreement (SAA) would be required for impacts to waters of the state. While the formal land use permitting is handled through the CEC licensing process, the CEC incorporates local agency requirements into its license and thus Kern County's land use zoning, plans, and policies also are important.

The anticipated local and state actions/authorizations pertaining to potential Project effects on biological resources are as follows:

- CEC: Electricity-generating facility license and associated CEQA compliance
- CDFG:
  - SAA, CFG Code Section 1602, and
  - CESA, CFG Code Section 2081
    (CDFG would be a "responsible agency" to the CEC's lead agency CEQA process)

Review of Project impacts and avoidance and minimization measures, and issuance of formal authorizations by CDFG will be needed before Project construction can begin. These reviews and authorizations are described further below.

5.1.1 Review and Authorization for Impacts to State Waters

Because the Project may affect state jurisdictional waters, a SAA is expected to be required from CDFG. Under CFG Code Sections 1600-1616, CDFG regulates activities that would alter the flow, bed, channel, or bank of streams and lakes in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit.

Project proponents must provide CDFG with written notification before activities begin that will:

- Substantially divert or obstruct the natural flow of any river, stream, or lake;

- Substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake; or
- Deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into any river, stream, or lake.

Notification is generally required for any activity that will take place in or in the vicinity of a river, stream, lake, or their tributaries. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks and support fish or other aquatic life, and watercourses having a surface or subsurface flow that support or have supported riparian vegetation. Generally, CDFG is concerned with activities that have the potential to impact state-regulated resources at the activity site, as well as the effects of those actions on the ecosystem at and surrounding the activity (i.e., upstream, downstream, and neighboring). As needed, the process of working with CDFG to develop a draft SAA will identify modifications to Project features, if any, to avoid or decrease potential impacts on fish and wildlife resources.

5.1.2 Review and Authorizations for Impacts to State Listed Species

The CESA requires issuance of a take authorization, pursuant to California Fish and Game (CFG) Code Section 2081, for species listed by the state as endangered or threatened. MGS and DT are two state listed species that may be affected by the Project. Because DT are present and MGS are assumed to be present in areas associated with the proposed transmission line, the Project will obtain a Section 2081 permit for MGS and either a Section 2081 permit for DT, or a CDFG concurrence under CESA Section 2080.1 with the federal take authorization issued by USFWS for DT under the federal ESA. The federal process is discussed below.

5.1.3 Compliance With Other State Laws

The Project also will comply with CFG Code Section 3503, which prohibits take, possession, or needless destruction of the nests or eggs of any bird, except as otherwise provided by the code or any regulation made pursuant thereto and CFG Code Section 3503.5, which prohibits take, possession, or destruction of any birds in the orders Falconiformes or Strigiformes (birds of prey) or take, possession, or destruction of the nests or eggs of any such bird except as otherwise provided by the code or any regulation adopted pursuant thereto.

5.2 FEDERAL ACTIONS

It is not anticipated that the Project will have any impacts on waters of the United States, and therefore no permitting will be required from the U.S. Army Corps of Engineers (USACE) under the federal Clean Water Act. A permit will be obtained under the federal ESA for impacts to the DT, which is listed as threatened under that act. The anticipated federal action/authorization pertaining to potential Project effects on biological resources, therefore, will be limited to a Section 10 Low Effect Habitat Conservation Plan (HCP) and Incidental Take Permit (ITP) issued by the USFWS pursuant to the Federal ESA.

5.2.1 Review and Authorizations for Impacts to Federal Waters

Waters that traverse the survey area flow into Koehn Lake, which was determined to be an isolated water body (through the jurisdictional review of an adjacent project unrelated to Beacon Solar, LLC and The Beacon Solar Energy Project) and not within USACE jurisdiction (USACE letter to the City of Los Angeles, dated July 22, 2003). The USACE and the U.S. Environmental Protection Agency have granted official concurrence of no waters of the United States within the survey area (Attachment H). Therefore the USACE will not take jurisdiction over any waters associated with the Project.

5.2.2 Review and Authorizations for Impacts to Federally Listed Species

Because the DT is protected by the ESA and CESA and is known to exist in the survey area, the requirements of both laws must be met. ESA permitting will be obtained through Section 10, which requires preparation of an HCP and issuance of an ITP by USFWS. Because the survey area has been previously heavily disturbed by agricultural activities and the potential impacts to listed species are minimal, the Project will obtain ESA permitting from USFWS using the "Low Effect" HCP process.

5.2.3 Compliance With Other Federal Laws

The Project also will comply with the BGEPA and the MBTA. National guidelines for eagle management have been published by the USFWS (2007) to assist land owners, land managers, and the general public in determining when and under what circumstances protective provisions of the BGEPA apply to their activities. The MBTA prohibits "take" of migratory birds, raptors, and eagles, where "take" is defined as pursue, hunt, shoot, wound, kill, trap, capture, possess, or collect. In addition, the BGEPA also prohibits "take" of bald or golden eagles, their parts, nests,

and eggs, and further defines "take" as pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb, where disturb is defined as:

> …agitate or bother…to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding or sheltering behavior.

This definition includes impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habitats and causes, or is likely to cause, a loss of productivity or nest abandonment.

CHAPTER 6
AVOIDANCE, MINIMIZATION, AND CONSERVATION MEASURES

6.1 GENERAL AVOIDANCE AND MINIMIZATION MEASURES

The following is a list of general impact avoidance and minimization measures that would apply to all Project activities. These measures are standard practices designed to prevent environmental degradation, and the Project applicant will ensure implementation of these measures to avoid and minimize impacts to the greatest extent feasible. A Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) has been developed for review by the CEC as a Condition of Certification. The BRMIMP comprehensively describes avoidance, minimization, and mitigation measures, and provides a matrix to document their implementation and monitor their effectiveness. Those measures include:

- All temporary and permanent impact areas will be surveyed for listed species within 30 days prior to commencement of construction activities in the survey area. Rare plant species identified during pre-activity surveys will be flagged for avoidance.

- The construction contractor(s)/crew(s) will be informed about the biological constraints of the Project. All construction personnel who work in the survey area will attend a contractor education program, developed and presented by a Project biologist prior to the commencement of construction activity. The construction crews and contractor(s) will be responsible for unauthorized impacts from construction activities to sensitive biological resources that are outside the areas defined as subject to impacts by the CEC and other agencies who must issue approvals for the Project.

- Construction crews and contractors will be responsible for working around all shrubs and trees within the construction zone to the extent feasible. Shrubs and trees will be flagged during pre-activity surveys to indicate priority for avoidance.

- The anticipated impact zones, including staging areas, equipment access, and disposal or temporary placement of spoils, will be delineated with stakes and flagging prior to construction to avoid natural resources where possible. Construction-related activities outside of the impact zone will be avoided.

- New and existing roads that are planned for either construction or widening will not extend beyond the planned impact area. All vehicles passing or turning around will do so within the

planned impact area or in previously disturbed areas. Where new access is required outside of existing roads or the construction zone, the route will be clearly marked (i.e., flagged and/or staked) prior to the onset of construction.

- The pipeline construction will involve nearly simultaneous trenching, laying of pipe, and backfilling so that no open trenches will be left unattended during daylight hours. Any open trenches that cannot be backfilled will be covered with steel plates at night. Biological monitors will attend pipeline construction to ensure that special status resources are avoided or moved to a safe location when necessary.

- Spoils will be stockpiled in disturbed areas presently lacking native vegetation. Stockpile areas should be marked to define the limits where stockpiling can occur.

- Best Management Practices (BMPs) will be employed to prevent loss of habitat due to erosion caused by Project-related impacts (i.e., grading or clearing for new roads). All detected erosion will be remedied within two (2) days of discovery.

- Fueling of equipment will take place within existing paved roads, and not within or adjacent to drainages or native desert habitats. Contractor equipment will be checked for leaks prior to operation and repaired as necessary.

- Construction activity will be monitored by a qualified biologist to ensure compliance with avoidance and minimization measures.

- The Project proponent is supportive of funding a monitoring program to document potential nesting ravens. The details of the funding mechanism and monitoring will be coordinated with the USFWS prior to initiation of the Project.

- The introduction of exotic plant species will be avoided and controlled wherever possible, and may be achieved through physical or chemical removal and prevention. Preventing exotic plants from entering the site via vehicular sources will include measures such as implementing Trackclean or other method of vehicle cleaning for vehicles coming and going from the site. Earth-moving equipment shall be cleaned prior to transport to the project site. Weed-free rice straw or other certified weed-free straw will be used for erosion control. Weed populations introduced into the site during construction will be eliminated by chemical and/or mechanical means approved by the CDFG, USFWS, and CEC.

6.2 RESOURCE-SPECIFIC AVOIDANCE, MINIMIZATION, AND CONSERVATION MEASURES

Resource-specific impact avoidance, minimization, and mitigation measures for the Project effects that were determined to be potentially significant are discussed below. Incorporation of these measures would reduce potentially significant measures to below a level of significance.

6.2.1 Vegetation Communities

No mitigation is required to compensate for nonsensitive vegetation that would be directly impacted by the Project (see below for mitigation required to compensate for impacts to the vegetation communities that are considered state waters or suitable habitat for listed species).

6.2.2 Sensitive Vegetation Communities

No sensitive vegetation communities would be permanently or temporarily impacted by Project-related activities; therefore, no mitigation is required.

6.2.3 Waters of the State

Project related direct permanent and temporary impacts to approximately 13.7 acres of state waters, in the form of the ephemeral washes occurring within the project boundaries are anticipated. The Project would apply a mitigation ratio of 1:1 for the direct impacts to approximately 13.7 acres of state waters. Compensatory mitigation would be achieved by onsite and in-kind planting of desert wash scrub vegetation within and immediately adjacent to the channels, in order to provide erosion control and bank stabilization. Project design includes rerouting both existing washes. The eastern wash will be rerouted to follow the southern and eastern boundaries of the plant site and ultimately match the original sheet flow drainage path just northeast of the plant site (Figure 2). The rerouted channel will be approximately 14,000 feet long. The realigned dry wash will be a 3:1 trapezoidal channel, with a minimum bottom width of 345 feet (to a maximum of about 2,900 at the end of transition to sheet flow). The proposed average channel depth is about 8 feet. Channel side dirt berms are used to accomplish the transition from the 8' depth channel bottom to daylight to the existing ground at the northeast corner of the plant site. The western, mostly unvegetated wash will be rerouted to a swale west of the proposed evaporation ponds, then follow the northern and western boundary of the plant site, pass through the plant site between solar arrays, and join the eastern wash outflow, east of the plant site. The swale will be approximately 9,000 feet long with an average depth of one foot and a minimum bottom width of 15 feet. Each rerouted wash will have an earthen bottom. The

proposed rerouted channels will meet the requirements of Kern County through use of the methodology outlined in the "Kern County Hydrology Manual" and "County Division Four Standards for Drainage." The rerouted channels will be sized to convey Capital Storm Design Discharge for a 100-year event with a minimum of one foot of freeboard above the water surface elevation. Project-specific mitigation would be refined in consultation with CDFG.

6.2.4 Special Status Plants

Mitigation for rare plants, if required, will be based on the results of future surveys should they occur. Appropriate mitigation would be provided and will include avoidance, where possible, or other conservation measures.

6.2.5 Special Status Wildlife

Anticipated mitigation requirements for the Project's permanent impacts to habitats occupied, or presumed occupied, by special status wildlife species (DT, MGS, and WBO) are outlined in Table 6. Mitigation for permanent impacts to these species is generally provided by acquiring and conserving in-kind habitat of equal or greater value than the habitat impacted.

Table 6
Anticipated Mitigation for Impacts to Habitats for
Special Status Wildlife Species within the Beacon Solar Energy Project Site

		Option 1		Option 2	
Listed Species	**Mitigation Ratio**	**Total Impact[1]**	**Total Mitigation Acreage**	**Total Impact[1]**	**Total Mitigation Acreage**
Desert Tortoise	1:1	5.0	5.0	5.8	5.8
Mohave Ground Squirrel	2:1	5.0	10.0	5.8	11.6
Western Burrowing Owl	6.5 - 19.5:1[2]	3 WBO pairs	19.5 - 58.5	3 WBO pairs	19.5 - 58.5
Total			**29.5 – 68.5**		**31.1 – 70.1**

[1] The temporary impacts are considered permanent in this desert ecosystem.
[2] Per CBOC/CDFG guidelines.

Avoidance and minimization measures for temporary indirect impacts to habitat of special status wildlife species will be achieved through on-site monitoring of construction activities in areas with the potential to support these species.

Mitigation totals may be lower than 70.1 acres, depending upon whether or not habitats suitable for these species overlap one another and which transmission line option is used. Additional discussion of the mitigation required for DT, MGS, and WBO is presented below.

Desert Tortoise

Avoidance, minimization, and mitigation measures for the DT would include the following:

1. Prior to the onset of construction, the entire plant site (east of the railroad tracks) will be enclosed with a permanent tortoise-proof fence to keep tortoises in habitat adjacent to the site from entering the site during construction and operations phases. The fencing type will be one- by two-inch vertical mesh galvanized fence material, extending at least two feet above the ground and buried at least one foot. Where burial is impossible, the mesh will be bent at a right angle toward the outside of the fence and covered with dirt, rocks, or gravel to prevent the tortoise from digging under the fence. Tortoise-proof gates will be established at all site entry points. Any utility corridors and tower locations will be temporarily fenced to prevent tortoise entry during construction. Temporary fencing will follow guidelines for permanent fencing and supporting stakes will be sufficiently spaced to maintain fence integrity. All fence construction will be monitored by qualified biologists (see #3, below) to ensure that no tortoises are harmed. Following installation, the fencing will be inspected monthly and during all major rainfall events. Any damage to the fencing will be repaired immediately.

2. A clearance for any desert tortoises that may be on the site east of the railroad tracks will be conducted in all areas with shrub cover. A minimum of two clearance passes will be completed after tortoise-proof fencing is installed and these will coincide with heightened tortoise activity, from late March through May and during October. This will maximize the probability of finding all tortoises. It is anticipated that no or very few tortoises will be found. Any tortoises found will be translocated to a location outside of the tortoise-proof fencing but within the plant site (e.g., the newly rerouted desert wash) using techniques approved by Agency Representatives. Translocation should only occur when daily ground temperatures do not exceed 42 degrees Centigrade (°C) (i.e., early spring or fall), so that animals can safely find refuge in potentially unfamiliar areas without the added constraints of lethal temperatures. No tortoises will be translocated between mid-April and early October, unless ambient temperatures are favorable. If the schedule of construction requires that clearance surveys continue past the safe time to translocate tortoises (i.e., past early April), then continued searches for tortoises would include temporarily affixing found tortoises with transmitters for ease of refinding them and translocating them during autumn, at a safe time for translocation. Once the site is deemed free of desert tortoises after two

consecutive clearance passes, then heavy equipment will be allowed to enter the sites to perform construction activities.

West of SR-14, tortoises will be monitored during construction activity to avoid direct impacts to individuals, or all tortoises will be sought and fenced out of construction zones. Tortoises may be moved during seasons when daily ambient temperatures exceed lethal levels, but only late in the day when ground temperatures fall below 42°C and air temperatures fall below 32°C. These tortoises will be temporarily monitored to ensure that their behaviors resulting from translocation do not affect their survival.

Following site clearance, a report will be prepared by the Project Authorized Biologist (see #3) to document the clearance surveys, the capture and release locations of all tortoises found, individual tortoise data, and other relevant data. This report will be submitted to Agency Representatives.

3. In the unlikely event that a tortoise is found on the site during Project Operations, the tortoise will be captured, boxed in a clean, escape-proof box, and temporarily maintained in a cool, quiet, safe location until the Authorized Biologist can arrive to remove it from the site, no more than one day. The capture location will be recorded. If ambient temperatures exceed lethal levels on a daily level, the Authorized Biologist will confer with CDFG and USFWS representatives prior to transporting the tortoise outside the tortoise-proof fence.

4. An Authorized Biologist (AB) and Biological Monitor(s) (BM) will be appointed to oversee compliance with the protection measures for the desert tortoise and other species. The AB or BM will be on site during fencing activities. The AB or BM will have the right to halt all activities that are in violation of the tortoise protection measures. Work will proceed only after hazards to the desert tortoise are removed and the species is no longer at risk, or the individual has been moved from harm's way by the AB. The AB and BM will have in their possession a copy of all the compliance measures while work is being conducted on site.

5. The proponent will submit the names and statement of qualifications of all proposed ABs and BMs to USFWS, the Department, and CEC (Agency Representatives) for review and approval at least 30 days prior to initiation of any tortoise handling, clearance, and preactivity surveys. Project activities will not begin until the ABs and BMs are approved by the aforementioned agencies. Only ABs will be allowed to handle and relocate desert tortoises when necessary. Biological monitors will ensure compliance with the protection measures

but will not be allowed to survey for or handle desert tortoises. Workers will notify the AB or BM of all desert tortoise observations.

6. The AB and BM will be responsible for awareness trainings, surveys, compliance monitoring, and reporting.

7. Personnel will utilize established roadways (paved or unpaved) in traveling to and from the survey area and also will utilize existing tracks on-site whenever possible. Cross-country vehicle and equipment use outside designated work areas will be prohibited. To minimize the likelihood for vehicle strikes of DTs, a speed limit of 25 miles per hour will be established for travel within DT habitat.

8. A trash abatement program will be established. Trash and food items will be contained in closed containers and removed daily to reduce the attractiveness to opportunistic predators such as common ravens, coyotes, and feral dogs.

9. Workers will be prohibited from bringing pets and firearms to the site.

10. As much as is feasible, parking and storage will occur within the tortoise exclusion fencing. Anytime a vehicle or construction equipment is parked for longer than two minutes in unfenced desert tortoise habitat, the ground under the vehicle will be inspected for the presence of desert tortoise before the vehicle is moved. If a desert tortoise is observed, it will be left to move on its own. If it does not move within 15 minutes, the AB will remove and relocate the animal to a safe location.

11. All vehicles and equipment will be in proper working condition to ensure that there is no potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The AB and BM will be informed of any hazardous spills within 24 hours. Hazardous spills will be immediately cleaned up and the contaminated soil will be properly disposed of at a licensed facility.

12. Intentional killing or collection of either plant or wildlife species including listed species such as the DT in the survey area and surrounding areas will be prohibited. The AB, BM, and Agency Representatives will be notified of any such occurrences within 24 hours.

13. For emergency response situations, the AB will notify the Agency Representatives within 24 hours. As a part of this response, the Agency Representatives may require additional measures to protect the DT. During any responses related to human health, fire, hazardous

waste, or repairs requiring off-road vehicle and equipment use, the Agency Representatives may also require measures to recover damaged habitat.

14. Water will be applied to the construction right-of-way, dirt roads, trenches, spoil piles, and other areas where ground disturbance has taken place to minimize dust emissions and topsoil erosion. During the DT active season, a BM will patrol these areas to ensure water does not puddle for long periods of time and attract DTs, common ravens, and other wildlife to the site.

15. Upon locating a dead or injured DT, the AB will make initial notification to the Agency Representatives within 24 hours of its finding. The notification must be made by telephone and writing to the nearest USFWS Field Offices. The report will include the date and time of the finding or incident (if known), location of the carcass, a photograph, cause of death (if known), and other pertinent information. Tortoises fatally injured as a result of Project-related activities will be submitted for necropsy as outlined in Salvaging Injured, Recently Dead, Ill, and Dying Wild, Free-Roaming Desert Tortoises (*Gopherus agassizii*) (Berry 2003). Tortoises with fewer major injuries will be transported to a nearby qualified veterinarian for treatment at the expense of the proponent. If an injured animal recovers, the offices of the Agency Representatives will be contacted for final disposition of the animal.

16. On a monthly basis until construction is completed, the AB will prepare a brief report for the Agency Representatives, documenting the effectiveness and practicality of the protection measures that are in place and making recommendations for modifying the measures to enhance species protection, as needed. The report will also provide information on the overall biological resources-related activities conducted, including the worker awareness training, clearance/preactivity surveys, monitoring activities, and any observed DTs including injuries and fatalities.

In addition to the measures discussed above, the Project proponent will compensate for impacts to DT habitat in the area west of the plant site potentially affected during construction activities related to the transmission line. This will be accomplished either by land acquisition acceptable to USFWS, CDFG, and CEC or an assessed financial contribution calculated based on the final construction footprint. Direct permanent and temporary impacts to 5.0 or 5.8 acres of potential DT habitat would be mitigated at a 1:1 ratio (Table 6). A 1:1 ratio is considered to be sufficient because of: (a) the documented reduction in habitat quality for areas adjacent to well-traveled roads; and (b) the minor biological significance of the small and dispersed surface disturbance resulting from construction of the transmission line. Habitat conservation generally consists of

the off-site purchase of in-kind habitat of equal or greater value than that impacted. Funding for the long-term management of the land preserved will also be required. The location of the preserved land and the management program would be negotiated between the resource agencies (including the CEC) and the Project applicant.

In addition to the avoidance and minimization measures outlined above, the Project proponent would implement any measures required by the CEC and CDFG as a condition of Project certification.

Mohave Ground Squirrel

As noted above, impacts to potential MGS habitat would require mitigation. On October 15, 2007, Dr. Leitner conducted a site evaluation of potential MGS habitat in the western portion of the survey area, primarily west of SR-14 where portions of the transmission line would be constructed. He concluded that the habitat in this area is of moderate quality, and a mitigation ratio of 2:1 would be appropriate. The Project therefore proposes to compensate for the potential direct permanent and temporary loss of 5.0 or 5.8 acres of potential MGS habitat (see Table 6) at a ratio of 2:1. Funding for the short term enhancement and long-term management of the compensation land also will be provided on a per acre basis. Because DT, MGS and WBO typically co-occur within the same habitat type, and the rare plants with moderate potential to occur within the survey area also share the same habitat requirements, the Project intends to purchase compensation lands that also would support DT, MGS, WBO and these rare plants, to mitigate impacts to both wildlife species and special status plants (if any).

As with DT, to help avoid and minimize impacts to the species, a BM should be on-site during all construction activities in potential MGS habitat. Addressing potential MGS-related concerns will be part of the biological portion of the construction worker education program mentioned above. Trash and food items should be removed from the plant site daily and disposed of properly to avoid attracting ravens, a common predator of the MGS. Monthly and final compliance reports should be provided to CDFG and other applicable resource agencies documenting the effectiveness of mitigation measures and the level of take associated with The Beacon Solar Energy Project.

Western Burrowing Owl

Avoidance and minimization of impacts to WBO will consist of the following:

1. A preconstruction survey of the permanent and temporary impact areas will be conducted to locate active WBO burrows. The survey will consist of walking parallel transects and noting any fresh WBO sign or presence of WBOs (may be combined with DT preconstruction surveys).

2. No disturbance will occur within 160 feet of occupied burrows during the nonbreeding season (September 1 – January 31) or within 250 feet of occupied burrows during the breeding season (February 1 – August 31), unless a qualified biologist approved by CDFG verifies through noninvasive methods that either the birds have not begun egg-laying and incubation or that juveniles from the occupied burrow are foraging independently and are capable of independent survival. A minimum of 6.5 acres of foraging habitat will be preserved, contiguous with occupied burrow sites to the extent possible, for each pair of breeding owls or single, unpaired resident owl.

3. WBOs within the temporary or permanent impact areas and a 160-foot buffer will be excluded from active burrows during the nonbreeding season (September 1 – January 31) and encouraged to passively relocate to suitable, unoccupied habitat at least 160 feet outside of the exclusion area. Off-site burrows will be supplemented at a 2:1 replacement ratio of enhanced natural, unoccupied burrows or artificial burrows, as per guidelines from the CBOC (1993) and CDFG Memorandum (1995). A minimum of 6.5 acres of foraging habitat for WBO will be preserved for each pair impacted. After burrows are confirmed to no longer be in use (1 week), the burrow will be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe or burlap bag will be inserted into the tunnels during excavation to maintain an escape route for any animals inside the burrow. If WBO activity is detected at a burrow during the breeding season (February 1 – August 31), a 250-foot buffer will be flagged surrounding the occupied burrow and all Project-related activity will remain outside of the flagged area. WBOs will not be moved or excluded from burrows during the breeding season.

4. A BM will be on-site during all construction activities in potential WBO habitat.

5. The WBO will be covered as part of the WEAP element of the CEC-required BRMIMP.

6. Trash and food items will be removed from the plant site daily and disposed of properly to avoid attracting ravens, a potential predator of the WBO.

7. During construction activities, monthly and final compliance reports will be provided to CDFG and other applicable resource agencies documenting the effectiveness of mitigation measures and the level of take associated with The Beacon Solar Energy Project.

Biological issues also will be covered in the ongoing compliance reporting required by the CEC.

The CBOC's mitigation guidelines used by CDFG recommend that mitigation for impacts to burrowing owls should be based on the number of pairs directly impacted. Mitigation ratios are based on whether suitable acquired habitat is occupied by the species or is contiguous to the impact area. The CBOC and CDFG mitigation guidelines recommend a ratio of 6.5 to 19.5 acres per pair of burrowing owls (or single individual) impacted, depending on whether the replacement habitat is occupied and/or contiguous with the occupied area to be impacted, and also Project-specific negotiations with CDFG. Three burrowing owls have been documented to occur within the plant site in different areas, although one individual may have been depredated prior to the final survey. Assuming that each detected WBO is part of a mated pair and therefore the plant site supports three burrowing owl pairs, the anticipated mitigation is anticipated to be 19.5 to 58.5 acres of suitable habitat at a location approved by CDFG. Funding for the long-term management of the land preserved would also be provided (on a per–acre-of-impact basis).

Other Special Status Wildlife Species

If construction is scheduled to occur during nesting season, a nesting bird survey (in addition to the WBO survey) will be conducted within permanent and temporary impact areas. If nesting birds, including but not limited to special status species, are detected in these areas, the nest will be flagged and no construction activity will take place near the nest until nesting is complete (nestlings have fledged or nest has failed) or the CDFG, USFWS and the CEC agree that construction can proceed with the incorporation of agreed-to monitoring measures.

If American badger dens are discovered during DT or WBO preconstruction surveys, a one-way trap door will be installed to passively exclude the badger from the den. American badgers are known to use several dens in a wide area, frequently moving between dens. Therefore, all potential badger dens will be fitted with the one-way trap doors to encourage badgers to move off-site. After 48 hours post-installation, the den will be excavated and collapsed, following the same protocol as with WBO burrows. These dens will be collapsed prior to construction of the DT fence, to allow badgers the opportunity to move off-site without impediment. Alternatively, a qualified biologist will trap and remove badgers from occupied dens and translocate them off-site into appropriate habitat.

The water discharged to the evaporation ponds will be routinely tested, throughout the active life of the facility. If any constituent of the pond water, in particular selenium, reach levels that may

adversely effect migratory bird species, then the Project would coordinate with the pertinent resource agencies to develop additional avoidance measures, such that no significant effect would occur to migratory bird species.

CHAPTER 7
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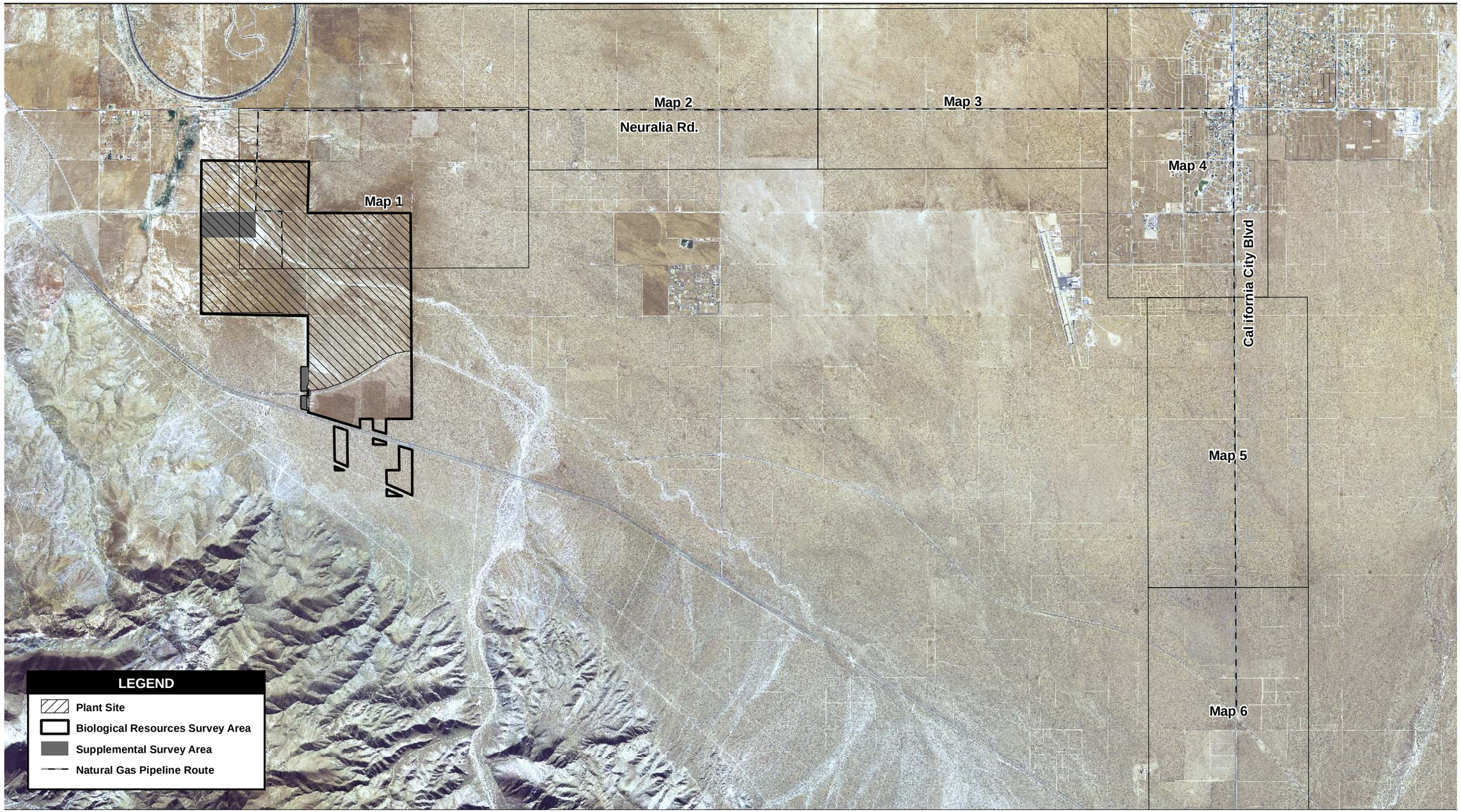
ATTACHMENT A

NATURAL GAS PIPELINE ROUTE AT 1:12,000-SCALE RESOLUTION



Source: NAIP 2005; Worley Parsons 2007

5,000 2,500 0 5,000 Feet

Scale: 1:60,000; 1 inch = 5,000 feet

Attachment A
Natural Gas Pipeline

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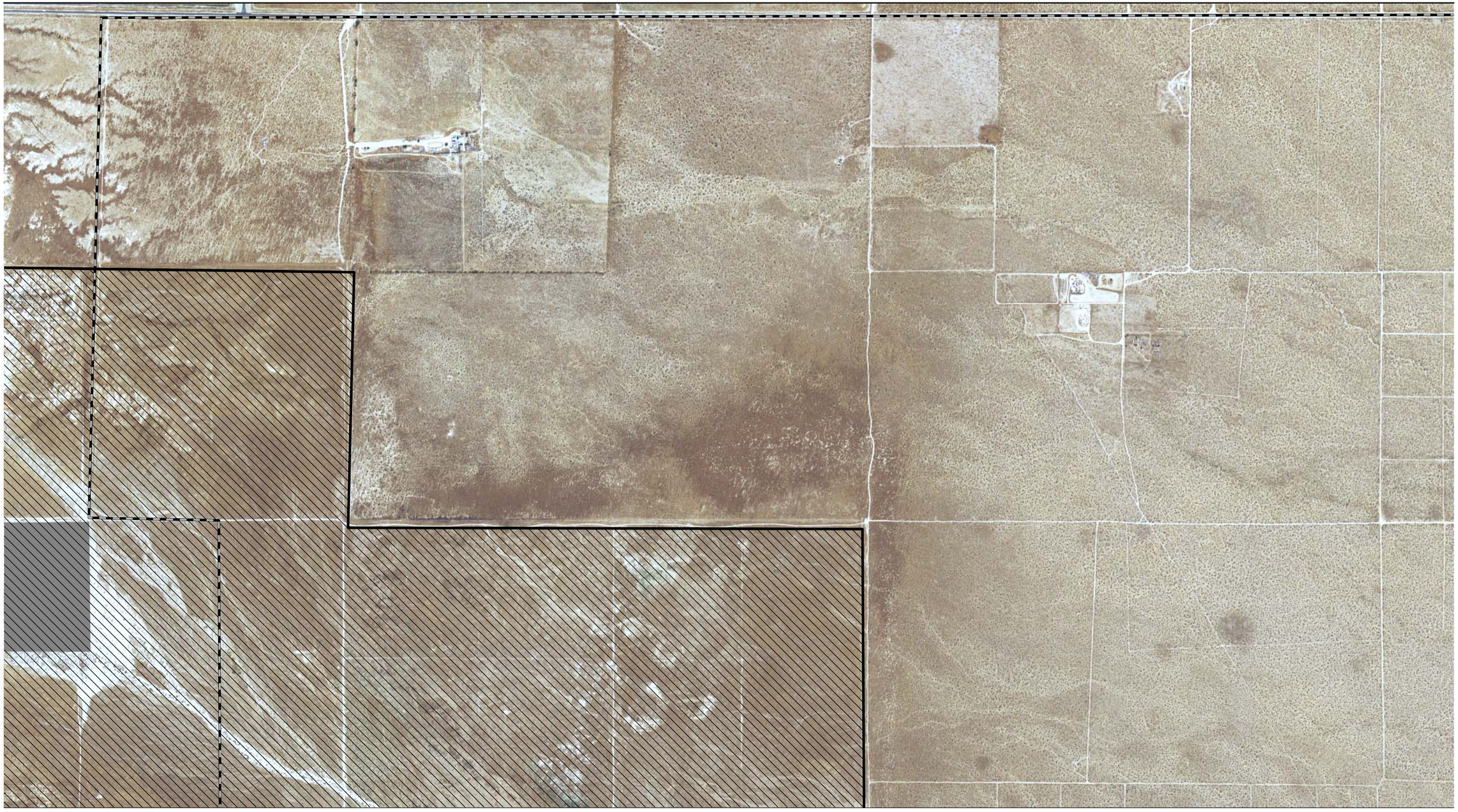

Source: NAIP 2005; Worley Parsons 2007

1,000 500 0 1,000 Feet

Scale: 1:12,000; 1 inch = 1,000 feet

Attachment A
Natural Gas Pipeline

Beacon Solar Energy Project Biological Technical Report

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Map 1

Source: NAIP 2005; Worley Parsons 2007

1,000 500 0 1,000 Feet

Scale: 1:12,000; 1 inch = 1,000 feet

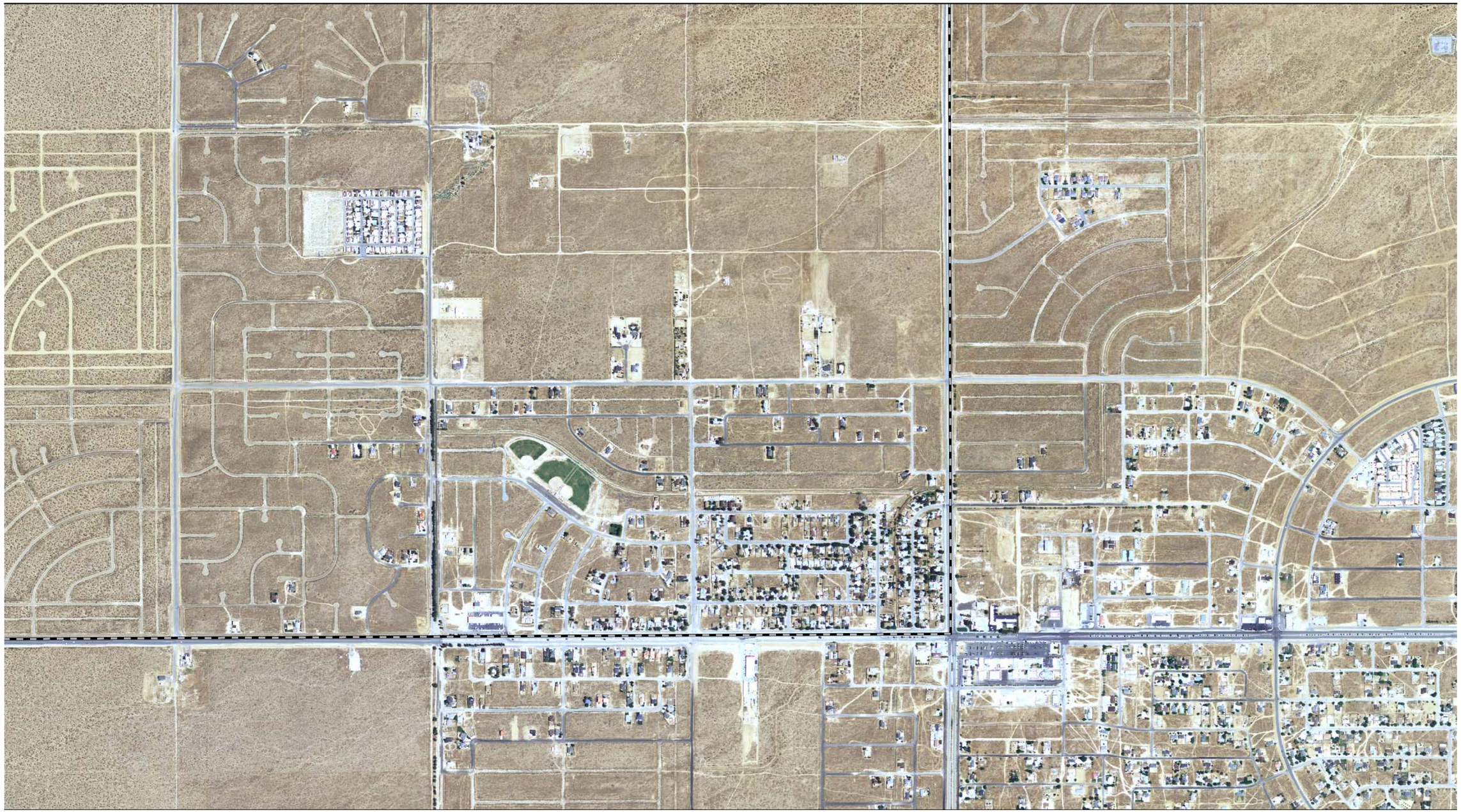
Attachment A
Natural Gas Pipeline

Source: NAIP 2005; Worley Parsons 2007

1,000 500 0 1,000 Feet

Scale: 1:12,000; 1 inch = 1,000 feet

Attachment A
Natural Gas Pipeline



Source: NAIP 2005; Worley Parsons 2007

1,000 500 0 1,000 Feet

Scale: 1:12,000; 1 inch = 1,000 feet

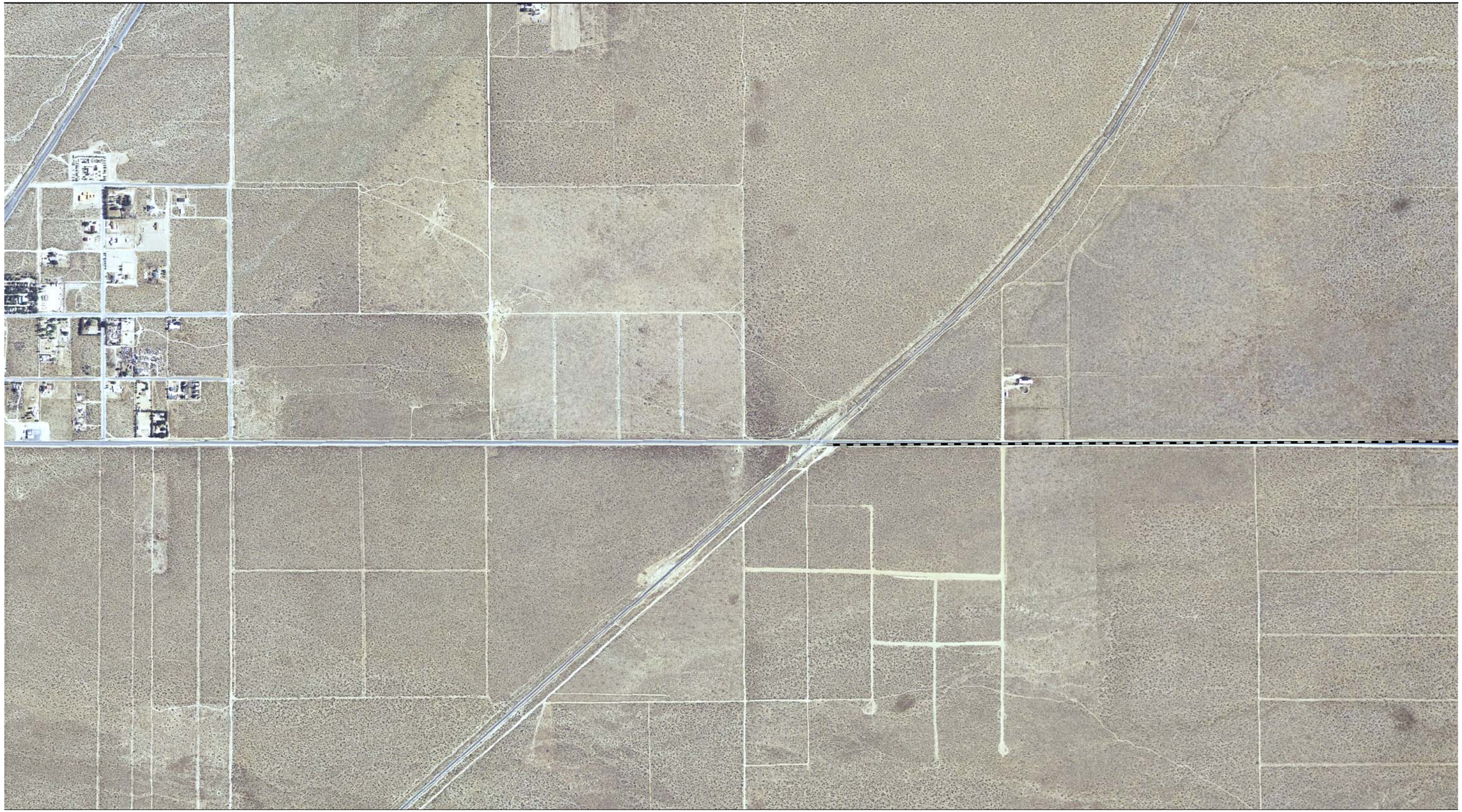
Attachment A
Natural Gas Pipeline

Source: NAIP 2005; Worley Parsons 2007

1,000 500 0 1,000 Feet

Scale: 1:12,000; 1 inch = 1,000 feet

Attachment A
Natural Gas Pipeline



Source: NAIP 2005; Worley Parsons 2007

1,000 500 0 1,000 Feet

Scale: 1:12,000; 1 inch = 1,000 feet

Attachment A
Natural Gas Pipeline

ATTACHMENT B

LIST OF FIELD BIOLOGISTS AND QUALIFICATIONS

ATTACHMENT B
LIST OF FIELD BIOLOGISTS AND QUALIFICATIONS

Name	Affiliation	Surveys Performed	Qualifications
Barbra Calantas	EDAW, Inc.	Western Burrowing Owl	Five years of experience as a wildlife biologist in southern California, and regularly conducts habitat assessments and focused surveys for various sensitive plant and wildlife species, including raptors, burrowing owl, and other sensitive birds.
Josh Corona-Bennett	EDAW, Inc.	Rare Plants Vegetation Mapping	Ten years of experience as a restoration ecologist that includes performing habitat restoration, rare plant surveys, vegetation mapping, and habitat assessments throughout the southern California region.
Andrea CurryLow	EDAW, Inc.	American Badger Desert Tortoise Western Burrowing Owl	Three years of professional consulting and survey experience including conducting biological reconnaissance surveys, vegetation mapping, and focused surveys for sensitive wildlife species, especially those in arid desert ecosystems, such as the burrowing owl and desert tortoise. Attended desert tortoise surveying, monitoring, and handling techniques workshop. Has over 600 hours of desert tortoise survey experience and is approved to handle desert tortoise.
Jeanette Duffels	EDAW, Inc.	Rare Plants Vegetation Mapping	Five years of professional consulting and survey experience including biological reconnaissance surveys, vegetation mapping, and focused surveys for sensitive plant species.
Katie Hall	EDAW, Inc.	American Badger Desert Tortoise Rare Plants Vegetation Mapping Western Burrowing Owl	Over 6 years of multidisciplinary experience; serving as environmental scientist, ecologist, on various projects related to ecological assessment, conducting biological reconnaissance surveys, vegetation mapping, and focused desert tortoise and avian protocol surveys. Has 230 hours of supervised experience surveying for desert tortoise.
Bruce Hanson	EDAW, Inc.	Rare Plants Vegetation Mapping	Over 10 years of experience of professional consulting and survey experience including vernal pools surveys, rare plant surveys, and vegetation mapping in California and Mexico.

Name	Affiliation	Surveys Performed	Qualifications
Kyle Harper	EDAW, Inc.	Western Burrowing Owl	Supervised by B. Calantas. One year of experience conducting vegetation mapping, global positioning system (GPS) data collection, focused rare plant surveys, and habitat assessments.
Suellen Lynn	EDAW, Inc.	Western Burrowing Owl	Sixteen years of professional experience as a biologist, with a background in evaluating wildlife-habitat relationships and regularly performing protocol surveys for sensitive avian species, including the burrowing owl.
Scott McMillan	EDAW, Inc.	Rare Plants Vegetation Mapping	Over 15 years of professional experience as a botanist in California, and over 10 years of experience as a restoration ecologist, conducting rare plant surveys, vegetation mapping, habitat assessments, habitat restoration and creation, and burrowing owl translocation.
Jesper Pietsch	EDAW, Inc.	Rare Plants Vegetation Mapping	Five years of experience as a restoration ecologist in southern California, performing rare plant surveys, vegetation mapping, and habitat assessment and restoration.
Linnea Spears-Lebrun	EDAW, Inc.	Rare Plants Vegetation Mapping	Two years of professional experience as a restoration ecologist, with experience in performing habitat restoration, rare plant surveys, and vegetation mapping throughout the southern California region.
Lindsey Spenceley	Sundance Biology	American Badger Desert Tortoise	Over 5 years of professional experience as a biologist, specializing in desert tortoise and large carnivore management. Has over 1,000 hours of desert tortoise survey experience and is approved to handle desert tortoise.
Peggy Wood	Peggy Wood, Inc.	American Badger Desert Tortoise	Over 17 years of professional experience as a biologist, specializing in desert tortoise and large carnivore management. Has over 1,000 hours of desert tortoise survey experience, supervised desert tortoise survey crews, and is approved to handle desert tortoise.

ATTACHMENT C

REPRESENTATIVE PHOTOS OF VEGETATION COMMUNITIES AT THE BEACON SOLAR ENERGY PROJECT SITE

ATTACHMENT C
REPRESENTATIVE PHOTOS OF VEGETATION COMMUNITIES AT PROJECT BEACON

Mojave Desert Wash Scrub

Dry Desert Wash, photo courtesy of Dr. Alice Karl

Scale broom (*Lepidospartum squamatum*) in Mojave Desert Wash Scrub

Swale, photo courtesy of Dr. Alice Karl

Fallow Agricultural – Disturbed Atriplex Scrub

Fallow Agricultural – Disturbed Atriplex Scrub, 22-25% Cover, photo courtesy of Dr. Alice Karl

Fallow Agricultural – Ruderal

Fallow Agricultural – Ruderal, photo courtesy of Dr. Alice Karl

Mojave Creosote Bush Scrub

Mojave Creosote Bush Scrub, photo courtesy of Dr. Alice Karl

ATTACHMENT D

DR. ALICE KARL'S *KEY TO SIGN CLASSES*

KEY TO SIGN CLASSES

BURROWS

1 – DEFINITELY TORTOISE – FRESH (TRACKS, TORTOISE INSIDE, FRESHLY DISTURBED SOIL ON MOUND/RUNWAY)
2 – DEFINITELY TORTOISE – USED THIS SEASON (CLEARED OF ANNUALS, BUT NO FRESHLY DISTURBED SOIL)
3 – DEFINITELY TORTOISE – NOT USED THIS SEASON (PROBABLY HAS ANNUALS GROWING IN RUNWAY)
4 – POSSIBLY TORTOISE – IN GOOD CONDITION BUT UNSURE OF SPECIES USING BURROW
5 – DEFINITELY TORTOISE – DETERIORATED SUCH THAT IT WOULD REQUIRE SUBSTANTIAL REMODELING TO BE USABLE
6 – POSSIBLY TORTOISE – DETERIORATED

SCAT

TY1 – WET OR FRESH DARK, ODORIFEROUS
TY2 – DRIED, POSSIBLE GLAZE ON PART; UNEXPOSED SURFACES DARK BROWN; SLIGHT ODOR
TY3 – DRIED, NO GLAZE; AT LEAST PARTIALLY FADED ON EXTERIOR; VERY SLIGHT ODOR
NTY3 – DRIED, NO GLAZE; AT LEAST PARTIALLY FADED ON EXTERIOR; NO ODOR (DISTINGUISHES FROM TY3)
NTY4 – DRIED, LOOSENING, PALE OR BLEACHED

CARCASSES – GENERAL INDICATORS FOR TIME SINCE DEATH

<1 YR – UNEXPOSED SCUTES NORMAL COLOR AND SHEEN, ADHERE TIGHTLY. EXPOSED SCUTES PALING AND MAY BE LIFTING OR OFF. UNEXPOSED BONE WAXY AND SOLID.
1–2 YRS – UNEXPOSED SCUTES NORMAL COLOR WITH SLIGHT SHEEN, MOSTLY TIGHTLY ATTACHED. EXPOSED SCUTES SLIGHTLY PALE WITH NO SHEEN AND NO TO SLIGHT GROWTH RING PEELING. NO ODOR. UNEXPOSED BONE SILKY.
2–3 YRS – UNEXPOSED SCUTES PALE AND WITHOUT SHEEN BUT NO GROWTH RING PEELING. EXPOSED SCUTES PALE WITH SLIGHT PEELING, SCUTES LOOSE, OFF AND/OR TIGHT. BONE SUTURES GENERALLY TIGHT.
4 YRS – UNEXPOSED SCUTES NORMAL COLOR TO SLIGHTLY PALE, NO SHEEN, NO PEELING. EXPOSED SCUTES LOOSE, PALE, DULL, WITH MODERATE PEELING. SUTURES SEPARATING AND BONE SURFACE IS FISSURED, EDGES ARE ROUGHENED (FISSURED UNDER HAND LENS) AND CHIP FAIRLY EASILY.
>>4 YRS – DISARTICULATED AND DISARTICULATING. BONE EDGES CHIP AND CRUMBLE EASILY. SCUTES ARE PEELING AND CURLED.

ATTACHMENT E

MOJAVE DESERT TORTOISE AND MOHAVE GROUND SQUIRREL HABITAT ASSESSMENT REPORTS

Alice E. Karl, Ph.D.
P.O. Box 74006
Davis, CA 95617

January 3, 2008

Mr. Arrie Bachrach
Senior Program Manager
ENSR
1220 Avenida Acaso
Camarillo, CA 93012

Re: Summary of August 10, 2007 site visit for FPLE Beacon Solar Energy Project

Dear Arrie,

On August 10, Manjunath Venkat (ENSR), Lyndon Quon (EDAW), Phil Leitner and I visited the FPLE Beacon Solar Energy Project (BSEP or Project) site in Fremont Valley to look at the habitat and determine whether it would be suitable for desert tortoises (my task) and Mohave ground squirrels (Phil's task). We drove around the site (all east of Highway 14, as we know that tortoises reside in the small Project area west of Highway 14) and walked through the habitat at several points. We described and photographed the habitat, partially mapped it, and also examined the habitat surrounding the site.

Below is a brief description of each area. Please refer to the vegetation map from EDAW labeled "Habitat Types in the Survey Area" (attached). For reference, I have labeled the areas on the map.

Area A - The area in the southwest, identified as Fallow Agricultural-Ruderal, is largely barren of shrubs. Split-grass (*Schismus arabicus*), plus annuals that are indicators of disturbance (*Salsola tragus, Ambrosia acanthicarpa*) are common, but split grass is the only available forage for tortoises. The soil is clay and relatively hard, although there is a shallow layer (about three inches) of depositional loamy sand over the top.

Area B - Within the barren area along the northern edge, there is a small patch of nearly monospecific allscale (*Atriplex polycarpa*) that is continuous to native habitat to the north. (This is identified as Fallow Agricultural-Disturbed Atriplex Scrub on the map.) The shrub community, while almost entirely one species, is fairly established, and about 22-25% cover. The soil is very fine and the area is replete with numerous tiny basins that obviously hold water temporarily. There is a shallow layer of depositional loamy sand over the clay lens.

Area C – This native habitat adjacent to Area B, north of the site boundary, is fair tortoise habitat. The shrub diversity is low, comprising mostly creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*), with occasional

goldenhead (*Acamptopappus sphaerocephalus*). Shrub cover is about 18%. The soil is generally fine and there are numerous tiny basins.

Area D - This area is similar to Area B, but appears to hold less water. The annual community is also more established and filaree (*Erodium cicutarium*) covers approximately 65% of the surface. The substrate is composed of about 20 % fine gravel and the soil is slightly hard. As in Area B, the site has been established almost exclusively by allscale, but there are large patches throughout the area that are devoid of vegetation. Even outside the barren patches, the allscale is represented by scattered small clumps of shrubs (a few yards in diameter) or individuals.

In the northern portion of this area and to the north, the basins become more common and the vegetation more sparse. The only tortoises here and to the north would likely be transients.

Area E - This area is nearly identical to Area D, but the barren patches are small, rather than large.

Swale – This swale, where the water has been artificially diverted from the wash onsite, is mostly vegetated by Russian thistle (*Salsola tragus*; an exotic annual indicative of disturbance and common in ruderal areas in this region) with some allscale and cheesebush (*Ambrosia salsola*). There are also a few scattered creosote bush and occasional other shrubs. Both the swale and connecting wash are typically dry, probably only holding water during high-intensity storms or possibly during historic agricultural practices. Each is bounded for most of both sides by nearly barren habitat, although there is some shrub cover northwest of the wash (Area D).

Area F - This entire area is essentially barren and has been bladed. The maximum cover is in the northeastern corner of Section 9, where there is about 1-2% shrub cover.

Area G - This entire area is essentially identical to Area F.

Native Habitat East of Section 9 - This area is creosote bush scrub dominated by creosote bush and allscale, with sudominant and common winterfat (*Krascheninnikovia lanata*). Goldenhead is fairly common towards the south. Shrub cover is about 18%. The topography is very gently undulating and the soil, while loose-sandy, is stabilized. The substrate has no coarse particles. Toward the southern portion of this section, there is more loam in the soil and fine gravel in the substrate.

We ran out of time and were unable to look at the habitat along the southern border. However, I looked at this on a subsequent site visit on November 13 and found it to be essentially barren.

Desert Tortoise Habitat Analysis

Below is a brief summary of the quality of the habitat for tortoises, followed by a detailed discussion:

Area A - This is not tortoise habitat.
Area B – It is poor tortoise habitat. There's a low possibility that a tortoise could be here because of connection to native habitat to the north.
Area C – (Section 5, north of site) This is fair tortoise habitat. Tortoises are probably here in very low numbers.
Area D – (Section 4) This is very poor tortoise habitat. There's a low possibility that one or two tortoises could be here because it is a sizeable patch and continuously connected to native habitat to the west. There is a decreasing possibility of tortoises in the northern part of the site in Section 4 as the habitat becomes increasingly sparse.

Note: The old chicken-wire fence along the northern border is mostly intact and would serve as a barrier to tortoises.

Area E - Same as Area D.
Swale - This is not tortoise habitat.
Area F - This is not tortoise habitat.
Area G - This is not tortoise habitat. The native habitat to the southeast is medium-quality tortoise habitat.

So, the only places where a tortoise might be found are Areas B, D and E or the wash. I don't think that there are any tortoises there, but it's possible because there's shrub cover that has been there quite awhile and because the areas are partially connected to tortoise habitat outside the site. However, I don't believe that these should be considered tortoise habitat or have any conservation value for desert tortoises, even if one or a few tortoises are found there. My rationale is based on the quality of this regrowth habitat, the broad area of adjacent non-habitat, the low quality of the adjacent intact habitat, the type and history of the disturbance, and the length of time that this block of land has been out of use by the local tortoise population. To explain:

In areas where allscale has re-invaded the site, it is unlike the native community surrounding the survey area. The surrounding habitat is native Creosote Bush Scrub whereas the regrowth area is nearly a monotypic allscale stand. It is patchy, with broad, open areas, has poor soil friability (i.e., fine, slightly hard soils) and shows evidence of periodic inundation by water. So, even though tortoises are known to occupy native saltbush scrub communities in relatively low densities, those occupied native scrub communities are far different in vegetation

structure and composition, soil, and hydrology than the invaded area on the Project site.

While there is a possibility that a DT might be observed in the allscale shrub patches on the site or in the wash that extends through the eastern portion of the survey area (see below), this would largely be due to the adjoining native habitat outside of the Project boundary and is likely to be temporary use because of the poor quality. It should also be recognized that even the native habitat north of the site is only poor to fair tortoise habitat, so tortoise densities there are expected to be low to very low.

The wash through the eastern-central portion of the site has poor shrub diversity and cover and is largely bordered by barren land. The northern terminus ("swale") is dominated by stands of exotic Russian thistle. Poor habitat in the wash limits the wash's usefulness as occupiable habitat or a movement corridor. Furthermore, while there is good tortoise habitat south of the Project, there is little habitat that such a "corridor" could connect to this. There is no habitat north or east of the wash or for much of the area west of the wash; these areas are entirely denuded of vegetation by long-term agriculture. The only shrub-populated area is the area northwest of the wash (see above).

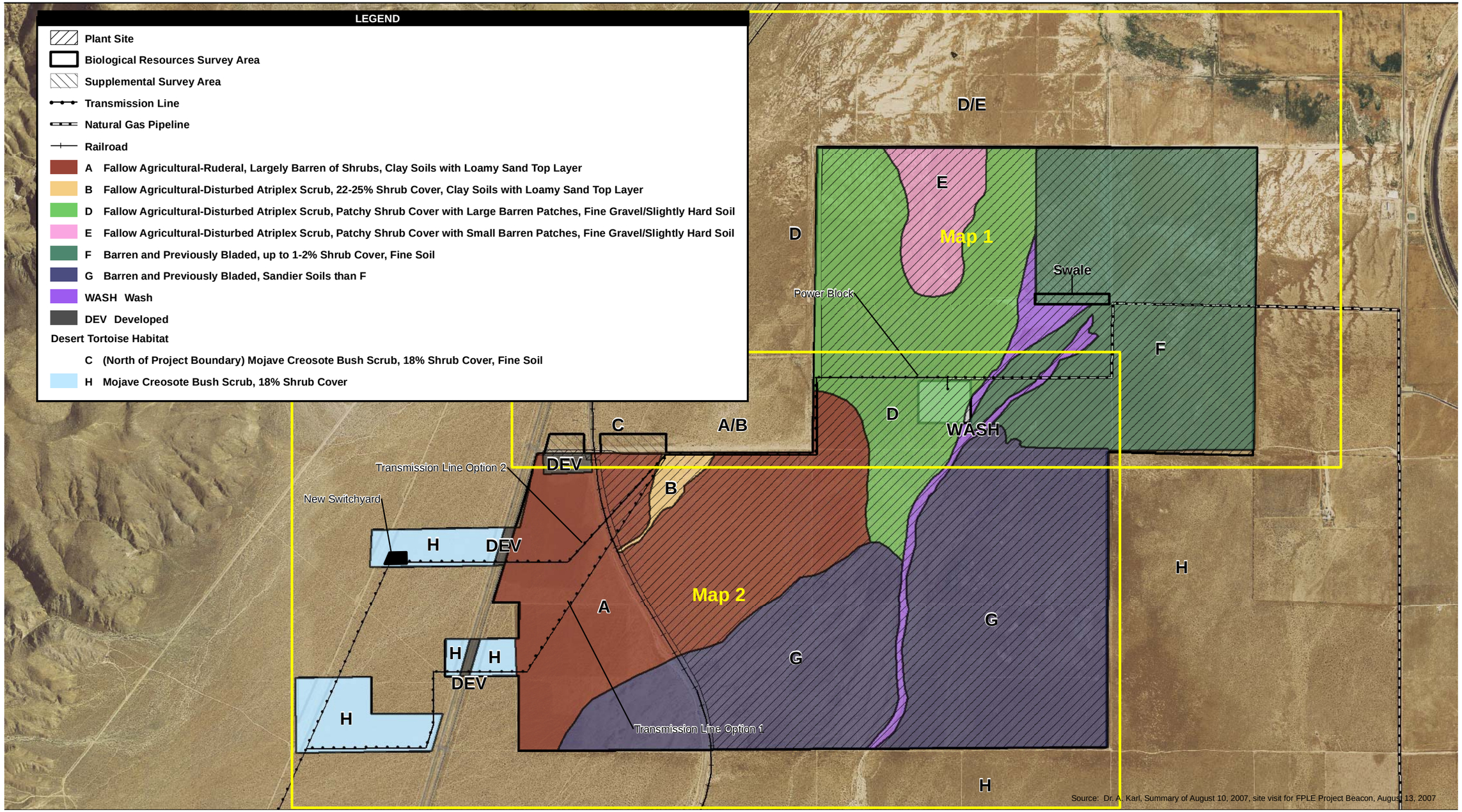
Not only does the site and some of the adjacent area to the east and northwest comprise a broad area of contiguous non-habitat, but this area also has been excluded from tortoise use for decades, due to farming. So, the area has had no value for population persistence or recovery for many years. Even the allscale-regrowth in the north is still moderately well excluded from tortoise use by the chicken-wire perimeter fence (originally erected to keep rabbits out of the alfalfa) that is intact for long segments. This fence would effectively block much of the movement of tortoises onto the site.

A clearance would be appropriate, after the entire site is fenced in tortoise-proof fencing. (This can be done at a fairly reasonable cost, using four-strand wire fencing and metal T-stakes, with tortoise fabric hung from the bottom 2-3 feet and buried.) I suspect that we won't find tortoises, but we may find a couple.

Respectfully,

Alice Karl

Cc: Kenny Stein
Lyndon Quon
Kim McCormick
Sara Head
Manjunath Venkat



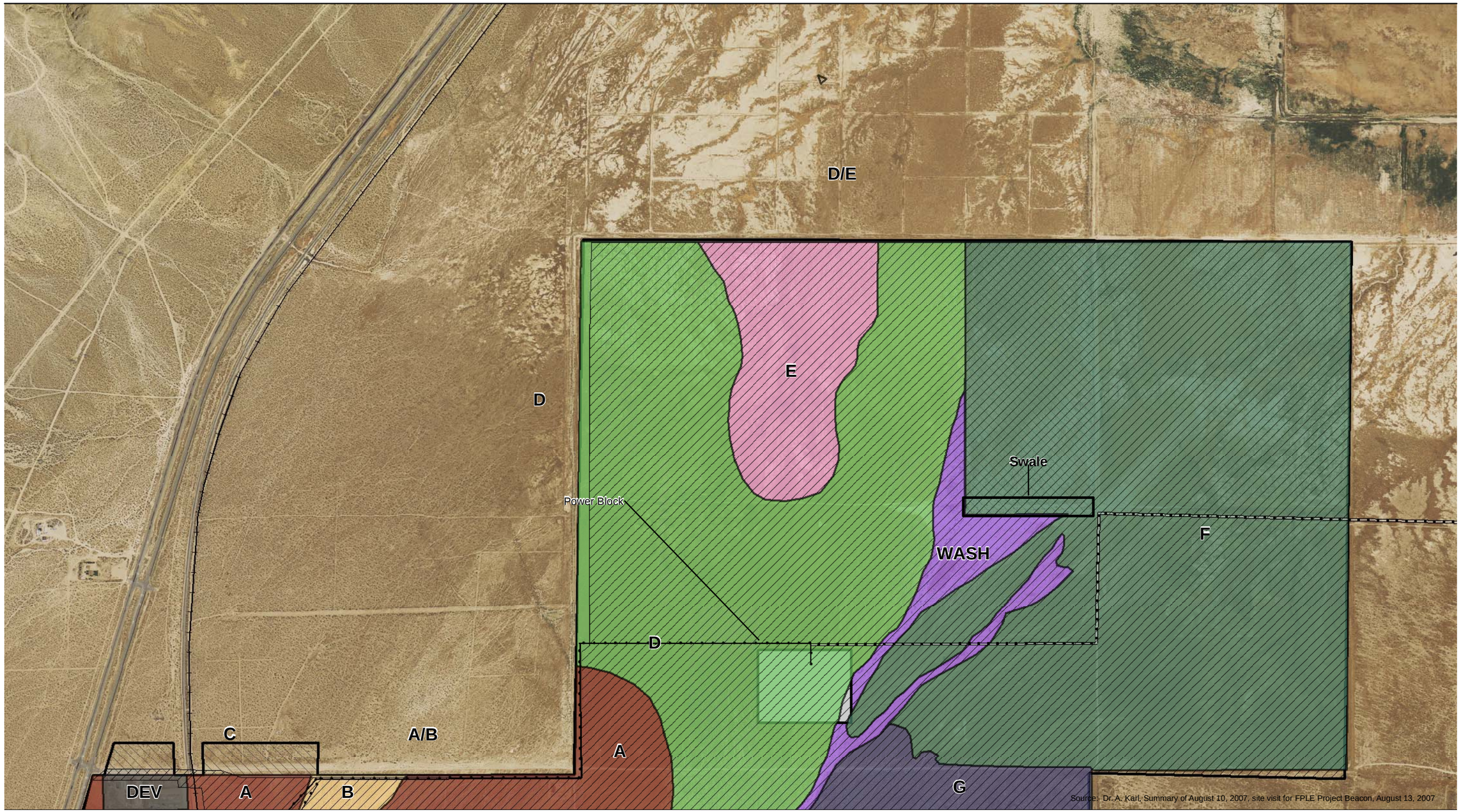
Source: NAIP 2005; EDAW 2007; WorleyParsons 2007

1,750 875 0 1,750 Feet

Scale: 1:21,000; 1 inch = 1,750 feet

Figure 7
Habitat Types in the Survey Area

Path: P:\2008\08080001 FPLE Proj Beacon Solar\5GIS\MXD\Bio Technical Report\Attachments\Figure 1 Habitat Types_Overview.mxd, 03/06/08, KochertE

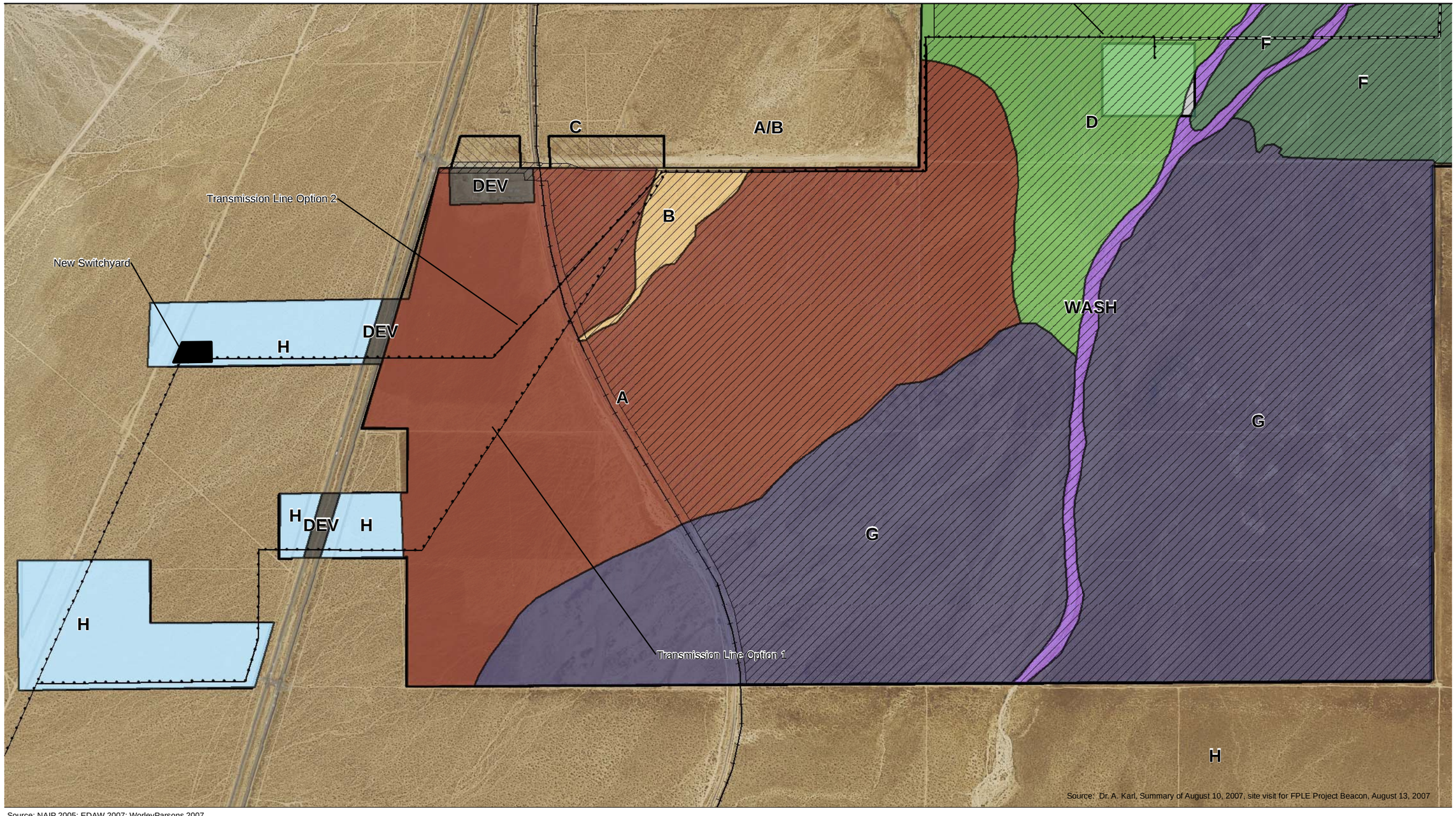


Source: NAIP 2005; EDAW 2007; WorleyParsons 2007

1,000 500 0 1,000 Feet

Scale: 1:12,000; 1 inch = 1,000 feet

Figure 1
Habitat Types in the Survey Area



Source: NAIP 2005; EDAW 2007; WorleyParsons 2007

1,000 500 0 1,000 Feet

Scale: 1:12,000; 1 inch = 1,000 feet

Figure 1
Habitat Types in the Survey Area

MOHAVE GROUND SQUIRREL HABITAT ASSESSMENT
BEACON SOLAR ENERGY PROJECT
KERN COUNTY, CALIFORNIA

Philip Leitner
2 Parkway Court
Orinda, CA 94563
(925) 253-8400
pleitner@pacbell.net

December 21, 2007

Beacon Solar LLC proposes to construct and operate the Beacon Solar Energy Project on private lands in the Fremont Valley north of California City, Kern County, California. This report provides an assessment of the suitability of habitat on the project site for the state-listed Mohave ground squirrel (*Spermophilus mohavensis*). It also discusses habitat suitability of the project site in a regional context and evaluates the potential for impacts to the species.

METHODOLOGY

The conclusions in this report are based upon two field visits to the project site and surrounding habitat, evaluation of all relevant published and unpublished data including the California Natural Diversity Database, and 30 years of personal research on the ecology and habitat requirements of the Mohave ground squirrel.

On August 10, 2007, I made my first visit to the proposed project site in order to conduct a field assessment of habitat conditions. I surveyed the entire site east of State Route 14 by driving dirt access roads and walking through selected areas. During the site visit, I focused on the species composition and physical structure of the vegetation, soil conditions, and evidence of rodent activity. I was also able to observe the habitat conditions of areas adjoining the project site to the north, east, and south.

During my second field visit on October 15, 2007, I was able to observe habitat conditions to the west of State Route 14. I drove all dirt access roads throughout the area between the highway and the transmission corridor. Again, I focused on the vegetation and soils, noting habitat features that are of significance for the Mohave ground squirrel.

I consulted the California Department of Fish and Game (CDFG) California Natural Diversity Database (CNDDB) to determine historic occurrences of the Mohave ground squirrel within ~16 kilometers (10 miles) of the proposed site (CDFG 2007). In addition, I utilized other records of Mohave ground squirrel occurrence that I have collected for a comprehensive database covering the period 1998-2007. I also reviewed maps prepared for the U.S. Bureau of Land Management (BLM) West Mojave Plan that indicate the

locations of lands designated for the Mohave Ground Squirrel Conservation Area (U.S. Bureau of Land Management 2005).

EXISTING HABITAT

Regional Context

All Mohave ground squirrel detections in the region of the proposed project site are shown on Figure 1. The CNDDB contains nine records of Mohave ground squirrel occurrence within 16 km (10 mi) of the project site. Three of them are located in Jawbone Canyon, from a point just west of State Route 14 to Blue Point (Occurrences # 86, 87, and 282). A fourth occurrence is near the southern edge of Red Rock Canyon State Park on the west side of State Route 14 (Occurrence #186). Mohave ground squirrels were detected recently on Cache Creek near the western boundary of the Desert Tortoise Natural Area (Occurrences #321 and 322). Three occurrences are farther east, but within the Desert Tortoise Natural Area (Occurrences #75, 77, and 185). There are ten other records within 20 km (12.4 mi) that have not been entered into the CNDDB (Fig. 1). All of these additional detections are associated with the Desert Tortoise Natural Area.

All public lands to the west of State Route 14 in the vicinity of the project site are included in the Mohave Ground Squirrel Conservation Area as designated in the West Mojave Plan (U.S. Bureau of Land Management 2005). However, the protections associated with the Mohave Ground Squirrel Conservation Area apply only to public lands managed by the U.S. Bureau of Land Management.

There is an extensive area of Mojave Creosote Bush Scrub to the east and south of the project site. It appears to provide suitable habitat for the Mohave ground squirrel, although there are no occurrence records and no evidence of any trapping attempts. To the north and northeast of the project site is a wide strip of fallow agricultural land that does not provide Mohave ground squirrel habitat. North of the project site and east of State Route 14 is a small patch of Mojave Creosote Bush Scrub. Vegetative cover here is sparse and there is very little plant diversity. At best, this area is marginal habitat for the Mohave ground squirrel. To the west of State Route 14 is a wide strip of Mojave Creosote Bush Scrub on the alluvial fans reaching down from the mountains. This area is characterized by vegetation and soil conditions that are suitable for Mohave ground squirrels.

Proposed Project Site

Based upon my field assessments, only a small portion of the project site can be considered as suitable Mohave ground squirrel habitat. The only vegetation community on the property capable of supporting Mohave ground squirrels is the ~116 acres of Mojave Creosote Bush Scrub in Section 7 at the western edge of the property. This area is located on a large alluvial fan deposited by outflows from Pine Tree Canyon. The dominant shrub species are creosote bush (*Larrea tridentata*) and white bursage

(*Ambrosia dumosa*). Because of disturbance from periodic surface water flows, desert senna (*Senna armata*) and cheesebush (*Hymenoclea salsola*) are also abundant. I did not observe any winterfat (*Krascheninnikovia lanata*) or spiny hopsage (*Grayia spinosa*), two shrubs that provide important food resources for Mohave ground squirrels (Leitner and Leitner 1998). This relatively undisturbed habitat has moderately diverse vegetation that could provide adequate forage and cover for Mohave ground squirrels. The habitat on this portion of the project site appears suitable for the species, but is not of high quality.

The remainder of the project site to the east of State Route 14 is unsuitable as habitat for Mohave ground squirrels. The natural vegetation on this portion of the property was completely removed some years ago, when the land was converted to irrigated agriculture. Most of the property is classified as Fallow Agricultural, which is barren and does not support any vegetative cover. Elsewhere on the project site, there are three separate shrub patches made up almost entirely of allscale (*Atriplex polycarpa*). These stands of allscale are mapped as Disturbed Atriplex Scrub and cover a total of ~539 acres. This is not a natural vegetation community, but is essentially an allscale monoculture that has become established since agricultural operations were abandoned. Within these patches, there is relatively low density and cover of allscale. The herbaceous layer is sparse and consists almost entirely of a few non-native species, including filaree (*Erodium cicutarum*). Mohave ground squirrels do occasionally consume *Atriplex* foliage and filaree seeds, but these plants do not provide the full range of food resources necessary for the species (Leitner and Leitner 1998).

An intermittent stream course runs through the eastern part of the project site, creating a total of ~57 acres of Mojave Desert Wash Scrub habitat. This habitat is not suitable for occupancy by Mohave ground squirrels, since the shrub vegetation is sparse, plant diversity is low, and there is little cover or forage appropriate for the species. In general, this wash habitat appears disturbed, with shrubs widely separated and damaged and extensive bare ground.

That portion of the project site to the east of State Route 14 has no value as a movement corridor for Mohave ground squirrels. Although dispersing juveniles might attempt to enter from adjoining creosote bush habitat, they would not be able to cross the wide bands of barren fallow agricultural land. Studies in the Coso area of Inyo County have shown that a small playa acted as a complete barrier to the dispersal movements of radiocollared juveniles (Harris and Leitner 2005).

CONCLUSIONS

The development of a transmission line, associated maintenance road, and substation facility in Mojave Creosote Bush Scrub habitat west of State Route 14 could potentially result in direct impact to <5 acres of suitable Mohave ground squirrel habitat. However, the abandoned agricultural lands east of State Route 14 do not provide suitable habitat for this species. The only shrub vegetation in this portion of the project site consists of several patches of allscale and a narrow strip of scattered shrubs along an intermittent

watercourse. This area does not provide the cover and diverse food resources that are necessary to support a Mohave ground squirrel population (Leitner and Leitner 1998). Furthermore, the lack of cover precludes use of the property as a dispersal route. I have never found Mohave ground squirrels to occur in or to use an area with these habitat characteristics.

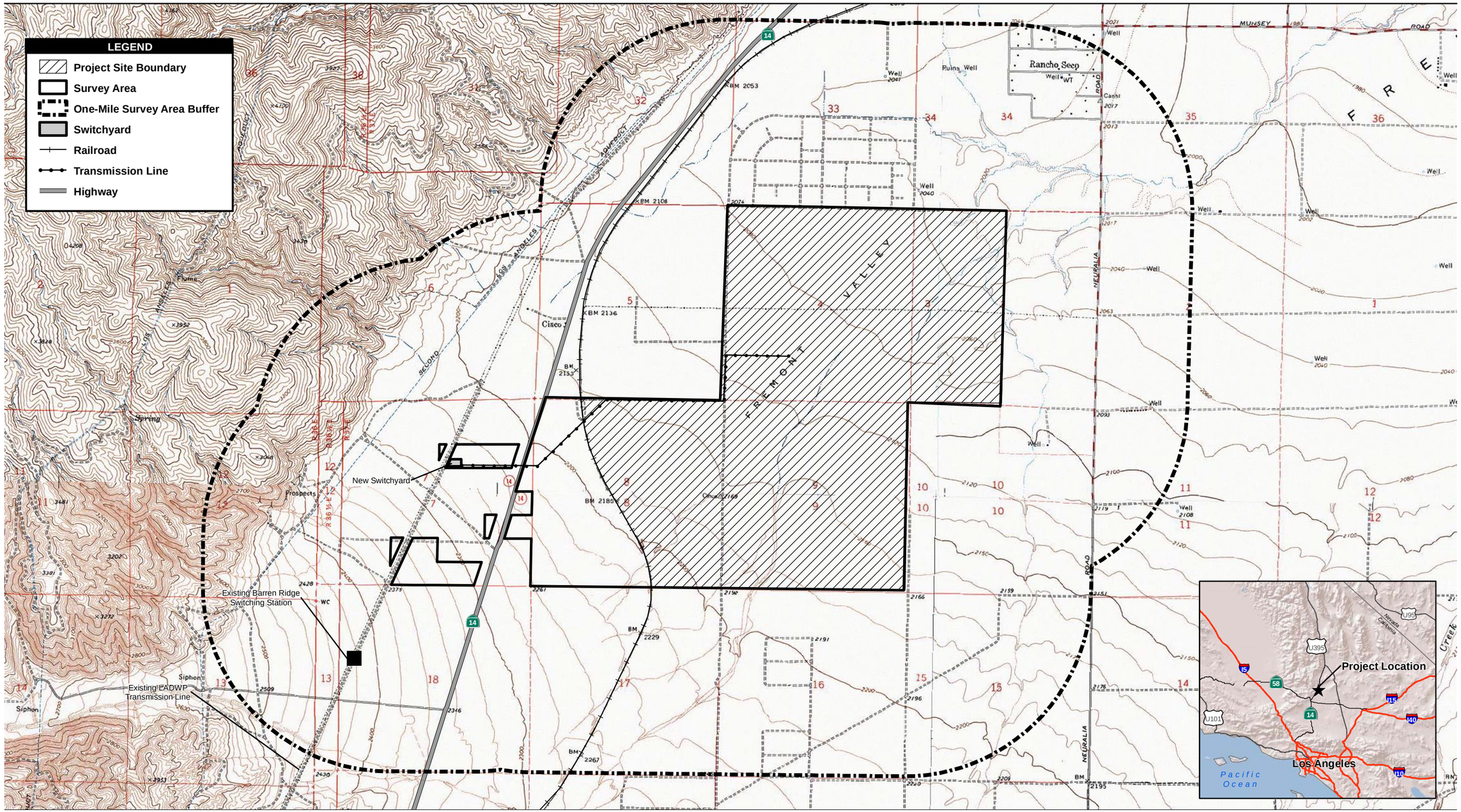
REFERENCES

California Department of Fish and Game (CDFG). 2007. California Department of Fish and Game. RareFind 3 computer program. California Natural Diversity Database search for USGS 7.5-minute quadrangles California City North, Cantil, Cinco, Dove Spring, Mojave NE, Saltdale NW. California Department of Fish and Game, State of California Resources Agency. Sacramento, California.

Harris, J.H. and P. Leitner. 2005. Long-distance movements of juvenile Mohave ground squirrels, *Spermophilus mohavensis*. Southwestern Naturalist, 50(2):188-196.

Leitner, P. and B.M. Leitner. 1998. Coso Grazing Exclosure Monitoring Study. Mohave Ground Squirrel Study, Coso Known Geothermal Resource Area, Major Findings, 1988-1996. Final Report. 42 pp. + append.

U.S. Bureau of Land Management. 2005. Final Environmental Impact Report and Statement for the West Mojave Plan. U.S. Bureau of Land Management, Moreno Valley, CA.

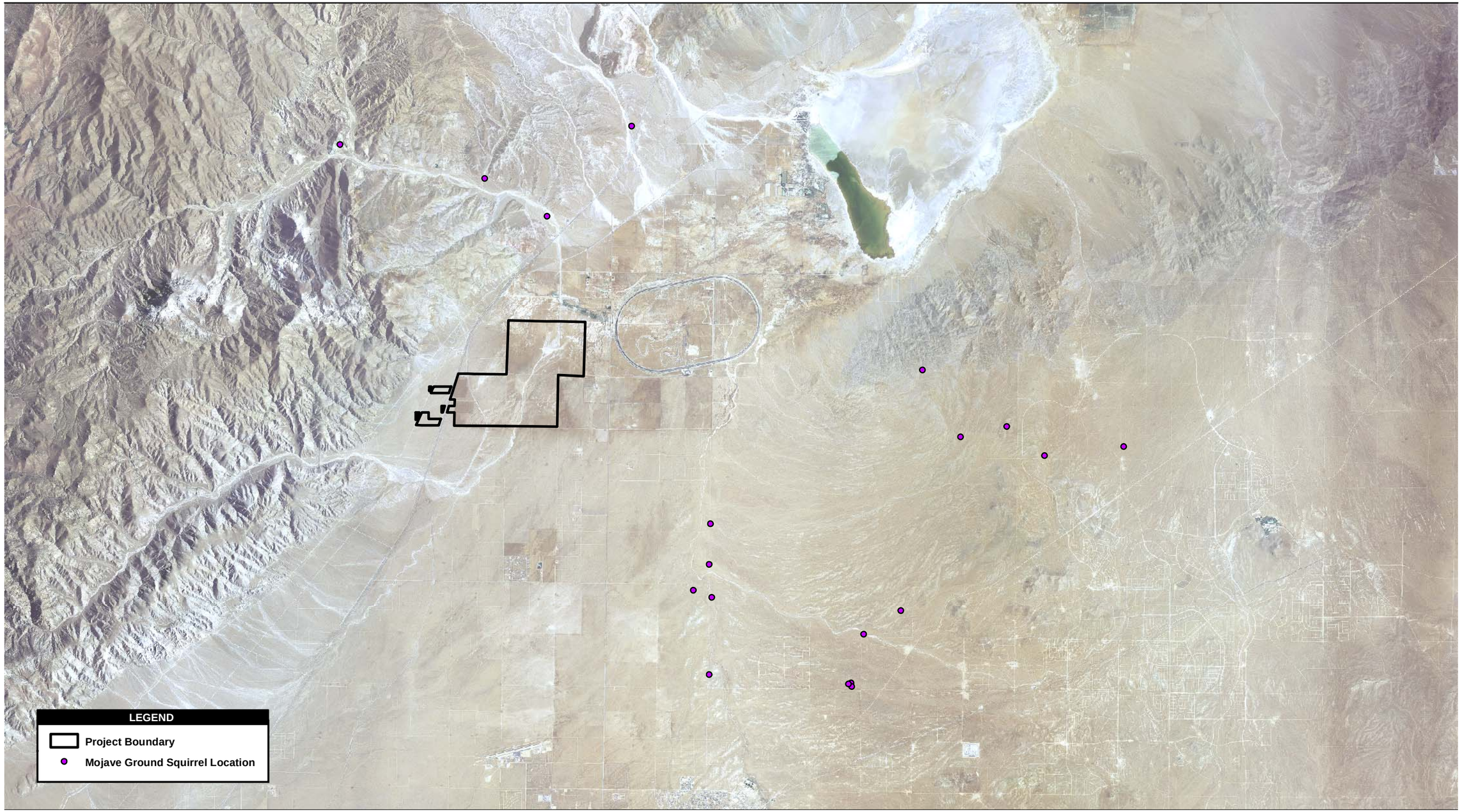


Source: TetraTech 2007; Kern County 2007; USGS 2007; WorleyParsons 2007

2,750 1,375 0 2,750 Feet

Scale: 1:33,000; 1 inch = 2,750 feet

Figure 1
Project Site Boundary and Survey Area



10,000 5,000 0 10,000 Feet

Scale: 1:120,000; 1 inch = 10,000 feet

Figure 2
Historic Mohave Ground Squirrel Locations

Path: P:\2008\08080001 FPLE Proj Beacon Solar\5GIS\MXD\MGS Habitat Assessment\Figure 2 Historic Locations.mxd, 01/16/08, KochertE

ATTACHMENT F

FLORAL SPECIES OBSERVED AT THE PROPOSED BEACON SOLAR ENERGY PROJECT SITE, 2007

ATTACHMENT F
FLORAL SPECIES OBSERVED AT PROJECT BEACON, SPRING/SUMMER 2007

Family	Scientific Name	Common Name
Asteraceae		
	Acamptopappus sphaerocephalus	goldenhead
	Ambrosia acanthicarpa	annual bursage
	Ambrosia dumosa	white bursage
	Chrysothamnus nauseosus ssp. *mohavensis*	rubber rabbitbush
	Gutierrezia microcephala	sticky snakeweed
	Helianthus annuus	western sunflower
	Hymenoclea salsola	cheesebush
	*Lactuca serriola**	prickly lettuce
	Lepidospartum squamatum	scale broom
	Tetradymia stenolepis	horsebrush
Boraginaceae		
	Heliotropium curassavicum	salt heliotrope
Brassicaceae		
	*Brassica tournefortii**	Sahara mustard
	*Sisymbrium officinale**	hedge mustard
Cactaceae		
	Cylindropuntia echinocarpa	silver cholla
Capperaceae		
	Isomeris arborea	bladderpod
Chenopodiaceae		
	Atripex confertifolia	shadscale
	Atriplex polycarpa	allscale
	Atriplex spinifera	spinescale
	Grayia spinosa	spiny hopsage
	Krascheninnikovia lanata	winter fat
	*Salsola tragus**	Russian thistle, tumbleweed
Cuscutaceae		
	Cuscuta sp.	dodder
Ephedraceae		
	Ephedra nevadensis	Mormon tea
Fabaceae		
	Senna armata	spiny senna
Krameriaceae		
	Krameria erecta	rhatany
Lamiaceae		
	Salvia columbariae	chia
Liliaceae		
	Yucca brevifolia	Joshua tree
Poaceae		
	Bromus madritensis ssp. *rubens**	foxtail chess
	Distichlis spicata	salt grass
	*Schismus arabicus**	split grass
	*Vulpia myuros**	Foxtail fescue
Rosaceae		
	Coleogyne ramosissima	blackbrush
	Purshia tridentata	antelope bush

Family	Scientific Name	Common Name
Solanaceae		
	Datura wrightii	jimson weed
	Lycium cooperi	box thorn
Tamaricaceae		
	*Tamarix ramosissima**	tamarisk
Zygophyllaceae		
	Larrea tridentata	creosote bush

* = nonnative plant species (introduced)

ATTACHMENT G

WILDLIFE SPECIES DETECTED AT THE PROPOSED BEACON SOLAR ENERGY PROJECT SITE, 2007

ATTACHMENT G
WILDLIFE SPECIES DETECTED AT PROPOSED PROJECT BEACON SITE, 2007

Scientific Names	Common Names
Reptiles	
Order Squamata	Lizards and Snakes
Family Colubridae	
Masticophis flagellum piceus	red coachwhip
Pituophis catenifer	pacific gopher snake
Family Crotaphytidae	
Gambelia wislizenii	long-nosed leopard lizard
Family Iguanidae	
Dipsosaurus dorsalis	desert iguana
Family Phrysonomatidae	
Callisaurus draconoides	zebra-tailed lizard
Phrynosoma platyrhinos	desert horned lizard
Sceloporus graciosus	sagebrush lizard
Family Teiidae	
Cnemidophorus tigris	western whiptail
Family Viperidae	
Crotalus scutulatus scutulatus	Mojave (green) rattlesnake
Order Testudines	Turtles and Tortoises
Family Testudinidae	
Gopherus agassizii	Mojave desert tortoise **
Birds	
Order Ciconiiformes	Herons, Egrets, Storks, etc
Family Cathartidae	
Cathartes aura	turkey vulture
Order Falconiformes	Diurnal Birds of Prey
Family Accipitridae	
Circus cyaneus	northern harrier *
Family Falconidae	
Falco peregrinus	peregrine falcon **
Falco sparverius	American kestrel
Order Columbiformes	Pigeons, Doves, Solitaires, and Dodo
Family Columbidae	
Zenaida macroura	mourning dove
Order Cuculiformes	Cuckoos, Anis, Coucals, etc
Family Cuculidae	
Geococcyx californianus	greater roadrunner
Order Strigiformes	Owls
Family Strigidae	
Athene cunicularia	burrowing owl *
Order Caprimulgiformes	Nightjars, Pootoos, Frogmouths, etc
Family Caprimulgidae	
Phalaenoptilus nuttallii	common poorwill

Scientific Names	Common Names
Order Passeriformes	Perching Birds
Family Tyrannidae	
Sayornis nigricans	black phoebe
Myiarchus cinerascens	ash-throated flycatcher
Family Laniidae	
Lanius ludovicianus	loggerhead shrike *
Family Corvidae	
Corvus corax	common raven
Family Alaudidae	
Eremophila alpestris actia	California horned lark *
Family Hirundinidae	
Hirundo rustica	barn swallow
Family Remizidae	
Auriparus flaviceps	verdin
Family Mimidae	
Toxostoma lecontei	Le Conte's thrasher *
Toxostoma redivivum	California thrasher
Family Sturnidae	
Sturnus vulgaris	European starling
Family Motacillidae	
Anthus rubescens	American pipit
Family Parulidae	
Wilsonia pusilla	Wilson's warbler
Family Thraupidae	
Piranga ludoviciana	western tanager
Family Emberizidae	
Amphispiza belli	sage sparrow
Melospiza melodia	song sparrow
Spizella breweri	Brewer's sparrow
Family Icteridae	
Agelaius phoeniceus	red-winged blackbird
Family Fringillidae	
Carpodacus mexicanus	house finch
Mammals	
Order Carnivora	Flesh-eaters
Family Canidae	
Canis latrans	coyote
Vulpes macrotis macrotis	desert kit fox (sign)
Family Felidae	
Lynx rufus	bobcat (scat)
Order Lagomorpha	Rabbits, Hares, and Pikas
Family Leporidae	
Sylvilagus audubonii	desert cottontail
Lepus californicus	black-tailed jackrabbit
Order Rodentia	Gnawing Mammals
Family Heteromyidae	
Dipodomys deserti	desert kangaroo rat
Family Sciuridae	
Ammospermophilus leucurus	whitetail antelope squirrel

* CDFG Species of Special Concern

** Listed under Federal or California State Endangered Species Act

ATTACHMENT H

DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS LETTER OF CONCURRENCE OF NON-JURISDICTION

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
VENTURA FIELD OFFICE
2151 ALESSANDRO DRIVE, SUITE 110
VENTURA, CALIFORNIA 93001

REPLY TO
ATTENTION OF:

February 5, 2008

Office of the Chief
Regulatory Division

Kenneth Stein
Beacon Solar, LLC
700 Universe Boulevard
Juno Beach, Florida 33408

Dear Mr. Stein:

Reference is made to your letter (Corps File No. 2007-1414-CLM), dated November 5, 2007 for a Department of the Army Jurisdictional Determination to construct a wind power generation project in unnamed tributaries to Koehn Dry Lake within an unincorporated area of Kern County, California.

Based on the information furnished in your letter, we have determined that Kohn Dry Lake does not exhibit any evidence of navigation. Using the criteria at 33 CFR Part 328.3, the Corps has determined that Koehn Dry Lake exhibits insufficient evidence of interstate commerce to meet the requirements of 33 CFR Part 328.3(a)(3)(iii) and does not meet the requirements for navigability at 33 CFR Part 328.3 (a)(1). Based on the above information and the Solid Waste Agency of Northern County Supreme Court Decision, your project does not discharge dredged or fill material into a water of the United States or an adjacent wetland. Therefore, the project is not subject to our jurisdiction under Section 404 of the Clean Water Act and a Section 404 permit is not required from our office.

Please be aware that our determination does not preclude the need to comply with Section 13260 of the California Water Code (Porter/Cologne) and we recommend that you contact the California Regional Water Quality Control Board to insure compliance with the above regulations. Furthermore, our determination does not obviate the need to obtain other Federal, state, or local authorizations required by law.

This letter contains an approved jurisdictional determination for the Beacon Street Solar Energy Project. If you object to this decision, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet (Appendix C) and Request for Appeal (RFA) form. If you request to appeal this decision you must submit a completed RFA form to the Corps South Pacific Division Office at the following address:

Tom Cavanaugh
Administrative Appeal Review Officer,
U.S. Army Corps of Engineers
South Pacific Division, CESPD-PDS-O, 2042B
1455 Market Street, San Francisco, California 94103-1399

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 C.F.R. Part 331.5, and that it has been received by the Division Office within 60 days of the date on the NAP. Should you decide to submit an RFA form, it must be received at the above address by April 6, 2008. It is not necessary to submit an RFA form to the Division Office if you do not object to the decision in this letter.

This verification is valid for five years from the date of this letter, unless new information warrants revision of the determination before the expiration date. If you wish to submit new information regarding the approved jurisdictional determination for this site, please submit this information to Crystal L. Marquez at the letterhead address by April 6, 2008. The Corps will consider any new information so submitted and respond within 60 days by either revising the prior determination, if appropriate, or reissuing the prior determination. A revised or reissued jurisdictional determination can be appealed as described above.

A courtesy copy of this letter has been sent to Mr. Joshua Zinn, EDAW Inc., 1420 Kettner Boulevard, Suite 500, San Diego, CA 92101. If you have any questions regarding this matter, please contact Crystal L. Marquez at (805) 585-2143. Please be advised that you can now comment on your experience with Regulatory Division by accessing the Corps web-based customer survey form at: http://per2.nwp.usace.army.mil/survey.html.

Sincerely,

Antal Szijj
Senior Project Manager
North Coast Branch

Enclosures

ATTACHMENT 6

DRAINAGE STUDY

June 25, 2008

Geoff Baxter, P.E.
WorleyParsons
2330 E. Bidwell, Suite 150
Folsom, CA 95630

Re: Beacon Solar Energy Project
Project #14291-1006 DR
Response to CEC Draft Issues Identification Report and Data Request

Dear Geoff,

We are in receipt of the Draft Issues Identification Report dated June 2, 2008 and the Data Request Letter dated June 16, 2008 from the California Energy Commission for the subject property. A response to each follows the original comment in ***bold italics***:

Data Request Letter dated June 16, 2008

Item 44. Please provide design information showing this configuration is suitable for the anticipated flows.

DESCRIPTION
The Beacon Solar Energy Project is located in the Fremont Valley on approximately 2,330 acres adjacent to State Route 14 (Midland Trail), north of California City in Kern County, California (Figures 1 & 2). The site is bounded by State Route 14 to the west, and undeveloped land to the north, east and south. Railroad tracks operated by Southern Pacific Railroad run north/south, bisecting the western portion of the site. The project includes construction of a solar power plant, which will generate approximately 250 Megawatts of power using solar thermal technology. In conjunction with the power plant, an administration building, a warehouse, and a paved access road from State Route 14 to the central power block will be constructed. The site is located over the Cantil Valley Fault (Garlock West Fault).

Based on Flood Hazard Maps prepared by the Federal Emergency Management Agency (FEMA) a 100-year flood zone crosses the central portion of the site, trending northeast along the alignment of Pine Tree Creek dry wash. Off-site drainage comes from the El Paso Mountains to the southwest. Pine Tree Creek is similar to other streams in the area. It discharges from well defined, steep canyons, but tends to spread out into a number of poorly defined drainage channels on the valley floor. This is evident from the topographic survey of the project site (provided by Lars Andersen).

The proposed improvements will realign the Pine Tree Creek dry wash to follow

the southern and eastern property boundaries. See attached exhibit. This will be achieved by the creation of two turns: the first turn is approximately 65 degrees to the east and the second turn is 90 degrees to the north. Due to the existing, poorly defined dry wash (sheet flow through portions of the dry wash) the channel outlet will be designed to return the flow from a concentrated flow into a sheet flow, which mimics the existing dry wash conditions.

DESIGN PARAMETERS

Per the Kern County Division Four Standards for Drainage, the constructed drainage system shall be designed to convey the Capital Storm Design Discharge (CSDD) 100-year event plus freeboard with the water surface elevation contained within the channel.

Based on a previous FEMA Flood Insurance Study, the 100-year peak discharge storm flow in the Pine Tree Creek Dry Wash is estimated to be between 14,000 and 20,000 cfs (see Conceptual Drainage Study prepared by Carlton Engineering, Inc., dated February 2008). For the purpose of this letter the more conservative flow of 20,000 cfs will be analyzed.

CHANNEL GEOMETRY AND ROUGHNESS

The Channel was designed using open channel flow criteria outlined in the Kern County Division Four Standards (KCDFS) for drainage. The typical rerouted dry wash channel is designed with maximum 3:1 side slopes and a minimum channel bottom of 345 feet. A 3 ft deep by 40 ft wide trapezoidal rock lined channel with 4:1 side slopes will be constructed in the center of the main channel to carry low flows (maximum capacity of 370 cfs) through the site. The low flow channel will be lined with Light Class (Caltrans Standard Specification Section 72) rock.

At the upstream end of the project the outside edge slope of the trapezoidal channel will be constructed at a 2:1 and lined with Light Class (Caltrans Standard Specification Section 72) rock. A 5-foot high berm will be constructed above the 8-foot deep channel, creating a total channel depth of 13 feet. This additional depth of channel will help turn the water at the bend and keep the water within the constructed channel.

The rerouted dry wash will slope from a minimum of 0.5% to a maximum of 1.38%. Channel Manning's n roughness was taken from Table 3 Summary of Roughness Coefficients in the FEMA Flood Insurance Study Kern County, California Unincorporated Areas Volume 1. The Manning's "n" roughness value for the Jawbone Canyon Wash in the channel ranges between 0.030-0.045. A Manning's n value of 0.035 was assumed for the rerouted dry wash (Pine Tree Creek). This will allow for a stone covered channel bottom and weed covered banks. This assumed n value will take into account re-vegetation of the dry wash with native plant species. The rock lined sides and rock lined low flow channel was assumed to have a Manning's n value of 0.045. A composite Manning's n value was determined to be 0.039.

Due to the high water velocities (8.2 to 12 fps) as indicated below, the channel may require additional erosion control measures (i.e. rip-rap, blanket, etc.). Per Figure 2 – *"Size of stone that will resist displacement for various velocities and side slopes"* in Appendix D of the Conceptual Drainage Study, the rip-rap will range in size between No. 1 Backing Class to Light Class (see Caltrans Standard Specification Section 72 for specification of class type). The rip-rap shall be placed along the channel floor and up the channel sides to estimated freeboard depth.

ALIGNMENT AND FREEBOARD

Per the KCDFS Chapter X the following standards shall be met:

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

2. The minimum freeboard between the design water surface, and the top of bank of the channel shall be 0.50 feet or 0.20 of the specific energy, whichever is greater.

3. The super-elevation of the water surface resulting from changing directions shall be considered prior to computing the required freeboard.

In order to compute the water surface elevation in a channel due to super-elevation, we used the method outlined in the Caltrans Highway Design Manual Chapter 860 Open Channels (dated September 1, 2006). Flow around a curve will result in a rise of the water surface on the outside of the curve. The heights required by this super-elevation of the water surface can be computed by the following Soil Conservation Service (SCS) formulas:

Trapezoidal Channels during Subcritical flow:

$$E = \frac{V^2(b+2kd)}{2(gr - 2KV^2)}$$

Where
- E = Maximum height of water surface in feet above depth "d".
- V = Average velocity for the flow cross section in feet per second at entrance to curve.
- b = Width of rectangular channel or bottom width of trapezoidal channel in feet.
- g = Acceleration of gravity = 32.2 feet per second squared.
- r = Radius of channel centerline in feet.
- K = Cotangent of bank slope.
- d = Depth of flow in feet for straight alignment at entrance to curve.

The Caltrans Method and the Kern County Method for determining channel alignment has been used for the calculations below.

DESIGN METHODOLOGY

The program Flowmaster by Bently was used to determine the water surface and velocity in the realigned channel. For purpose of this report, five channel section locations were analyzed in the rerouted dry wash. We assumed for these channels that the depth of flow achieves a condition known as normal depth, and is assumed constant along the length of the channel.

The analysis of the rerouted dry wash has been broken out into five sections:

Turn #1 – the first turn at the upstream end of the project – the beginning of the realigned dry wash.

Straight #1 – downstream of Turn #1 – traveling east to west - approximately 1800 LF in length.

Turn #2 – down stream of Straight #1 - 90 degree turn– south east corner of the project.

Straight #2 – downstream of Turn #2 – traveling south to north - approximately 5100 LF in length.

Outlet – downstream of Straight #2

TURN #1 - 65 degree turn

Turn #1 has a smooth outside curve radius of 1800 ft. The centerline radius of Turn #1 is 600 ft. The inside radius is 970 ft with an angle point of 65 degrees. Turn #1 at the project southern property line is approximately 1600 ft wide. At the end of Turn #1 the bottom width of the channel is 345 ft. Turn #1 was designed following Caltrans requirements for calculating the outside water surface elevation due to the super-elevation of the water surface around the turn.

Velocity at entrance to curve = 6.1 fps
Velocity at exit to curve = 8.8 fps

Estimated Radius of channel centerline = 600 ft
Soil Conservation Service (SCS) formula for Trapezoidal Channel for Subcritical Flow: E = Maximum height of water surface in feet above depth "d".

TURN #1 SUMMARY TABLE

Trapezoidal Channel	Slope	Normal Depth	Specific Energy	Freeboard (0.2 x Specific Energy)	Super-elevation Height (E)	Normal Depth + Super-elevation Height + Freeboard	Minimum Channel Design Depth
Entrance of Curve - 1600 ft Bottom Width with 2:1 Side Slopes Outside Edge and 3:1Side Slopes Inside Edge	1.3%	2.05 FT	2.63 FT	0.53 FT	3.1 FT	5.7FT	11.9 FT Inside Curve 13 FT Outside Curve
Exit of Curve - 345 ft Bottom Width with 2:1Side Slopes Outside Edge and 3:1 Side Slopes Inside	0.5%	6.82 FT	7.25 FT	1.45 FT	1.4 FT	9.67 FT	11.9 FT Inside Curve 13 FT Outside Curve

The minimum designed channel depth at Turn #1 on the inside of the turn is 11.9 ft. The minimum design channel depth at Turn #1 on the outside of the turn is 13ft. A 5 ft tall berm will be constructed on the outside turn.

The minimum freeboard required following Kern County's requirements is 0.5 ft or 0.2 x Specific Energy, whichever is greater. The maximum Specific Energy in turn #1 is 7.25 ft. The maximum freeboard is 1.45 ft (0.2 x 7.25 ft>0.5 ft).

The maximum water surface at the outside edge of Turn #1 is approximately 8.22 ft (6.82ft + 1.4ft). The minimum required channel depth is 9.67 ft (6.82ft + 1.4 ft+ 1.45ft). The minimum designed channel depth at Turn #1 is 11.9 ft on the inside of the turn and 13 ft on the outside of the turn. The super-elevated water in Turn #1 will remain within the designed channel.

The entire channel is lined with Light Class (Caltrans Standard Specification Section 72) rock to dissipate the energy of the incoming water.

STRAIGHT #1

The depth of flow for Straight #1 at a slope of 0.5 is 6.04 feet with a velocity of approximately 8.7 fps. The flow is subcritical.

STRAIGHT #1 SUMMARY TABLE

Trapezoidal Channel	Slope	Normal Depth	Specific Energy	Freeboard (0.2 x Specific Energy)	Water Depth + Freeboard	Minimum Channel Design Depth
345 ft Bottom Width with 3:1 Side Slopes	0.5%	6.04 FT	7.23 FT	1.45 FT	7.5 FT	8 FT

The minimum freeboard required following Kern County's requirements is 0.5 ft or 0.2 x Specific Energy, whichever is greater. The Specific Energy in straight #1 is 7.23 ft. The freeboard is 1.45 ft (0.2 x 7.23 ft>0.5 ft). The minimum required channel depth is 7.5 ft (6.04 ft + 1.45 ft). The minimum designed channel depth at Straight #1 is 8 ft. The water in Straight #1 will remain within the designed channel.

TURN #2 - 90 Degree turn
Channel configuration: Top width of water surface = 375 ft
Radius of channel centerline = 1143 ft (Kern County Minimum Radius 1125 ft [3 x 375 ft])
Velocity at entrance to curve = 10.51 fps
Soil Conservation Service (SCS) formula for Trapezoidal Channel during Subcritical Flow: E = Maximum height of water surface in feet above depth "d"= 1.04 ft

TURN #2 SUMMARY TABLE

Trapezoidal Channel	Slope	Normal Depth	Specific Energy	Freeboard (0.2 x Specific Energy)	Super-elevation Height (E)	Normal Depth + Super-elevation Height + Freeboard	Minimum Channel Design Depth
345 ft Bottom Width with 3:1 Side Slopes	0.9%	5.02 FT	6.74 FT	1.35 FT	1.04 FT	7.4 FT	8 FT

The minimum freeboard required following Kern County's requirements is 0.5 ft or 0.2 x Specific Energy, whichever is greater. The Specific Energy in turn #2 is 6.74 ft. The freeboard is 1.35 ft (0.2 x 6.74 ft>0.5 ft).
The water surface at the outside edge of Turn #2 is approximately 6.06 ft. The minimum required channel depth is 7.4 ft (6.06 ft + 1.35 ft). The minimum designed channel depth at Turn #2 is 8 ft on the inside of the turn and varies from 8 ft to 16 ft on the outside of the turn. The super-elevated water in Turn #2 will remain within the designed channel.

STRAIGHT #2

The depth of flow for Straight #2 at a slope of 1.38% is 4.38 feet with a velocity of approximately 12.01 fps. The flow is subcritical.

STRAIGHT #2 SUMMARY TABLE

Trapezoidal Channel	Slope	Normal Depth	Specific Energy	Freeboard (0.2 x Specific Energy)	Water Depth + Freeboard	Minimum Channel Design Depth
345 ft Bottom Width with 3:1 Side Slopes	1.38%	4.38 FT	6.62 FT	1.32 FT	5.7 FT	8 FT

The minimum freeboard required following Kern County's requirements is 0.5 ft or 0.2 x Specific Energy, whichever is greater. The Specific Energy in Straight #2 is 6.62 ft. The freeboard is 1.32 ft (0.2 x 6.62 ft>0.5 ft). The minimum required channel depth is 5.7 ft (4.38 ft + 1.32 ft). The minimum designed channel depth at Straight #2 is 8 ft. The water in Straight #2 will remain within the designed channel.

OUTLET

Due to the nature of the existing dry wash spreading out into poorly defined drainages on the valley floor, the outlet of the rerouted dry wash will return the channelized flow back into sheet flow. The channel will transition from a well-defined trapezoidal channel to a wide channel that will convert the concentrated flow into sheet flow.

The Low Flow Channel will continue toward the north east to a location where it will tie into an existing channel and exit the project site.

CONCLUSIONS

Using Caltrans and Kern County's design criteria for open channels we have shown that the configuration of the re-routed dry wash is suitable for the anticipated flows.

During the design of final construction documents, final erosion control measures in the channel shall be further reviewed and refined.

Data Request Letter Dated June 16, 2008

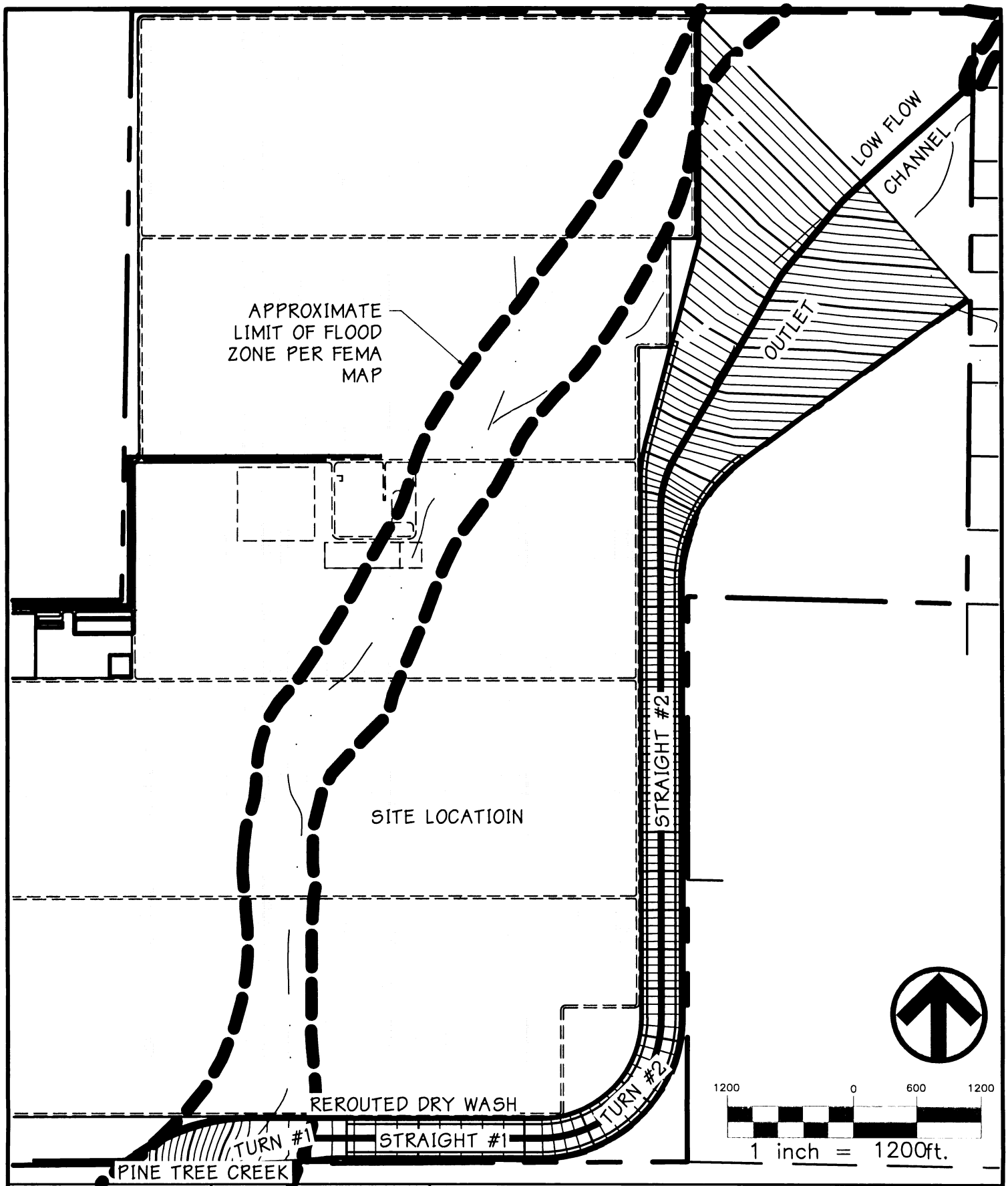
Item 45.b. Please provide plans or maps that clearly show the conceptual grading plan that identifies all cut and fill area.

Carlton believes the Conceptual Grading plan submitted with the original submittal satisfies item 45.b. The existing ground contours and proposed contours are shown on the Conceptual Grading plan. In addition to the proposed contours, grade tags at the corners and points of interest have been added. However, in order to simplify review, we have added an additional sheet (Sheet C2) that shows depth of cuts or fills relative to the existing ground surface and to the proposed finished grade surface. These cut/fill distances have been shown on a roughly 200 ft x 200 ft grid.

In conclusion, please refer to attached prints showing additional information described above and do not hesitate to call if you have any questions.

Sincerely,
Carlton Engineering, Inc.

Michael Hauge, P.E.
Project Engineer



6199-01-07	06/25/2008	BEACON SOLAR ENERGY PROJECT	FIGURE
CARLTON Engineering Inc.		Kern County, California	1
3883 Ponderosa Road, Shingle Springs, CA 95682 Voice 530.677.5515 Fax 530.677.6645		Site Map	

Trapezoidal Channel 1.0% - Turn #1 – 1600 ft

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.01300	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	1600.00	ft
Discharge	20000.00	ft^3/s

Results

Normal Depth	2.05	ft
Flow Area	3295.96	ft^2
Wetted Perimeter	1611.08	ft
Top Width	1610.27	ft
Critical Depth	1.69	ft
Critical Slope	0.02480	ft/ft
Velocity	6.07	ft/s
Velocity Head	0.57	ft
Specific Energy	2.63	ft
Froude Number	0.75	
Flow Type	Subcritical	
Normal Depth	2.05	ft
Critical Depth	1.69	ft
Channel Slope	0.01300	ft/ft
Critical Slope	0.02480	ft/ft

Trapezoidal Channel 0.5% - Turn #1 – 345 ft

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.00500	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	345.00	ft
Discharge	20000.00	ft^3/s

Results

Normal Depth	6.82	ft
Flow Area	2468.27	ft^2
Wetted Perimeter	381.80	ft
Top Width	379.09	ft
Critical Depth	4.66	ft
Critical Slope	0.01798	ft/ft
Velocity	8.10	ft/s
Velocity Head	1.02	ft
Specific Energy	7.84	ft
Froude Number	0.56	
Flow Type	Subcritical	
Normal Depth	6.82	ft
Critical Depth	4.66	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.01798	ft/ft

Trapezoidal Channel 0.5% - Straight #1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth
Channel Slope	0.00500 ft/ft
Discharge	20000.00ft³/s

Section Definitions

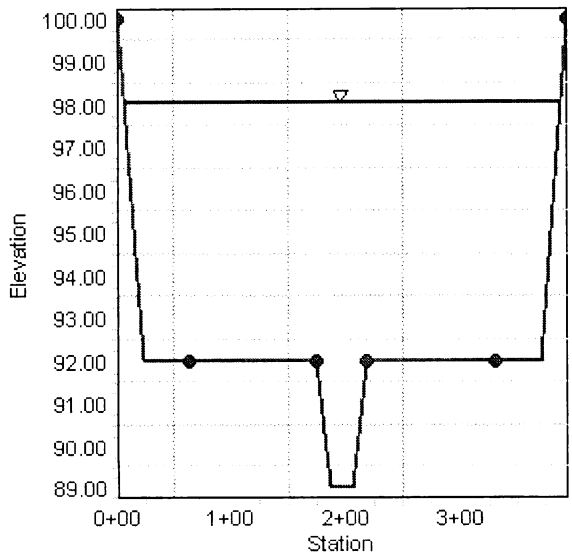
Station (ft)	Elevation (ft)
0+00	100.00
0+24	92.00
0+64	92.00
1+75	92.00
1+87	89.00
2+07	89.00
2+19	92.00
3+29	92.00
3+69	92.00
3+93	100.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 100.00)	(0+64, 92.00)	0.045
(0+64, 92.00)	(1+75, 92.00)	0.035
(1+75, 92.00)	(2+19, 92.00)	0.045
(2+19, 92.00)	(3+29, 92.00)	0.035
(3+29, 92.00)	(3+93, 100.00)	0.045

Results

Normal Depth	6.04	ft
Flow Area	2289.56	ft²
Wetted Perimeter	383.94	ft
Specific Energy	7.23	ft



Trapezoidal Channel 0.9% - Turn #2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth
Channel Slope	0.00900 ft/ft
Discharge	20000.00 ft^3/s

Section Definitions

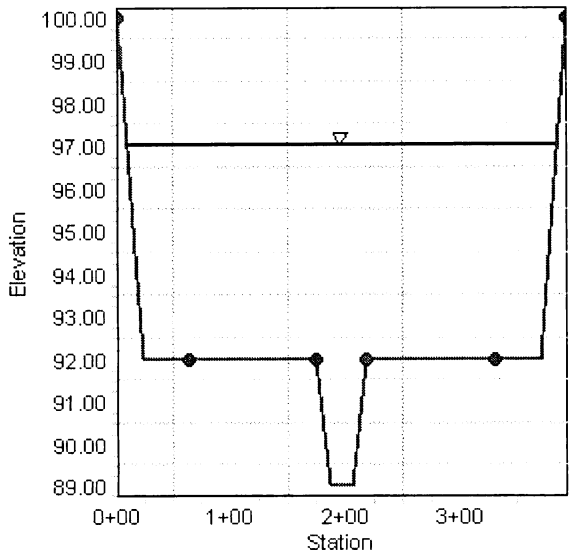
Station (ft)	Elevation (ft)
0+00	100.00
0+24	92.00
0+64	92.00
1+75	92.00
1+87	89.00
2+07	89.00
2+19	92.00
3+29	92.00
3+69	92.00
3+93	100.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 100.00)	(0+64, 92.00)	0.045
(0+64, 92.00)	(1+75, 92.00)	0.035
(1+75, 92.00)	(2+19, 92.00)	0.045
(2+19, 92.00)	(3+29, 92.00)	0.035
(3+29, 92.00)	(3+93, 100.00)	0.045

Results

Normal Depth	5.02 ft
Flow Area	1903.55 ft^2
Wetted Perimeter	377.49 ft
Specific Energy	6.74 ft



Trapezoidal Channel 1.38% - Straight #2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth
Channel Slope	0.01380 ft/ft
Discharge	20000.00 ft^3/s

Section Definitions

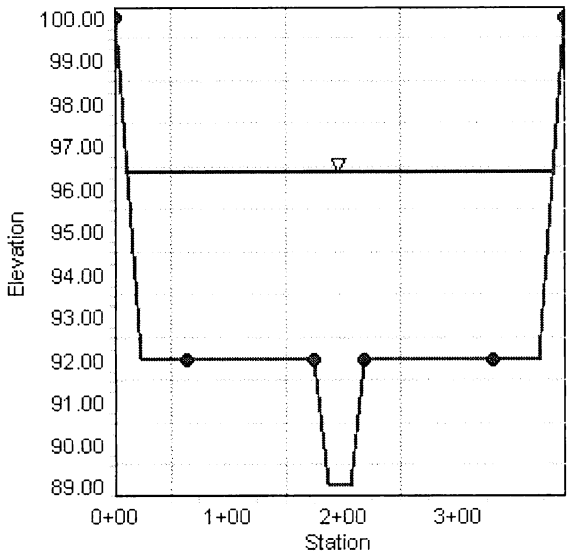
Station (ft)	Elevation (ft)
0+00	100.00
0+24	92.00
0+64	92.00
1+75	92.00
1+87	89.00
2+07	89.00
2+19	92.00
3+29	92.00
3+69	92.00
3+93	100.00

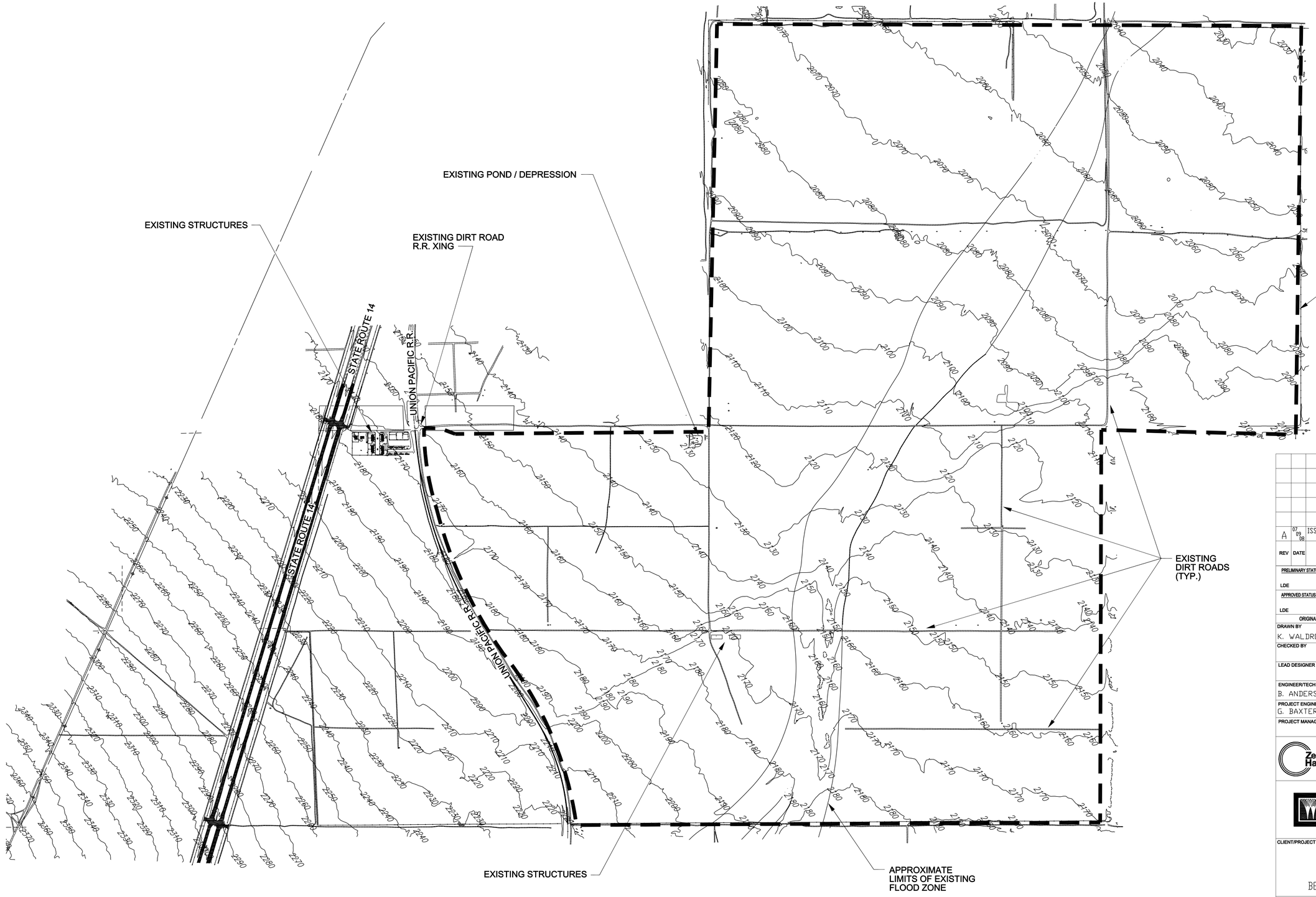
Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 100.00)	(0+64, 92.00)	0.045
(0+64, 92.00)	(1+75, 92.00)	0.035
(1+75, 92.00)	(2+19, 92.00)	0.045
(2+19, 92.00)	(3+29, 92.00)	0.035
(3+29, 92.00)	(3+93, 100.00)	0.045

Results

Normal Depth	4.38 ft
Flow Area	1665.66 ft^2
Wetted Perimeter	373.46 ft
Specific Energy	6.62 ft





REV	DATE	DESCRIPTION	DRAWN	CHECKED	LEAD DESIGNER	ENGINEER/ TECH SPEC	LEAD DISC ENGINEER	PROJ ENGR MANAGER	PROJECT MANAGER
A	07 09 08	ISSUED FOR USE	KSW			BA		GB	

PRELIMINARY STATUS — DATE — LDE
REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.

APPROVED STATUS — DATE — LDE
REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL

DRAWN BY: K. WALDRON
CHECKED BY:
LEAD DESIGNER:
ENGINEER/TECH SPECIALIST: B. ANDERS
PROJECT ENGINEERING MANAGER: G. BAXTER
PROJECT MANAGER:

PROFESSIONAL ENGINEER'S SEAL

Zero Harm — Leadership, No Incidents, Safe Behavior

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PE: STATE:
LIC. NO.: DATE:

WorleyParsons
resources & energy

CLIENT/PROJECT TITLE

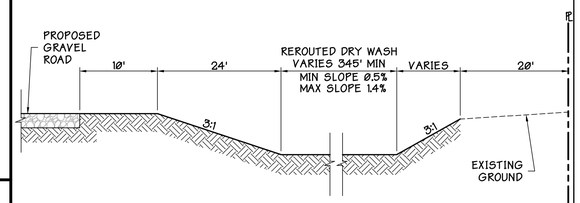
BEACON SOLAR, LLC

BEACON SOLAR ENERGY PROJECT

EXISTING CONDITIONS

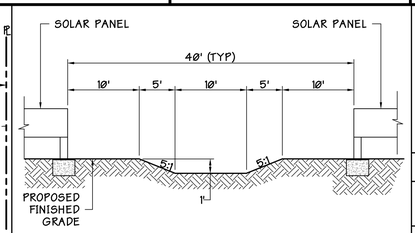
SITE PLAN

SCALE: 1" = 1000'
DRAWING SIZE: ARCH D (36" x 24")
WORLEYPARSONS DWG. NO.: FPLS-0-SK-111-002-000
REV: A



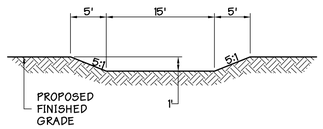
Rerouted Dry Wash

NTS **1**



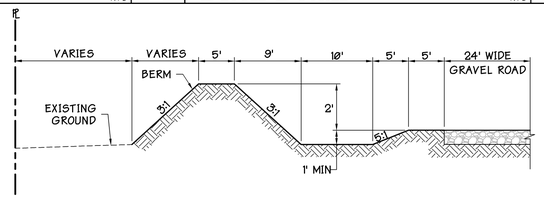
Ditch Detail

NTS **2**



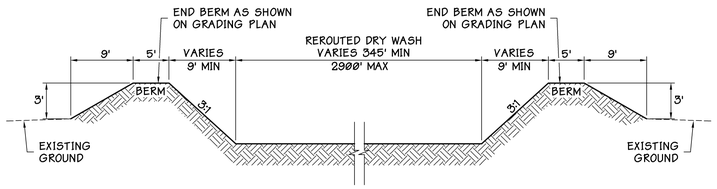
Ditch Detail

NTS **3**



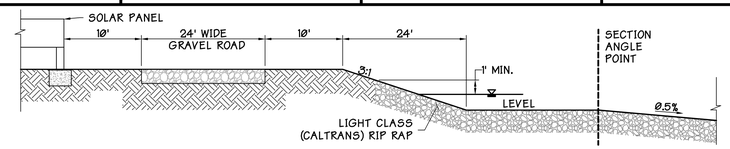
Berm

NTS **4**



Rerouted Dry Wash Channel Outlet

NTS **5**

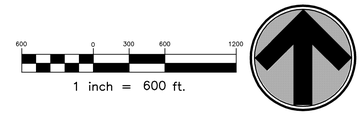


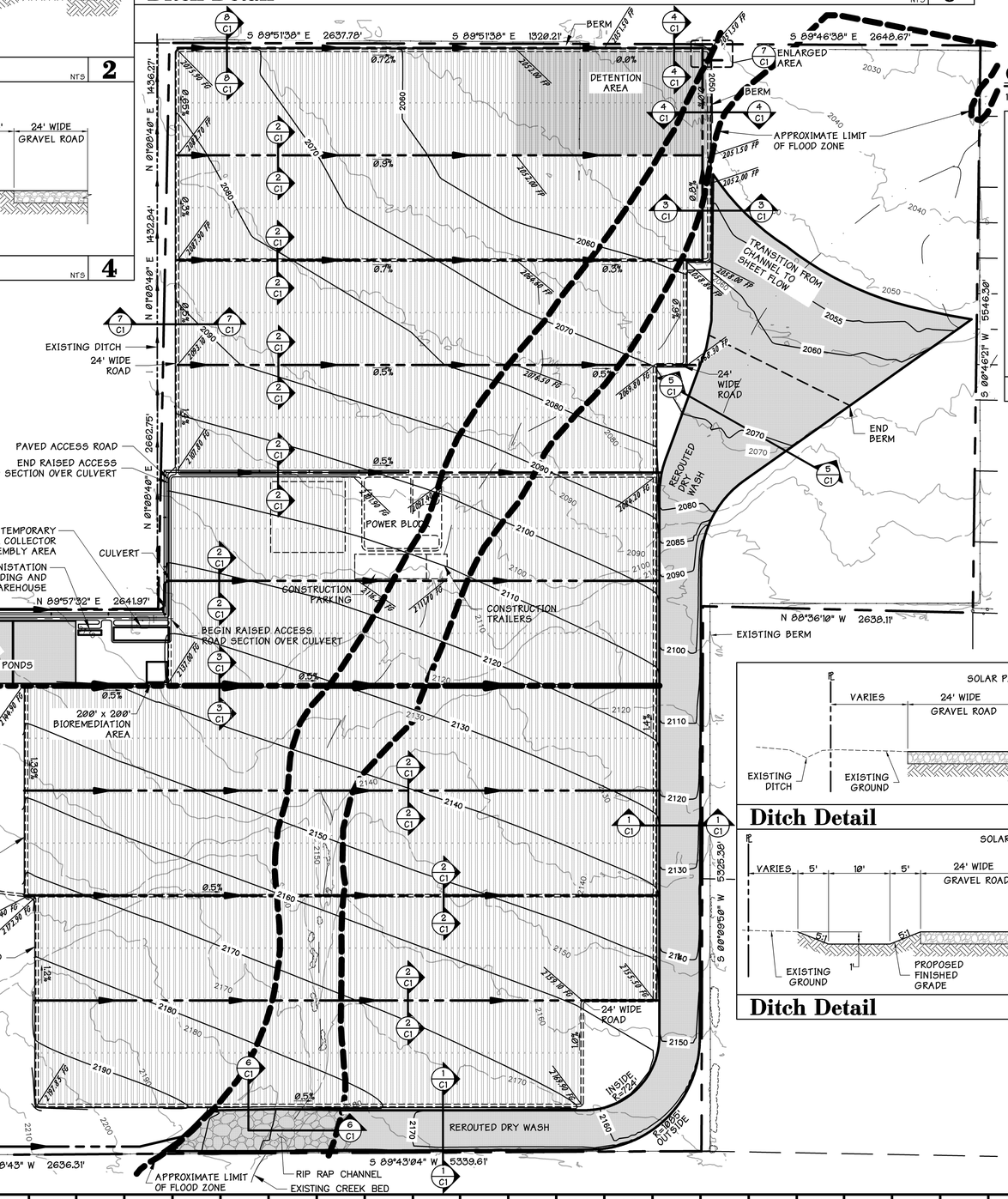
Ditch Detail

NTS **6**

DATE	CUT (YARDS)	FILL (YARDS)	TOTAL (YARDS)
01-16-2008	5,160,000	4,830,000	330,000 CUT *

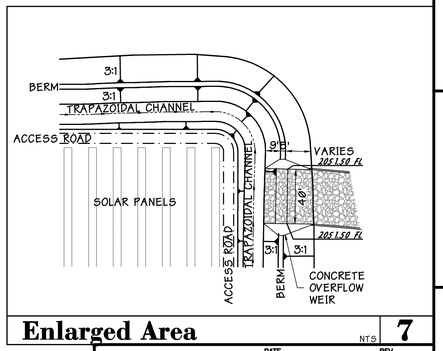
* ASSUMES SHRINK OF APPOXIMATELY 7% BASED ON RELATIVE COMPACTION OF 90 PERCENT OF MAXIMUM DENSITY PER ASTM D1577





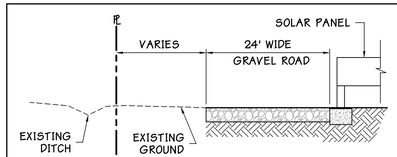
General Notes

1. ALL SLOPES ARE 3:1 UNLESS OTHERWISE SHOWN



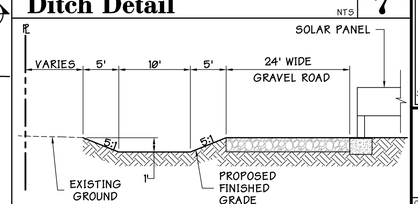
Enlarged Area

NTS **7**



Ditch Detail

NTS **7**



Ditch Detail

NTS **8**

WORKING DRAWING — DATE 02/21/2008 — REV

PRELIMINARY STATUS LDE .	DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
APPROVED STATUS LDE	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: PEM	
CHECKED BY: JDT	
LEAD DESIGNER: MDH	
ENGINEER/TECH SPECIALIST: MDH	
PROJECT ENGINEERING MANAGER: GEOFF BAXTER	
PROJECT MANAGER	

Zero Harm — Leadership, No Incidents, Safe Behavior

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF: PE: ___ STATE: ___ LIC. NO.: ___ DATE: ___

TEAM DRIVEN SOLUTIONS FOR THE BUILT ENVIRONMENT
CARLTON Engineering Inc.
3883 Ponderosa Road, Shingle Springs, CA 95682
Voice 530.677.5515 Fax 530.677.6645

PRELIMINARY — NOT FOR CONSTRUCTION

WorleyParsons resources & energy

CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR
ENERGY PROJECT

DRAWING TITLE: CONCEPTUAL GRADING PLAN

SHEET NO: C1

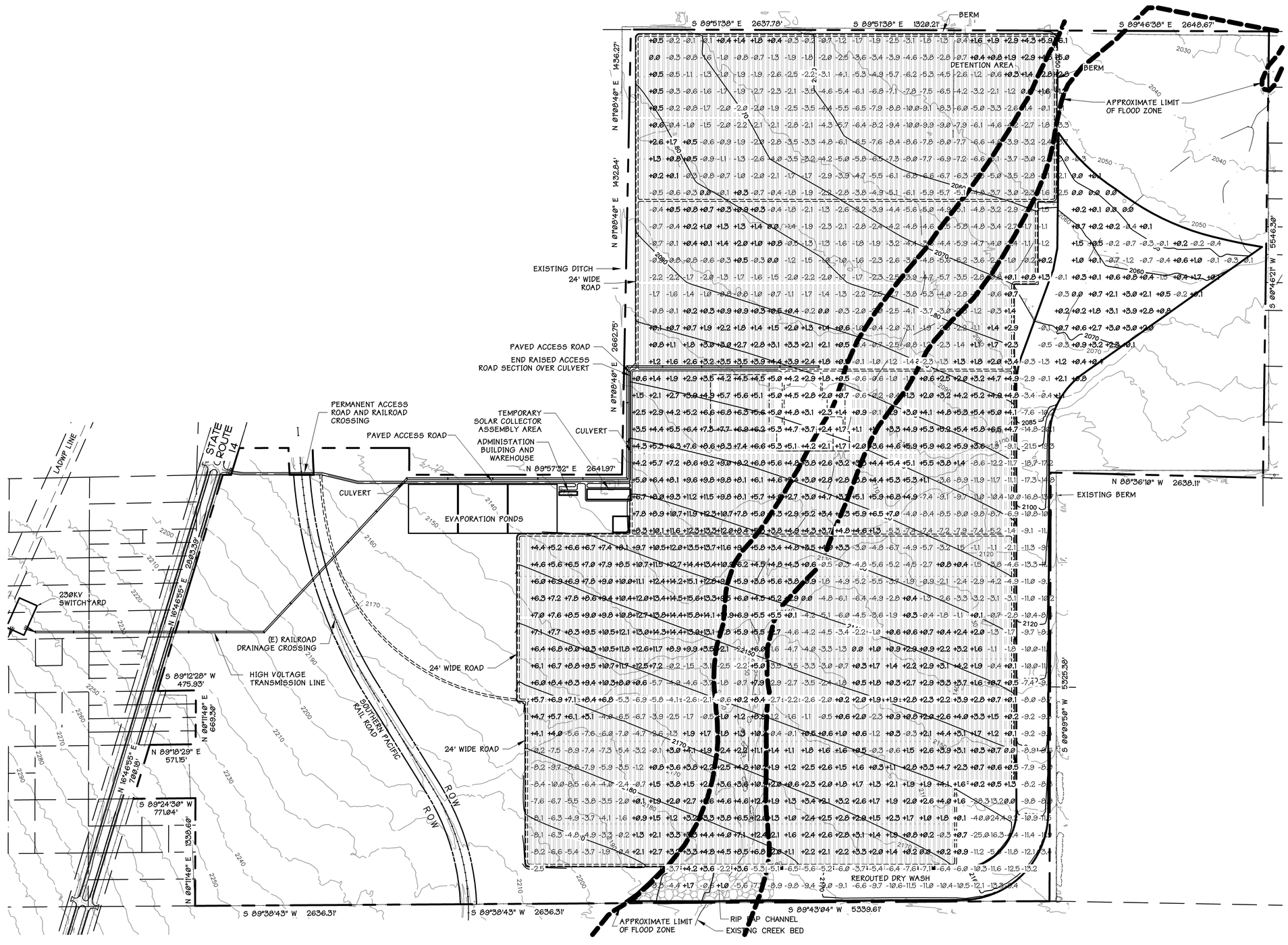
SCALE: 1" = 600' — DRAWING SIZE: ARCH D (24" x 36")

WORLEYPARSONS DWG. NO. — REV: A

PROJECT MANAGER | PROJ ENGR MANAGER | LEAD DISC ENGINEER | ENGINEER/TECH. SPEC | LEAD DESIGNER | CHECKED | DRAWN | DATE | REV

FAC PIPING I & C ELECT MECH CIVIL STRUC

25Jun2008 11:05am pmckenna Z:\Worley Parsons\6199-01-07 TRE Project Beacon\DwgSet\619901_C1



1 inch = 600 ft.

Cut/Fill Legend

-1.3	DEPTH OF CUT
0.0	BALANCE
+1.0	DEPTH OF FILL

WORKING DRAWING — DATE 06/26/2008 — REV

PRELIMINARY STATUS LDE	DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
APPROVED STATUS LDE	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: PEM	
CHECKED BY: JDT	
LEAD DESIGNER: MDH	
ENGINEER/TECH SPECIALIST: MDH	
PROJECT ENGINEERING MANAGER: GEOFF BAXTER	
PROJECT MANAGER	

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ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PE: STATE:
LIC. NO.: DATE:

TEAM DRIVEN SOLUTIONS FOR THE BUILT ENVIRONMENT
CARLTON Engineering Inc.
3883 Ponderosa Road, Shingle Springs, CA 95682
Voice 530.677.5515 Fax 530.677.6545

PRELIMINARY — NOT FOR CONSTRUCTION

WorleyParsons — resources & energy

CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR
ENERGY PROJECT

DRAWING TITLE
CONCEPTUAL
CUT/FILL MAP

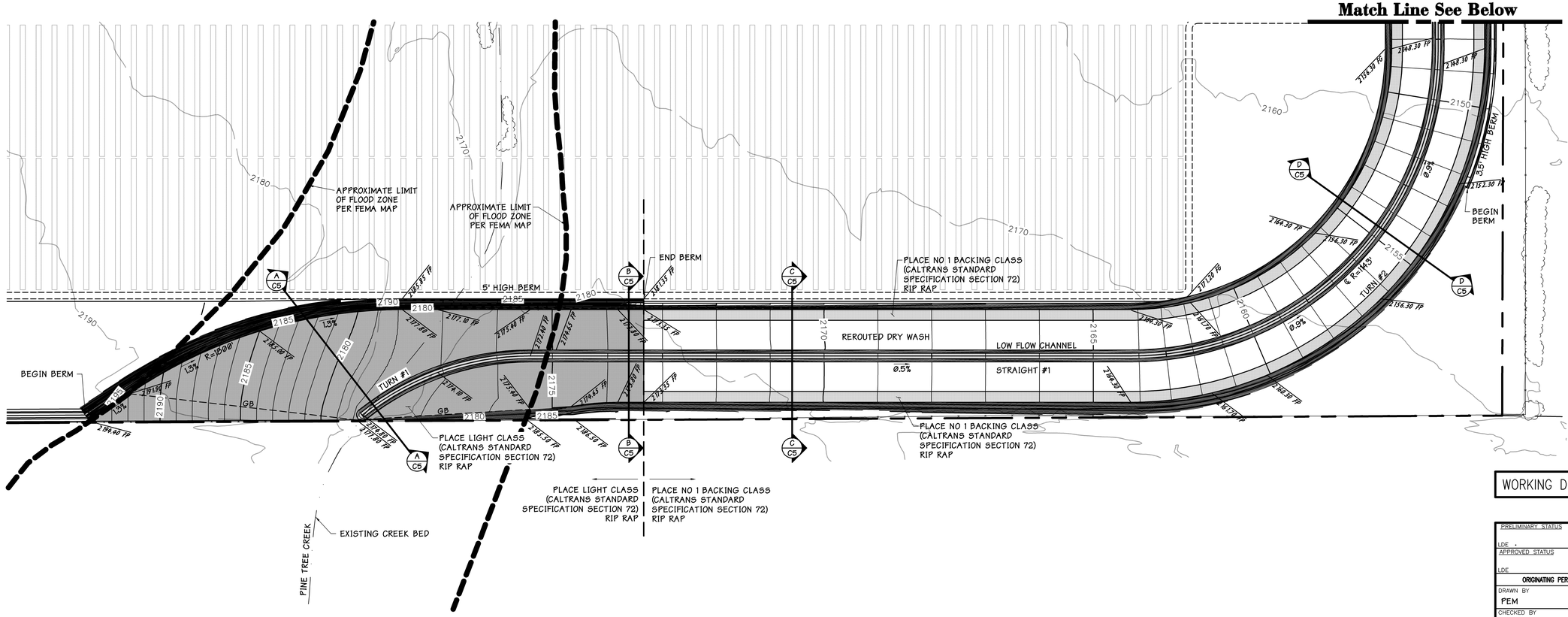
SHEET NO: C2

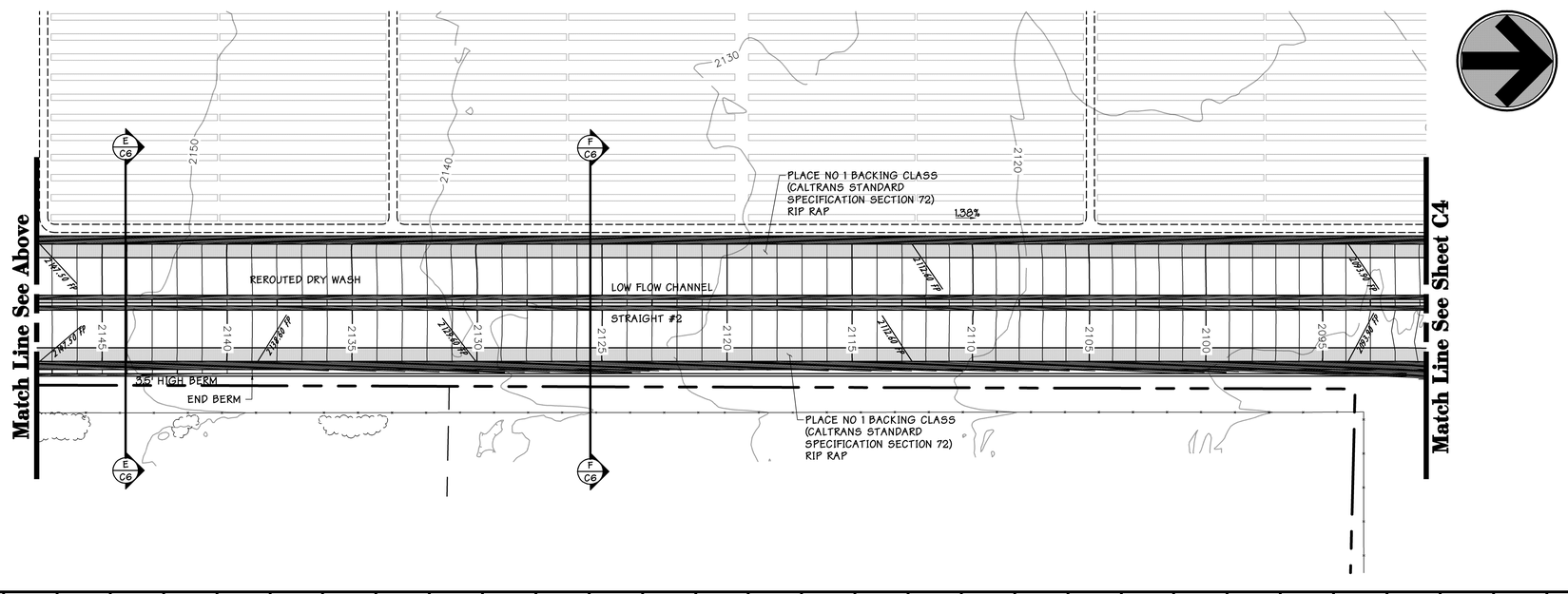
SCALE: 1" = 600'
DRAWING SIZE: ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.
REV

PROJECT MANAGER	
PROJ ENGR MANAGER	
LEAD DISC. ENGINEER	
ENGINEER/ TECH. SPEC.	
LEAD DESIGNER	
CHECKED	
DRAWN	
DATE	
REV	

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

26Jun2008 7:57am pmckenna Z:\Worley Parsons\61/99-01-07 FILE Project Beacon\DwgSet\619901_C2





WORKING DRAWING DATE 06/26/2008 REV

PRELIMINARY STATUS	DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LDE .		
APPROVED STATUS	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE		

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: PEM	
CHECKED BY: JDT	
LEAD DESIGNER: MDH	
ENGINEER/TECH SPECIALIST: MDH	
PROJECT ENGINEERING MANAGER: GEOFF BAXTER	
PROJECT MANAGER:	

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DRAWING TITLE: CHANNEL GRADING PLAN

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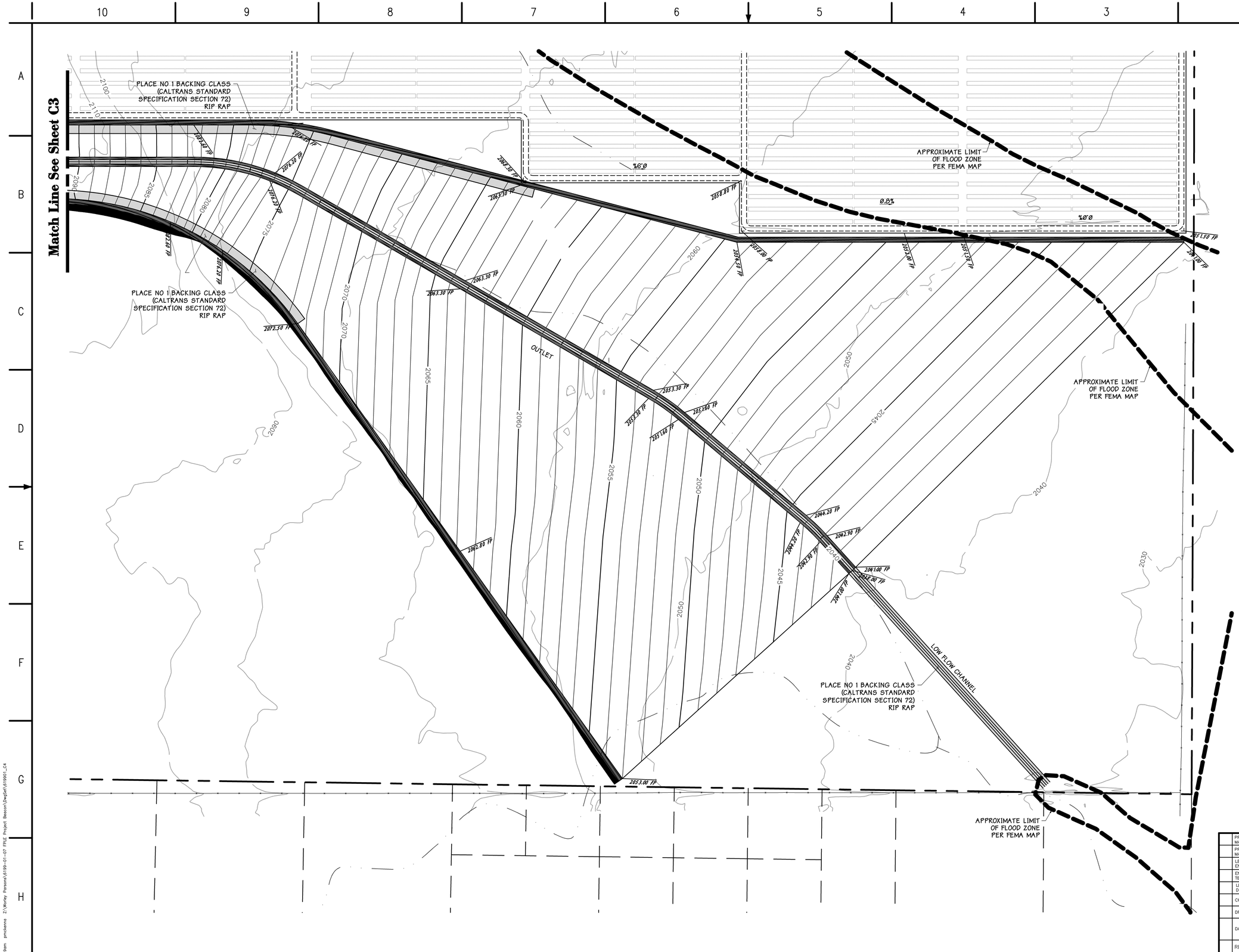

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DRAWING TITLE
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GRADING PLAN

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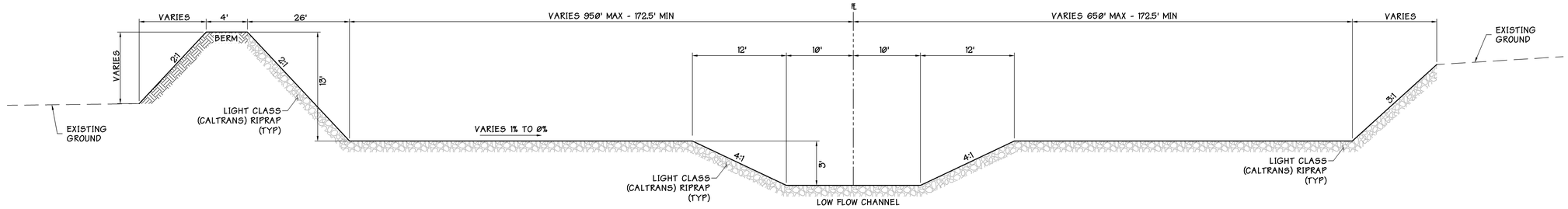

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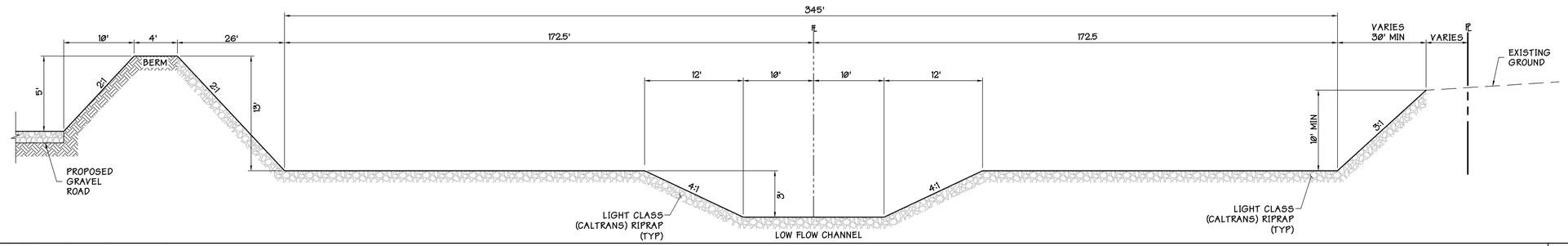

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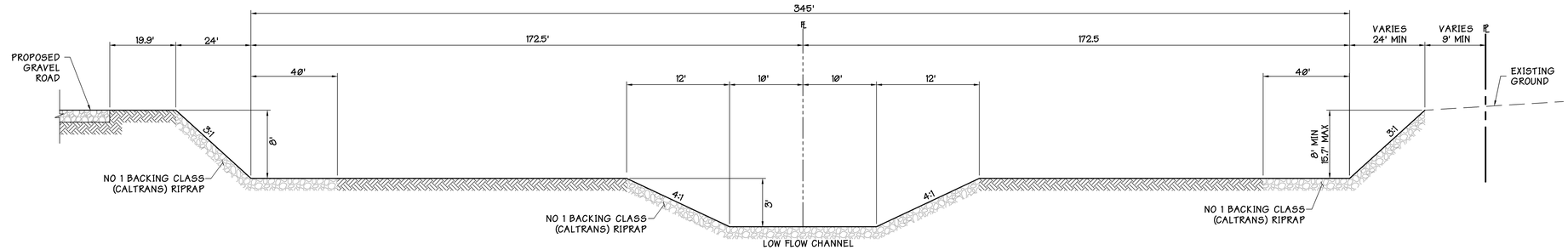

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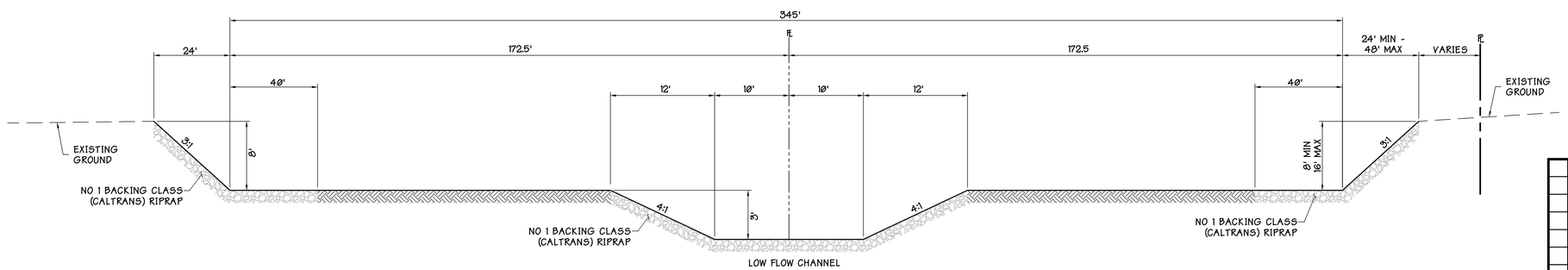

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SCALE: 1" = 600'

DRAWING SIZE: ARCH D (24" x 36")

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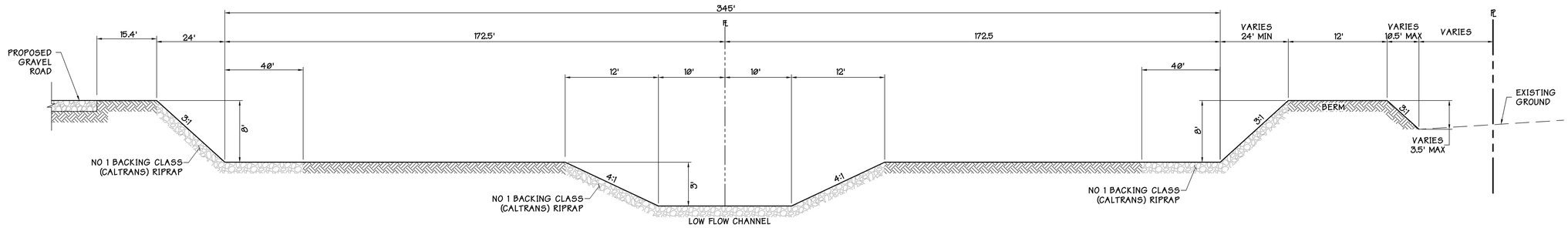

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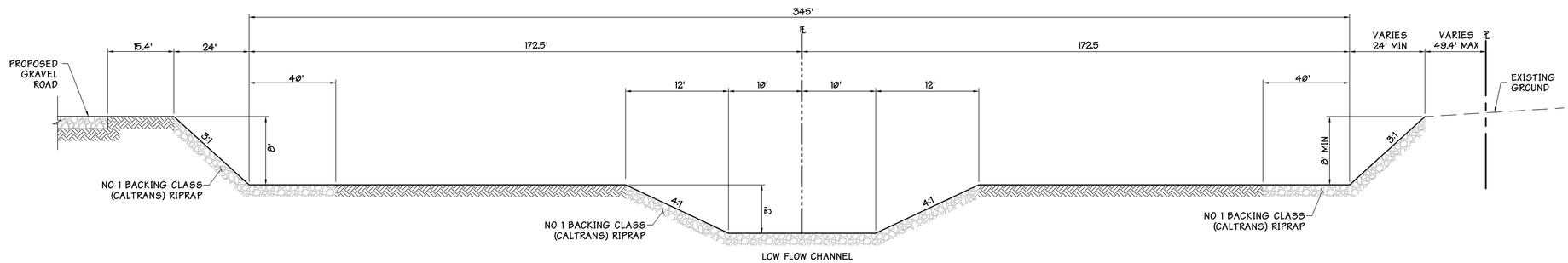

Section F-F

NTS **F**

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PROJECT MANAGER:

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ENERGY PROJECT

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SHEET NO: C6

SCALE: 1" = 600'
DRAWING SIZE: ARCH D (24" x 36")
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N

14

LADWP 230 KV LINE

LADWP 500 KV LINE

ROW

ROW

MIDLAND TRAIL
STATE ROUTE 14

N 645014.93
E 1993976.58

FENCE

24' WIDE
EARTHEN
ROAD

EXISTING SCE
DISTRIBUTION LINE

PAVED ACCESS
ROAD

ADMINISTATION
BUILDING AND
WAREHOUSE

SOLAR COLLECTOR
ASSEMBLY
FABRICATION AREA

PERMANENT
ACCESS ROAD
& RR XING

GATE

PAVED ACCESS ROAD

WELL 63

WELL 42

WELL 49

HIGH VOLTAGE
TRANSMISSION LINE
INTERCONNECTION
OPTION 2

BEACON SOLAR ENERGY
PROJECT, 230KV
SWITCHING STATION

PL

LAND
FARM

EVAPORATION PONDS

24' WIDE
EARTHEN ROAD

WELL 41

24' WIDE
EARTHEN ROAD

HIGH VOLTAGE
TRANSMISSION LINE
INTERCONNECTION
OPTION 1

ROW

ROW

PL

PL

LADWP LINE

NEW 230KV LINE
TO BARREN RIDGE
SWITCHING STATION

14

N 634126.01
E 1988563.99

NORTH DEBRIS & ORGANICS
HANDLING AREA

CONST TRAILERS

CONST PARKING

LAYDOWN AREA

SOUTH DEBRIS & ORGANICS
HANDLING AREA

N 644991.77
E 2001903.42

APPROXIMATE LIMIT
OF EXISTING FLOOD
ZONE

RELOCATED SCE
DISTRIBUTION LINE

EXISTING SCE
DISTRIBUTION LINE

UNDERGROUND
GAS LINE TO SOCAL
GAS CONNECTION

24' WIDE
EARTHEN ROAD

PROPERTY LINE

LOW MAINTENANCE
FENCE

24' WIDE ROAD

FENCE

REROUTED
DRY WASH

N 634184.94
E 1999176.05

APPROXIMATE LIMIT
OF EXISTING FLOOD
ZONE

500 0 500 1000 1500 2000 2500

SCALE IN FEET

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PROJECT ENGINEERING MANAGER: GEOFF BAXTER	
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BEACON SOLAR ENERGY PROJECT

GENERAL ARRANGEMENT
SITE PLAN

ISSUED FOR INFORMATION		
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ENGINEER/ TECH. SPEC.

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WORLEYPARSONS DWG. NO.: FPLS-0-SK-111-002-001
REV: H

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DWG-FILE: FPLS-0-SK-111-002-001.dwg
DWG-DATE: 19-MAY-08

Conceptual Drainage Study
for
BEACON SOLAR ENERGY PROJECT
Kern County
California

Prepared for:
WorleyParsons
2330 East Bidwell Suite 150
Folsom, CA 95630

February, 2008
Project No. 6199-01-07

CARLTON
Engineering Inc.

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Figure 1: Location Map

Figure 2: Vicinity Map

I. PROJECT INTRODUCTION:

The Beacon Solar Energy Project is located in the Fremont Valley on approximately 2,330 acres adjacent to State Route 14 (Midland Trail), north of California City in Kern County, California (Figures 1 & 2). The site is bounded by State Route 14 to the west, and undeveloped land to the north, east and south. Railroad tracks operated by Southern Pacific Railroad run north/south, bisecting the western portion of the site. The project includes construction of a solar power plant, which will generate approximately 250 Megawatts of power using solar thermal technology. In conjunction with the power plant, an administration building, a warehouse, and a paved access road from State Route 14 to the central power block will be constructed. The site is located over the Cantil Valley Fault (Garlock West Fault).

Based on Flood Hazard Maps prepared by the Federal Emergency Management Agency (FEMA) a 100 year flood zone crosses the central portion of the site, trending northeast along the alignment of Pine Tree Creek dry wash. Off-site drainage comes from the El Paso Mountains to the southwest. Pine Tree Creek is similar to other streams in the area, it discharges from well defined, steep canyons, but tends to spread out into a number of poorly defined drainage channels on the valley floor. This is evident from the topographic survey of the project site (provided by Lars Andersen).

The proposed improvements will realign the dry wash to follow the southern and eastern property boundaries. The outlet of the rerouted dry wash will be designed and constructed to return the flow from a channelized flow into sheet flow, which mimics the existing dry wash channel.

Major grading is necessary because of design constraints involved in constructing the solar panel arrays. In approximate numbers, 4.3 million cubic yards of material will be excavated and balanced on site (see the conceptual grading plan located in Appendix B).

This conceptual drainage report addresses drainage patterns associated with the onsite development of the solar plant, and existing and proposed drainage flows through and around the development.

II. OBJECTIVE:

This report outlines the hydraulic and hydrologic conditions associated with the development of approximately 2,330 acres of desert shrub range. The information and calculations presented in this report follow the requirements of Kern County through use of the methodology outlined in the “Kern County Hydrology Manual” and “Kern County Division Four Standards for Drainage”.

Anticipated increases in storm water runoff due to conversion of existing pervious soils to compacted and impervious surfaces will be mitigated through use of an onsite detention area. Preliminary sizing of the onsite detention area is located in Appendix B.

The existing dry wash (Pine Tree Creek) will be relocated around the proposed solar array facility. The relocated dry wash channel will be sized to contain the 100 year water surface within the channel with appropriate freeboard per the Kern County Division Four Standards for Drainage.

III. SUMMARY:

Pre- and Post-development flow to the point of interest has been calculated and summarized in Table 1A below.

Table 1: Summary of Peak Flows at Point of Interest-Downstream Project Pine Tree Crk (7P)

	Peak Flow			
	Pre-Development		Post-Development*	
Storm Duration	10-year	100-year	10-year	100-year
24-hour	48.6 cfs	175.8 cfs	48.5 cfs	175.5 cfs

*Per Requirements from the Kern County Hydrology Manual

IV. HYDROLOGY:

The hydrologic analysis was performed and analyzed as set forth in the Kern County Hydrology Manual. USDA Natural Resources Conservation Service (SCS) Technical Release 55 (TR-55) is used to assign curve numbers (CN) in calculating runoff. TR-55 is also used to compute time of concentration, or the time it takes for runoff to travel from the most hydraulically distant part of the watershed to the point of reference downstream. Time of concentration is based on sheet flow, shallow concentrated flows, and channel flow.

The components of storm drain systems include swales, drain inlets, pipes, and detention structures. It is anticipated that the Beacon Solar Energy Project will predominately use ditches and channels to convey runoff through and around the project. The design of each component must take into account the worst-case scenario. For onsite ditches, this occurs during a short duration event, resulting in high peak flow (cubic feet per second). The rational method will be utilized for this calculation. A longer duration (24-hour), less intense storm will produce the greatest volume and should be used in designing detention structures. The SCS Unit Hydrograph Method will be used for this calculation.

Onsite ditches and channels were sized using Manning's Equation and Bently Flowmaster (Service Pack 3, 2005) computer program. Detention structures are sized using the SCS Synthetic Unit Hydrograph method (Technical Release 20, TR-20). For detention, calculations were performed with HydroCAD version 8.50 (HydroCAD Software Solutions), which incorporates the methodologies described above. HydroCAD is a Computer Aided Design system used for modeling the hydrology and hydraulics of storm water runoff. It is based largely on the hydrology techniques developed by the Soil Conservation Service (SCS/NRCS), combined with other hydrology and hydraulics calculations. For a given rainfall event, these techniques are used to generate hydrographs throughout a watershed.

A. RAINFALL

Mean annual rainfall for the project site is 5.3 inches per year (USGS). Using the figures in the Hydrology Manual, the rainfall depth is 1.10 inches for the 2-year storm, 1.97 inches for the 10-year storm, and 3.25 inches for the 100-year storm (Appendix C). As the elevation of the project site is above 1,640 feet (project site varies from 2,026 to 2,257 feet), the SCS Type IA storm temporal distribution will be used.

B. SOILS

Soil classification is made using data from the SCS Soil Survey for Kern County, California, Southeastern Part (Appendix C). The soil in the project site is classified as Arizo Gravelly Loamy Sand, Hydrologic Soil Group (HSG) A; Cajon Loamy Sand, HSG A; Cajon Gravelly Loamy Sand, HSG A; Jawbone Gravelly Loamy Sand, HSG D; and Rosamond Clay Loam (Saline-Alkali), HSG C. Kleinfelder, who is preparing the final Geotechnical Engineering Study for the project, was contacted and confirmed the soil types listed above to be consistent with the NRCS Soil Map.

The table below lists the soil classification number, and description of the soils permeability.

Table 2: Summary of Soil NRCS Soil Map

Kern County NRCS Soil Map, Southeastern Part			
NRCS Map Number	Map Unit Name	Permeability Description	Permeability (Inches per Hour)
104	Arizo Gravelly Loamy Sand	Very Rapid	More than 20 inches

114	Cajon Loamy Sand	Rapid	6.0 to 20 inches
116	Cajon Gravelly Loamy Sand	Rapid	6.0 to 20 inches
148	Jawbone Gravelly Loamy Sand	Rapid	6.0 to 20 inches
172	Rosamond Clay Loam	Moderately Slow	0.2 to 0.6 inch

C. HYDROLOGIC LOSSES

With the hydrologic soil group established, hydrologic losses can be computed using SCS runoff curve numbers (CN) found by using the TR-55 runoff curve numbers (see Appendix C). The subcatchment areas and associated curve numbers are input into HydroCAD, which calculates a weighted CN and total area in computing runoff. The hydrologic cover type was assumed to be Desert Shrub and a hydrologic density, or the percent of the ground surface covered by the crown canopy of live plants and trees, was assumed to be POOR with a vegetative cover ranging from 0 to 20%.

D. EXISTING CONDITIONS:

A pre-construction drainage shed map (DS1, page 15 and DS2, page 16) was prepared to estimate the historical flow to Node 7P. The calculations of the 10- and 100-year storm flows for the pre-development conditions are summarized in Appendix A. The total water shed area draining to the site at Node 7P is approximately 83.2 square miles. State Route 14 and the Southern Pacific Rail Road bisect the watershed. Drainage crossing locations were estimated using aerial photos from Google Earth. The crossing locations are identified on shed map DS2. The size of the existing crossing structure is unknown at this time. We've assumed flow is unimpeded at each crossing. This assumption is conservative because it does not take into account any storage or reduction in peak flows that may be associated with an undersized crossing structure. There is one identified onsite drainage crossing of the railroad identified on the shed map. The watershed area to this crossing location is approximately 937 acres. The majority of the offsite drainage area passes through the site along the Pine Tree Creek dry wash.

The 10 and 100-year storm flows were determined using the SCS unit hydrograph procedure (also known as the TR-20 runoff method). The SCS unit hydrograph method generates a runoff hydrograph by the following basic steps:

1) A rainfall distribution is selected which indicates how the storm depth will be distributed over time. For the purposes of this report, a SCS Type IA 24 hour storm distribution will be used.

2) The design storm depth is determined from rainfall intensity duration frequency (I-D-F) curves from Kern County Hydrology Manual Rainfall Isohyet Map and the Point Precipitation Frequency Estimates from NOAA Atlas 14 (see Appendix C). Combined with the rainfall distribution, this specifies the total rainfall depth at all times during the storm.

3) Based on the Time-of-Concentration the storm is divided into small segments of equal duration. For each segment, the SCS runoff equation and the average Curve Number are used to determine the portion of that segment that will appear as runoff.

4) A Unit Hydrograph (or a hydrograph of a storm dropping one inch of runoff on the entire basin) in conjunction with the Time-of-Concentration, is used to determine how the runoff from a single segment is distributed over time. The result is a complete runoff hydrograph for a single segment.

5) Individual hydrographs are added together for all segments in the storm, yielding the complete runoff hydrograph for the storm.

Due to the complexity of the SCS unit hydrograph method and analyzing detention requirements, the computer program HydroCAD will be utilized. The backup calculations are located at the end of this report in Appendix A.

Existing condition watershed sub areas are depicted on shed map DS2 (Appendix A) and are summarized below. The calculated peak runoff will be used as a target flow in the post-development condition.

1. SUBCATCHMENT 1S – Above State Route 14

a) SUB AREA A1

Soil Name – 148 Jawbone gravelly loamy sand, Desert Shrub Range, Poor, HSG D, CN 88 (207.3 acres).

b) SUB AREA A2

Soil Name – 104 Arizo gravelly loamy sand, Desert Shrub Range, Poor, HSG A, CN 63 (340.7 acres).

2. SUBCATCHMENT 3S – Above Rail Road

a) SUB AREA B1

Soil Name – 104 Arizo gravelly loamy sand and 114 Cajon loamy sand, Desert Shrub Range, Poor, HSG A, CN 63 (389.4 acres).

3. SUBCATCHMENT 5S – West of Dry Wash (Pine Tree Creek)

a) SUB AREA C1

Soil Name – 172 Rosamond clay loam, Desert Shrub Range, Poor, HSG C, CN 85 (353.3 acres).

b) SUB AREA C2

Soil Name – 104 Arizo gravelly loamy sand and 114 Cajon loamy sand, Desert Shrub Range, Poor, HSG A, CN 63 (700.8 acres).

4. SUBCATCHMENT 6S – East of Dry Wash (Pine Tree Creek)

a) SUB AREA D1

Soil Name – 172 Rosamond clay loam, Desert Shrub Range, Poor, HSG C, CN 85 (397.6 acres).

b) SUB AREA D2

Soil Name – 114 Cajon loamy sand and 116 Cajon gravelly loamy sand, Desert Shrub Range, Fair, HSG A, CN 63 (537.8 acres).

It should be noted that the flows through the Pine Tree Creek dry wash were not added to the drainage calculations in Appendix A. It is assumed that the flow through the dry wash in the existing and proposed flow rate will remain unchanged by the project development.

E. PROPOSED CONDITIONS

The Kern County Hydrology Manual suggests restricting the area to use the rational method to 640 acres and less. The post construction drainage areas for each shed are less than 640 acres and the rational method will be used to size the onsite drainage swales to contain the 10- and 100-year rainfall events. One exclusion to this rule is the onsite water sheds D

(Node 17S, see DS4 page 51). The watershed entering the site at the rail road drainage crossing identified above (described in section D—Existing Conditions) is greater than 640 acres (approximately 1168.4 acres), and therefore, the SCS Unit Hydrograph Method will be used to size this channel.

The 10- and 100-year storm flows were determined using the Rational Method, Q=CIA, where C is the Runoff Coefficient, I is the Intensity (inches/hour) and A is the area (in acres).

Rainfall intensity, I, was derived from rainfall intensity duration frequency (I-D-F) curves from NOAA Atlas 14 Point Precipitation Frequency Estimates (see Appendix C). The Runoff Coefficient, C, is shown in Appendix B for each post development watershed.

The Beacon Solar Energy Project is shown on the attached site plan (provided by WorleyParsons) and on the Conceptual Grading Plan (prepared by Carlton Engineering). Both plans are located in Appendix B. The development will consist of a 24' wide paved access road, which will connect the solar power block to State Route 14. A new Administration Building and Warehouse will also be constructed.

The power block is located in the approximate geographic center of the solar array field. The power block covers approximately 13.1 acres and is approximately 39% impervious.

The Solar Collector Assembly Area (SCAA) will contain a paved access road and assembly building. According to WorleyParsons, the assembly area is temporary and will be removed after construction of the facility. For purposes of this conceptual drainage study, the SCAA area will not be used in the calculations of post development runoff.

The post development curve numbers were increased approximately 3% from the existing condition curve numbers due to the minimal increase in impervious area from the development as described above.

Each of the solar panel mirrors will freely drain and will be assumed pervious. The solar panel field is divided up into "design cubes". Each "design cube" is 2,050 linear feet by 1,180 linear feet. Within each design cube there are eighty, 489 linear feet long solar panels. Each solar panel has thirteen support footings, measuring two feet in diameter each (40.9 square feet). Therefore, each design cube contains approximately 3,270 square feet of impervious solar panel footings, making each design cube approximately 0.14% impervious.

Approximately 26.6 acres has been identified as evaporation ponds to be constructed as a part of this project. The evaporation ponds will be considered retention basins with no outlet. Uphill drainage will be routed around the evaporation ponds. Rain falling directly on the ponds will be retained and evaporated, and will not be used in the calculation of the post development runoff totals.

A detention area will be required to restrict the flows from the north section of the site (see watershed DS3 in Appendix B). The construction of the solar field will transform existing surface flow (sheet, shallow channel flow) to a single concentrated point of discharge. In order to reduce the overall project peak post-development flows to pre-development runoffs, a detention basin will gravity drain to the east to Pine Tree Creek.

The proposed detention area (identified as node 11P in the HydroCAD printouts located in Appendix B) is located within Rosamond Clay Loam as identified by the SCS Maps. An infiltration factor of 0.2 inches per hour was assumed for the basin. The basin's watershed is approximately 374 acres (see attached shed map DS3 in Appendix B). The time of concentration for the developed watershed was determined to be 133.2 minutes (based on sheet flow + shallow concentrated flow + channel flow). Kern County requires the detention basin be sized for the Intermediate Storm Duration Discharge (10 year) five-day runoff hydrograph.

From the Point Precipitation Frequency Estimates from NOAA Atlas 14 in Appendix C, the interpolated 10-year, 5-day rainfall depth is 2.59 inches. The peak 10-year, 5-day flow into the detention area was determined to be 20.4 cfs. The design storm volume was determined to be 3.1 acre-ft. At the north east side of the detention area, a 40' wide trapezoidal weir (2:1 side slopes) will serve as an outlet for the detention structure. During the 10-year, 5-day storm event, the trapezoidal weir will limit the runoff to the pre-development level (7.8 cfs). For the 100- year, 24-hour event, the trapezoidal weir will limit the runoff to the pre-development level (35.5 cfs). The detention area will completely drain within seven days, as required by Kern County. For larger storms than the 10-year, 5-day event, the runoff will flow over the top of the earthen berms through a concrete lined overflow weir structure. The peak water surface depth within the detention area will be approximately 5.0 inches, storing approximately 12.6 acre-ft. The trapezoidal weir will flow to Pine Tree Creek dry wash.

Pine Tree Creek dry wash will be rerouted to follow the project's southern and eastern property boundaries. Per the Kern County Division Four Standards for Drainage, the realigned dry wash will be sized to convey the

Capital Storm Design Discharge (100 year) event. The realigned dry wash will be a trapezoidal channel having 3:1 side slopes with a minimum bottom width of 345 feet and minimum depth of 8 feet. By constructing a channel with this shape, the minimum freeboard of one foot above the water surface will be obtained. Due to the existing, poorly defined dry wash channel (sheet flow through portions of the dry wash) the channel outlet will be designed to return the flow from a concentrated flow into sheet flow.

Shed map DS3 (Appendix B) depicts the post-development conditions and drainage patterns and are summarized as follow:

1. SUBCATCHMENT 8S – West of Rerouted Dry Wash/East of Rail Road

a) SUB AREA E1

Soil Name – 114 Cajon loamy sand and 116 Cajon gravelly loamy sand, Desert Shrub Range, Poor, HSG A, CN 65 (1031.4 acres).

b) SUB AREA E2

Soil Name – 172 Rosamond clay loam, Desert Shrub Range, Poor, HSG C, CN 87 (94.8 acres).

2. SUBCATCHMENT 9S– East of Rerouted Dry Wash (Including Dry Wash)

a) SUB AREA F1

Soil Name – 114 Cajon loamy sand, Desert Shrub Range, Poor, HSG A, CN 63 (293.6 acres).

b) SUB AREA F2

Soil Name – 172 Rosamond clay loam, Desert Shrub Range, Poor, HSG C, CN 85 (208.9 acres).

3. SUBCATCHMENT 10S – North Section

a) SUB AREA G1

Soil Name – 114 Cajon loamy sand, Desert Shrub Range, Poor, HSG A, CN 65 (16.3 acres).

b) SUB AREA G2

Soil Name – 172 Rosamond clay loam, Desert Shrub Range, Poor, HSG C, CN 87 (357.8 acres).

4. SUBCATCHMENT 13S – Evaporation Ponds

a) SUB AREA H1

Soil Name – 114 Cajon loamy sand, Desert Shrub Range, Poor, HSG A, CN 63 (26.6 acres).

It should be noted that the flows through the Pine Tree Creek dry wash were not added to the drainage calculations in Appendix A. It is assumed that the flow through the dry wash in the existing and proposed conditions will remain unaffected by the project development.

F. PINE TREE CREEK ANALYSIS

The scope of this conceptual drainage study did not include a detailed study of the flows in Pine Tree Creek dry wash. As previously mentioned, the drainage area at Point of Interest 7P is approximately 83.2 square miles. The 1986 FEMA Flood Insurance Study of Kern County, California Unincorporated Areas Table 2 Summary of Discharges identifies several drainage sheds within Kern County that are both larger and smaller than this project's watershed. This project is located within one of these studied areas. Pine Tree Creek drains northeast from the site, to Jawbone Canyon Wash. The FEMA study analyzed Jawbone Canyon Wash at a point approximately 2 miles northeast of point 7P where the Wash crosses Munsey Road (see shed map DS1). At this location, the 100-year peak flow in Jawbone Canyon Wash is identified as 36,000 cfs, with a total contributing watershed of 280.4 square miles.

Obtaining a conservative estimated flow for Pine Tree Creek was accomplished by plotting these similar drainage basins onto a graph and interpolating the data to determine a design flow that will remain within the conservative estimated flow of this study. The graph is located in Appendix A.

Based on the data points on the graph, and assuming that the sampled watersheds are similar to this basin (ie. shape, vegetation cover, soil, elevation, length, urbanization), then the conservative estimated flows anticipated for Pine Tree Creek range from 14,000 to 20,000 cfs. The rerouted Pine Tree Creek dry wash channel will be designed to carry these flows.

V. HYDRAULICS

A. SUMMARY

Ditches and channels were designed using open channel flow criteria outlined in the Kern County Division Four Standards for Drainage. Design criteria can be reviewed in Appendix D.

B. DESIGN CONSIDERATIONS

1. DESIGN STORM FREQUENCY

Per the Kern County Division Four Standards for Drainage, the constructed drainage system is designed to convey the Capital Storm Design Discharge (CSDD) 100-year event with the water surface elevation contained within all ditches and channels.

2. DESIGN STORM DURATION

The goal in storm drain design is to convey the maximum peak flow for a given design storm. This involves choosing a storm with the same duration as the time of concentration for the watershed (critical duration). In our case, the minimum time of concentration equals 100 minutes. As the storm flow is passed down the collection system, the time of concentration at each point downstream of the headwater sheds will increase according to shed minimum time of concentration plus travel time in pipes.

3. MINOR LOSSES

A Manning's roughness coefficient n value of 0.022 was assumed for the clean excavated ditches within the project site. A Manning's n value of 0.035 was assumed for the rerouted dry wash (Pine Tree Creek). This will allow for a stone covered channel bottom and weed covered banks. This assumed n value will take into account revegetation of the dry wash with native plant species. See Appendix D for roughness coefficient backup data.

C. OPEN CHANNEL STUDY OF PINE TREE CREEK DRY WASH CHANNEL

The program Flowmaster by Bently was used to determine the water surface and velocity in the realigned channel. For purposes of this report, two channel section locations were analyzed in the dry wash: one section along the east flowing channel at the southern property line, and one along the north flowing channel adjacent to the eastern property line. We

assumed for these channels that the depth of flow achieves a condition known as normal depth, and is assumed constant along the length of the channel. See Appendix D for Flowmaster calculations of the dry wash channel.

Input Variables
Flows:
Based on a previous FEMA Flood Insurance Study, as described above, the 100-year peak discharge storm flow in the Pine Tree Creek Dry Wash is estimated to be between 14,000 and 20,000 cfs.

Channel Geometry and Alignment:
The Dry Wash channel is designed with maximum 3:1 side slopes and a minimum channel bottom of 345 feet. The minimum channel centerline curve in constructed channels is three times the top width of the design water surface.

Channel Slope and Roughness:
The rerouted Dry Wash will slope from a minimum of 0.5% to a maximum of 1.4%. Channel roughness was taken from Table 3 Summary of Roughness Coefficients in the FEMA Flood Insurance Study Kern County, California Unincorporated Areas Volume 1. The roughness for the Jawbone Canyon Wash for the Channel "n" value ranges between 0.030-0.045.

Channel Depth and Velocity:
The depth of flow for the portion of the rerouted dry wash channel that is at 0.5% for the 14,000 to 20,000 cfs flow range is 4.7 to 5.9 feet while the velocity ranges between 8.2 fps to 9.4 fps (see Appendix D).

The depth of flow for the portion of the rerouted dry wash channel that is at 1.4% for the 14,000 to 20,000 cfs flow range is 3.5 to 4.3 feet while the velocity ranges between 11.3 to 13.0 fps (see Appendix D).

For final construction documents for the project it is our recommendation that a detailed study be prepared to calculate the water surface elevation using a computer program such as the United States Army Corps HEC-RAS, or an equivalent.

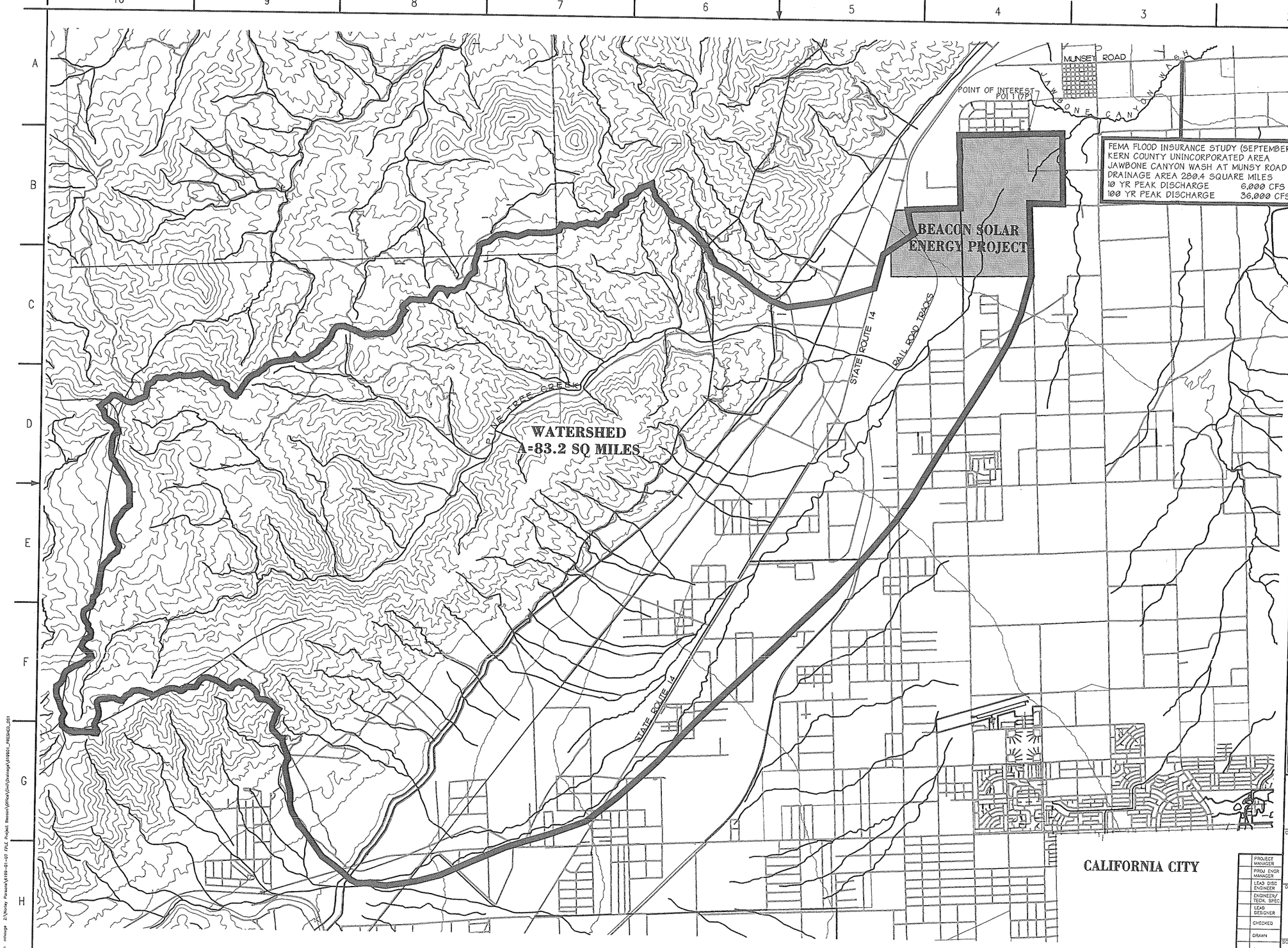
Erosion:
Due to the high water velocities (8.2 to 13.0 fps) as indicated above, the channel may require additional erosion control measures (ie. rip-rap, blanket, etc.). Per Figure 2 – *"Size of stone that will resist displacement for various velocities and side slopes"* in Appendix D, the rip-rap will range

in size between No. 2 Backing Class to Light Class (see Caltrans Standard Specification Section 72 for specification of class type). The rip-rap shall be placed along the channel floor and up the channel sides to estimated water depth.

Final erosion control measures in the channel shall also take into account the scour potential of the native soil. This information should be included in the geotechnical report during final detailed design.

Outlet:
Due to the nature of the existing dry wash spreading out into poorly defined drainages on the valley floor, the outlet of the rerouted dry wash will return the channelized flow back into sheet flow. The channel will transition from a well-defined trapezoidal channel to a wide channel that will convert the concentrated flow into sheet flow.

VI. APPENDIX A: EXISTING CONDITIONS



WORKING DRAWING DATE 02/20/2008 REV

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LDE		
APPROVED STATUS	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE		

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: PEM	
CHECKED BY: JDT	
LEAD DESIGNER: MDH	
ENGINEER/TECH. SPECIALIST: MDH	
PROJECT ENGINEERING MANAGER: GEOFF BAXTER	
PROJECT MANAGER	

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P.E. _____ STATE _____
C.E. NO. _____ DATE _____

REAL DRIVEN SOLUTIONS FOR THE BUILT ENVIRONMENT
CARLTON Engineering Inc.
3883 Ponderosa Road, Shingle Springs, CA 95682
Voice 530.677.5515 Fax 530.677.6845

PRELIMINARY
NOT FOR CONSTRUCTION

WorleyParsons
resources & energy

CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR
ENERGY PROJECT

DRAWING TITLE
PRE-DEVELOPMENT
DRAINAGE SHED MAP

SHEET NO: DS1

SCALE 1" = 3000'
DRAWING SIZE ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.
REV A

PROJECT MANAGER	
PROJ ENGR MANAGER	
LEAD DISC ENGINEER	
ENGINEER/ TECH. SPEC	
LEAD DESIGNER	
CHECKED	
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DATE	
REV	

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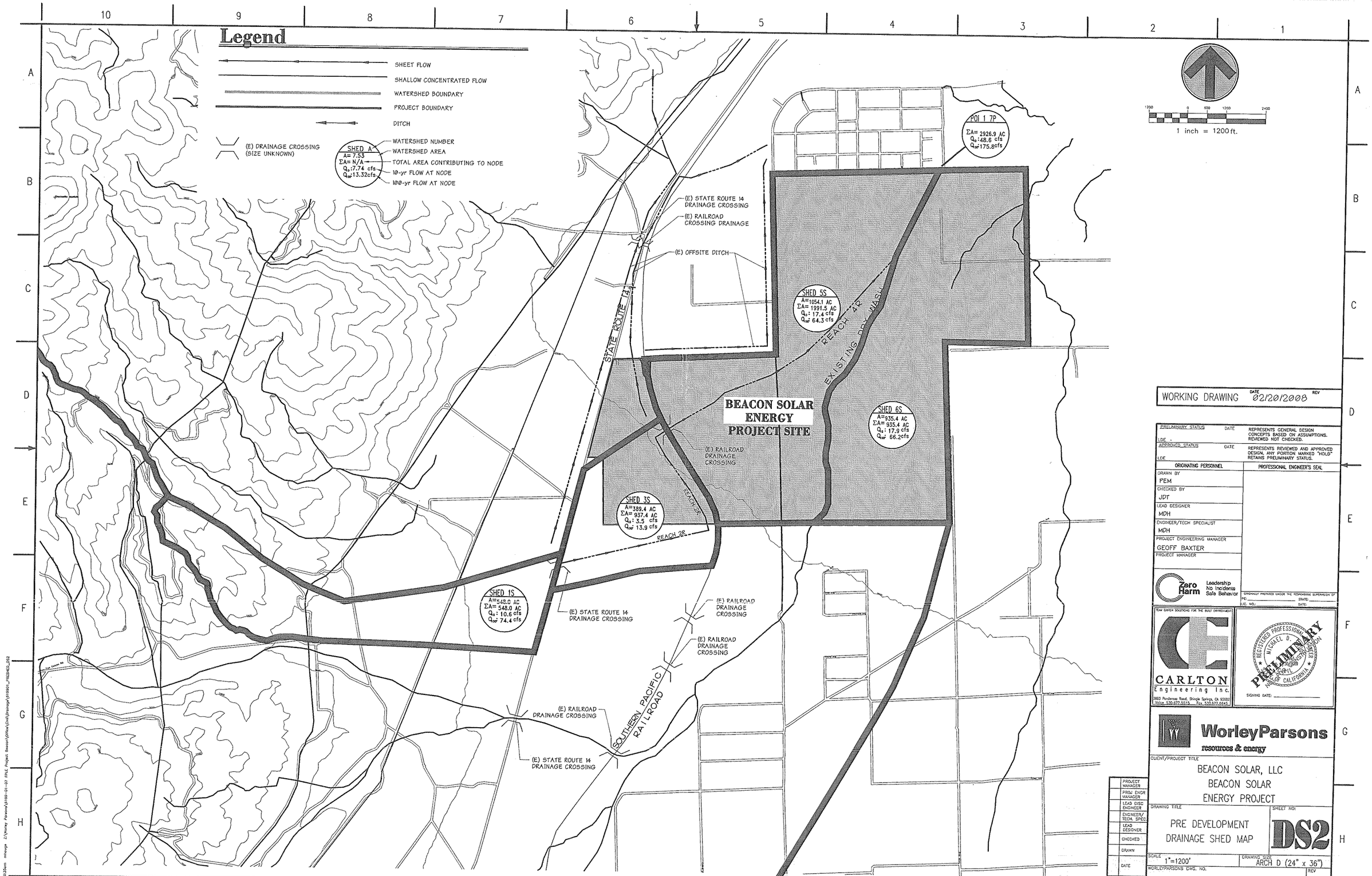

WORKING DRAWING DATE 02/20/2008 REV

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APPROVED STATUS	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LOE		

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: PEM	
CHECKED BY: JDT	
LEAD DESIGNER: MDH	
ENGINEER/TECH SPECIALIST: MDH	
PROJECT ENGINEERING MANAGER: GEOFF BAXTER	
PROJECT MANAGER	

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PE: STATE:
LIC. NO.: DATE:

TEAM DRIVEN SOLUTIONS FOR THE BUILT ENVIRONMENT
CARLTON Engineering Inc.
3583 Pendersen Road, Shingle Springs, CA 95682
Voice 530.677.5515 Fax 530.677.6645

REGISTERED PROFESSIONAL ENGINEER MICHAEL D. MCGRAW CIVIL STATE OF CALIFORNIA
PRELIMINARY
SIGNING DATE:

WorleyParsons resources & energy

CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR ENERGY PROJECT

DRAWING TITLE
PRE DEVELOPMENT DRAINAGE SHED MAP

SHEET NO: DS2

SCALE 1"=1200' | DRAWING SIZE ARCH D (24" x 36")
WORLEYPARSONS DWG. NO. | REV A

PROJECT MANAGER
PROJ ENGR MANAGER
LEAD DISC ENGINEER
ENGINEER/ TECH. SPEC.
LEAD DESIGNER
CHECKED
DRAWN
DATE
REV

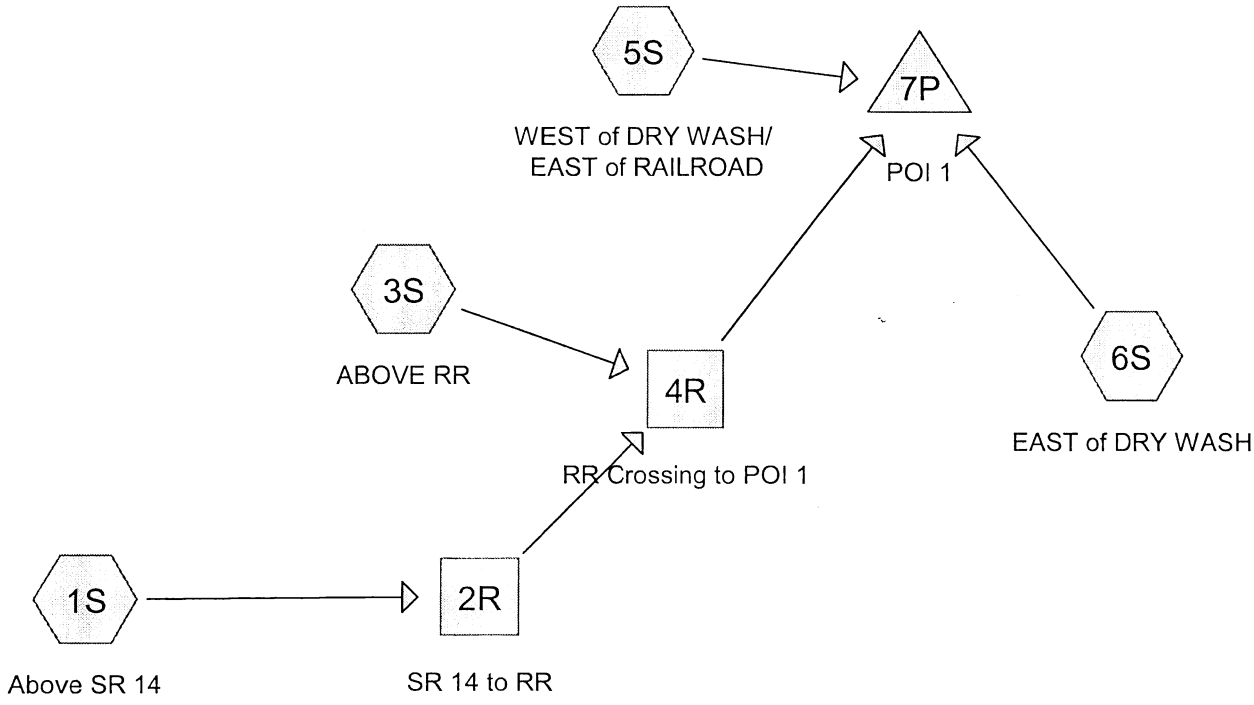
FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

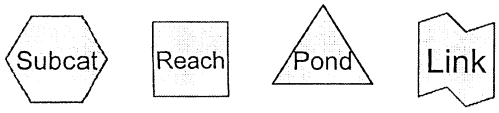
16

PRE CONSTRUCTION

Q_{10} = 48.6 CFS

Q_{100} = 175.8 CFS





Drainage Diagram for PRE
Prepared by Carlton Engineering, Inc, Printed 01/08/2008
HydroCAD® 8.50 s/n 003190 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1,968.700	63	Desert shrub range, Poor, HSG A (1S,3S,5S,6S)
750.900	85	Desert shrub range, Poor, HSG C (5S,6S)
207.300	88	Desert shrub range, Poor, HSG D (1S)
2,926.900		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
1,968.700	HSG A	1S, 3S, 5S, 6S
0.000	HSG B	
750.900	HSG C	5S, 6S
207.300	HSG D	1S
0.000	Other	
2,926.900		**TOTAL AREA**

Time span=3.00-24.00 hrs, dt=0.05 hrs, 421 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Above SR 14 Runoff Area=548.000 ac 0.00% Impervious Runoff Depth>0.27"
Flow Length=13,530' Tc=29.5 min CN=72 Runoff=10.55 cfs 12.468 af

Subcatchment 3S: ABOVE RR Runoff Area=389.400 ac 0.00% Impervious Runoff Depth>0.09"
Flow Length=8,690' Tc=32.0 min CN=63 Runoff=3.52 cfs 2.951 af

Subcatchment 5S: WEST of DRY WASH/ Runoff Area=1,054.100 ac 0.00% Impervious Runoff Depth>0.19"
Flow Length=10,700' Slope=0.0120 '/' Tc=169.8 min CN=70 Runoff=17.42 cfs 16.782 af

Subcatchment 6S: EAST of DRY WASH Runoff Area=935.400 ac 0.00% Impervious Runoff Depth>0.23"
Flow Length=11,600' Slope=0.0120 '/' Tc=188.2 min CN=72 Runoff=17.86 cfs 18.044 af

Reach 2R: SR 14 to RR Avg. Depth=0.68' Max Vel=3.83 fps Inflow=10.55 cfs 12.468 af
n=0.030 L=8,590.0' S=0.0180 '/' Capacity=296.80 cfs Outflow=10.54 cfs 11.521 af

Reach 4R: RR Crossing to POI 1 Avg. Depth=0.19' Max Vel=1.43 fps Inflow=13.95 cfs 14.472 af
n=0.030 L=10,560.0' S=0.0116 '/' Capacity=97.06 cfs Outflow=13.76 cfs 9.950 af

Pond 7P: POI 1 Inflow=48.55 cfs 44.775 af
Primary=48.55 cfs 44.775 af

Total Runoff Area = 2,926.900 ac Runoff Volume = 50.244 af Average Runoff Depth = 0.21"
100.00% Pervious = 2,926.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Above SR 14

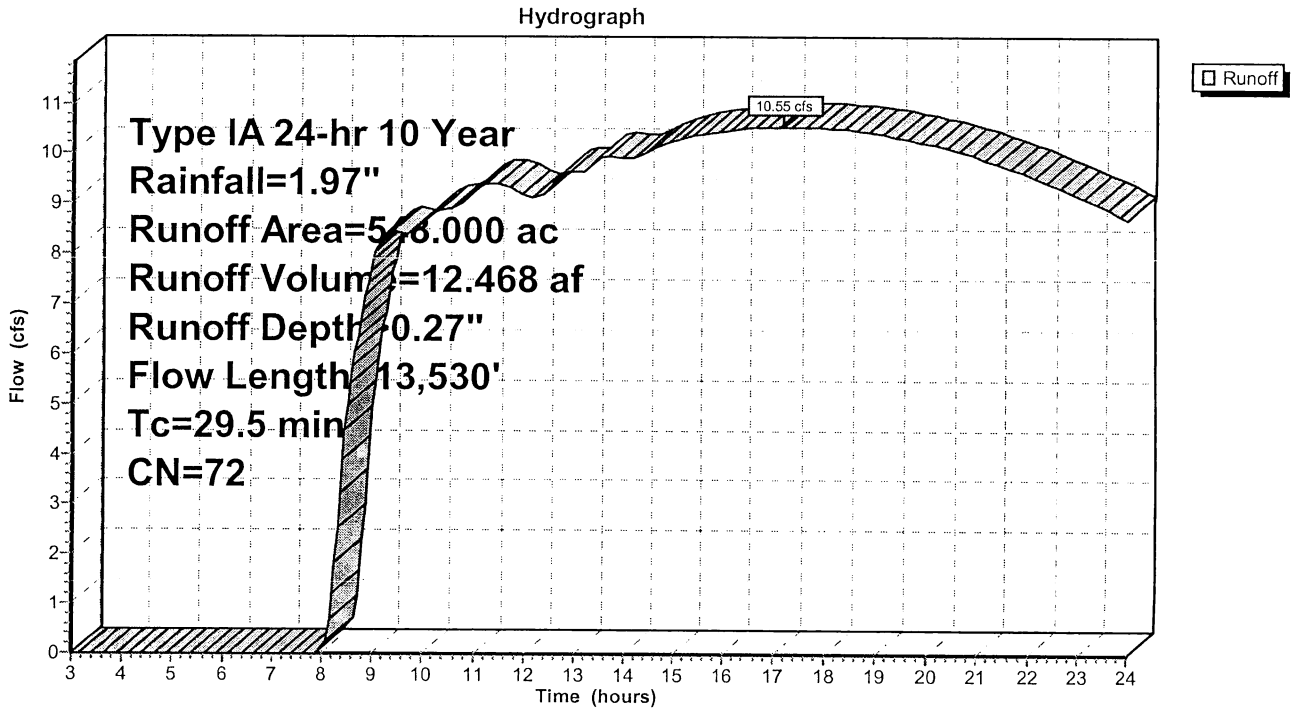
Runoff = 10.55 cfs @ 17.18 hrs, Volume= 12.468 af, Depth> 0.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
207.300	88	Desert shrub range, Poor, HSG D
340.700	63	Desert shrub range, Poor, HSG A
548.000	72	Weighted Average
548.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	200	0.0940	0.51		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
12.0	8,350	0.0940	11.59	115.90	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.0	4,980	0.0400	7.56	75.60	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
29.5	13,530	Total			

Subcatchment 1S: Above SR 14



Summary for Subcatchment 3S: ABOVE RR

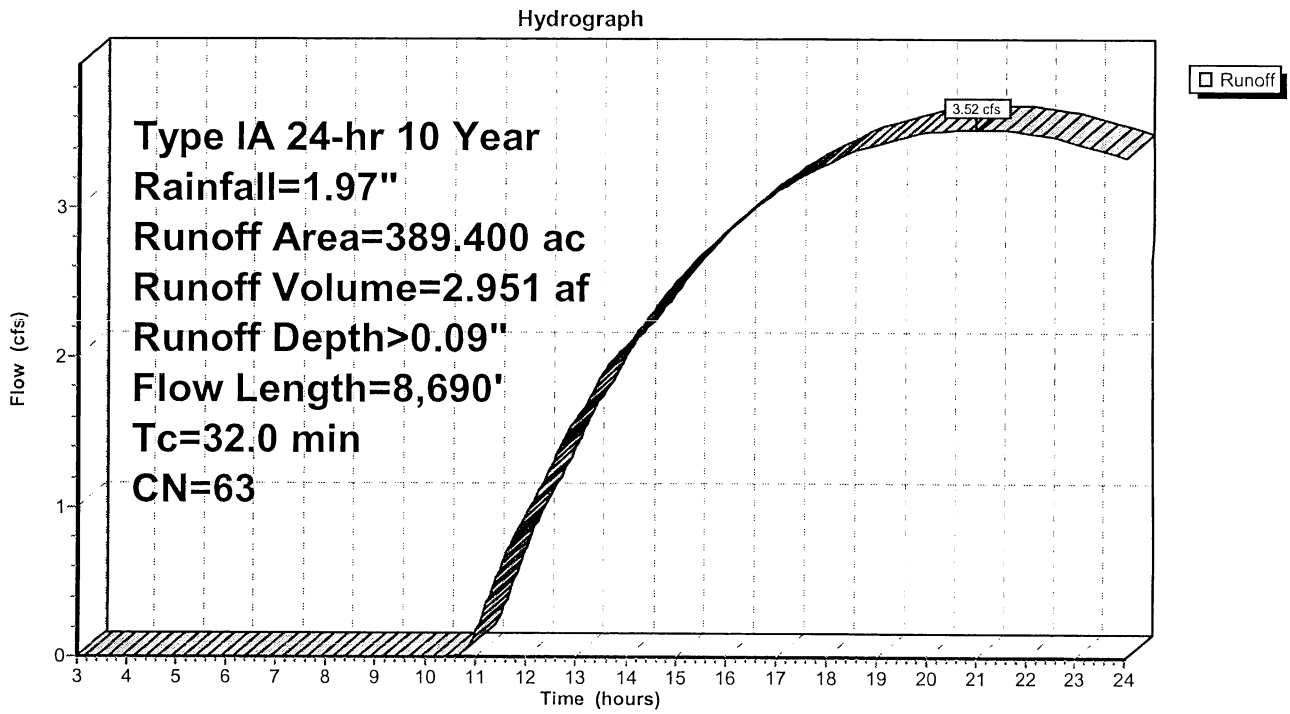
Runoff = 3.52 cfs @ 20.97 hrs, Volume= 2.951 af, Depth> 0.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
389.400	63	Desert shrub range, Poor, HSG A
389.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0200	0.36		**Sheet Flow,** n= 0.030 P2= 1.10"
16.1	5,180	0.0200	5.35	53.46	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.3	3,410	0.0150	5.01	75.12	**Channel Flow,** Area= 15.0 sf Perim= 20.0' r= 0.75' n= 0.030
32.0	8,690	Total			

Subcatchment 3S: ABOVE RR



Summary for Subcatchment 5S: WEST of DRY WASH/ EAST of RAILROAD

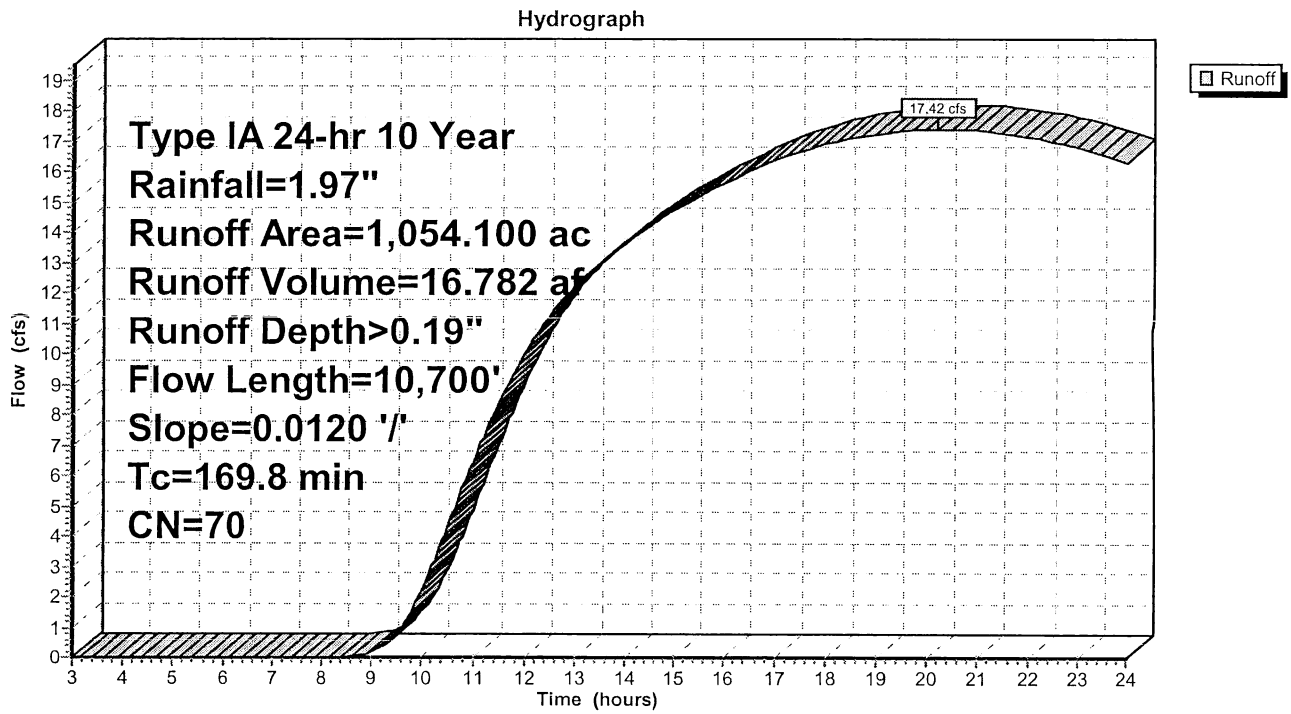
Runoff = 17.42 cfs @ 20.19 hrs, Volume= 16.782 af, Depth> 0.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
353.300	85	Desert shrub range, Poor, HSG C
700.800	63	Desert shrub range, Poor, HSG A
1,054.100	70	Weighted Average
1,054.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0120	0.20		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
161.3	10,600	0.0120	1.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
169.8	10,700	Total			

Subcatchment 5S: WEST of DRY WASH/ EAST of RAILROAD



Summary for Subcatchment 6S: EAST of DRY WASH

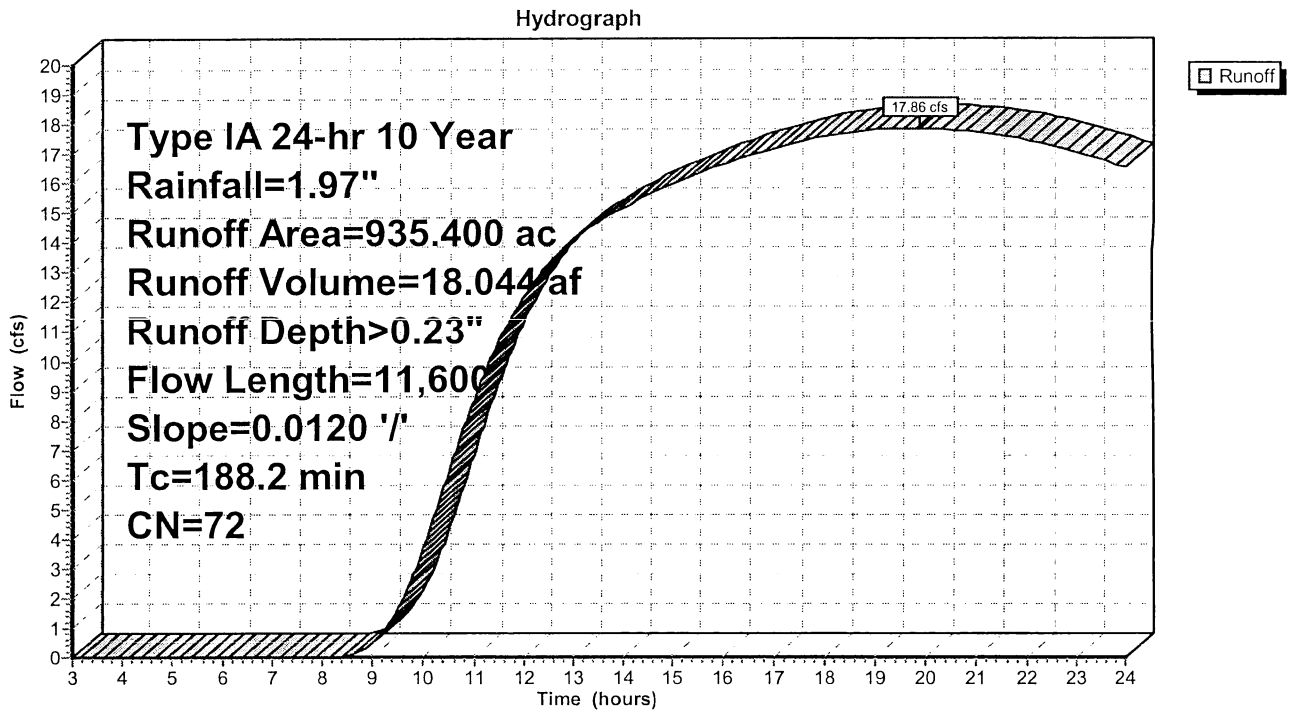
Runoff = 17.86 cfs @ 19.86 hrs, Volume= 18.044 af, Depth> 0.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
397.600	85	Desert shrub range, Poor, HSG C
537.800	63	Desert shrub range, Poor, HSG A
935.400	72	Weighted Average
935.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	200	0.0120	0.22		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
173.4	11,400	0.0120	1.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
188.2	11,600	Total			

Subcatchment 6S: EAST of DRY WASH



Summary for Reach 2R: SR 14 to RR

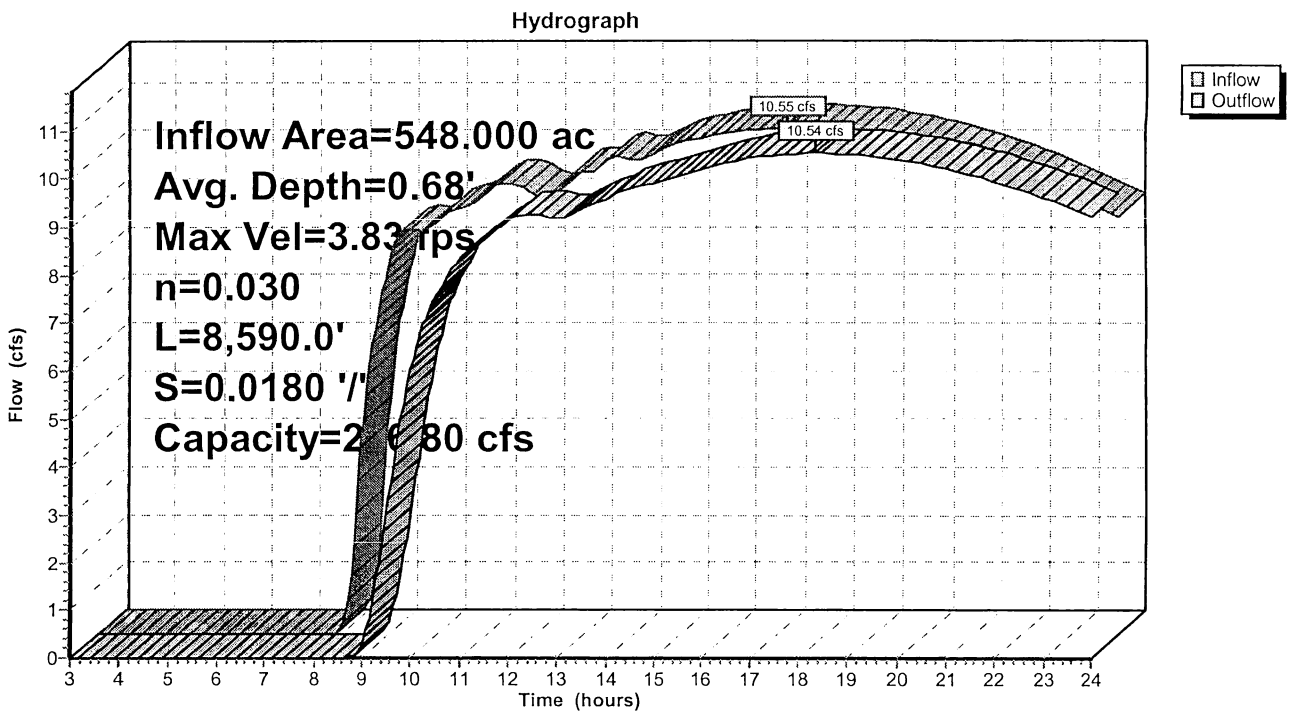
Inflow Area = 548.000 ac, 0.00% Impervious, Inflow Depth > 0.27" for 10 Year event
Inflow = 10.55 cfs @ 17.18 hrs, Volume= 12.468 af
Outflow = 10.54 cfs @ 18.35 hrs, Volume= 11.521 af, Atten= 0%, Lag= 70.0 min

Routing by Stor-Ind+Trans method, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.83 fps, Min. Travel Time= 37.4 min
Avg. Velocity = 3.59 fps, Avg. Travel Time= 39.9 min

Peak Storage= 23,658 cf @ 17.71 hrs, Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 296.80 cfs

2.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 8,590.0' Slope= 0.0180 '/'
Inlet Invert= 2,326.75', Outlet Invert= 2,172.00'

Reach 2R: SR 14 to RR



Summary for Reach 4R: RR Crossing to POI 1

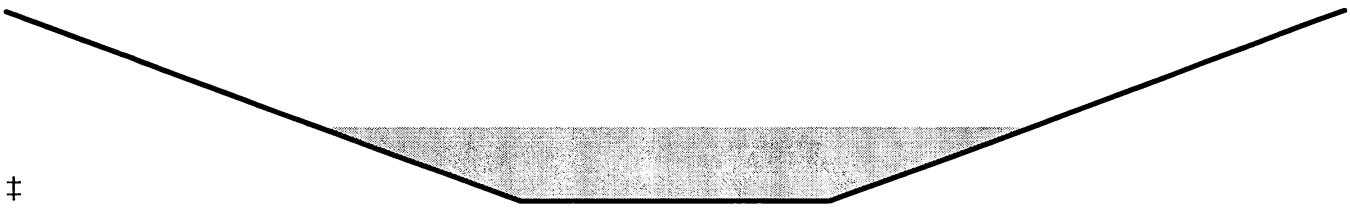
[61] Hint: Exceeded Reach 2R outlet invert by 0.19' @ 20.85 hrs

Inflow Area = 937.400 ac, 0.00% Impervious, Inflow Depth > 0.19" for 10 Year event
Inflow = 13.95 cfs @ 19.28 hrs, Volume= 14.472 af
Outflow = 13.76 cfs @ 22.92 hrs, Volume= 9.950 af, Atten= 1%, Lag= 218.1 min

Routing by Stor-Ind+Trans method, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.43 fps, Min. Travel Time= 122.9 min
Avg. Velocity = 1.20 fps, Avg. Travel Time= 146.4 min

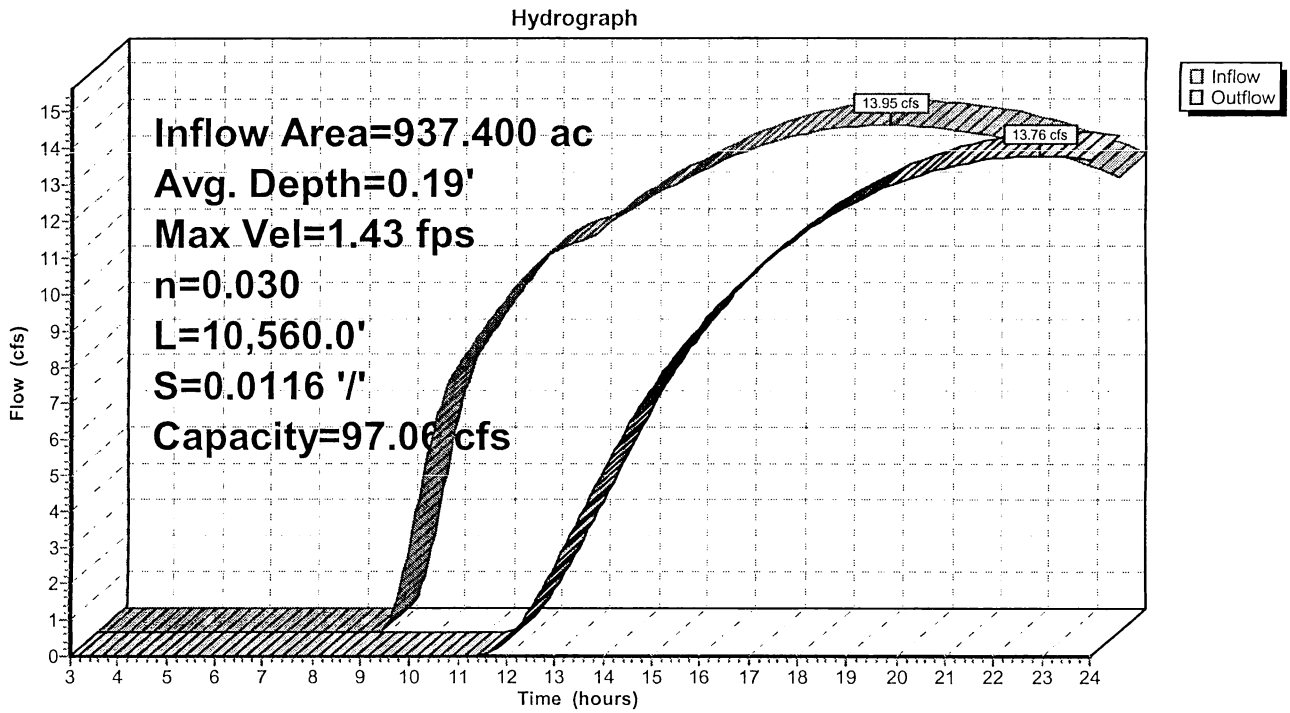
Peak Storage= 101,479 cf @ 20.87 hrs, Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 97.06 cfs

30.00' x 0.50' deep channel, n= 0.030
Side Slope Z-value= 100.0 '/' Top Width= 130.00'
Length= 10,560.0' Slope= 0.0116 '/'
Inlet Invert= 2,172.00', Outlet Invert= 2,050.00'



‡

Reach 4R: RR Crossing to POI 1



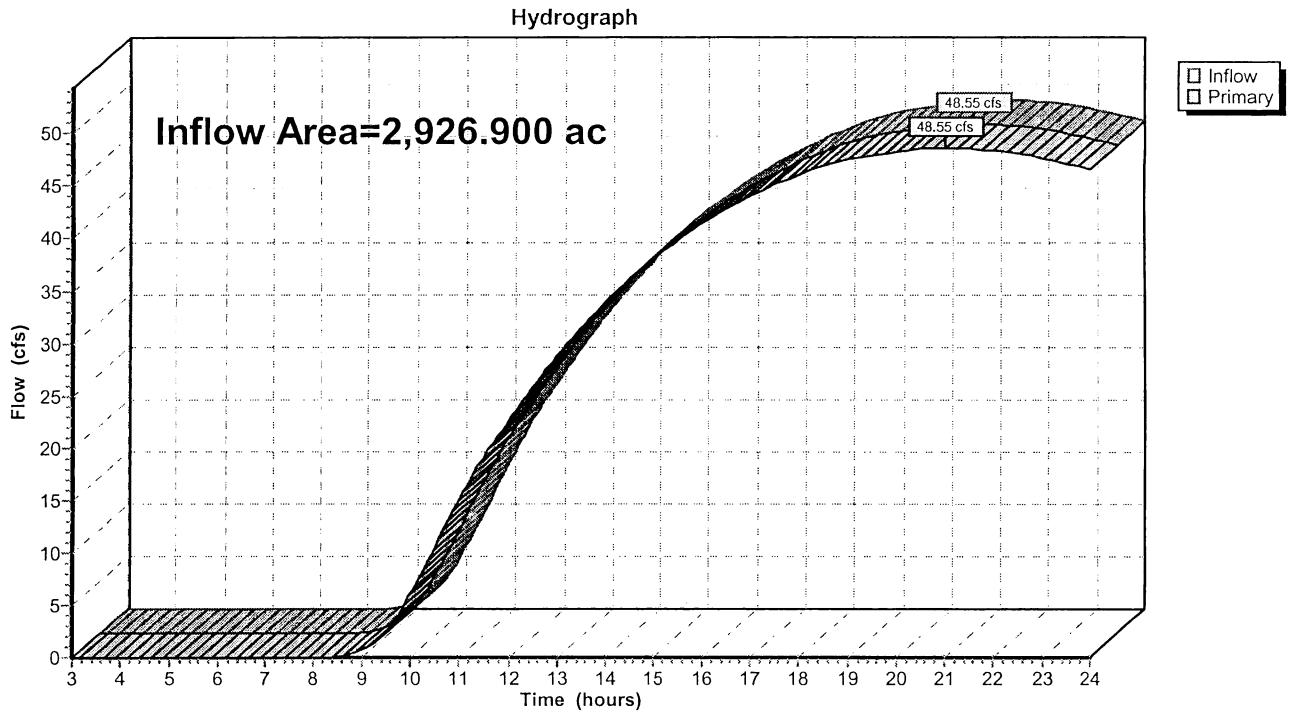
Summary for Pond 7P: POI 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2,926.900 ac, 0.00% Impervious, Inflow Depth > 0.18" for 10 Year event
Inflow = 48.55 cfs @ 20.98 hrs, Volume= 44.775 af
Primary = 48.55 cfs @ 20.98 hrs, Volume= 44.775 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs

Pond 7P: POI 1



Time span=3.00-24.00 hrs, dt=0.05 hrs, 421 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Above SR 14 Runoff Area=548.000 ac 0.00% Impervious Runoff Depth>0.94"
Flow Length=13,530' Tc=29.5 min CN=72 Runoff=74.42 cfs 43.110 af

Subcatchment 3S: ABOVE RR Runoff Area=389.400 ac 0.00% Impervious Runoff Depth>0.53"
Flow Length=8,690' Tc=32.0 min CN=63 Runoff=13.95 cfs 17.154 af

Subcatchment 5S: WEST of DRY WASH/ Runoff Area=1,054.100 ac 0.00% Impervious Runoff Depth>0.75"
Flow Length=10,700' Slope=0.0120 '/' Tc=169.8 min CN=70 Runoff=64.31 cfs 66.277 af

Subcatchment 6S: EAST of DRY WASH Runoff Area=935.400 ac 0.00% Impervious Runoff Depth>0.84"
Flow Length=11,600' Slope=0.0120 '/' Tc=188.2 min CN=72 Runoff=66.16 cfs 65.314 af

Reach 2R: SR 14 to RR Avg. Depth=1.52' Max Vel=6.00 fps Inflow=74.42 cfs 43.110 af
n=0.030 L=8,590.0' S=0.0180 '/' Capacity=296.80 cfs Outflow=59.56 cfs 41.425 af

Reach 4R: RR Crossing to POI 1 Avg. Depth=0.37' Max Vel=2.03 fps Inflow=73.11 cfs 58.579 af
n=0.030 L=10,560.0' S=0.0116 '/' Capacity=97.06 cfs Outflow=49.41 cfs 49.426 af

Pond 7P: POI 1 Inflow=175.75 cfs 181.017 af
Primary=175.75 cfs 181.017 af

Total Runoff Area = 2,926.900 ac Runoff Volume = 191.856 af Average Runoff Depth = 0.79"
100.00% Pervious = 2,926.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Above SR 14

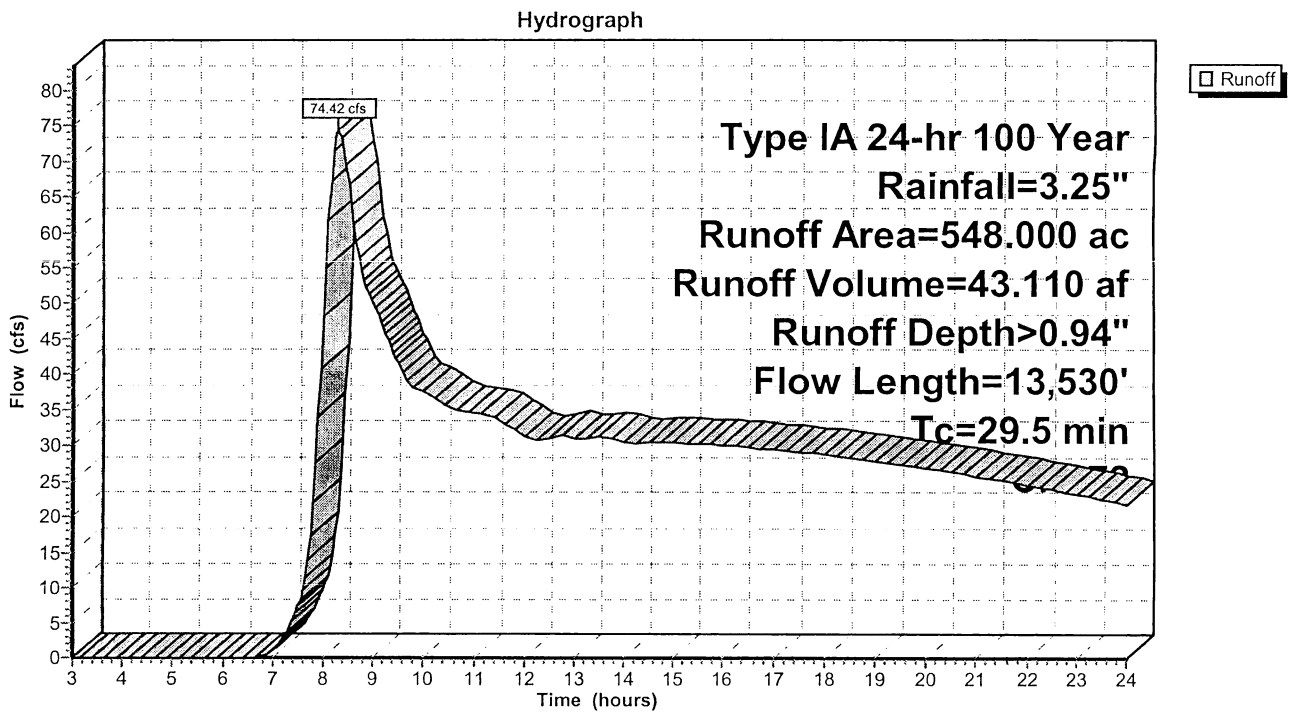
Runoff = 74.42 cfs @ 8.30 hrs, Volume= 43.110 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
207.300	88	Desert shrub range, Poor, HSG D
340.700	63	Desert shrub range, Poor, HSG A
548.000	72	Weighted Average
548.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	200	0.0940	0.51		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
12.0	8,350	0.0940	11.59	115.90	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.0	4,980	0.0400	7.56	75.60	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
29.5	13,530	Total			

Subcatchment 1S: Above SR 14



Summary for Subcatchment 3S: ABOVE RR

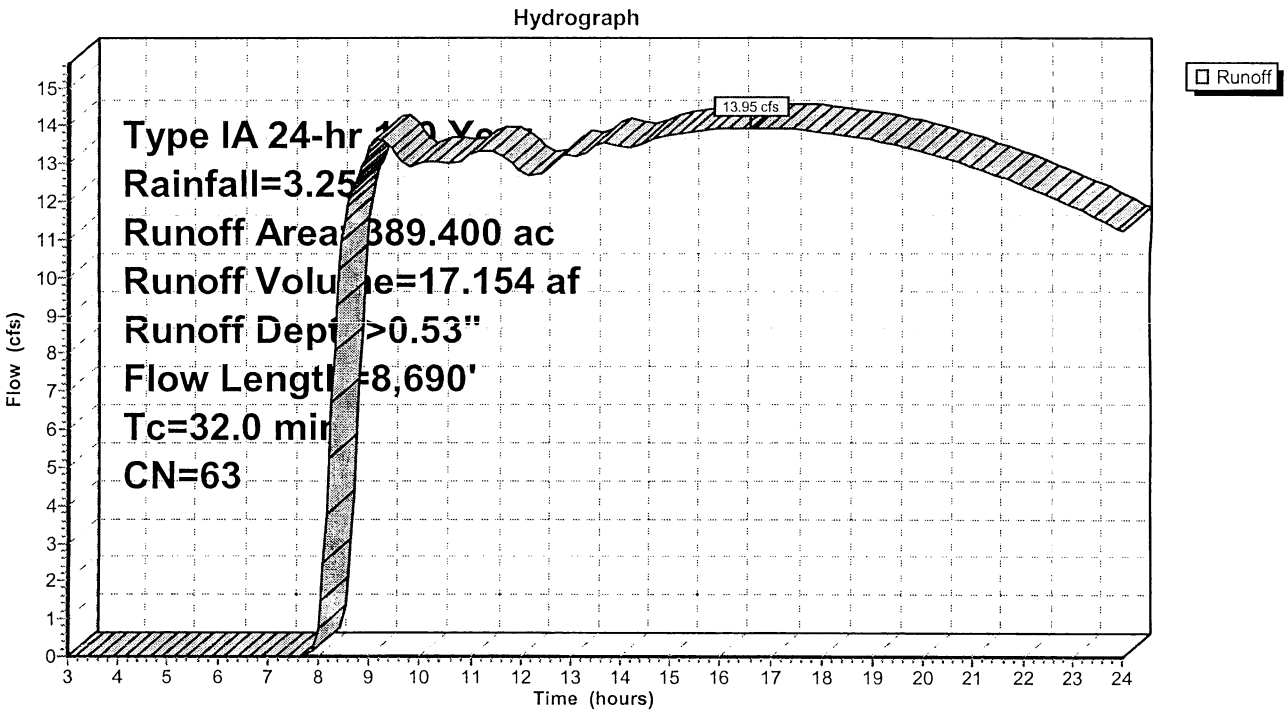
Runoff = 13.95 cfs @ 16.59 hrs, Volume= 17.154 af, Depth> 0.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
389.400	63	Desert shrub range, Poor, HSG A
389.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0200	0.36		**Sheet Flow,** n= 0.030 P2= 1.10"
16.1	5,180	0.0200	5.35	53.46	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.3	3,410	0.0150	5.01	75.12	**Channel Flow,** Area= 15.0 sf Perim= 20.0' r= 0.75' n= 0.030
32.0	8,690	Total			

Subcatchment 3S: ABOVE RR



Summary for Subcatchment 5S: WEST of DRY WASH/ EAST of RAILROAD

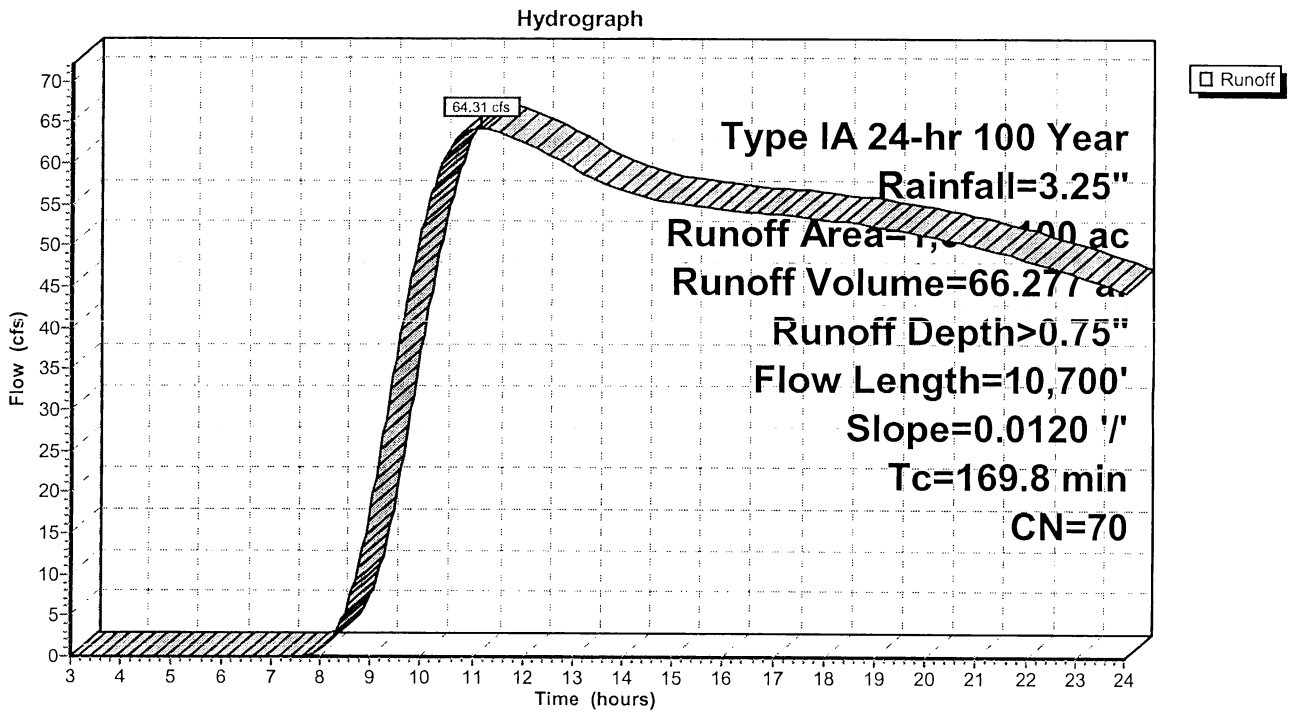
Runoff = 64.31 cfs @ 11.13 hrs, Volume= 66.277 af, Depth> 0.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
353.300	85	Desert shrub range, Poor, HSG C
700.800	63	Desert shrub range, Poor, HSG A
1,054.100	70	Weighted Average
1,054.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0120	0.20		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
161.3	10,600	0.0120	1.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
169.8	10,700	Total			

Subcatchment 5S: WEST of DRY WASH/ EAST of RAILROAD



Summary for Subcatchment 6S: EAST of DRY WASH

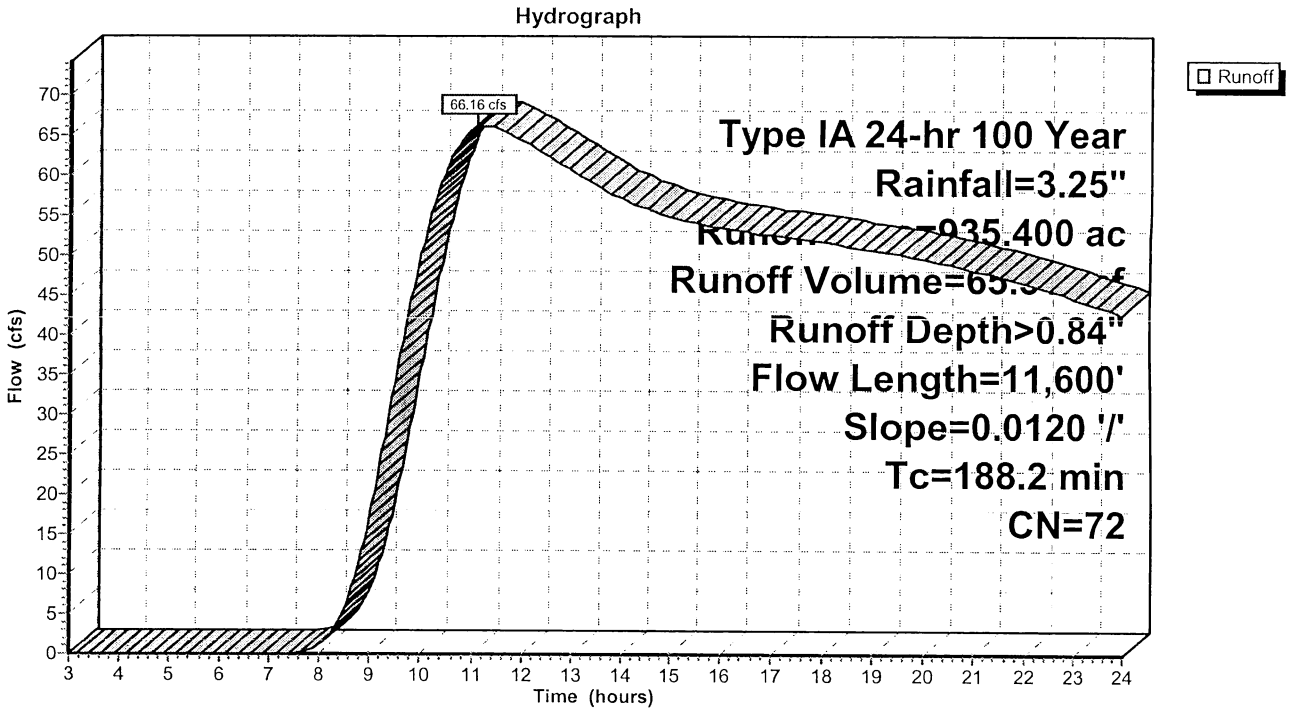
Runoff = 66.16 cfs @ 11.10 hrs, Volume= 65.314 af, Depth> 0.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
397.600	85	Desert shrub range, Poor, HSG C
537.800	63	Desert shrub range, Poor, HSG A
935.400	72	Weighted Average
935.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	200	0.0120	0.22		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
173.4	11,400	0.0120	1.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
188.2	11,600	Total			

Subcatchment 6S: EAST of DRY WASH



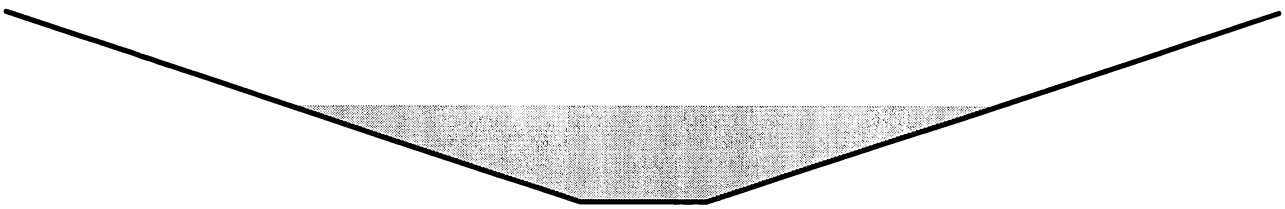
Summary for Reach 2R: SR 14 to RR

Inflow Area = 548.000 ac, 0.00% Impervious, Inflow Depth > 0.94" for 100 Year event
Inflow = 74.42 cfs @ 8.30 hrs, Volume= 43.110 af
Outflow = 59.56 cfs @ 9.03 hrs, Volume= 41.425 af, Atten= 20%, Lag= 43.8 min

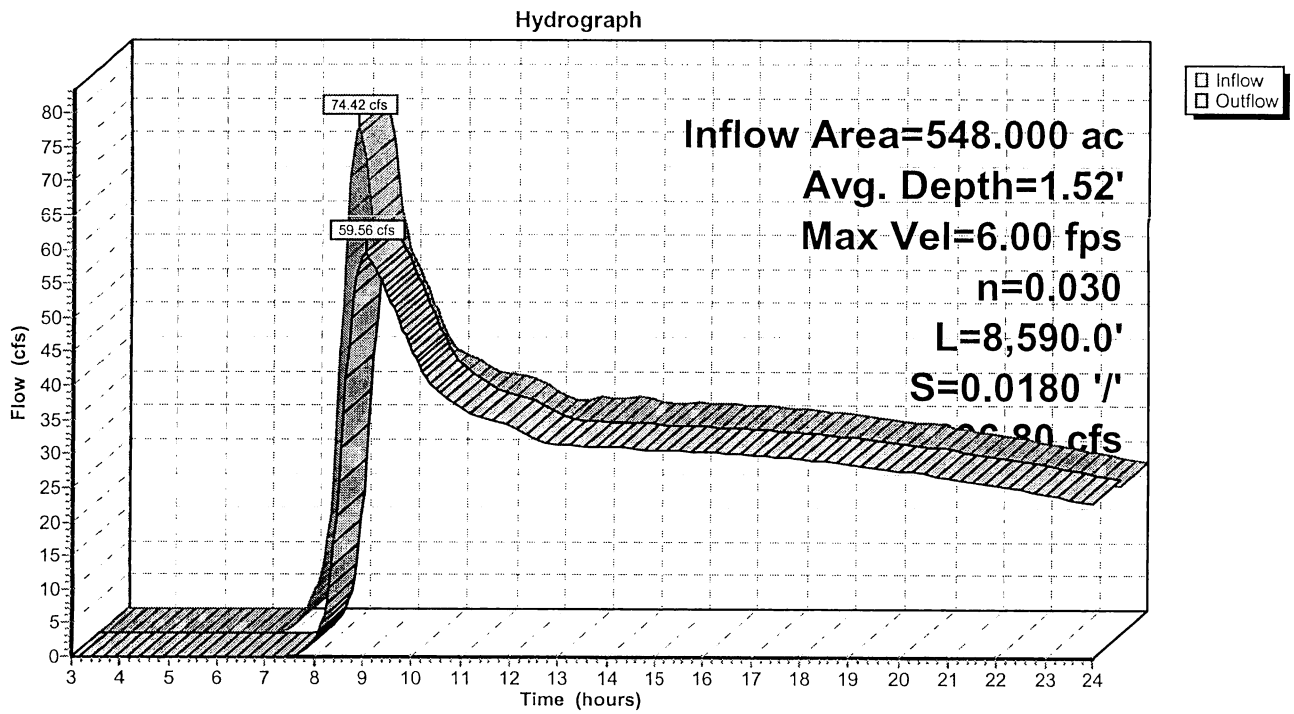
Routing by Stor-Ind+Trans method, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.00 fps, Min. Travel Time= 23.9 min
Avg. Velocity = 4.83 fps, Avg. Travel Time= 29.6 min

Peak Storage= 85,311 cf @ 8.63 hrs, Average Depth at Peak Storage= 1.52'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 296.80 cfs

2.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 8,590.0' Slope= 0.0180 '/'
Inlet Invert= 2,326.75', Outlet Invert= 2,172.00'



Reach 2R: SR 14 to RR



Summary for Reach 4R: RR Crossing to POI 1

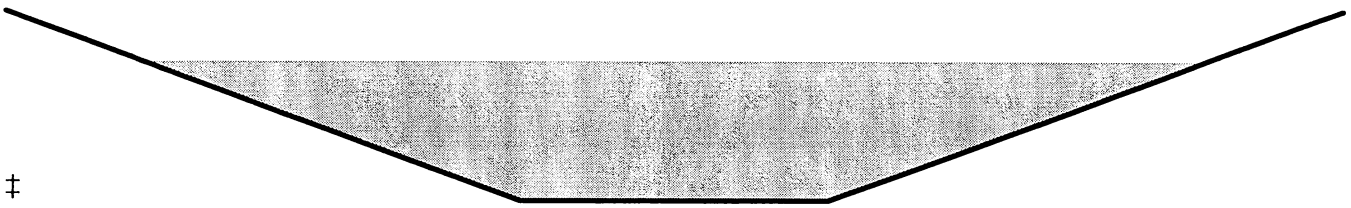
[61] Hint: Exceeded Reach 2R outlet invert by 0.37' @ 11.15 hrs

Inflow Area = 937.400 ac, 0.00% Impervious, Inflow Depth > 0.75" for 100 Year event
Inflow = 73.11 cfs @ 9.04 hrs, Volume= 58.579 af
Outflow = 49.41 cfs @ 12.57 hrs, Volume= 49.426 af, Atten= 32%, Lag= 211.8 min

Routing by Stor-Ind+Trans method, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.03 fps, Min. Travel Time= 86.6 min
Avg. Velocity = 1.81 fps, Avg. Travel Time= 97.1 min

Peak Storage= 256,718 cf @ 11.13 hrs, Average Depth at Peak Storage= 0.37'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 97.06 cfs

30.00' x 0.50' deep channel, n= 0.030
Side Slope Z-value= 100.0 '/' Top Width= 130.00'
Length= 10,560.0' Slope= 0.0116 '/'
Inlet Invert= 2,172.00', Outlet Invert= 2,050.00'



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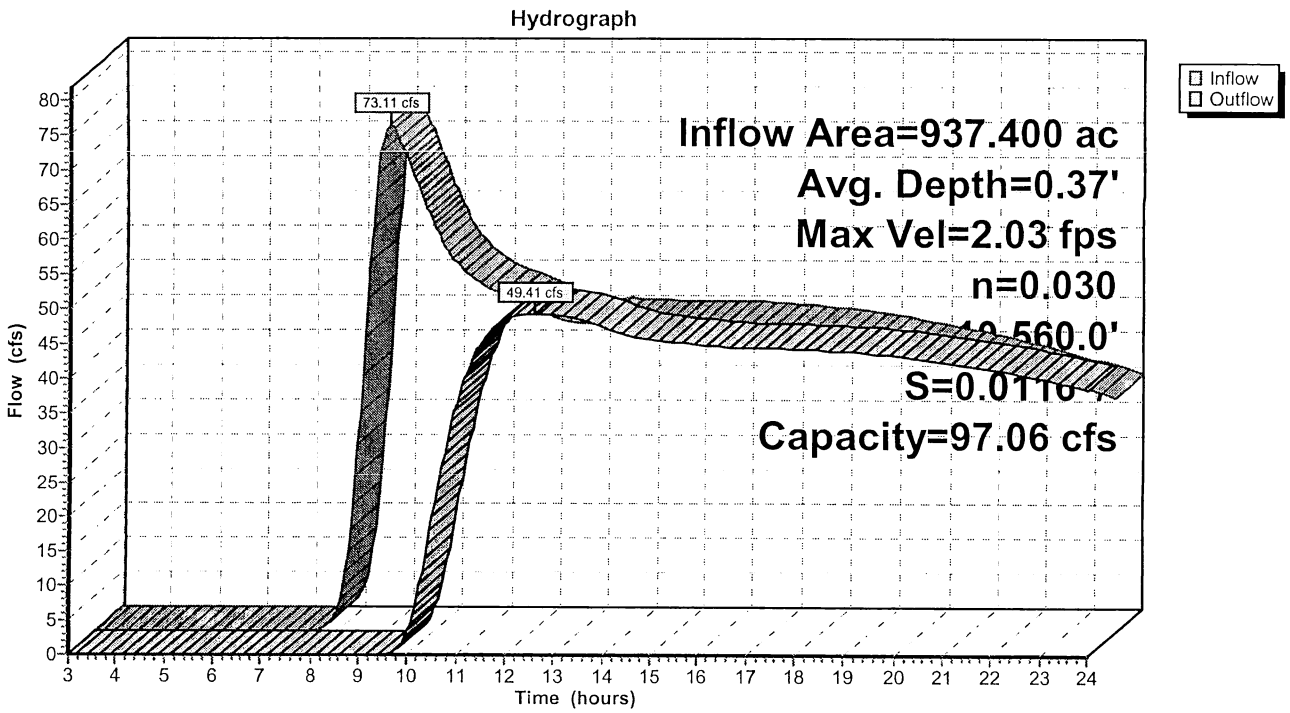
Reach 4R: RR Crossing to POI 1



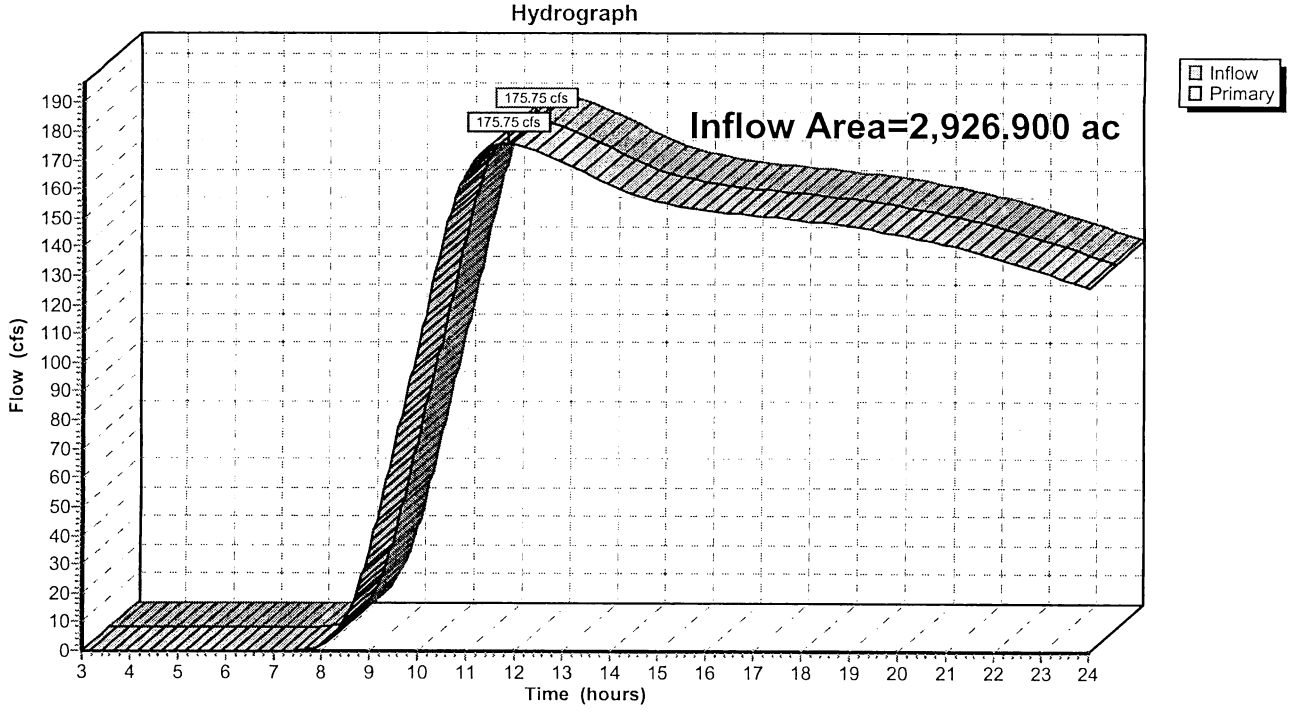
Summary for Pond 7P: POI 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2,926.900 ac, 0.00% Impervious, Inflow Depth > 0.74" for 100 Year event
Inflow = 175.75 cfs @ 11.83 hrs, Volume= 181.017 af
Primary = 175.75 cfs @ 11.83 hrs, Volume= 181.017 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs

Pond 7P: POI 1

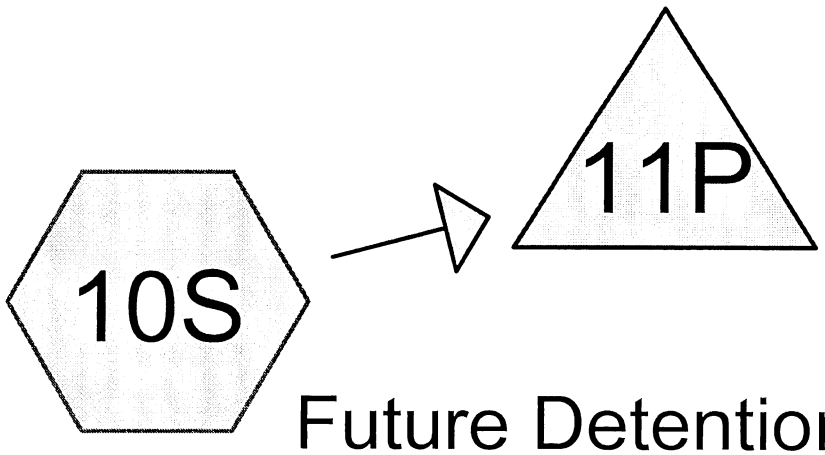


PRE - CONSTRUCTION

10YR 5 DAY Q = 17.5CFS

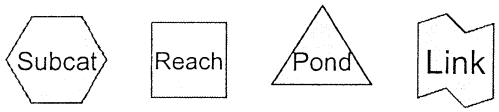
10YR 24HR Q = 25.8CFS

100YR 24HR Q = 73.5CFS



Future Detention Area

NORTH SECTION



Drainage Diagram for PRE - North-without Detention Area
Prepared by Carlton Engineering, Inc, Printed 01/10/2008
HydroCAD® 8.50 s/n 003190 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
16.300	63	Desert shrub range, Poor, HSG A (10S)
357.800	85	Desert shrub range, Poor, HSG C (10S)
374.100		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
16.300	HSG A	10S
0.000	HSG B	
357.800	HSG C	10S
0.000	HSG D	
0.000	Other	
374.100		**TOTAL AREA**

Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth=1.19"
Flow Length=9,425' Tc=133.2 min CN=84 Runoff=17.49 cfs 36.980 af

Pond 11P: Future Detention Area
Inflow=17.49 cfs 36.980 af
Primary=17.49 cfs 36.980 af

Total Runoff Area = 374.100 ac Runoff Volume = 36.980 af Average Runoff Depth = 1.19"
100.00% Pervious = 374.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 10S: NORTH SECTION

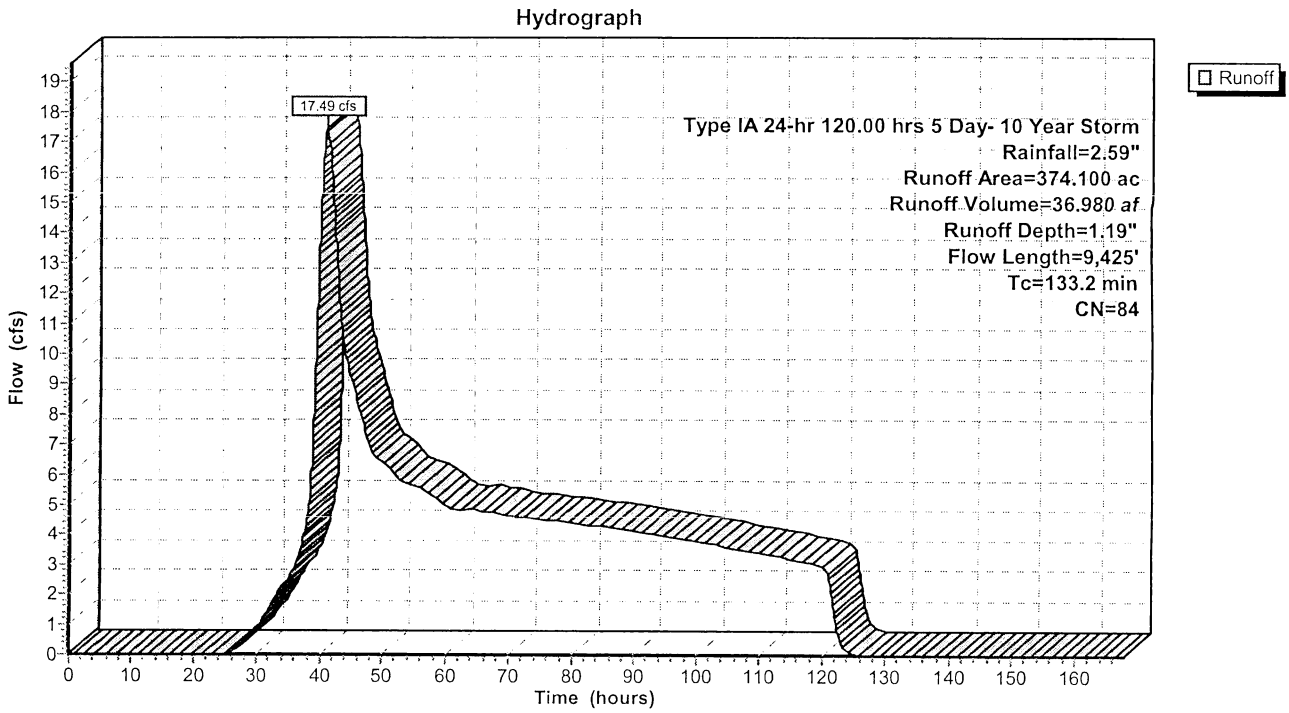
Runoff = 17.49 cfs @ 41.01 hrs, Volume= 36.980 af, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type IA 24-hr 120.00 hrs 5 Day- 10 Year Storm Rainfall=2.59"

Area (ac)	CN	Description
16.300	63	Desert shrub range, Poor, HSG A
357.800	85	Desert shrub range, Poor, HSG C
374.100	84	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



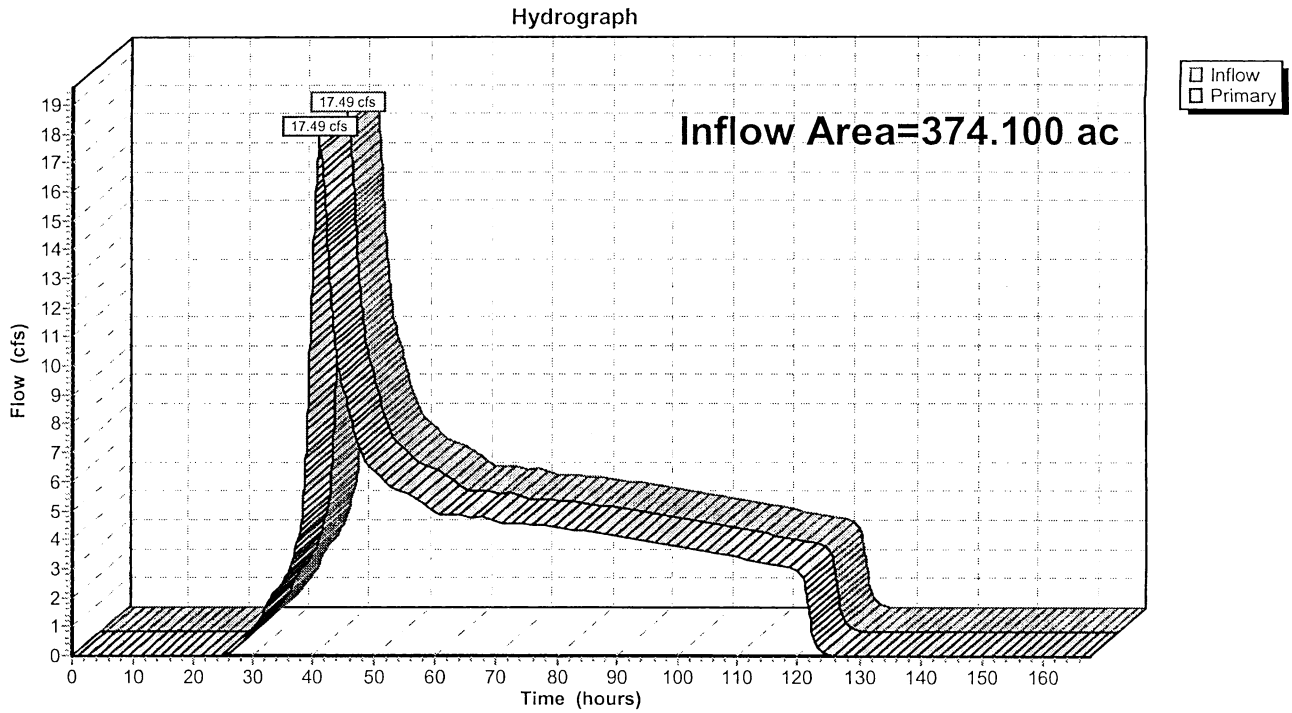
Summary for Pond 11P: Future Detention Area

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 374.100 ac, 0.00% Impervious, Inflow Depth = 1.19" for 5 Day- 10 Year Storm event
Inflow = 17.49 cfs @ 41.01 hrs, Volume= 36.980 af
Primary = 17.49 cfs @ 41.01 hrs, Volume= 36.980 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Pond 11P: Future Detention Area



Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth=0.72"
Flow Length=9,425' Tc=133.2 min CN=84 Runoff=25.78 cfs 22.531 af

Pond 11P: Future Detention Area Inflow=25.78 cfs 22.531 af
Primary=25.78 cfs 22.531 af

Total Runoff Area = 374.100 ac Runoff Volume = 22.531 af Average Runoff Depth = 0.72"
100.00% Pervious = 374.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 10S: NORTH SECTION

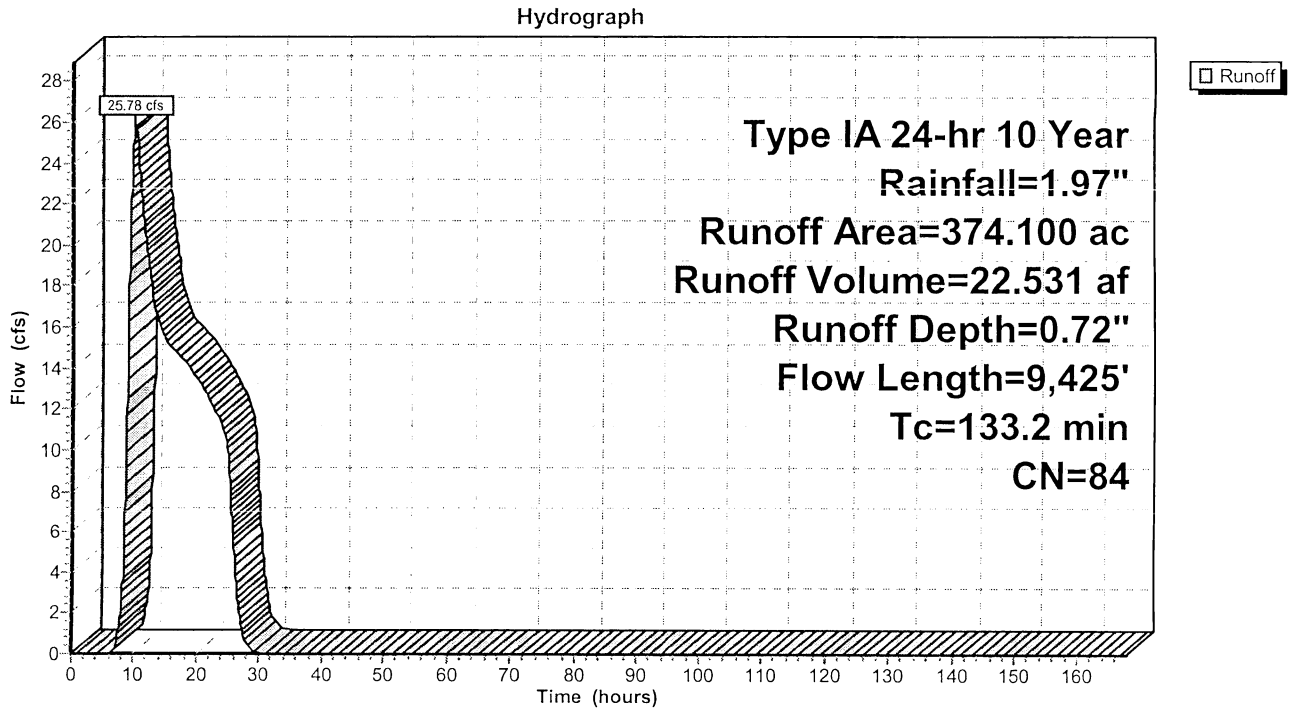
Runoff = 25.78 cfs @ 9.95 hrs, Volume= 22.531 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
16.300	63	Desert shrub range, Poor, HSG A
357.800	85	Desert shrub range, Poor, HSG C
374.100	84	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



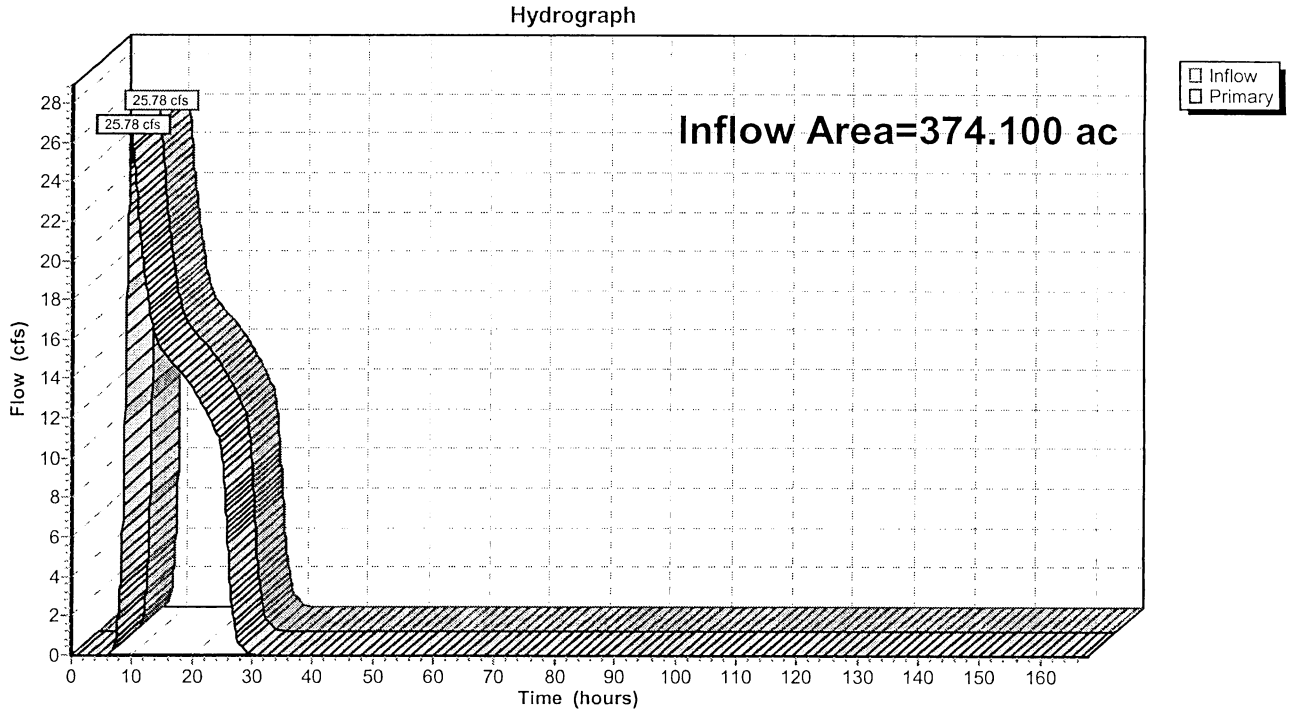
Summary for Pond 11P: Future Detention Area

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 374.100 ac, 0.00% Impervious, Inflow Depth = 0.72" for 10 Year event
Inflow = 25.78 cfs @ 9.95 hrs, Volume= 22.531 af
Primary = 25.78 cfs @ 9.95 hrs, Volume= 22.531 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Pond 11P: Future Detention Area



Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth=1.72"
Flow Length=9,425' Tc=133.2 min CN=84 Runoff=73.48 cfs 53.755 af

Pond 11P: Future Detention Area
Inflow=73.48 cfs 53.755 af
Primary=73.48 cfs 53.755 af

Total Runoff Area = 374.100 ac Runoff Volume = 53.755 af Average Runoff Depth = 1.72"
100.00% Pervious = 374.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 10S: NORTH SECTION

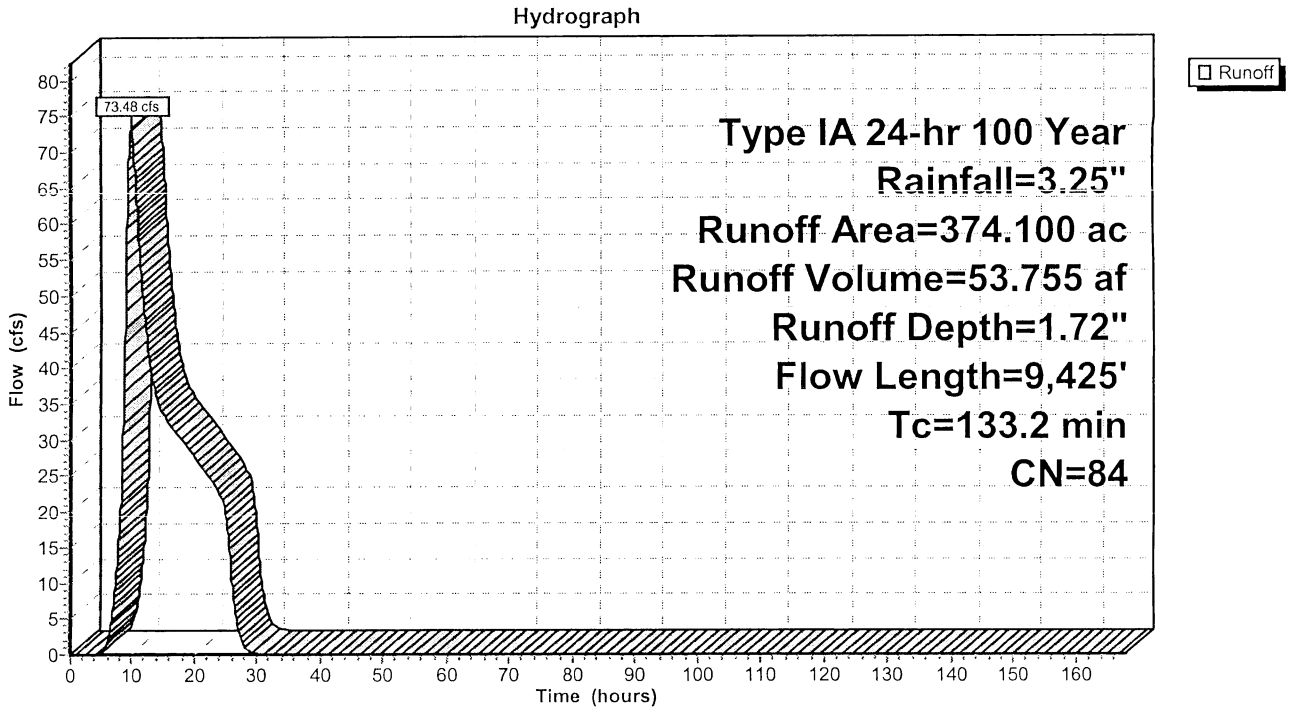
Runoff = 73.48 cfs @ 9.77 hrs, Volume= 53.755 af, Depth= 1.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
16.300	63	Desert shrub range, Poor, HSG A
357.800	85	Desert shrub range, Poor, HSG C
374.100	84	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



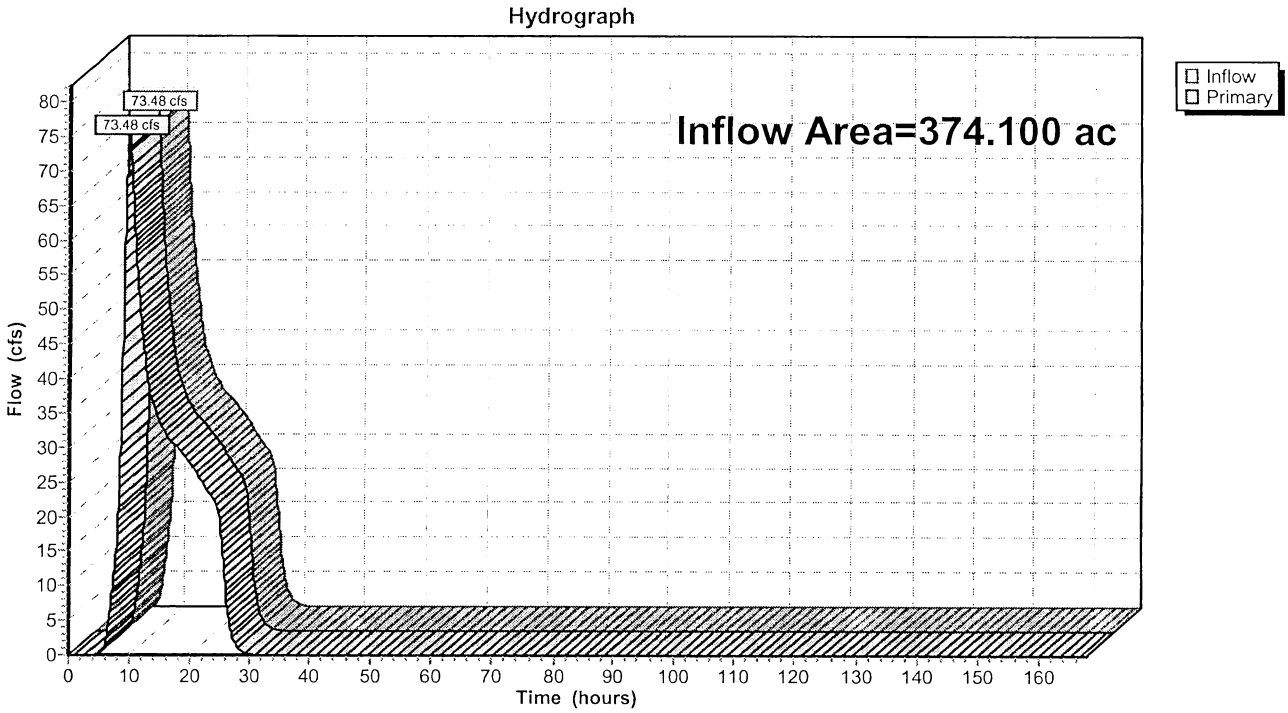
Summary for Pond 11P: Future Detention Area

[40] Hint: Not Described (Outflow=Inflow)

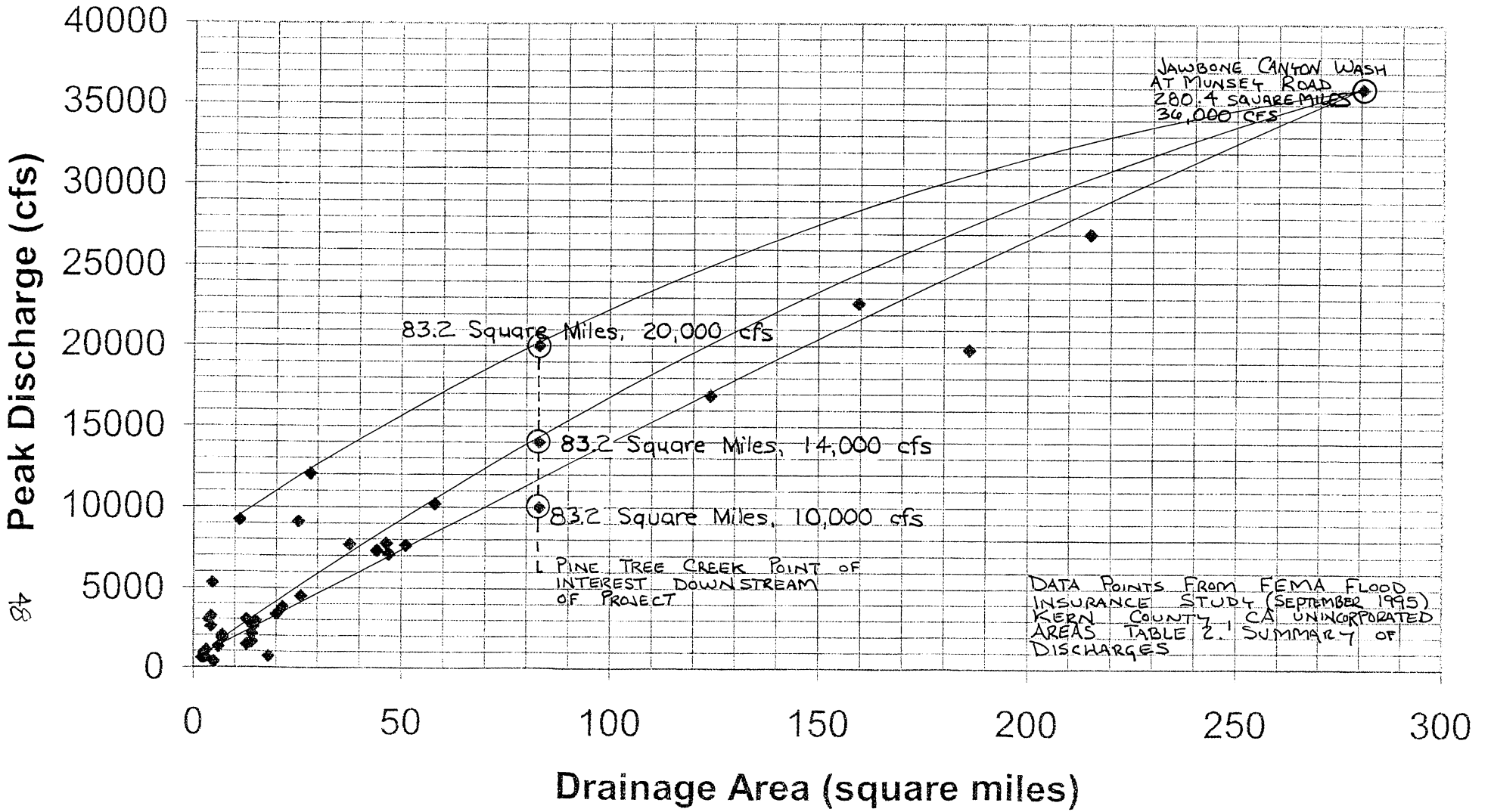
Inflow Area =	374.100 ac,	0.00% Impervious,	Inflow Depth =	1.72"	for 100 Year event	
Inflow =	73.48 cfs @	9.77 hrs,	Volume=	53.755 af		
Primary =	73.48 cfs @	9.77 hrs,	Volume=	53.755 af,	Atten= 0%,	Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

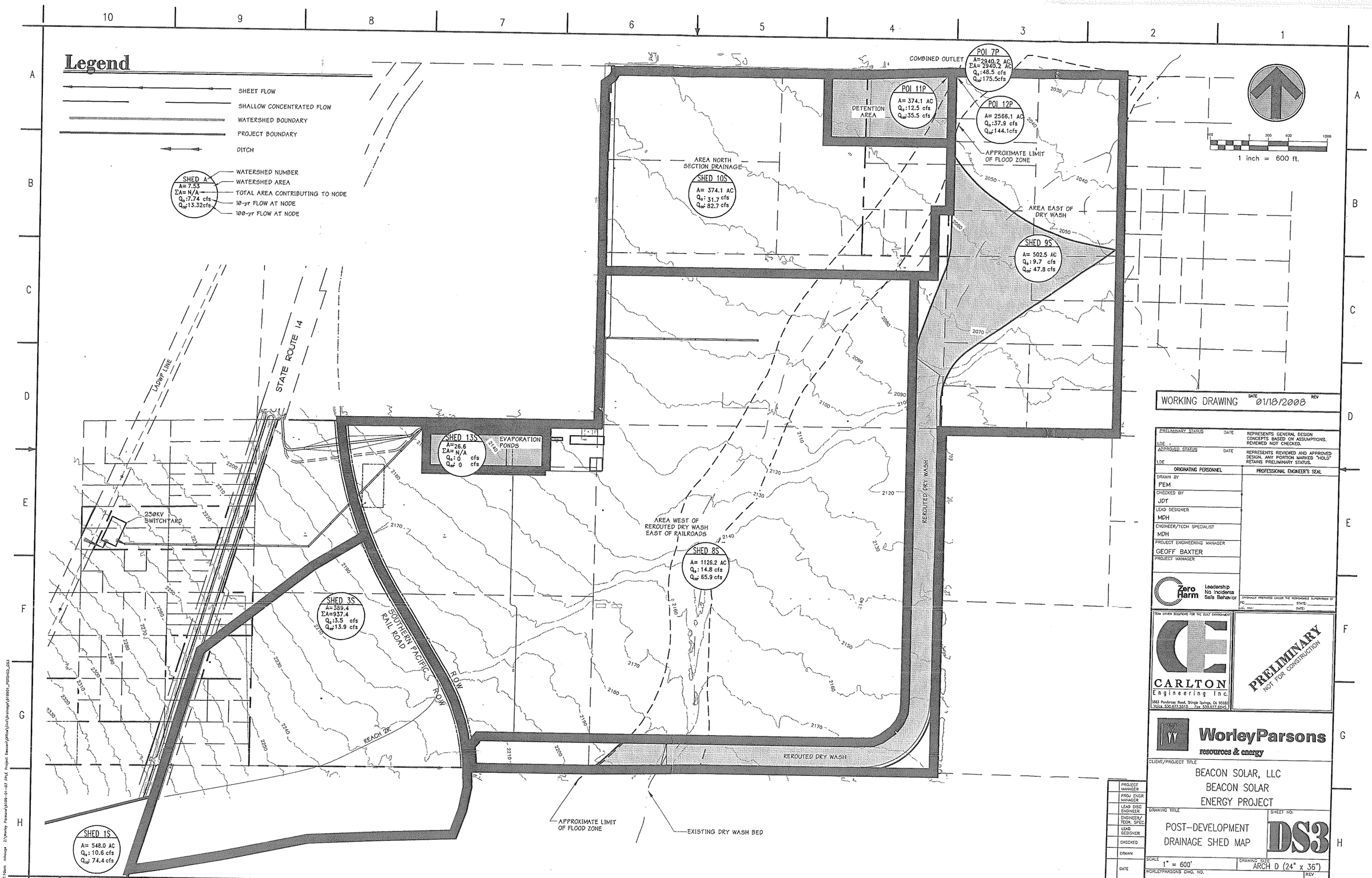
Pond 11P: Future Detention Area



Summary of 100 Yr Discharges



VII. APPENDIX B: PROPOSED CONDITIONS



WORKING DRAWING DATE 01/18/2008 REV

PRELIMINARY STATUS	DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LDE		
APPROVED STATUS	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE		

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: PEM	
CHECKED BY: JDT	
LEAD DESIGNER: MDH	
ENGINEER/TECH SPECIALIST: MDH	
PROJECT ENGINEERING MANAGER: GEOFF BAXTER	
PROJECT MANAGER	

Zero Harm — Leadership, No Incidents, Safe Behavior

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF: PE: STATE: EXP. DATE: DATE:

TEAM DRIVEN SOLUTIONS FOR THE BUILT ENVIRONMENT
CARLTON Engineering Inc.
3083 Prudentes Road, Shingle Springs, CA 95682
Voice 530.677.5515 Fax 530.677.6545

PRELIMINARY NOT FOR CONSTRUCTION

WorleyParsons resources & energy

CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR
ENERGY PROJECT

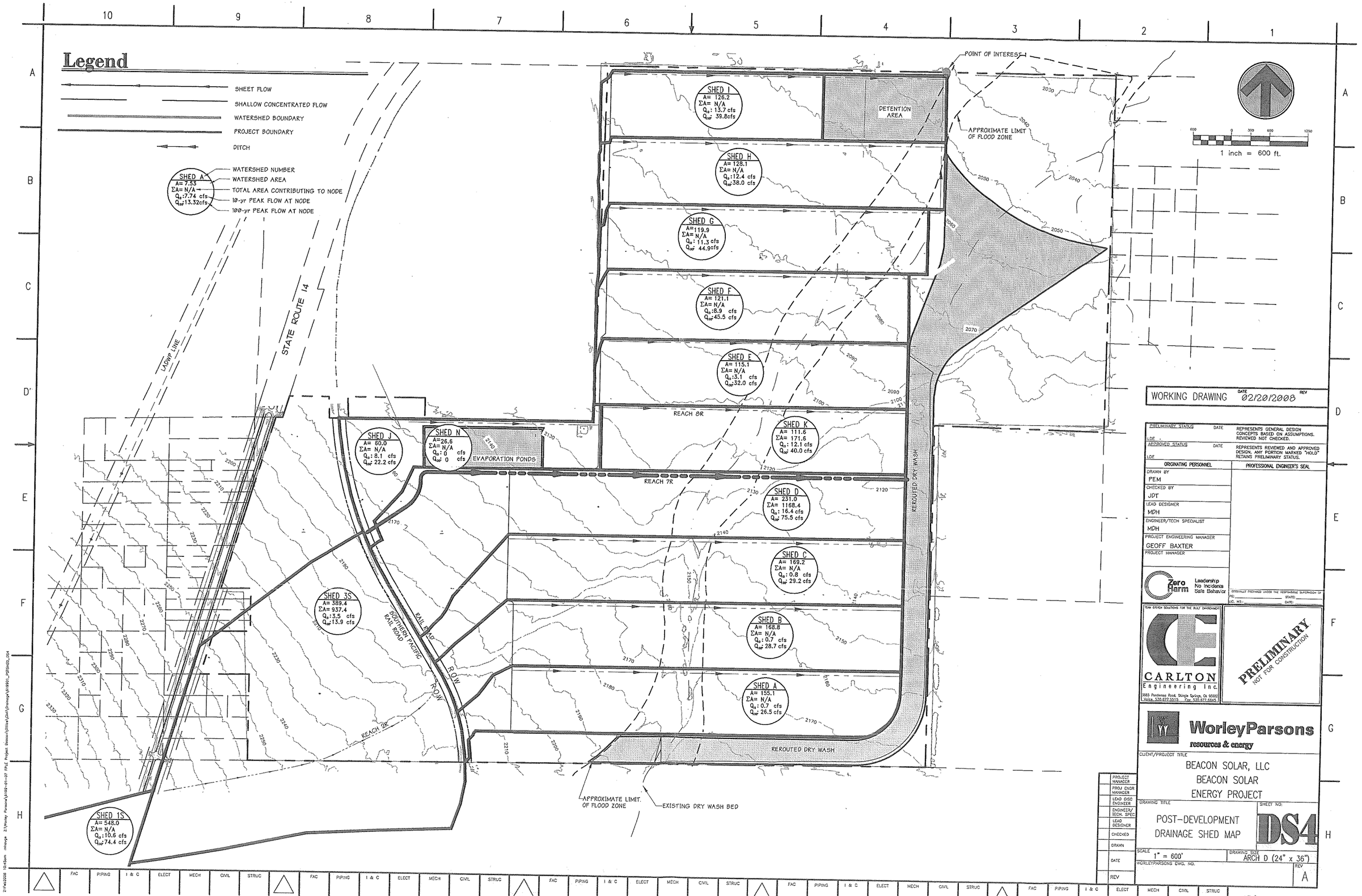
DRAWING TITLE
POST-DEVELOPMENT DRAINAGE SHED MAP

SHEET NO: DS3

SCALE 1" = 600'
DRAWING SIZE ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.
REV A

PROJECT MANAGER	
PROJ ENGR MANAGER	
LEAD DISC ENGINEER	
ENGINEER/ TECH. SPEC	
LEAD DESIGNER	
CHECKED	
DRAWN	
DATE	
REV	

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC



WORKING DRAWING DATE 02/20/2008 REV

PRELIMINARY STATUS	DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LDE		
APPROVED STATUS	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE		

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: PEM	
CHECKED BY: JDT	
LEAD DESIGNER: MDH	
ENGINEER/TECH SPECIALIST: MDH	
PROJECT ENGINEERING MANAGER: GEOFF BAXTER	
PROJECT MANAGER	

Zero Harm — Leadership, No Incidents, Safe Behavior

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF PE: STATE: LIC. NO.: DATE:

TEAM DRIVEN SOLUTIONS FOR THE BUILT ENVIRONMENT
CARLTON Engineering Inc.
3883 Ponderosa Road, Shingle Springs, CA 95682
Voice: 530.677.5515 Fax: 530.677.6645

PRELIMINARY NOT FOR CONSTRUCTION

WorleyParsons resources & energy

CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR ENERGY PROJECT

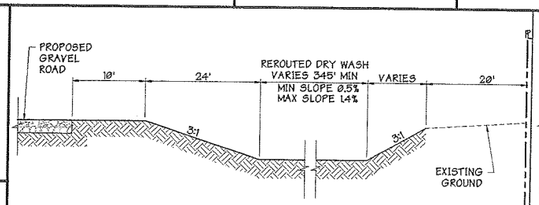
DRAWING TITLE
POST-DEVELOPMENT DRAINAGE SHED MAP

SHEET NO: DS4

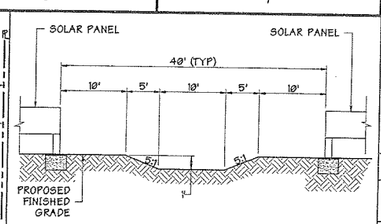
SCALE 1" = 600'
DRAWING SIZE ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.
REV A

PROJECT MANAGER	
PROJ ENGR MANAGER	
LEAD DISC ENGINEER	
ENGINEER/ TECH. SPEC	
LEAD DESIGNER	
CHECKED	
DRAWN	
DATE	
REV	

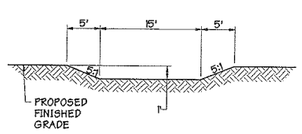
FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC



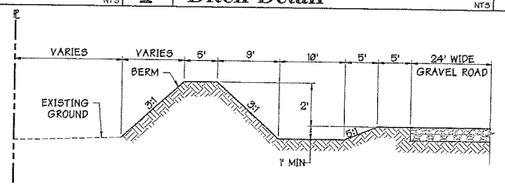
Rerouted Dry Wash NTS **1**



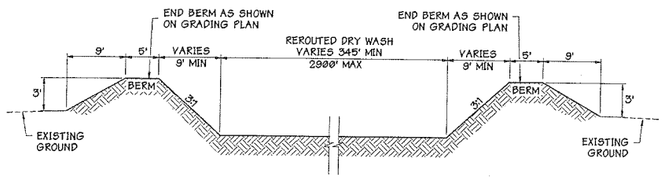
Ditch Detail NTS **2**



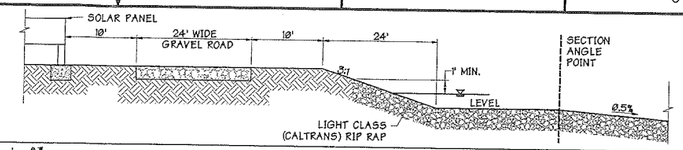
Ditch Detail NTS **3**



Berm NTS **4**



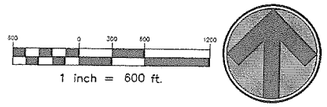
Rerouted Dry Wash Channel Outlet NTS **5**

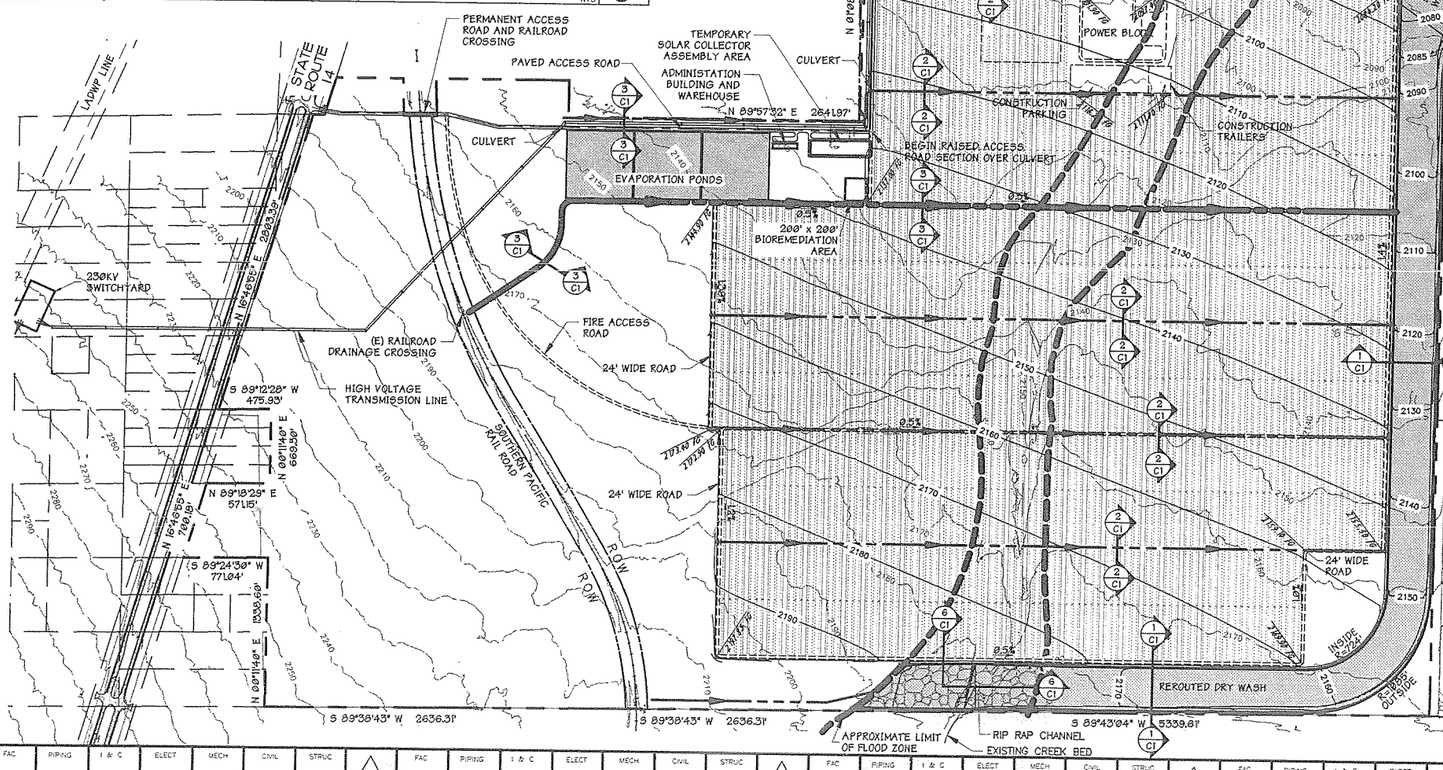


Ditch Detail NTS **6**

DATE	CUT (YARDS)	FILL (YARDS)	TOTAL (YARDS)
01-16-2008	5,160,000	4,830,000	330,000 CUT *

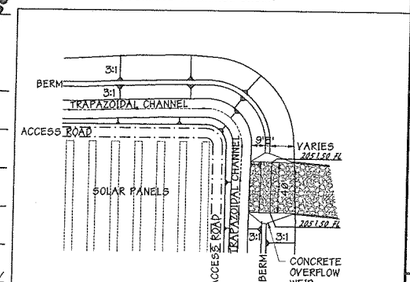
* ASSUMES SHRINK OF APPOXIMATELY 7% BASED ON RELATIVE COMPACTION OF 90 PERCENT OF MAXIMUM DENSITY PER ASTM D1577





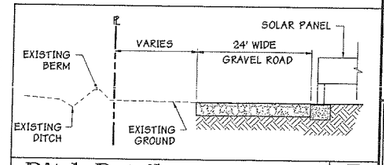
General Notes

1. ALL SLOPES ARE 3:1 UNLESS OTHERWISE SHOWN

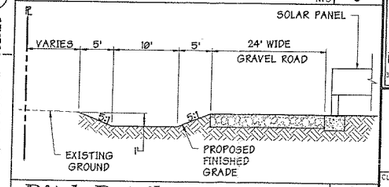


Enlarged Area NTS **7**

WORKING DRAWING DATE 02/21/2008 REV



Ditch Detail NTS **7**



Ditch Detail NTS **8**

PRELIMINARY STATUS	DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LDE		
APPROVED STATUS	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE		

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: PEM	
CHECKED BY: JDT	
LEAD DESIGNER: MDH	
ENGINEER/TECH SPECIALIST: MDH	
PROJECT ENGINEERING MANAGER: GEOFF BAXTER	
PROJECT MANAGER	

Zero Harm — Leadership, No Incidents, Safe Behavior

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF PE: STATE: LIC. NO.: DATE:

TEAM DRIVEN SOLUTIONS FOR THE BUILT ENVIRONMENT

CARLTON Engineering Inc.
3883 Pontoness Road, Shingle Springs, CA 95682
Phone: 530.677.5514 Fax: 530.677.8665

PRELIMINARY NOT FOR CONSTRUCTION

WorleyParsons resources & energy

CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR ENERGY PROJECT

DRAWING TITLE
CONCEPTUAL GRADING PLAN

SHEET NO. C1

SCALE 1" = 600' | DRAWING SIZE ARCH D (24" x 36")

WORLEYPARSONS DWG. NO. | REV A

PROJECT MANAGER	
PROJ ENGR MANAGER	
LEAD DISC ENGINEER	
ENGINEER/ TECH. SPEC.	
LEAD DESIGNER	
CHECKED	
DRAWN	
DATE	
REV	

FAC PIPING I & C ELECT MECH CIVIL STRUC

52

N

N 645014.93
E 1993976.58

N 644991.77
E 2001903.42

14

LADWP 500 KV LINE

LADWP 230 KV LINE

ROW

ROW

MIDLAND TRAIL
STATE ROUTE 14

SOUTHERN PACIFIC
RAIL ROAD TRACKS

SOLAR COLLECTOR
ASSEMBLY
FABRICATION AREA

ADMINISTATION
BUILDING AND
WAREHOUSE

200' x 200'
BIOREMEDIATION AREA

PAVED ACCESS ROAD

POWER BLOCK

CONST TRAILERS

CONST PARKING

LAYDOWN AREA

EVAPORATION PONDS

PROPERTY LINE

PL

HIGH VOLTAGE
TRANSMISSION LINE

ROW

ROW

PL

ROW

ROW

PL

LADWP LINE

14

N 634126.01
E 1988563.99

500 0 500 1000 1500 2000 2500

SCALE IN FEET

Edd

J. FOSTER

GEOFF BAXTER

Zero Harm
Leadership
No Incidents
Safe Behavior

WorleyParsons
resources & energy

BEACON SOLAR, LLC
BEACON SOLAR ENERGY PROJECT

GENERAL ARRANGEMENT
SITE PLAN

1" = 600'

ARCH D (24" x 36")

FPLS-0-SK-111-002-001

E

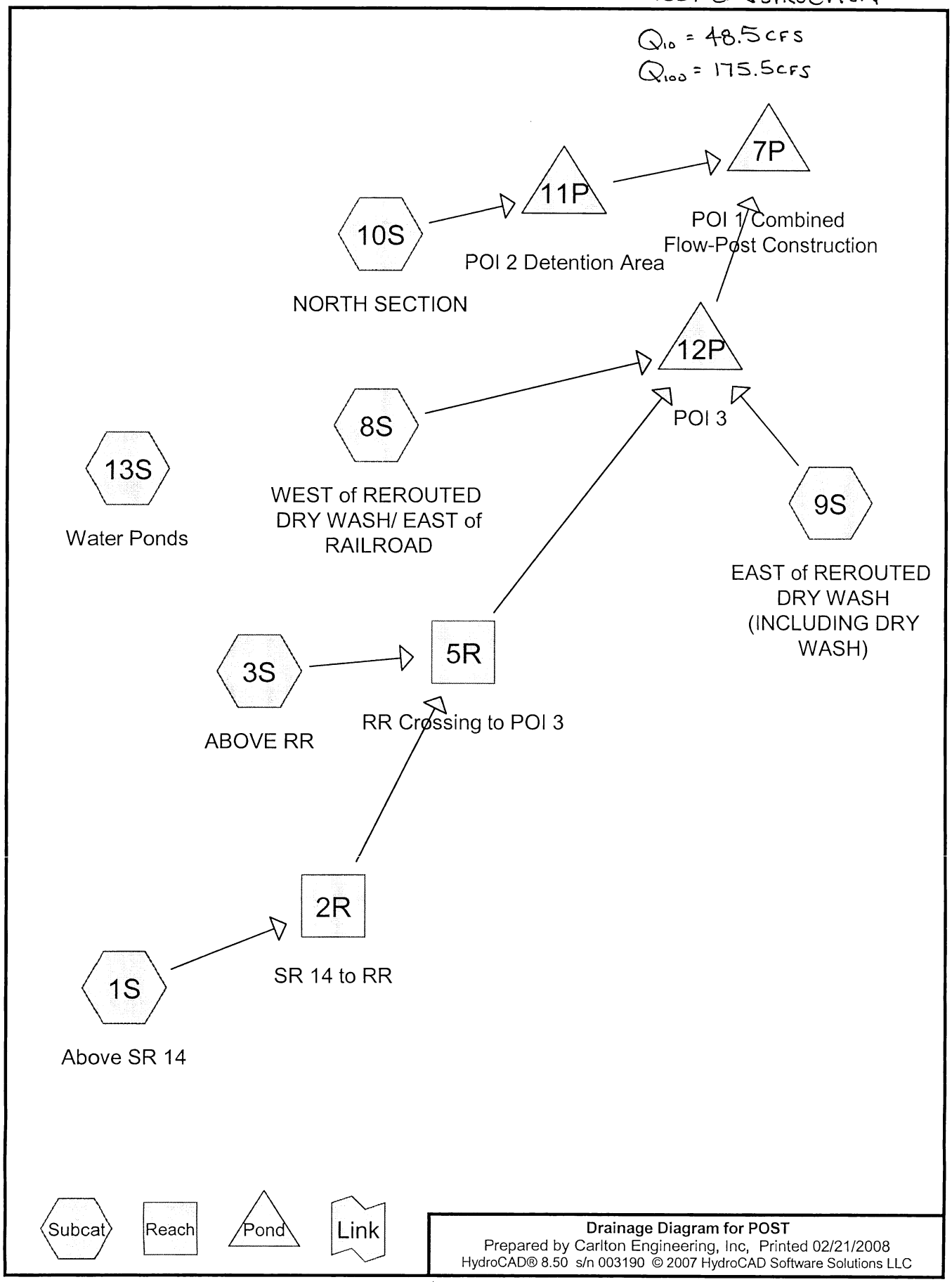
ISSUED FOR REVIEW

12/10/09 AND ELD

DWG-FILE: FPLS-0-SK-111-002-001.dwg

POST CONSTRUCTION

Q_{10} = 48.5 CFS
Q_{100} = 175.5 CFS



Drainage Diagram for POST
Prepared by Carlton Engineering, Inc, Printed 02/21/2008
HydroCAD® 8.50 s/n 003190 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1,050.300	63	Desert shrub range, Poor, HSG A (1S,3S,9S,13S)
1,047.700	65	Desert shrub range, Poor, HSG A (8S,10S)
208.900	85	Desert shrub range, Poor, HSG C (9S)
452.600	87	Desert shrub range, Poor, HSG C (8S,10S)
207.300	88	Desert shrub range, Poor, HSG D (1S)
2,966.800		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
2,098.000	HSG A	1S, 3S, 8S, 9S, 10S, 13S
0.000	HSG B	
661.500	HSG C	8S, 9S, 10S
207.300	HSG D	1S
0.000	Other	
2,966.800		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Above SR 14 Runoff Area=548.000 ac 0.00% Impervious Runoff Depth>0.27"
Flow Length=13,530' Tc=29.5 min CN=72 Runoff=10.55 cfs 12.468 af

Subcatchment 3S: ABOVE RR Runoff Area=389.400 ac 0.00% Impervious Runoff Depth>0.09"
Flow Length=8,690' Tc=32.0 min CN=63 Runoff=3.52 cfs 2.951 af

Subcatchment 8S: WEST of REROUTED Runoff Area=1,126.200 ac 0.00% Impervious Runoff Depth>0.15"
Flow Length=8,935' Tc=54.2 min CN=67 Runoff=14.77 cfs 14.519 af

Subcatchment 9S: EAST of REROUTED Runoff Area=502.500 ac 0.00% Impervious Runoff Depth>0.26"
Flow Length=5,350' Slope=0.0120 '/' Tc=81.4 min CN=72 Runoff=9.67 cfs 10.888 af

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth>0.76"
Flow Length=9,425' Tc=133.2 min CN=86 Runoff=31.73 cfs 23.837 af

Subcatchment 13S: Water Ponds Runoff Area=26.600 ac 0.00% Impervious Runoff Depth>0.09"
Flow Length=100' Slope=0.0150 '/' Tc=7.8 min CN=63 Runoff=0.24 cfs 0.209 af

Reach 2R: SR 14 to RR Avg. Depth=0.68' Max Vel=3.83 fps Inflow=10.55 cfs 12.468 af
n=0.030 L=8,590.0' S=0.0180 '/' Capacity=296.80 cfs Outflow=10.54 cfs 11.521 af

Reach 5R: RR Crossing to POI 3 Avg. Depth=0.41' Max Vel=3.02 fps Inflow=13.95 cfs 14.472 af
n=0.022 L=15,850.0' S=0.0077 '/' Capacity=238.77 cfs Outflow=13.88 cfs 11.281 af

Pond 7P: POI 1 Combined Flow-Post Construction Inflow=48.50 cfs 49.659 af
Primary=48.50 cfs 49.659 af

Pond 11P: POI 2 Detention Area Peak Elev=2,051.71' Storage=4.670 af Inflow=31.73 cfs 23.837 af
Discarded=6.10 cfs 7.495 af Primary=12.54 cfs 12.970 af Outflow=18.65 cfs 20.466 af

Pond 12P: POI 3 Inflow=37.90 cfs 36.689 af
Primary=37.90 cfs 36.689 af

Total Runoff Area = 2,966.800 ac Runoff Volume = 64.871 af Average Runoff Depth = 0.26"
100.00% Pervious = 2,966.800 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Above SR 14

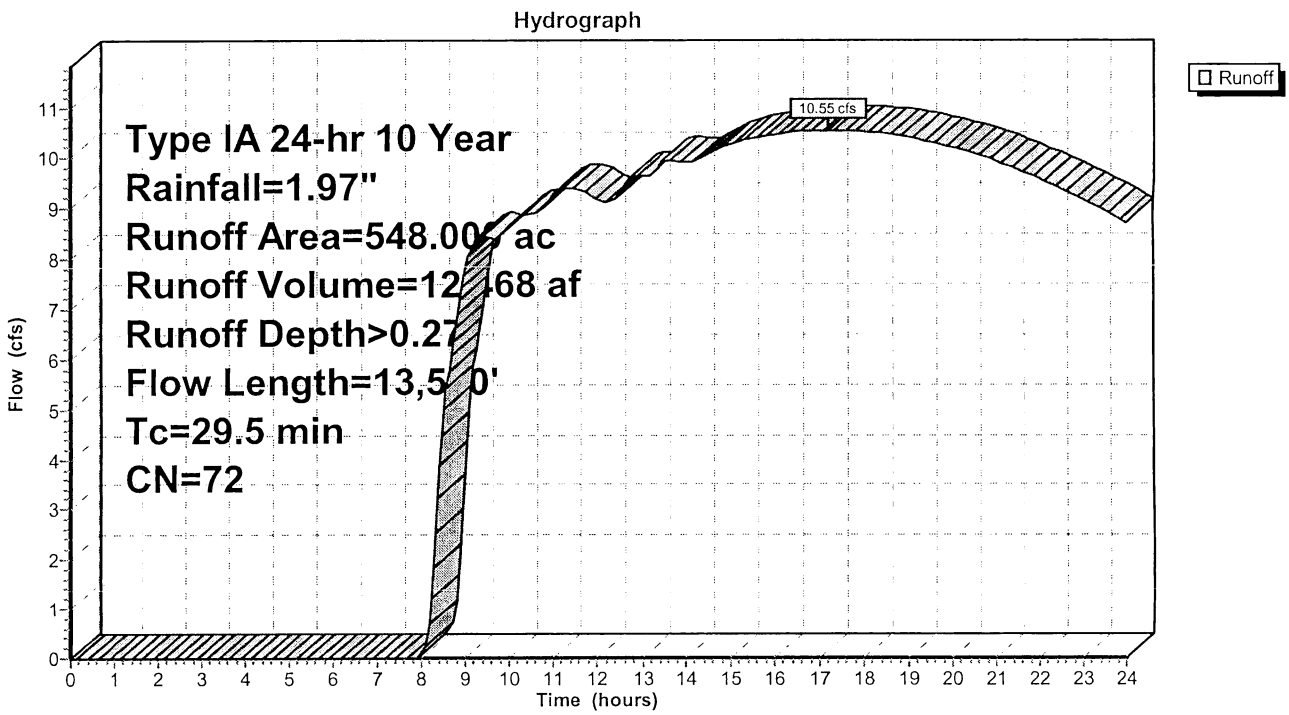
Runoff = 10.55 cfs @ 17.18 hrs, Volume= 12.468 af, Depth> 0.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
207.300	88	Desert shrub range, Poor, HSG D
340.700	63	Desert shrub range, Poor, HSG A
548.000	72	Weighted Average
548.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	200	0.0940	0.51		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
12.0	8,350	0.0940	11.59	115.90	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.0	4,980	0.0400	7.56	75.60	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
29.5	13,530	Total			

Subcatchment 1S: Above SR 14



Summary for Subcatchment 3S: ABOVE RR

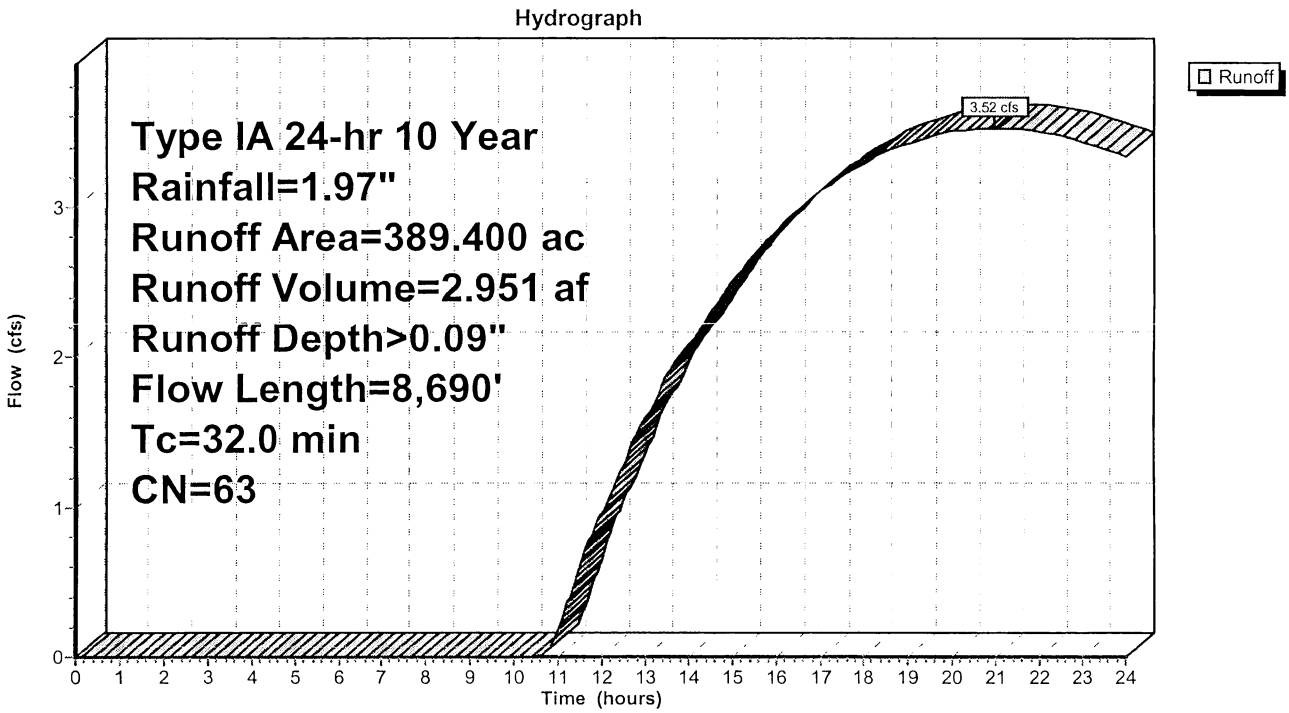
Runoff = 3.52 cfs @ 20.97 hrs, Volume= 2.951 af, Depth> 0.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
389.400	63	Desert shrub range, Poor, HSG A
389.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0200	0.36		**Sheet Flow,** n= 0.030 P2= 1.10"
16.1	5,180	0.0200	5.35	53.46	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.3	3,410	0.0150	5.01	75.12	**Channel Flow,** Area= 15.0 sf Perim= 20.0' r= 0.75' n= 0.030
32.0	8,690	Total			

Subcatchment 3S: ABOVE RR



Summary for Subcatchment 8S: WEST of REROUTED DRY WASH/ EAST of RAILROAD

Desert Shrub Range, poor, A Area=1255.6
Subtract Water Pond area=53.9 acres
Total Desert Shrub Range poor A Area=1201.7 acres

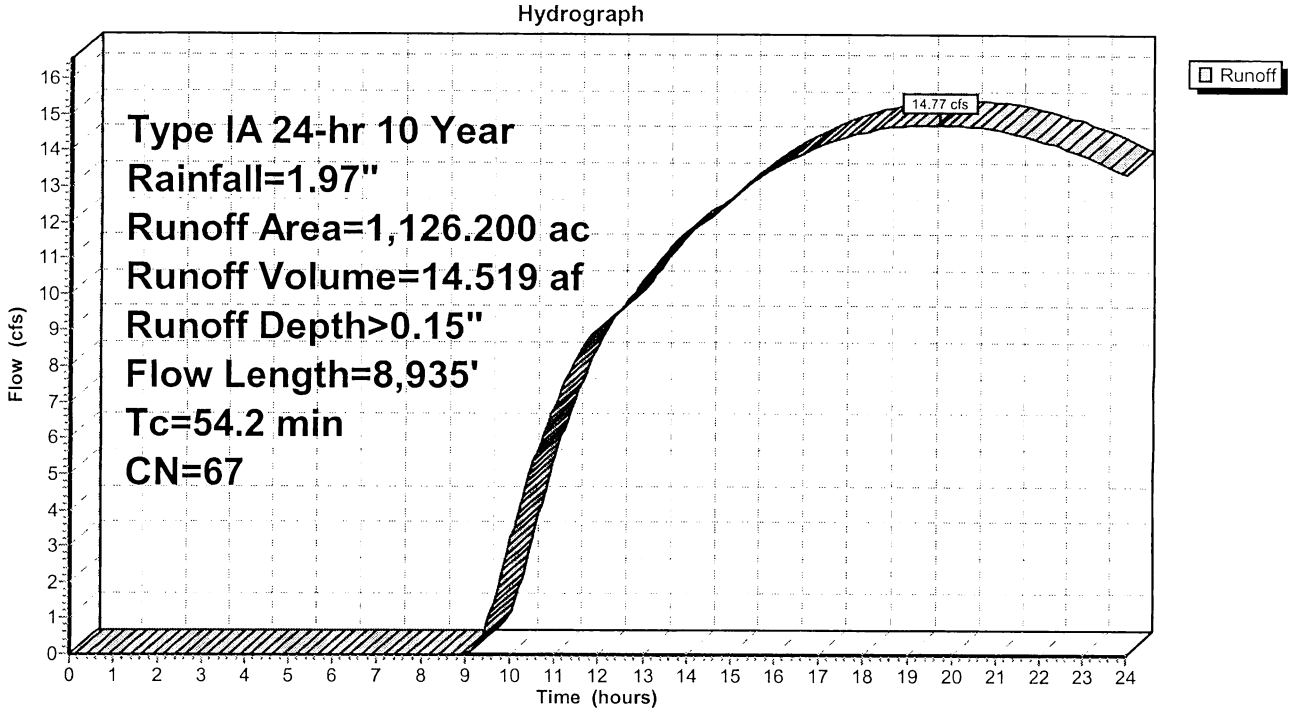
Runoff = 14.77 cfs @ 19.70 hrs, Volume= 14.519 af, Depth> 0.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
94.800	87	Desert shrub range, Poor, HSG C
1,031.400	65	Desert shrub range, Poor, HSG A
1,126.200	67	Weighted Average
1,126.200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
6.9	725	0.0120	1.76		**Shallow Concentrated Flow, Unpaved** Unpaved Kv= 16.1 fps
35.7	7,810	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
5.9	100	0.0300	0.28		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
54.2	8,935	Total			

Subcatchment 8S: WEST of REROUTED DRY WASH/ EAST of RAILROAD



Summary for Subcatchment 9S: EAST of REROUTED DRY WASH (INCLUDING DRY WASH)

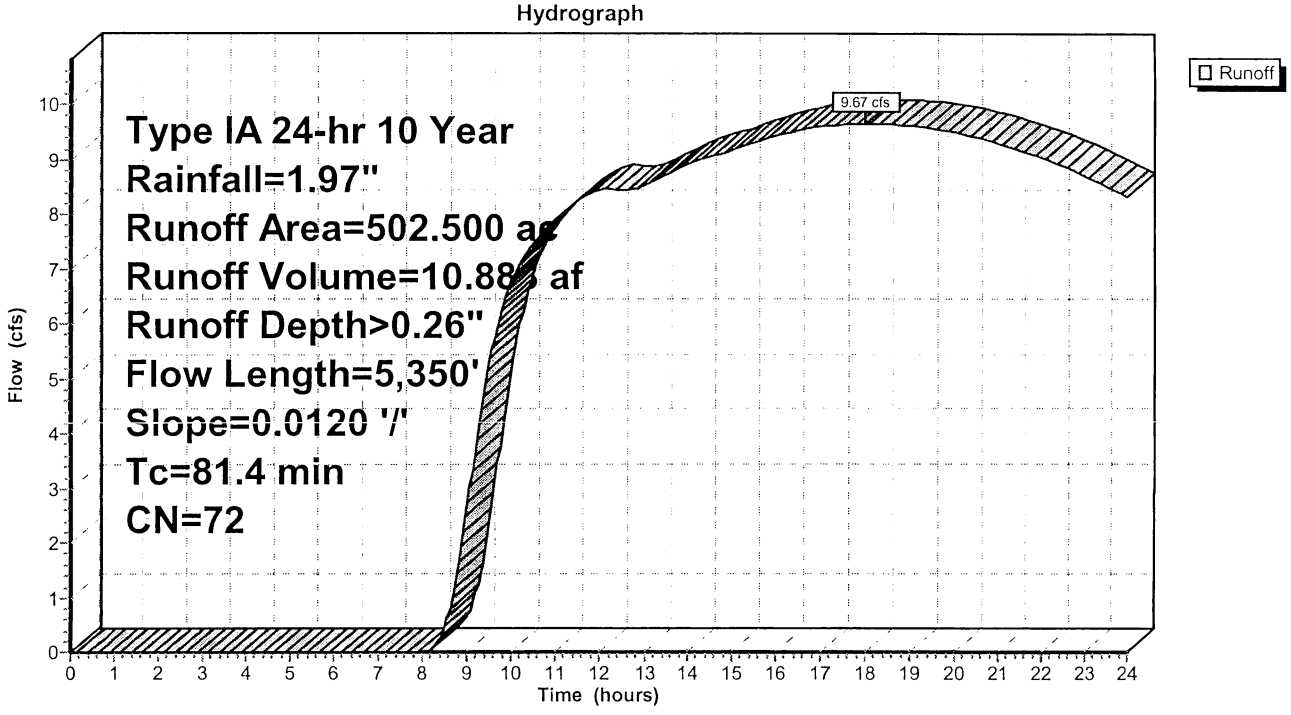
Runoff = 9.67 cfs @ 18.00 hrs, Volume= 10.888 af, Depth> 0.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
208.900	85	Desert shrub range, Poor, HSG C
293.600	63	Desert shrub range, Poor, HSG A
502.500	72	Weighted Average
502.500		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
81.4	5,350	0.0120	1.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps

Subcatchment 9S: EAST of REROUTED DRY WASH (INCLUDING DRY WASH)



Summary for Subcatchment 10S: NORTH SECTION

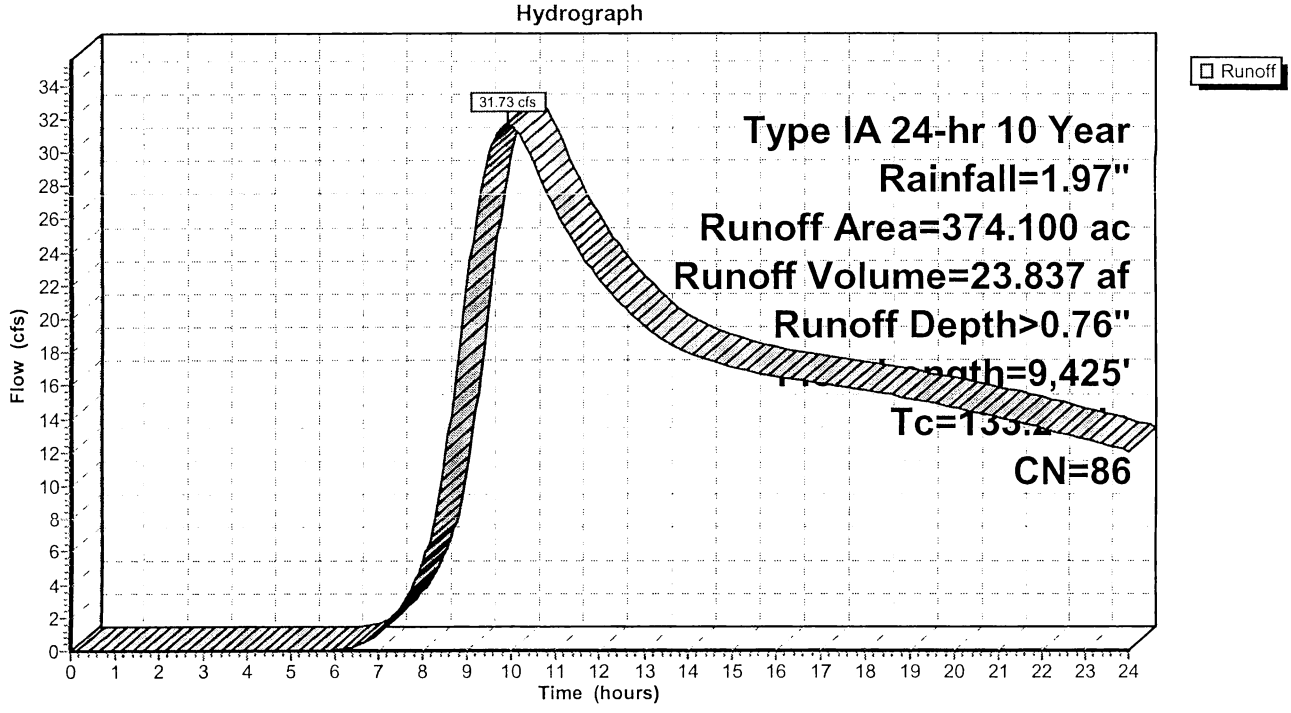
Runoff = 31.73 cfs @ 9.91 hrs, Volume= 23.837 af, Depth> 0.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
16.300	65	Desert shrub range, Poor, HSG A
357.800	87	Desert shrub range, Poor, HSG C
374.100	86	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



Summary for Subcatchment 13S: Water Ponds

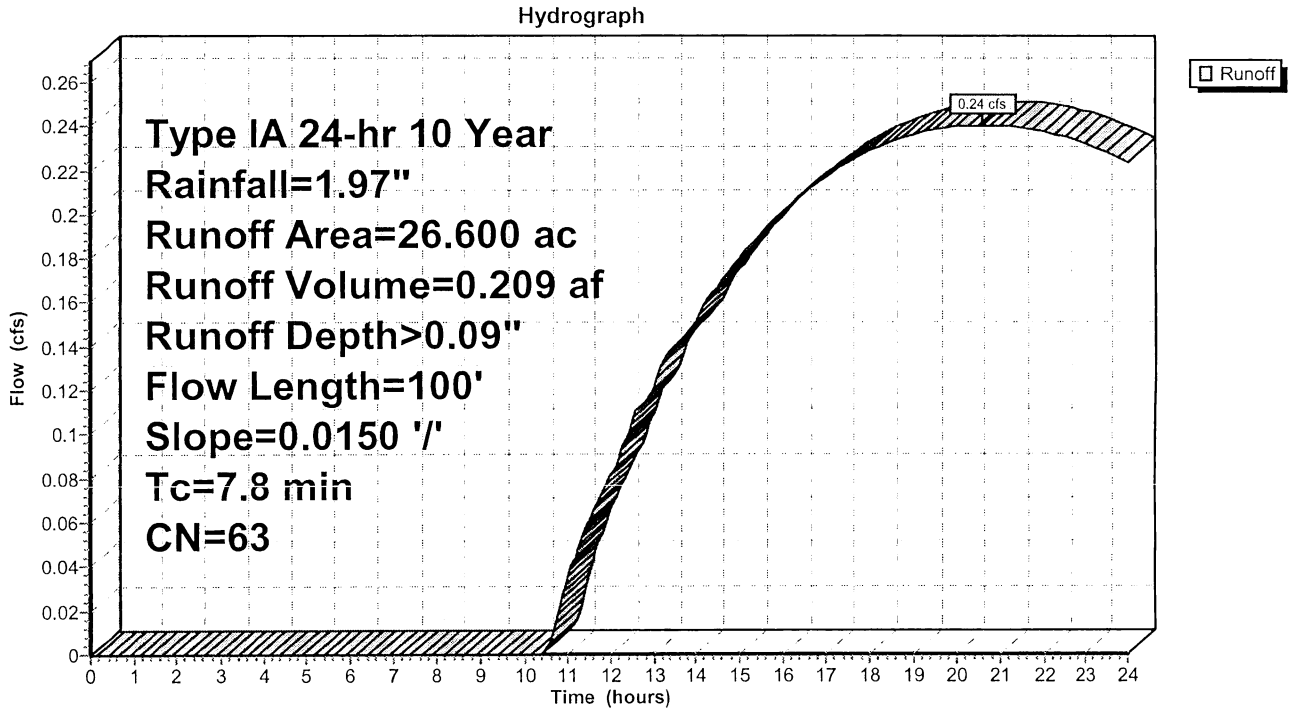
Runoff = 0.24 cfs @ 20.59 hrs, Volume= 0.209 af, Depth> 0.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
26.600	63	Desert shrub range, Poor, HSG A
26.600		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.0150	0.21		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"

Subcatchment 13S: Water Ponds



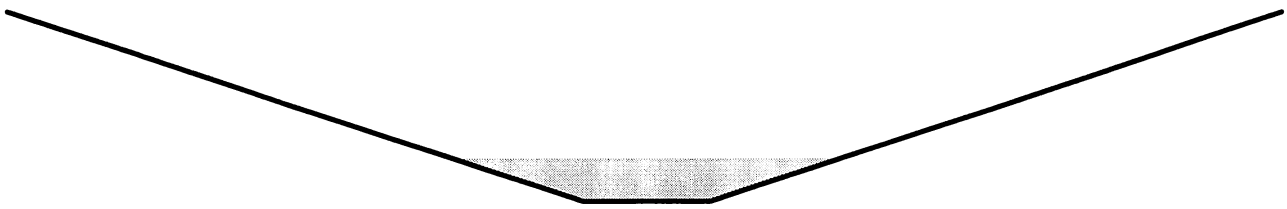
Summary for Reach 2R: SR 14 to RR

Inflow Area = 548.000 ac, 0.00% Impervious, Inflow Depth > 0.27" for 10 Year event
Inflow = 10.55 cfs @ 17.18 hrs, Volume= 12.468 af
Outflow = 10.54 cfs @ 18.35 hrs, Volume= 11.521 af, Atten= 0%, Lag= 70.0 min

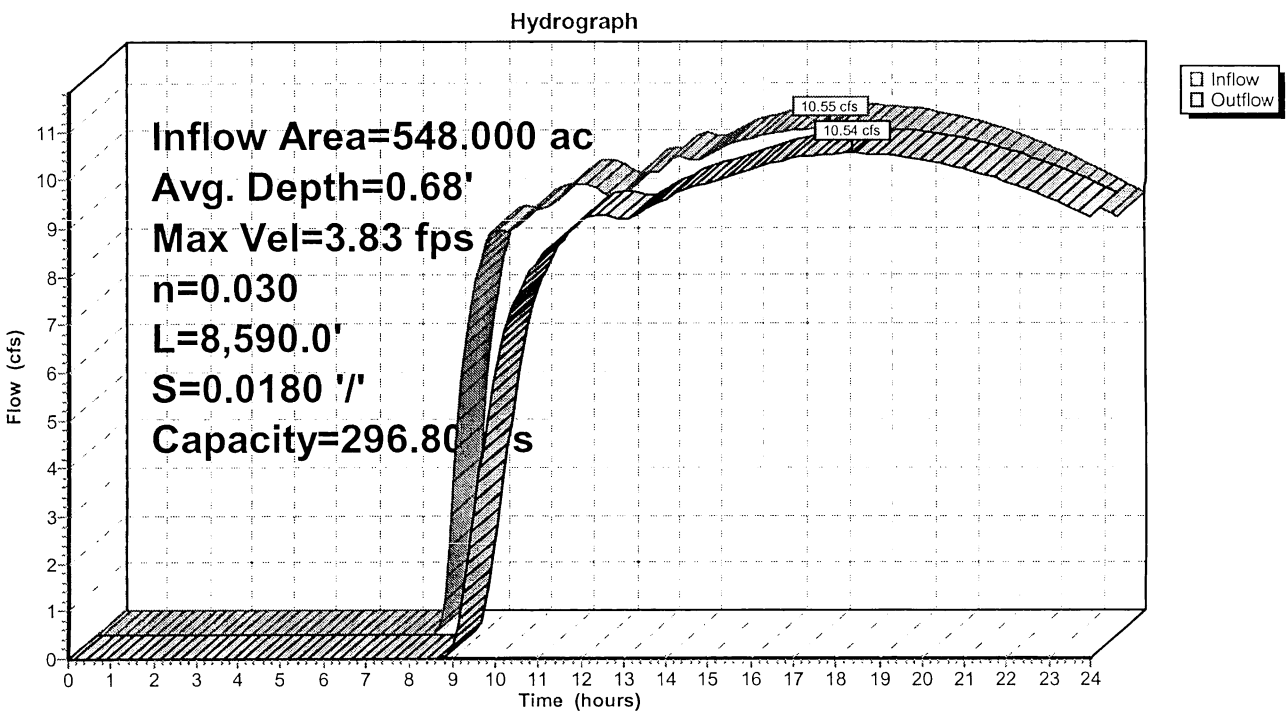
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.83 fps, Min. Travel Time= 37.4 min
Avg. Velocity = 3.59 fps, Avg. Travel Time= 39.9 min

Peak Storage= 23,658 cf @ 17.71 hrs, Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 296.80 cfs

2.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 8,590.0' Slope= 0.0180 '/'
Inlet Invert= 2,326.75', Outlet Invert= 2,172.00'



Reach 2R: SR 14 to RR



Summary for Reach 5R: RR Crossing to POI 3

[61] Hint: Exceeded Reach 2R outlet invert by 0.41' @ 20.25 hrs

Inflow Area = 937.400 ac, 0.00% Impervious, Inflow Depth > 0.19" for 10 Year event
Inflow = 13.95 cfs @ 19.28 hrs, Volume= 14.472 af
Outflow = 13.88 cfs @ 21.70 hrs, Volume= 11.281 af, Atten= 1%, Lag= 145.3 min

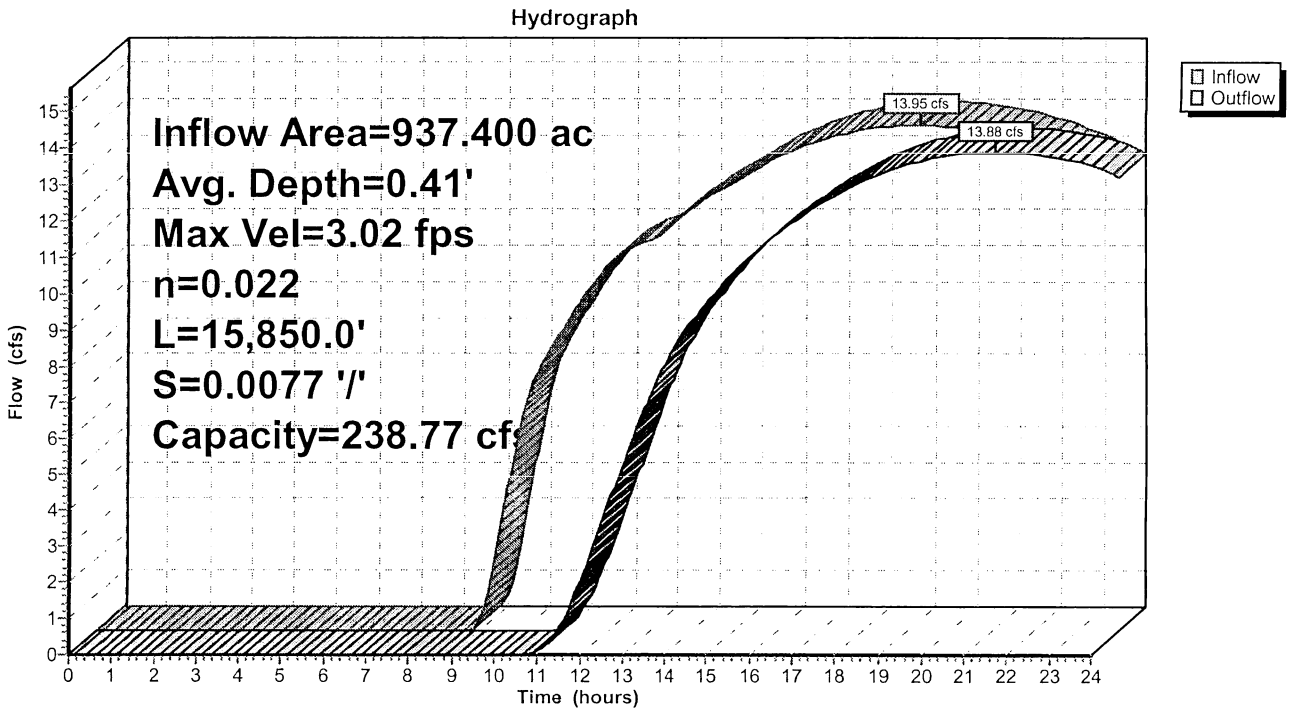
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.02 fps, Min. Travel Time= 87.3 min
Avg. Velocity = 2.56 fps, Avg. Travel Time= 103.3 min

Peak Storage= 72,712 cf @ 20.25 hrs, Average Depth at Peak Storage= 0.41'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 238.77 cfs

10.00' x 2.00' deep channel, n= 0.022
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 15,850.0' Slope= 0.0077 '/'
Inlet Invert= 2,172.00', Outlet Invert= 2,050.00'

‡

Reach 5R: RR Crossing to POI 3



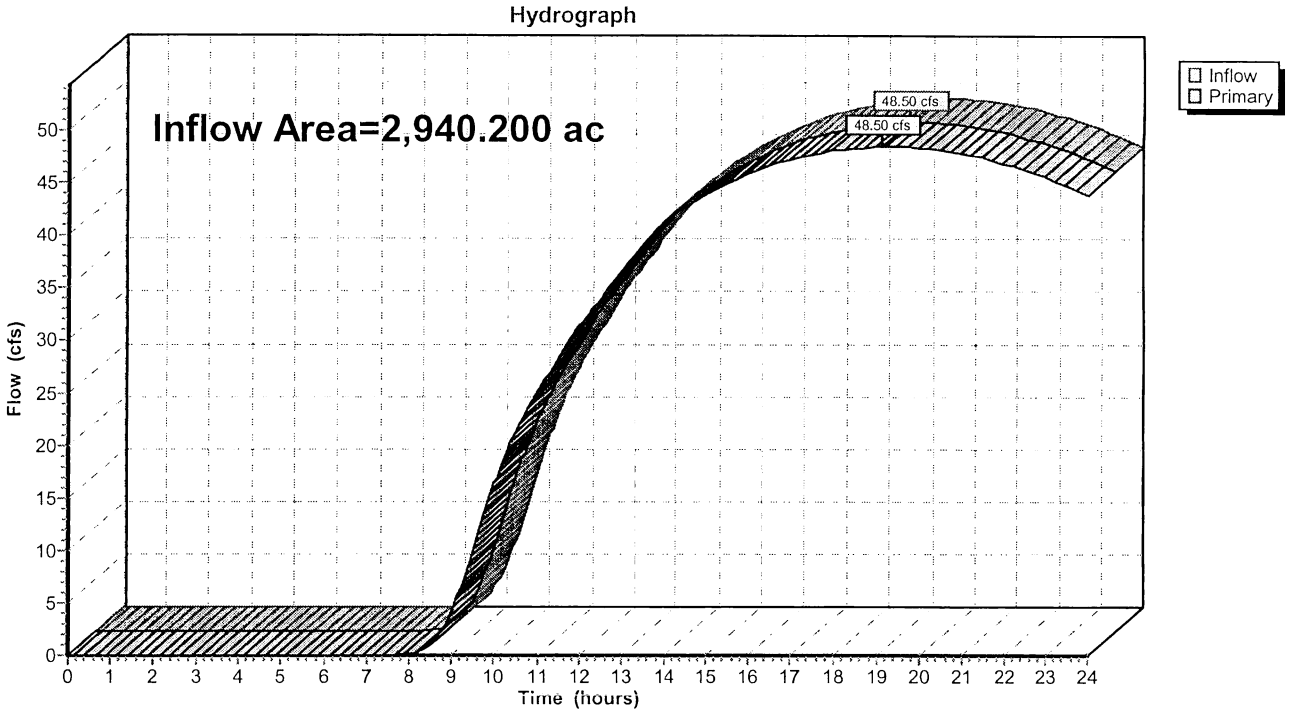
Summary for Pond 7P: POI 1 Combined Flow-Post Construction

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2,940.200 ac, 0.00% Impervious, Inflow Depth > 0.20" for 10 Year event
Inflow = 48.50 cfs @ 19.10 hrs, Volume= 49.659 af
Primary = 48.50 cfs @ 19.10 hrs, Volume= 49.659 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 7P: POI 1 Combined Flow-Post Construction



Summary for Pond 11P: POI 2 Detention Area

Inflow Area =	374.100 ac,	0.00% Impervious,	Inflow Depth >	0.76"	for 10 Year event
Inflow =	31.73 cfs @	9.91 hrs,	Volume=	23.837 af	
Outflow =	18.65 cfs @	13.46 hrs,	Volume=	20.466 af,	Atten= 41%, Lag= 213.3 min
Discarded =	6.10 cfs @	13.46 hrs,	Volume=	7.495 af	
Primary =	12.54 cfs @	13.46 hrs,	Volume=	12.970 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 2,051.71' @ 13.46 hrs Surf.Area= 30.272 ac Storage= 4.670 af

Plug-Flow detention time= 159.5 min calculated for 20.466 af (86% of inflow)
Center-of-Mass det. time= 86.0 min (985.3 - 899.3)

Volume	Invert	Avail.Storage	Storage Description
#1	2,051.50'	44.100 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

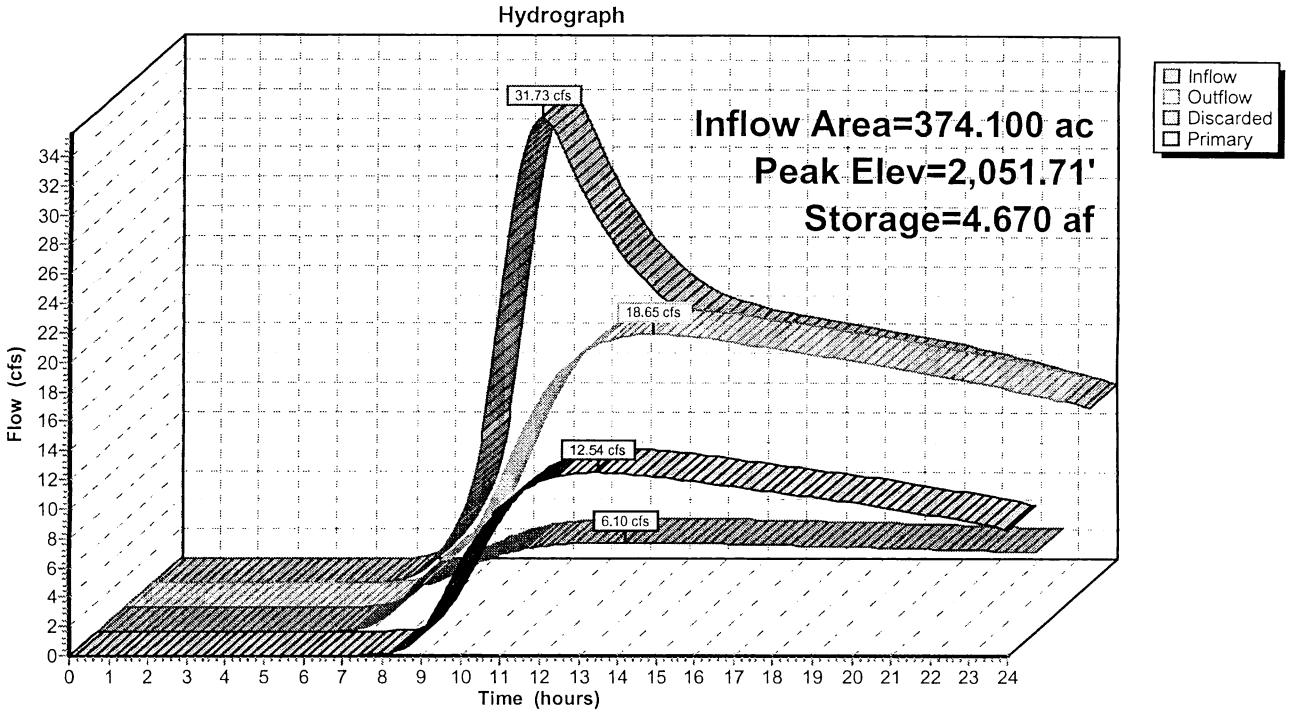
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
2,051.50	14.500	0.000	0.000
2,052.00	52.300	16.700	16.700
2,052.50	57.300	27.400	44.100

Device	Routing	Invert	Outlet Devices
#1	Discarded	2,051.50'	**0.200 in/hr Exfiltration over Surface area**
#2	Primary	2,051.50'	**26.6 deg x 40.0' long Sharp-Crested Vee/Trap Weir** C= 2.63

Discarded OutFlow Max=6.10 cfs @ 13.46 hrs HW=2,051.71' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 6.10 cfs)

Primary OutFlow Max=12.54 cfs @ 13.46 hrs HW=2,051.71' (Free Discharge)
└**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 12.54 cfs @ 1.50 fps)

Pond 11P: POI 2 Detention Area



Summary for Pond 12P: POI 3

Removed 53.9 acres of Water Ponds

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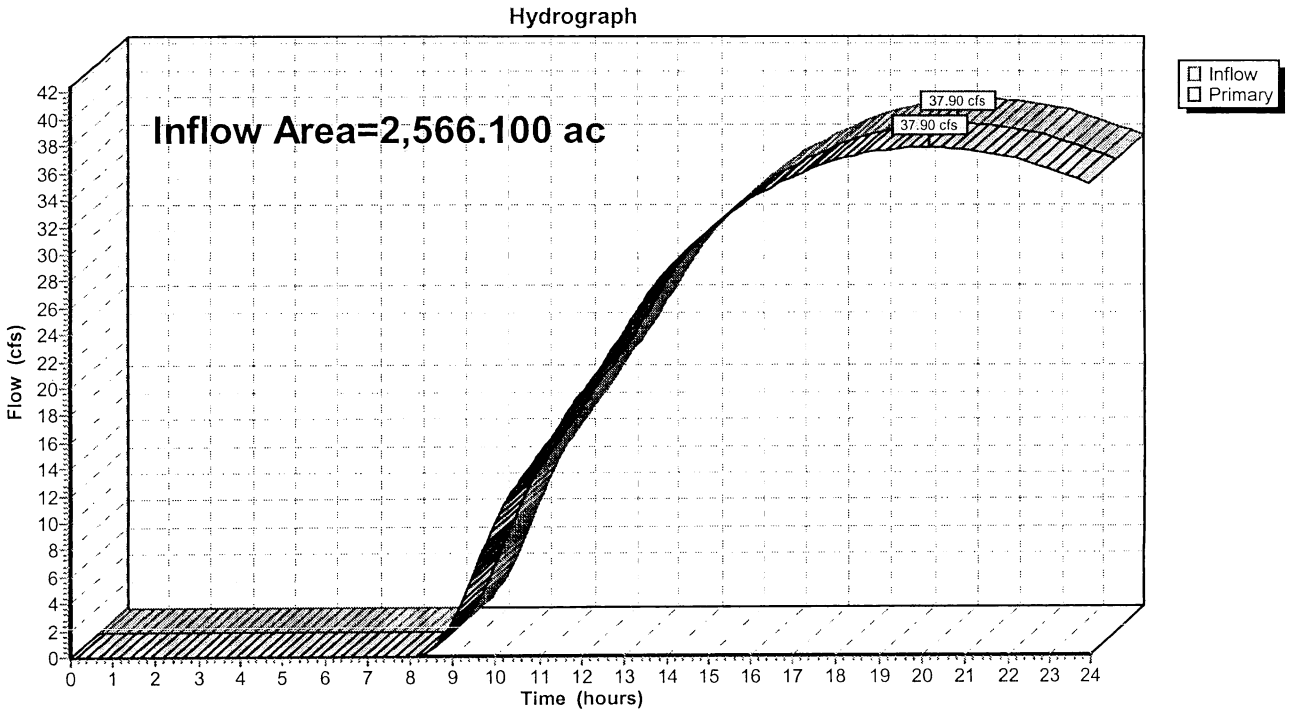
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2,566.100 ac, 0.00% Impervious, Inflow Depth > 0.17" for 10 Year event
Inflow = 37.90 cfs @ 20.17 hrs, Volume= 36.689 af
Primary = 37.90 cfs @ 20.17 hrs, Volume= 36.689 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 12P: POI 3



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Above SR 14 Runoff Area=548.000 ac 0.00% Impervious Runoff Depth>0.94"
Flow Length=13,530' Tc=29.5 min CN=72 Runoff=74.42 cfs 43.110 af

Subcatchment 3S: ABOVE RR Runoff Area=389.400 ac 0.00% Impervious Runoff Depth>0.53"
Flow Length=8,690' Tc=32.0 min CN=63 Runoff=13.95 cfs 17.154 af

Subcatchment 8S: WEST of REROUTED Runoff Area=1,126.200 ac 0.00% Impervious Runoff Depth>0.69"
Flow Length=8,935' Tc=54.2 min CN=67 Runoff=65.93 cfs 64.403 af

Subcatchment 9S: EAST of REROUTED Runoff Area=502.500 ac 0.00% Impervious Runoff Depth>0.91"
Flow Length=5,350' Slope=0.0120 '/' Tc=81.4 min CN=72 Runoff=47.84 cfs 38.157 af

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth>1.76"
Flow Length=9,425' Tc=133.2 min CN=86 Runoff=82.69 cfs 54.868 af

Subcatchment 13S: Water Ponds Runoff Area=26.600 ac 0.00% Impervious Runoff Depth>0.54"
Flow Length=100' Slope=0.0150 '/' Tc=7.8 min CN=63 Runoff=1.00 cfs 1.195 af

Reach 2R: SR 14 to RR Avg. Depth=1.52' Max Vel=6.00 fps Inflow=74.42 cfs 43.110 af
n=0.030 L=8,590.0' S=0.0180 '/' Capacity=296.80 cfs Outflow=59.56 cfs 41.425 af

Reach 5R: RR Crossing to POI 3 Avg. Depth=0.91' Max Vel=4.83 fps Inflow=73.11 cfs 58.579 af
n=0.022 L=15,850.0' S=0.0077 '/' Capacity=238.77 cfs Outflow=56.17 cfs 52.756 af

Pond 7P: POI 1 Combined Flow-Post Construction Inflow=175.49 cfs 191.189 af
Primary=175.49 cfs 191.189 af

Pond 11P: POI 2 Detention Area Peak Elev=2,051.92' Storage=12.617 af Inflow=82.69 cfs 54.868 af
Discarded=9.28 cfs 11.450 af Primary=35.47 cfs 35.873 af Outflow=44.76 cfs 47.323 af

Pond 12P: POI 3 Inflow=144.08 cfs 155.316 af
Primary=144.08 cfs 155.316 af

Total Runoff Area = 2,966.800 ac Runoff Volume = 218.888 af Average Runoff Depth = 0.89"
100.00% Pervious = 2,966.800 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Above SR 14

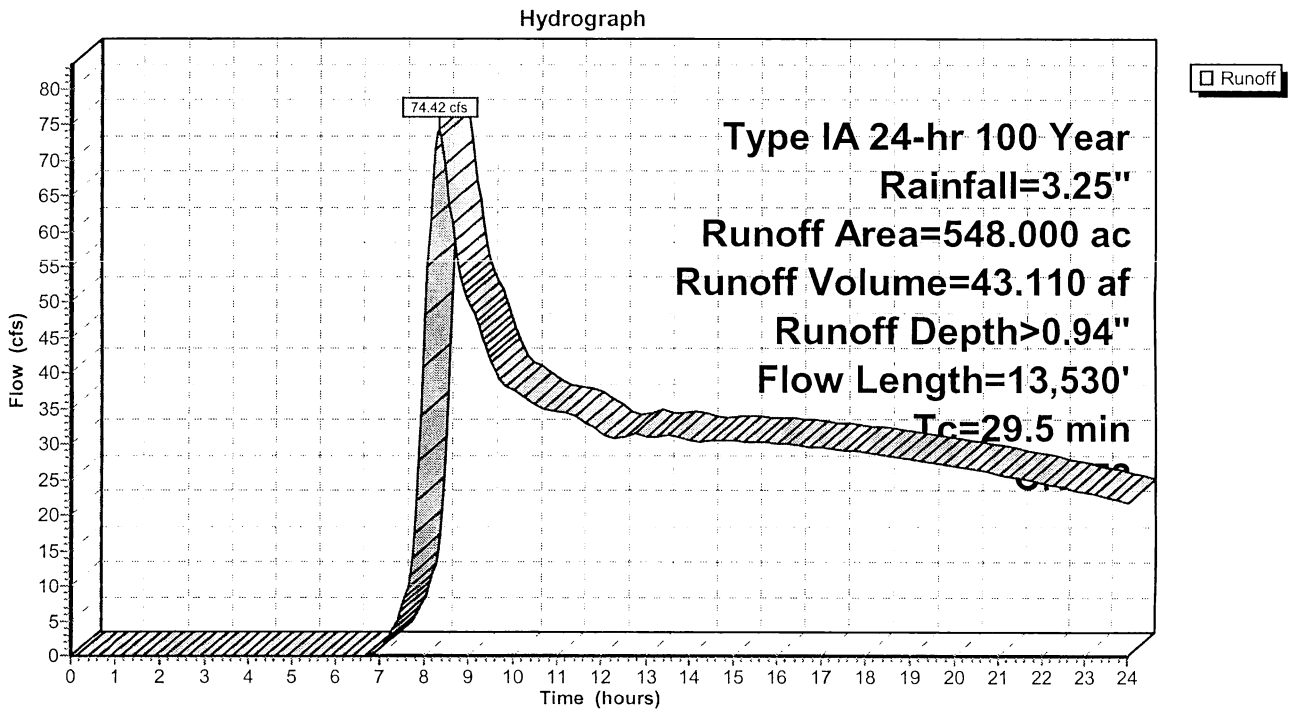
Runoff = 74.42 cfs @ 8.30 hrs, Volume= 43.110 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
207.300	88	Desert shrub range, Poor, HSG D
340.700	63	Desert shrub range, Poor, HSG A
548.000	72	Weighted Average
548.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	200	0.0940	0.51		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
12.0	8,350	0.0940	11.59	115.90	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.0	4,980	0.0400	7.56	75.60	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
29.5	13,530	Total			

Subcatchment 1S: Above SR 14



Summary for Subcatchment 3S: ABOVE RR

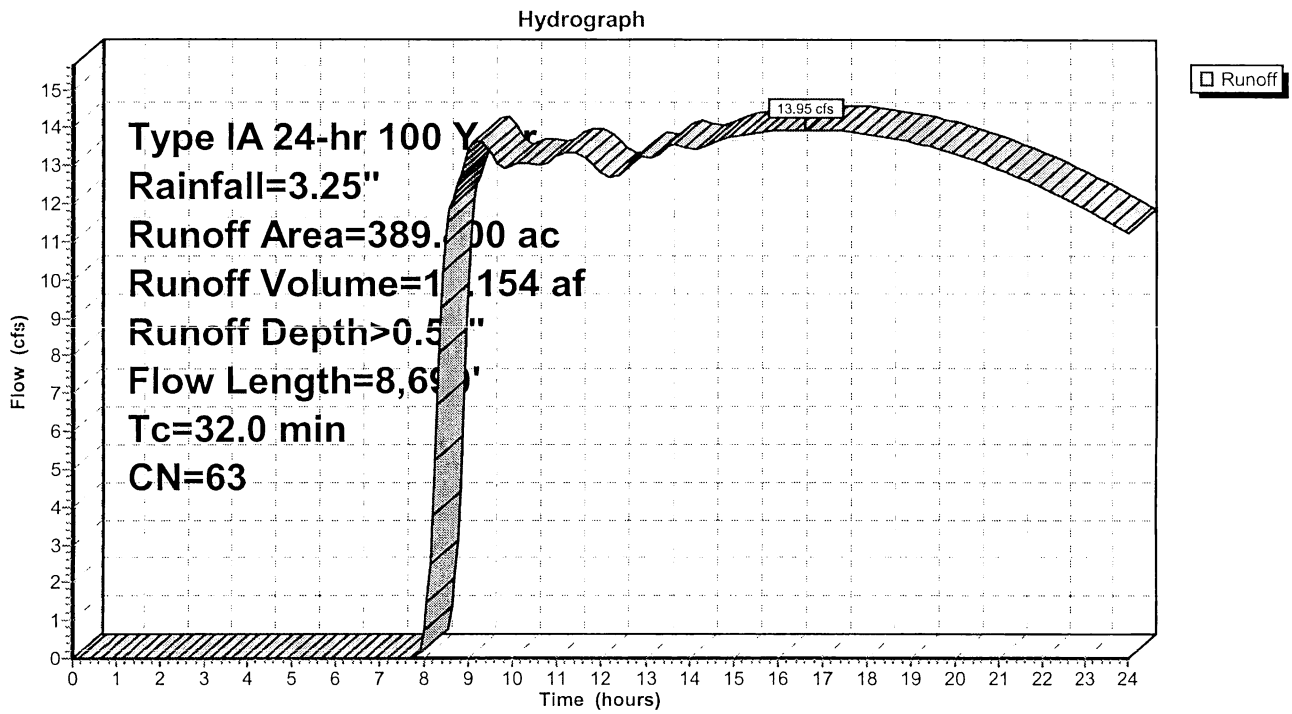
Runoff = 13.95 cfs @ 16.59 hrs, Volume= 17.154 af, Depth> 0.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
389.400	63	Desert shrub range, Poor, HSG A
389.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0200	0.36		**Sheet Flow,** n= 0.030 P2= 1.10"
16.1	5,180	0.0200	5.35	53.46	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.3	3,410	0.0150	5.01	75.12	**Channel Flow,** Area= 15.0 sf Perim= 20.0' r= 0.75' n= 0.030
32.0	8,690	Total			

Subcatchment 3S: ABOVE RR



Summary for Subcatchment 8S: WEST of REROUTED DRY WASH/ EAST of RAILROAD

Desert Shrub Range, poor, A Area=1255.6
Subtract Water Pond area=53.9 acres
Total Desert Shrub Range poor A Area=1201.7 acres

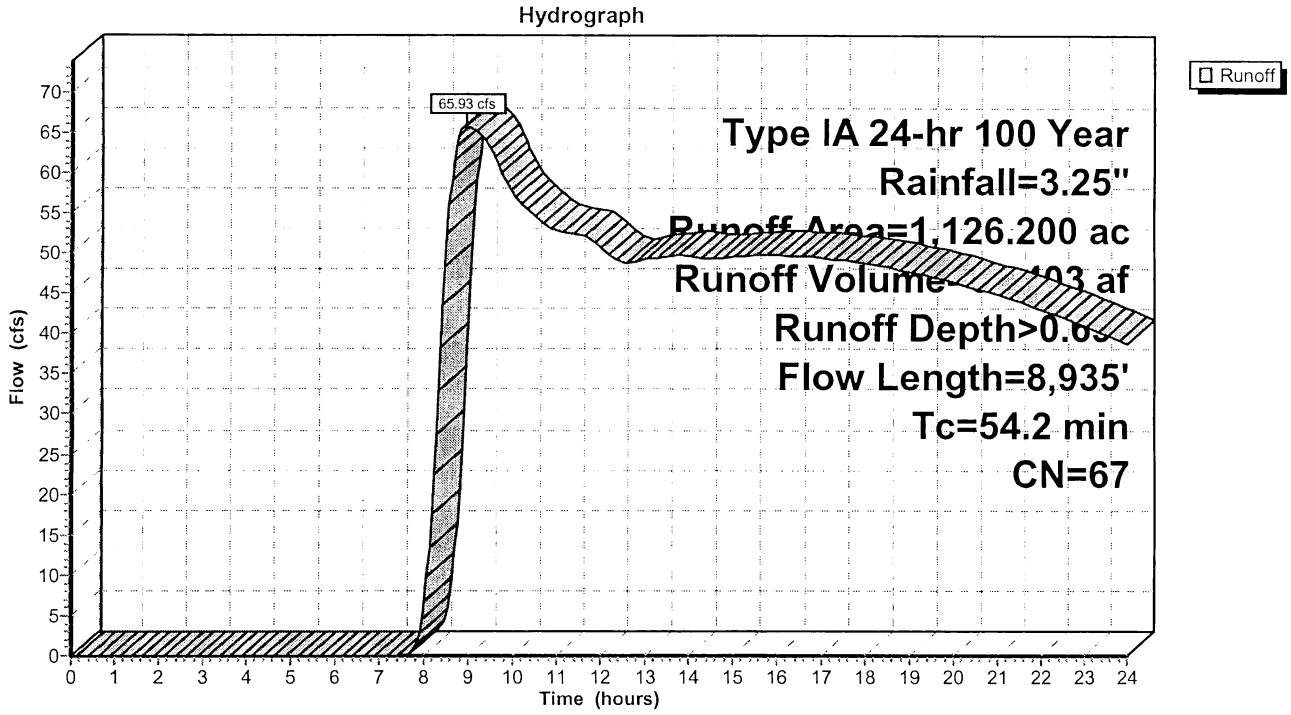
Runoff = 65.93 cfs @ 8.93 hrs, Volume= 64.403 af, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
94.800	87	Desert shrub range, Poor, HSG C
1,031.400	65	Desert shrub range, Poor, HSG A
1,126.200	67	Weighted Average
1,126.200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
6.9	725	0.0120	1.76		**Shallow Concentrated Flow, Unpaved** Unpaved Kv= 16.1 fps
35.7	7,810	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
5.9	100	0.0300	0.28		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
54.2	8,935	Total			

Subcatchment 8S: WEST of REROUTED DRY WASH/ EAST of RAILROAD



Summary for Subcatchment 9S: EAST of REROUTED DRY WASH (INCLUDING DRY WASH)

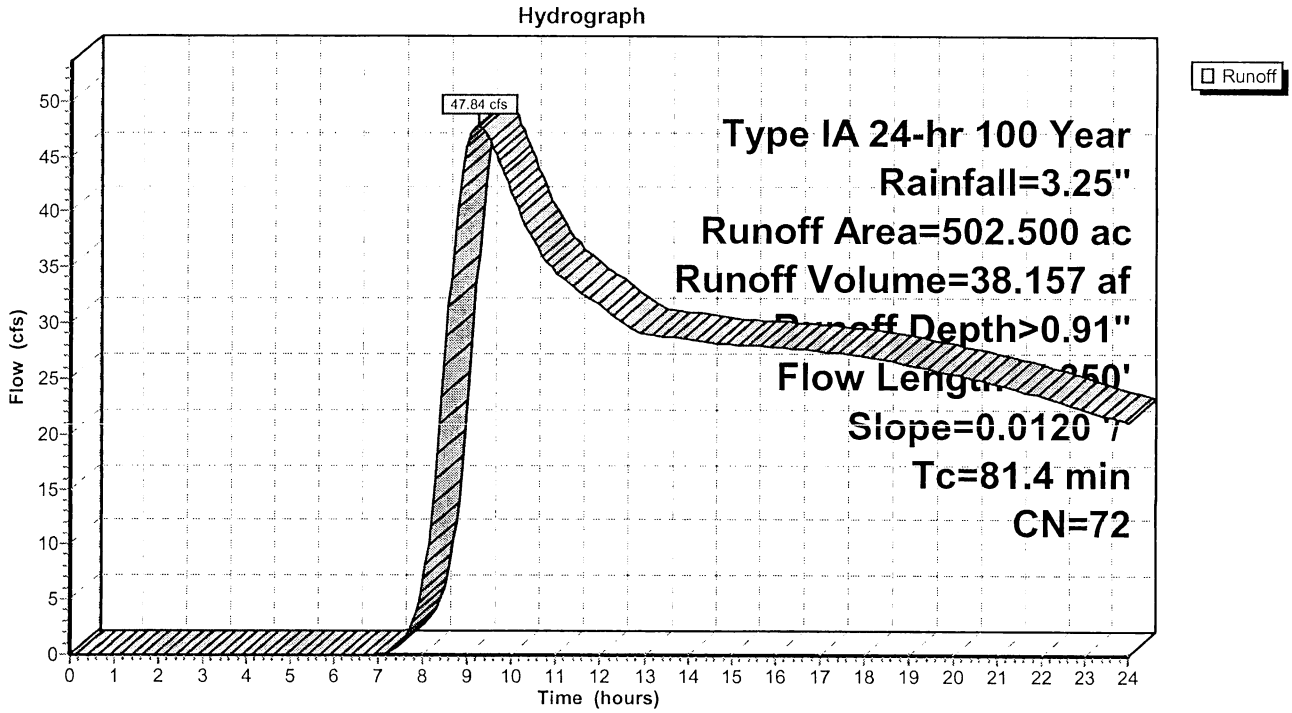
Runoff = 47.84 cfs @ 9.19 hrs, Volume= 38.157 af, Depth> 0.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
208.900	85	Desert shrub range, Poor, HSG C
293.600	63	Desert shrub range, Poor, HSG A
502.500	72	Weighted Average
502.500		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
81.4	5,350	0.0120	1.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps

Subcatchment 9S: EAST of REROUTED DRY WASH (INCLUDING DRY WASH)



Summary for Subcatchment 10S: NORTH SECTION

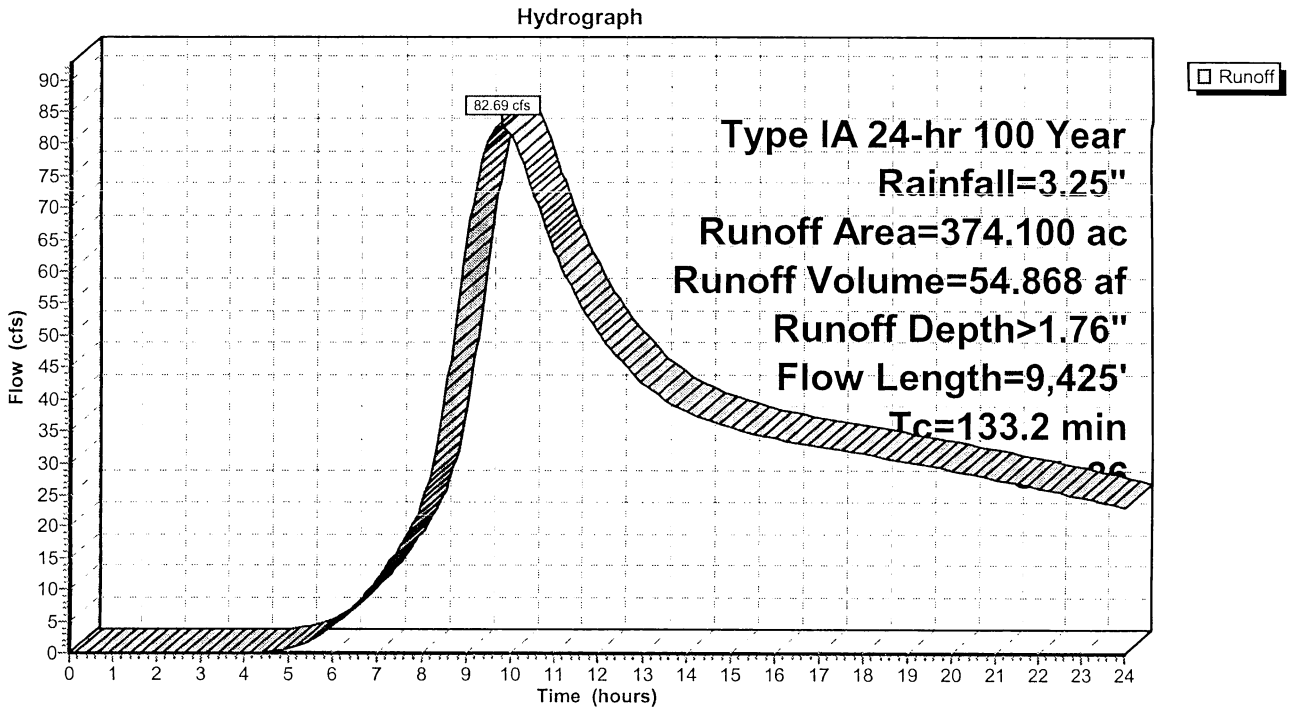
Runoff = 82.69 cfs @ 9.74 hrs, Volume= 54.868 af, Depth> 1.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
16.300	65	Desert shrub range, Poor, HSG A
357.800	87	Desert shrub range, Poor, HSG C
374.100	86	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



Summary for Subcatchment 13S: Water Ponds

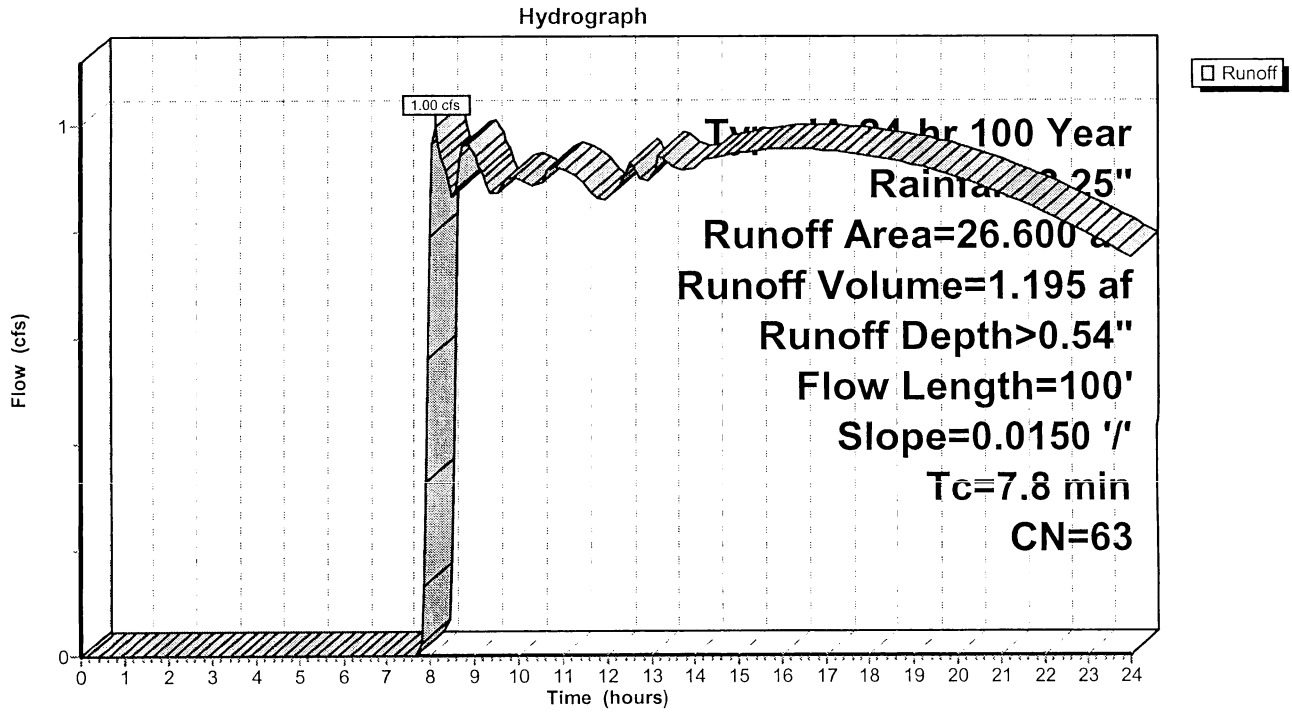
Runoff = 1.00 cfs @ 8.10 hrs, Volume= 1.195 af, Depth> 0.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
26.600	63	Desert shrub range, Poor, HSG A
26.600		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.0150	0.21		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"

Subcatchment 13S: Water Ponds



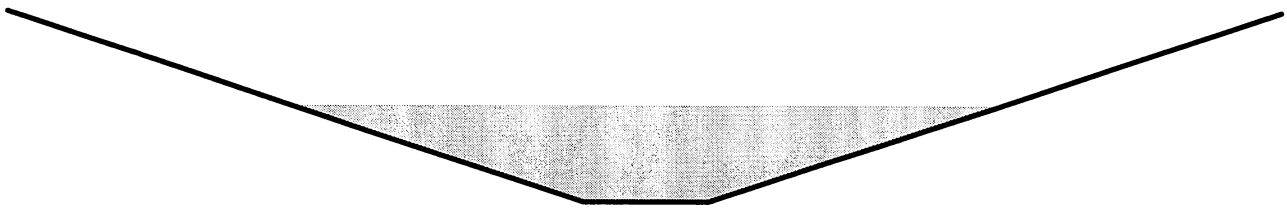
Summary for Reach 2R: SR 14 to RR

Inflow Area = 548.000 ac, 0.00% Impervious, Inflow Depth > 0.94" for 100 Year event
Inflow = 74.42 cfs @ 8.30 hrs, Volume= 43.110 af
Outflow = 59.56 cfs @ 9.03 hrs, Volume= 41.425 af, Atten= 20%, Lag= 43.8 min

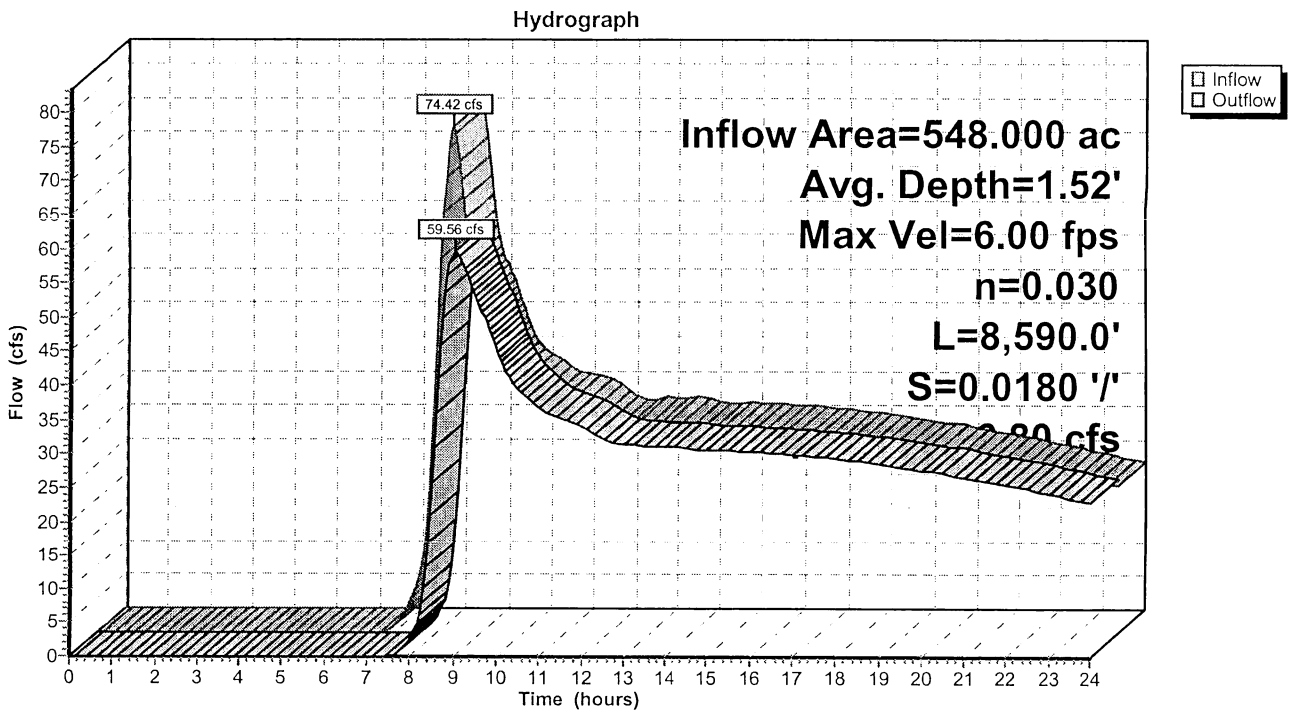
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.00 fps, Min. Travel Time= 23.9 min
Avg. Velocity = 4.83 fps, Avg. Travel Time= 29.6 min

Peak Storage= 85,311 cf @ 8.63 hrs, Average Depth at Peak Storage= 1.52'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 296.80 cfs

2.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 8,590.0' Slope= 0.0180 '/'
Inlet Invert= 2,326.75', Outlet Invert= 2,172.00'



Reach 2R: SR 14 to RR



Summary for Reach 5R: RR Crossing to POI 3

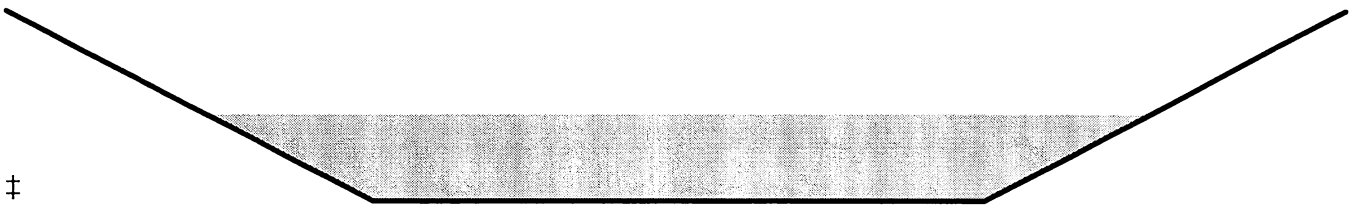
[61] Hint: Exceeded Reach 2R outlet invert by 0.91' @ 10.15 hrs

Inflow Area = 937.400 ac, 0.00% Impervious, Inflow Depth > 0.75" for 100 Year event
Inflow = 73.11 cfs @ 9.04 hrs, Volume= 58.579 af
Outflow = 56.17 cfs @ 11.04 hrs, Volume= 52.756 af, Atten= 23%, Lag= 119.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.83 fps, Min. Travel Time= 54.6 min
Avg. Velocity = 4.14 fps, Avg. Travel Time= 63.8 min

Peak Storage= 184,177 cf @ 10.13 hrs, Average Depth at Peak Storage= 0.91'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 238.77 cfs

10.00' x 2.00' deep channel, n= 0.022
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 15,850.0' Slope= 0.0077 '/'
Inlet Invert= 2,172.00', Outlet Invert= 2,050.00'



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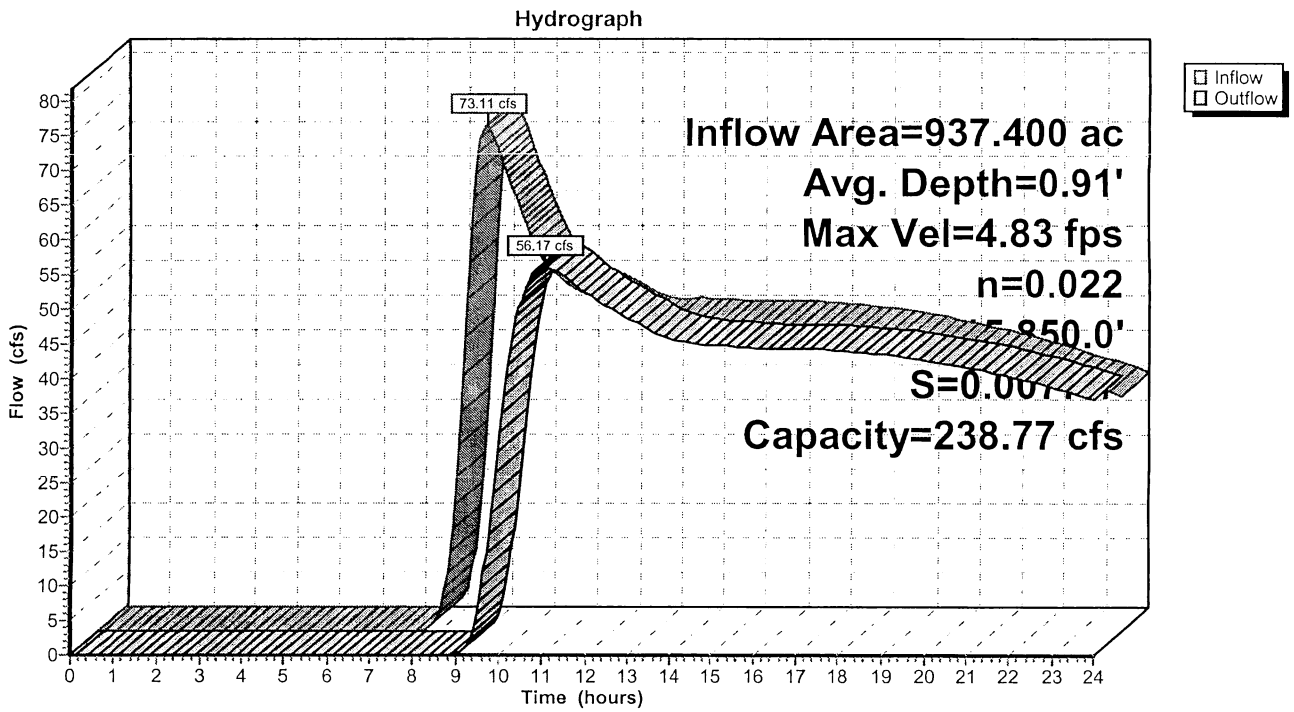
Reach 5R: RR Crossing to POI 3



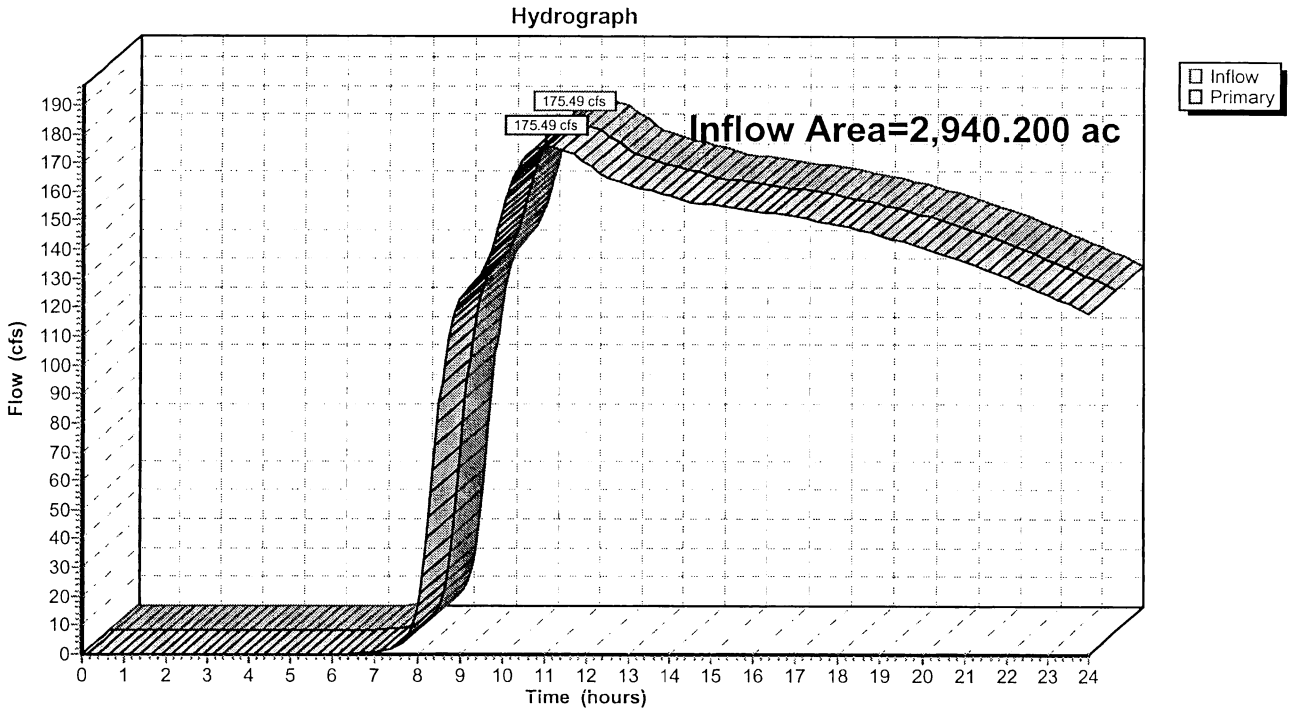
Summary for Pond 7P: POI 1 Combined Flow-Post Construction

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2,940.200 ac, 0.00% Impervious, Inflow Depth > 0.78" for 100 Year event
Inflow = 175.49 cfs @ 11.01 hrs, Volume= 191.189 af
Primary = 175.49 cfs @ 11.01 hrs, Volume= 191.189 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 7P: POI 1 Combined Flow-Post Construction



Summary for Pond 11P: POI 2 Detention Area

Inflow Area =	374.100 ac,	0.00% Impervious,	Inflow Depth >	1.76"	for 100 Year event
Inflow =	82.69 cfs @	9.74 hrs,	Volume=	54.868 af	
Outflow =	44.76 cfs @	12.65 hrs,	Volume=	47.323 af,	Atten= 46%, Lag= 174.7 min
Discarded =	9.28 cfs @	12.65 hrs,	Volume=	11.450 af	
Primary =	35.47 cfs @	12.65 hrs,	Volume=	35.873 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 2,051.92' @ 12.65 hrs Surf.Area= 46.021 ac Storage= 12.617 af

Plug-Flow detention time= 179.5 min calculated for 47.225 af (86% of inflow)
Center-of-Mass det. time= 103.2 min (956.3 - 853.0)

Volume	Invert	Avail.Storage	Storage Description
#1	2,051.50'	44.100 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

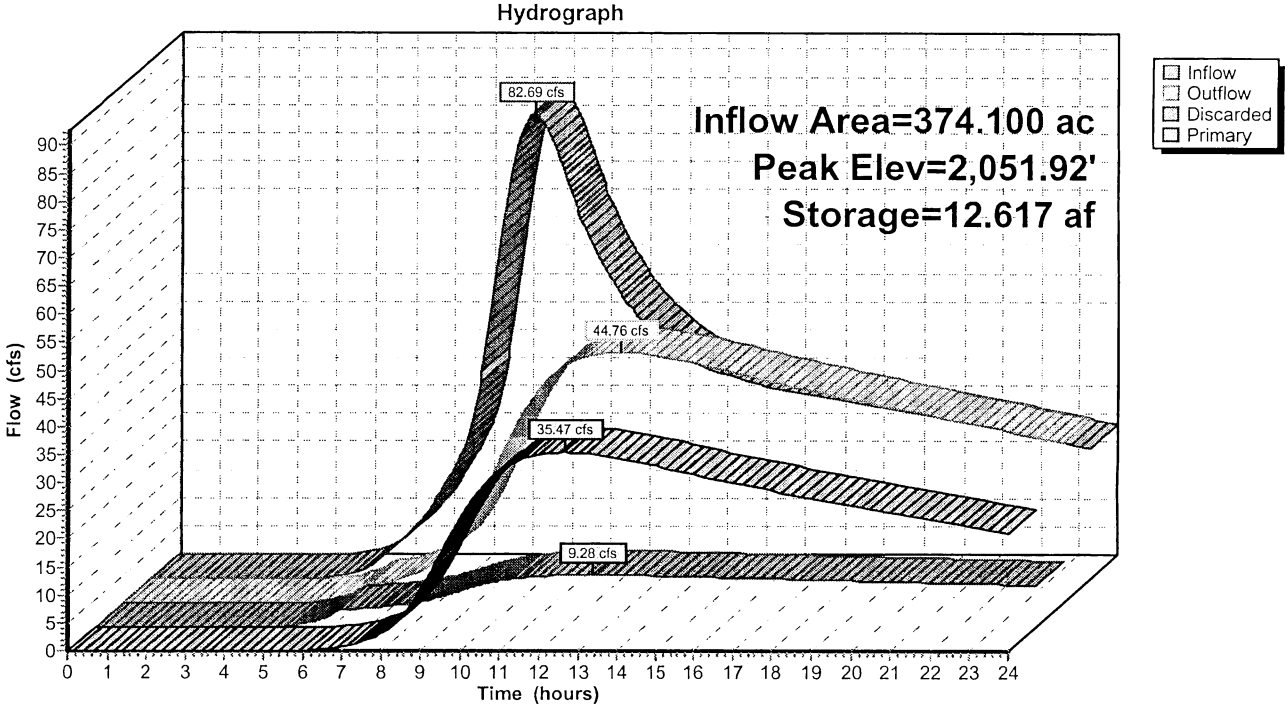
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
2,051.50	14.500	0.000	0.000
2,052.00	52.300	16.700	16.700
2,052.50	57.300	27.400	44.100

Device	Routing	Invert	Outlet Devices
#1	Discarded	2,051.50'	**0.200 in/hr Exfiltration over Surface area**
#2	Primary	2,051.50'	**26.6 deg x 40.0' long Sharp-Crested Vee/Trap Weir** C= 2.63

Discarded OutFlow Max=9.28 cfs @ 12.65 hrs HW=2,051.92' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 9.28 cfs)

Primary OutFlow Max=35.47 cfs @ 12.65 hrs HW=2,051.92' (Free Discharge)
└**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 35.47 cfs @ 2.12 fps)

Pond 11P: POI 2 Detention Area



Summary for Pond 12P: POI 3

Removed 53.9 acres of Water Ponds

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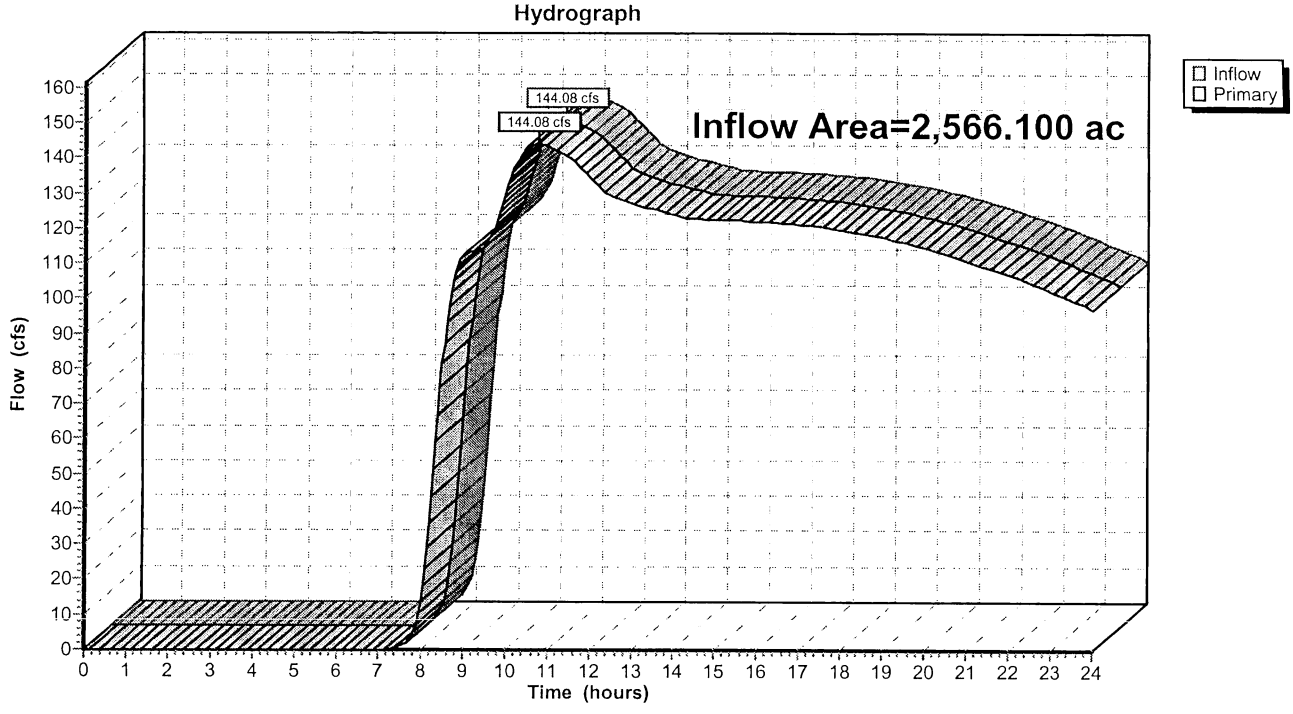
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2,566.100 ac, 0.00% Impervious, Inflow Depth > 0.73" for 100 Year event
Inflow = 144.08 cfs @ 10.75 hrs, Volume= 155.316 af
Primary = 144.08 cfs @ 10.75 hrs, Volume= 155.316 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 12P: POI 3

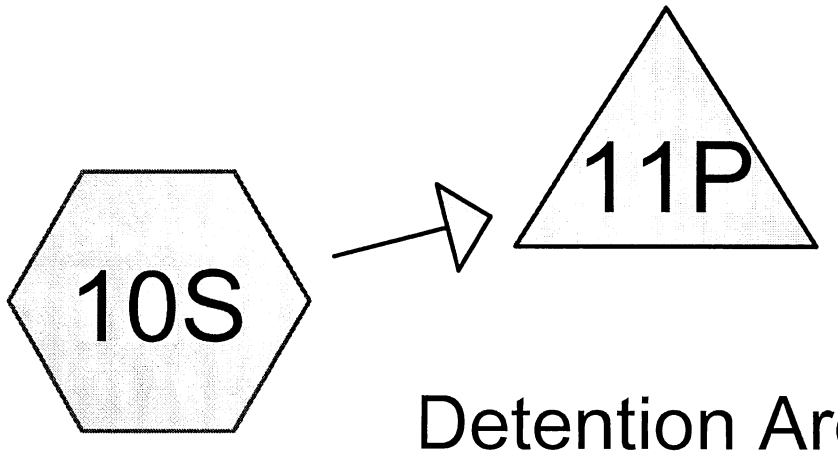


POST CONSTRUCTION

10 YR 5 DAY Q_{IN} = 20.4CFS, Q_{OUT} = 7.8CFS

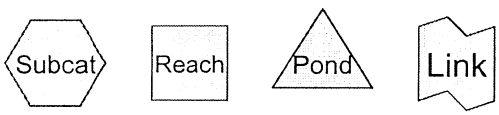
10 YR 24 HR Q_{IN} = 31.7CFS, Q_{OUT} = 12.5CFS

100 YR 24 HR Q_{IN} = 82.7CFS, Q_{OUT} = 35.5CFS



Detention Area

NORTH SECTION



Drainage Diagram for POST - North Detention Area
Prepared by Carlton Engineering, Inc, Printed 02/21/2008
HydroCAD® 8.50 s/n 003190 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
16.300	65	Desert shrub range, Poor, HSG A (10S)
357.800	87	Desert shrub range, Poor, HSG C (10S)
374.100		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
16.300	HSG A	10S
0.000	HSG B	
357.800	HSG C	10S
0.000	HSG D	
0.000	Other	
374.100		**TOTAL AREA**

Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth=1.32"
Flow Length=9,425' Tc=133.2 min CN=86 Runoff=20.39 cfs 41.069 af

Pond 11P: Detention Area Peak Elev=2,051.65' Storage=3.091 af Inflow=20.39 cfs 41.069 af
Discarded=5.25 cfs 28.147 af Primary=7.84 cfs 12.922 af Outflow=13.09 cfs 41.069 af

Total Runoff Area = 374.100 ac Runoff Volume = 41.069 af Average Runoff Depth = 1.32"
100.00% Pervious = 374.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 10S: NORTH SECTION

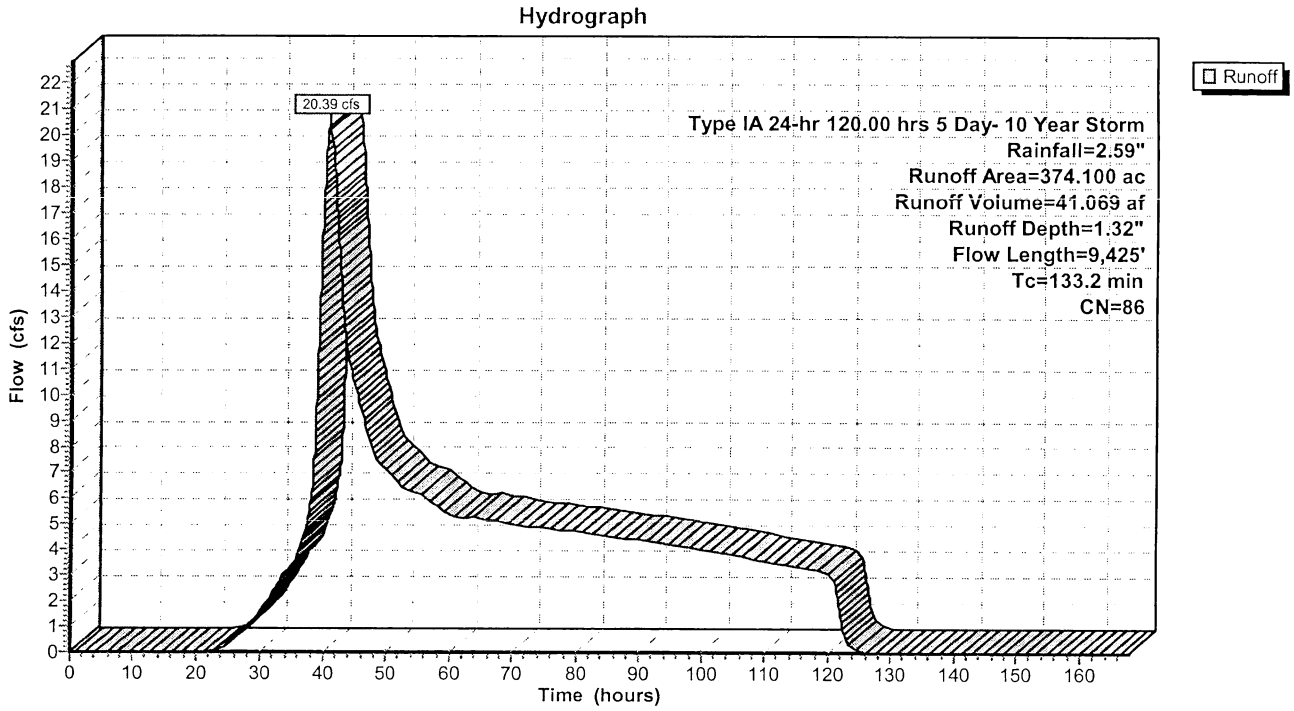
Runoff = 20.39 cfs @ 40.99 hrs, Volume= 41.069 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type IA 24-hr 120.00 hrs 5 Day- 10 Year Storm Rainfall=2.59"

Area (ac)	CN	Description
16.300	65	Desert shrub range, Poor, HSG A
357.800	87	Desert shrub range, Poor, HSG C
374.100	86	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



Summary for Pond 11P: Detention Area

Inflow Area =	374.100 ac,	0.00% Impervious,	Inflow Depth =	1.32"	for 5 Day- 10 Year Storm event
Inflow =	20.39 cfs @	40.99 hrs,	Volume=	41.069 af	
Outflow =	13.09 cfs @	43.14 hrs,	Volume=	41.069 af,	Atten= 36%, Lag= 128.7 min
Discarded =	5.25 cfs @	43.14 hrs,	Volume=	28.147 af	
Primary =	7.84 cfs @	43.14 hrs,	Volume=	12.922 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 2,051.65' @ 43.14 hrs Surf.Area= 26.030 ac Storage= 3.091 af

Plug-Flow detention time= 115.3 min calculated for 41.069 af (100% of inflow)
Center-of-Mass det. time= 115.2 min (4,201.9 - 4,086.7)

Volume	Invert	Avail.Storage	Storage Description
#1	2,051.50'	44.100 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

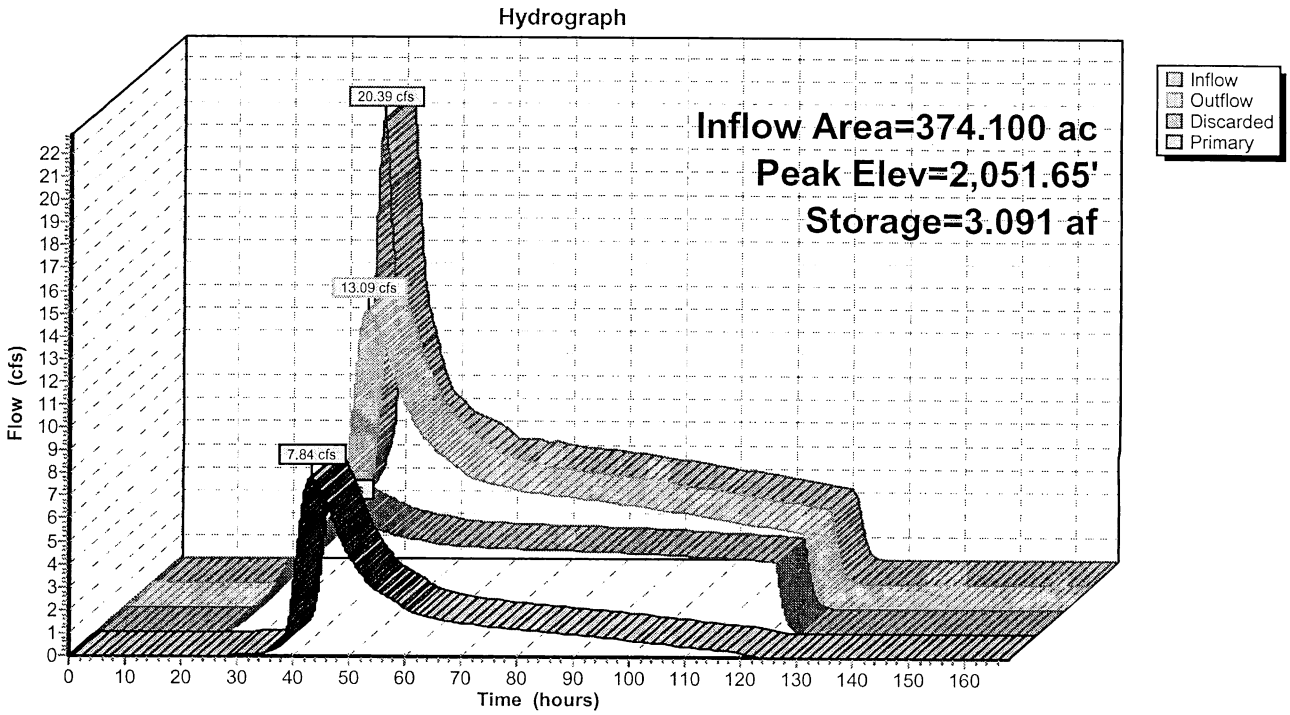
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
2,051.50	14.500	0.000	0.000
2,052.00	52.300	16.700	16.700
2,052.50	57.300	27.400	44.100

Device	Routing	Invert	Outlet Devices
#1	Discarded	2,051.50'	**0.200 in/hr Exfiltration over Surface area**
#2	Primary	2,051.50'	**26.6 deg x 40.0' long Sharp-Crested Vee/Trap Weir** C= 2.63

Discarded OutFlow Max=5.25 cfs @ 43.14 hrs HW=2,051.65' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 5.25 cfs)

Primary OutFlow Max=7.84 cfs @ 43.14 hrs HW=2,051.65' (Free Discharge)
└**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 7.84 cfs @ 1.28 fps)

Pond 11P: Detention Area



Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth=0.83"
Flow Length=9,425' Tc=133.2 min CN=86 Runoff=31.73 cfs 25.762 af

Pond 11P: Detention Area Peak Elev=2,051.71' Storage=4.670 af Inflow=31.73 cfs 25.762 af
Discarded=6.10 cfs 10.275 af Primary=12.54 cfs 15.486 af Outflow=18.65 cfs 25.762 af

Total Runoff Area = 374.100 ac Runoff Volume = 25.762 af Average Runoff Depth = 0.83"
100.00% Pervious = 374.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 10S: NORTH SECTION

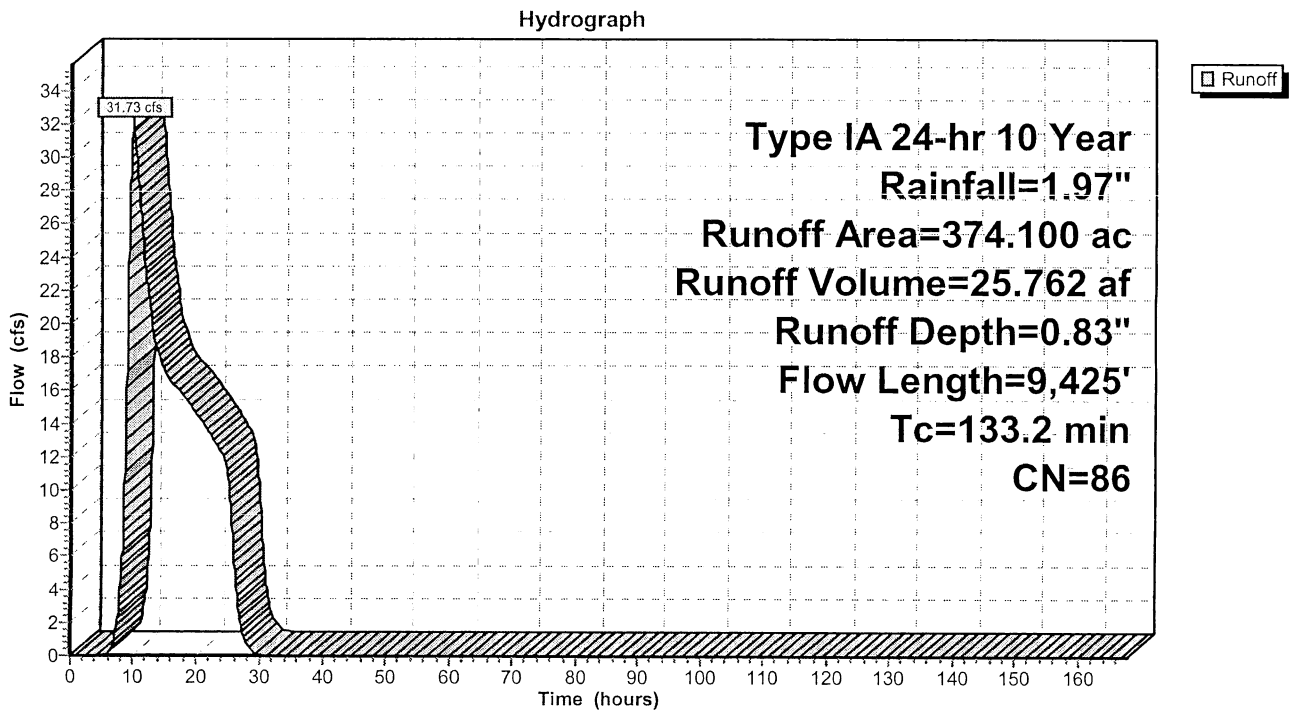
Runoff = 31.73 cfs @ 9.91 hrs, Volume= 25.762 af, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
16.300	65	Desert shrub range, Poor, HSG A
357.800	87	Desert shrub range, Poor, HSG C
374.100	86	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



Summary for Pond 11P: Detention Area

Inflow Area =	374.100 ac,	0.00% Impervious,	Inflow Depth =	0.83"	for 10 Year event	
Inflow =	31.73 cfs @	9.91 hrs,	Volume=	25.762 af		
Outflow =	18.65 cfs @	13.46 hrs,	Volume=	25.762 af,	Atten= 41%,	Lag= 213.3 min
Discarded =	6.10 cfs @	13.46 hrs,	Volume=	10.275 af		
Primary =	12.54 cfs @	13.46 hrs,	Volume=	15.486 af		

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 2,051.71' @ 13.46 hrs Surf.Area= 30.272 ac Storage= 4.670 af

Plug-Flow detention time= 169.6 min calculated for 25.754 af (100% of inflow)
Center-of-Mass det. time= 169.6 min (1,115.0 - 945.3)

Volume	Invert	Avail.Storage	Storage Description
#1	2,051.50'	44.100 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

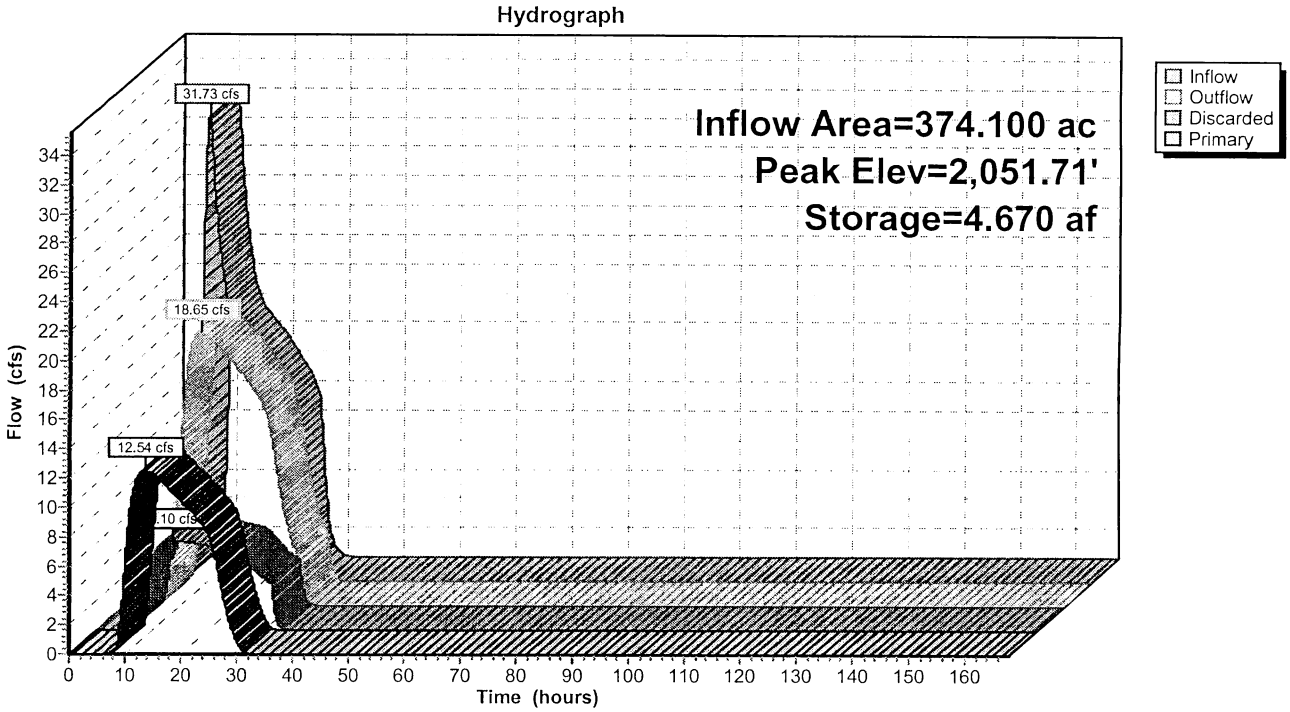
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
2,051.50	14.500	0.000	0.000
2,052.00	52.300	16.700	16.700
2,052.50	57.300	27.400	44.100

Device	Routing	Invert	Outlet Devices
#1	Discarded	2,051.50'	**0.200 in/hr Exfiltration over Surface area**
#2	Primary	2,051.50'	**26.6 deg x 40.0' long Sharp-Crested Vee/Trap Weir** C= 2.63

Discarded OutFlow Max=6.10 cfs @ 13.46 hrs HW=2,051.71' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 6.10 cfs)

Primary OutFlow Max=12.54 cfs @ 13.46 hrs HW=2,051.71' (Free Discharge)
└**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 12.54 cfs @ 1.50 fps)

Pond 11P: Detention Area



Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth=1.88"
Flow Length=9,425' Tc=133.2 min CN=86 Runoff=82.69 cfs 58.567 af

Pond 11P: Detention Area Peak Elev=2,051.92' Storage=12.617 af Inflow=82.69 cfs 58.567 af
Discarded=9.28 cfs 15.758 af Primary=35.47 cfs 42.808 af Outflow=44.76 cfs 58.567 af

Total Runoff Area = 374.100 ac Runoff Volume = 58.567 af Average Runoff Depth = 1.88"
100.00% Pervious = 374.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 10S: NORTH SECTION

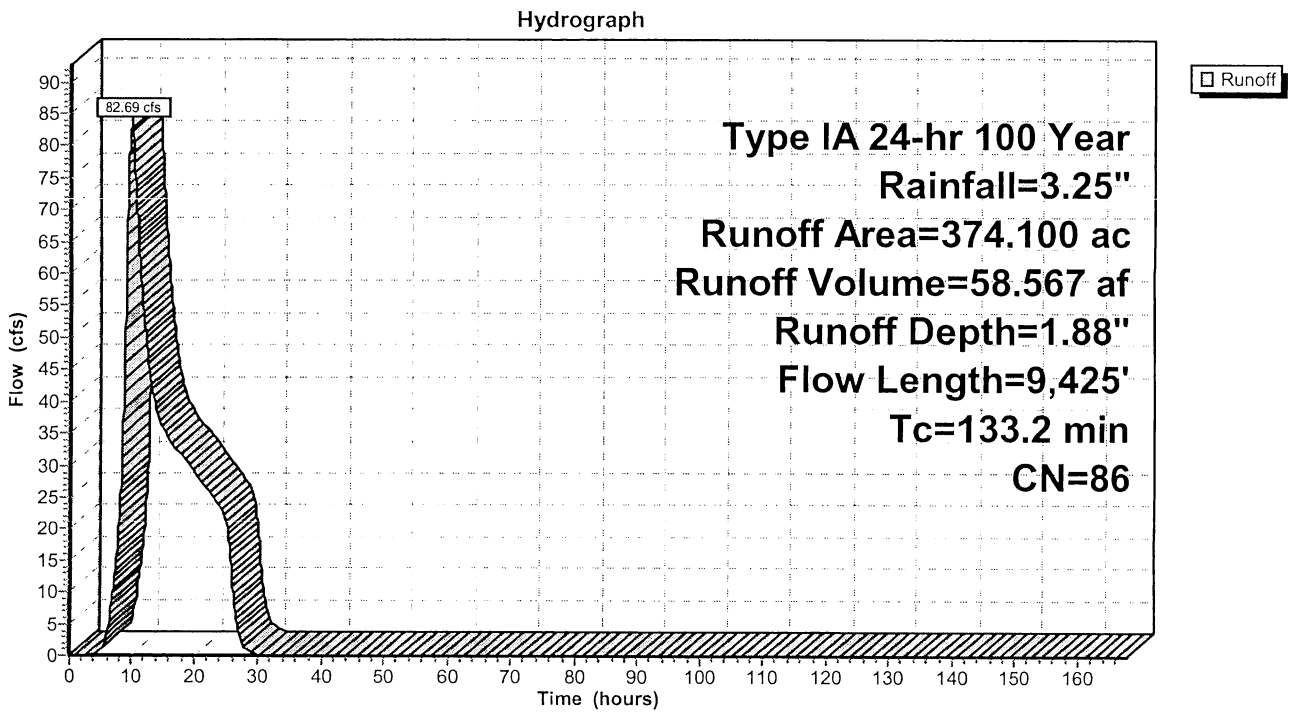
Runoff = 82.69 cfs @ 9.74 hrs, Volume= 58.567 af, Depth= 1.88"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
16.300	65	Desert shrub range, Poor, HSG A
357.800	87	Desert shrub range, Poor, HSG C
374.100	86	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



Summary for Pond 11P: Detention Area

Inflow Area =	374.100 ac,	0.00% Impervious,	Inflow Depth =	1.88"	for 100 Year event
Inflow =	82.69 cfs @	9.74 hrs,	Volume=	58.567 af	
Outflow =	44.76 cfs @	12.65 hrs,	Volume=	58.567 af,	Atten= 46%, Lag= 174.7 min
Discarded =	9.28 cfs @	12.65 hrs,	Volume=	15.758 af	
Primary =	35.47 cfs @	12.65 hrs,	Volume=	42.808 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 2,051.92' @ 12.65 hrs Surf.Area= 46.021 ac Storage= 12.617 af

Plug-Flow detention time= 192.1 min calculated for 58.549 af (100% of inflow)
Center-of-Mass det. time= 192.1 min (1,087.0 - 894.9)

Volume	Invert	Avail.Storage	Storage Description
#1	2,051.50'	44.100 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

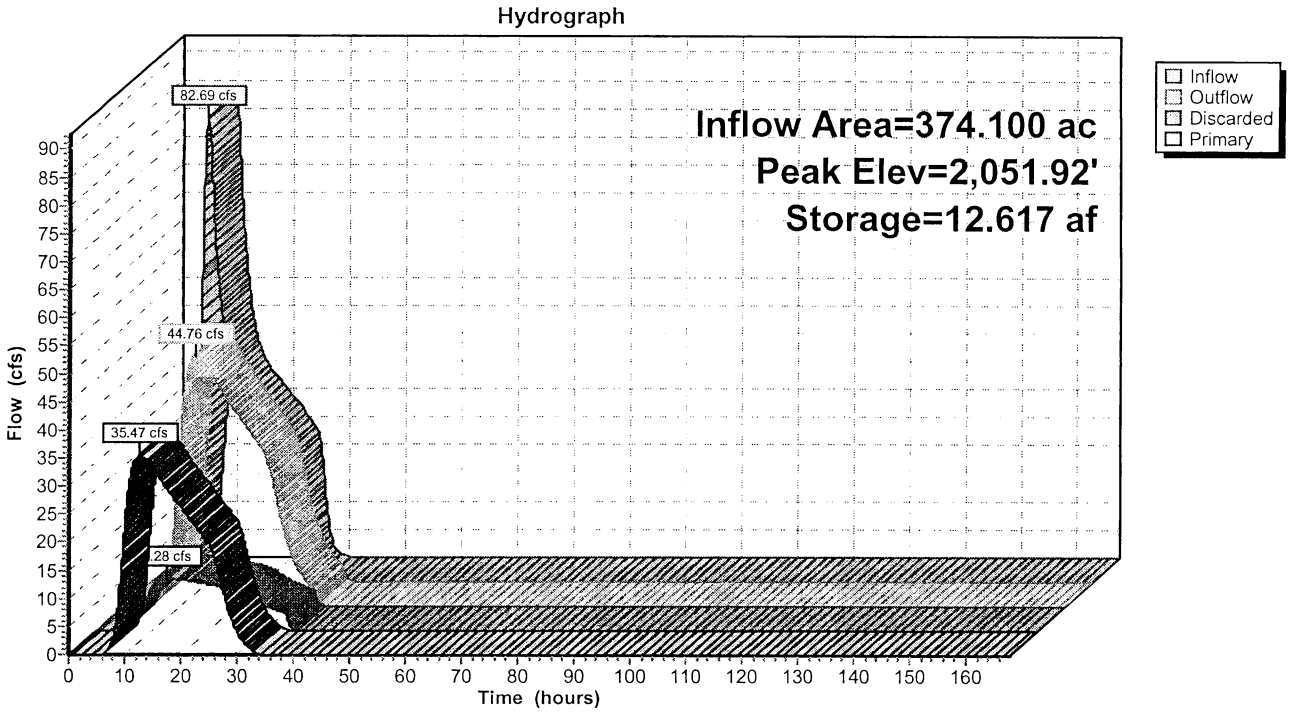
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
2,051.50	14.500	0.000	0.000
2,052.00	52.300	16.700	16.700
2,052.50	57.300	27.400	44.100

Device	Routing	Invert	Outlet Devices
#1	Discarded	2,051.50'	**0.200 in/hr Exfiltration over Surface area**
#2	Primary	2,051.50'	**26.6 deg x 40.0' long Sharp-Crested Vee/Trap Weir** C= 2.63

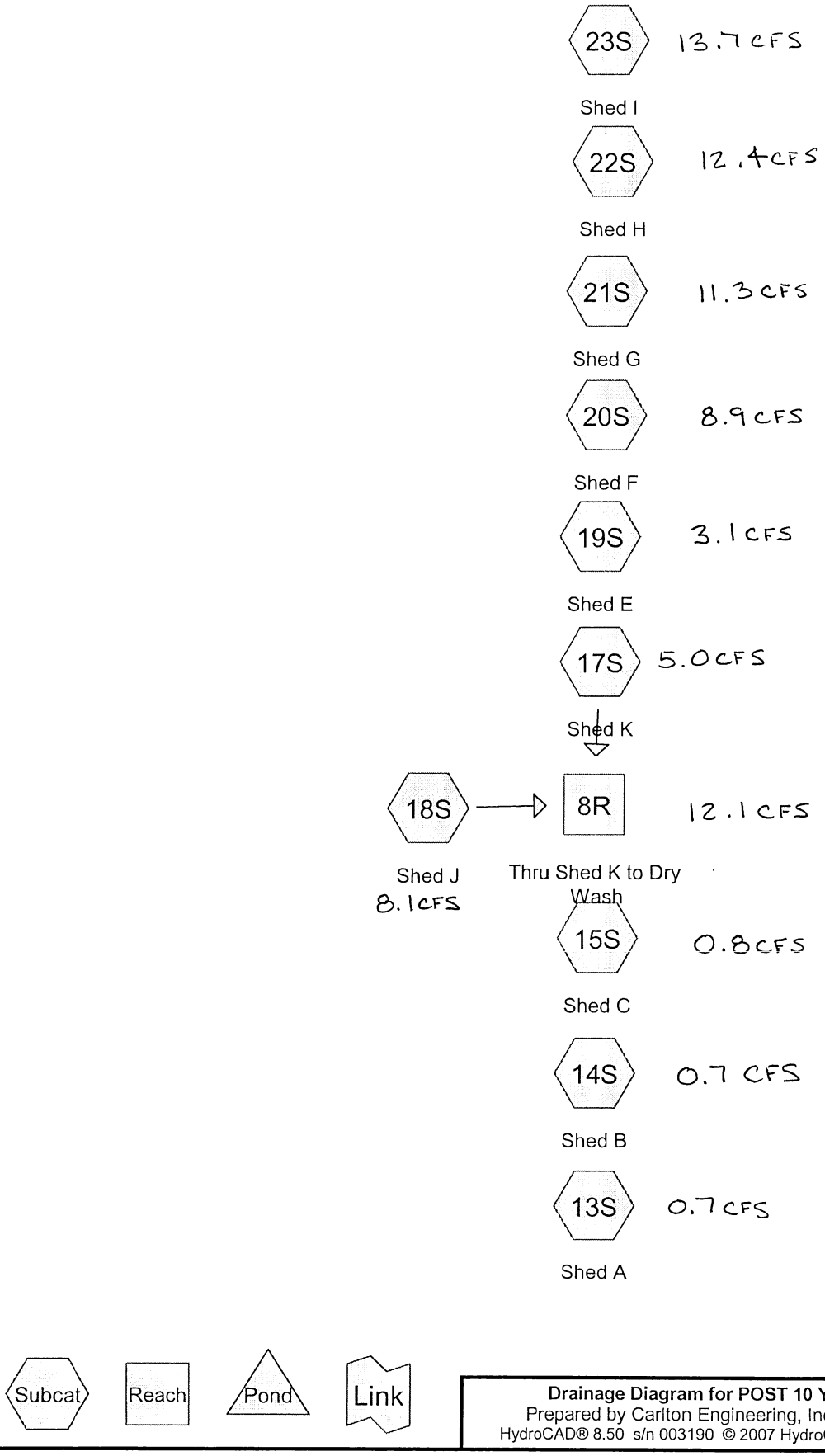
Discarded OutFlow Max=9.28 cfs @ 12.65 hrs HW=2,051.92' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 9.28 cfs)

Primary OutFlow Max=35.47 cfs @ 12.65 hrs HW=2,051.92' (Free Discharge)
└**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 35.47 cfs @ 2.12 fps)

Pond 11P: Detention Area



RATIONAL METHOD POST CONSTRUCTION 10YR



Drainage Diagram for POST 10 Yr Rational Method
Prepared by Carlton Engineering, Inc, Printed 01/23/2008
HydroCAD® 8.50 s/n 003190 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	C	Description (subcatchment-numbers)
493.100	0.01	(13S,14S,15S)
115.100	0.07	(19S)
111.600	0.10	(17S)
121.100	0.18	(20S)
119.900	0.25	(21S)
60.000	0.30	(18S)
128.100	0.36	(22S)
126.200	0.39	(23S)
1,275.100		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
1,275.100	Other	13S, 14S, 15S, 17S, 18S, 19S, 20S, 21S, 22S, 23S
1,275.100		**TOTAL AREA**

Time span=0.00-6.00 hrs, dt=0.01 hrs, 601 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 13S: Shed A Runoff Area=155.100 ac 0.00% Impervious Runoff Depth=0.01"
Flow Length=7,725' Tc=101.1 min C=0.01 Runoff=0.69 cfs 0.095 af

Subcatchment 14S: Shed B Runoff Area=168.800 ac 0.00% Impervious Runoff Depth=0.01"
Flow Length=8,625' Tc=101.6 min C=0.01 Runoff=0.74 cfs 0.103 af

Subcatchment 15S: Shed C Runoff Area=169.200 ac 0.00% Impervious Runoff Depth=0.01"
Flow Length=8,625' Tc=93.4 min C=0.01 Runoff=0.76 cfs 0.105 af

Subcatchment 17S: Shed K Runoff Area=111.600 ac 0.00% Impervious Runoff Depth=0.07"
Flow Length=5,800' Tc=84.6 min C=0.10 Runoff=5.01 cfs 0.690 af

Subcatchment 18S: Shed J Runoff Area=60.000 ac 0.00% Impervious Runoff Depth=0.22"
Flow Length=6,740' Tc=26.7 min C=0.30 Runoff=8.08 cfs 1.113 af

Subcatchment 19S: Shed E Runoff Area=115.100 ac 0.00% Impervious Runoff Depth=0.05"
Flow Length=5,800' Tc=115.2 min C=0.07 Runoff=3.13 cfs 0.432 af

Subcatchment 20S: Shed F Runoff Area=121.100 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=4,830' Tc=109.4 min C=0.18 Runoff=8.93 cfs 1.232 af

Subcatchment 21S: Shed G Runoff Area=119.900 ac 0.00% Impervious Runoff Depth=0.16"
Flow Length=6,230' Tc=118.4 min C=0.25 Runoff=11.34 cfs 1.565 af

Subcatchment 22S: Shed H Runoff Area=128.100 ac 0.00% Impervious Runoff Depth=0.16"
Flow Length=6,230' Tc=166.3 min C=0.36 Runoff=12.42 cfs 1.714 af

Subcatchment 23S: Shed I Runoff Area=126.200 ac 0.00% Impervious Runoff Depth=0.18"
Flow Length=6,225' Tc=161.4 min C=0.39 Runoff=13.66 cfs 1.885 af

Reach 8R: Thru Shed K to Dry Wash Avg. Depth=0.40' Max Vel=2.50 fps Inflow=13.08 cfs 1.802 af
n=0.022 L=4,770.0' S=0.0057 '/' Capacity=62.74 cfs Outflow=12.14 cfs 1.763 af

Total Runoff Area = 1,275.100 ac Runoff Volume = 8.932 af Average Runoff Depth = 0.08"
100.00% Pervious = 1,275.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 13S: Shed A

[48] Hint: Peak<CiA due to short duration

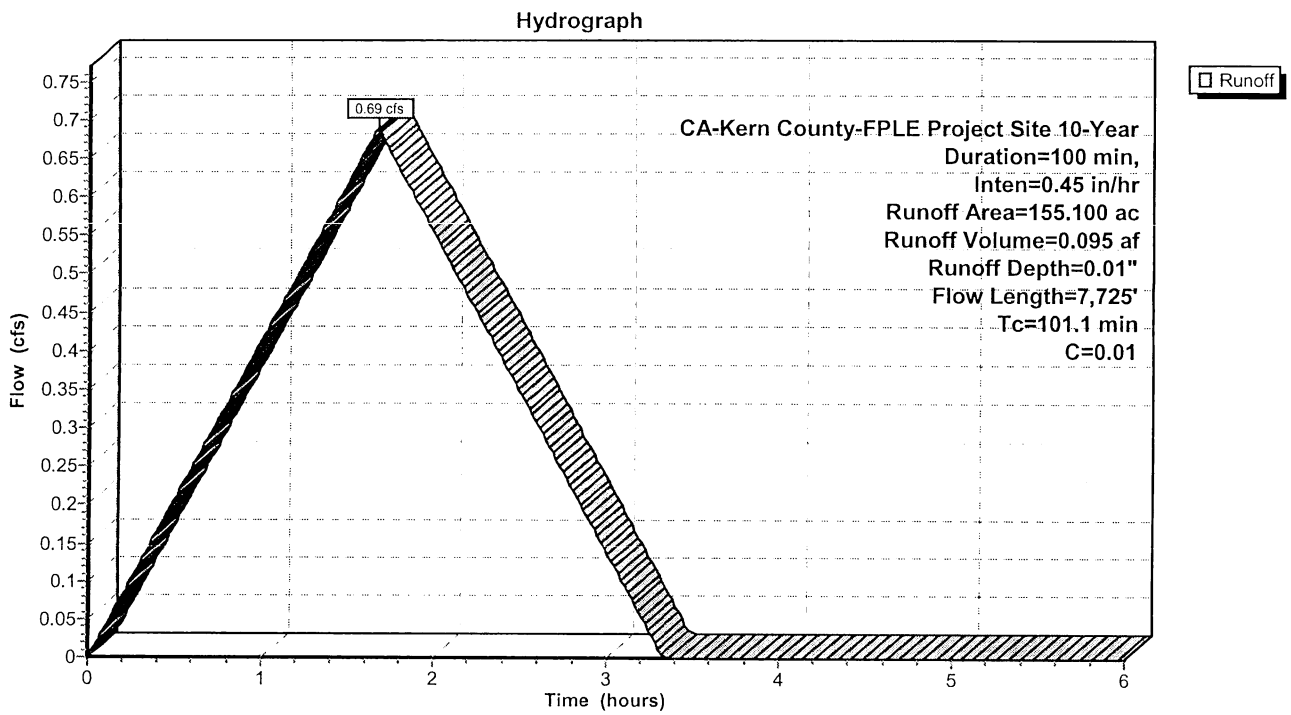
Runoff = 0.69 cfs @ 1.67 hrs, Volume= 0.095 af, Depth= 0.01"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
155.100	0.01	
155.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	300	0.0120	0.82		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
61.3	725	0.0120	0.20		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
33.7	6,700	0.0050	3.31	33.44	**Channel Flow,** Area= 10.1 sf Perim= 17.5' r= 0.58' n= 0.022 Earth, clean & straight
101.1	7,725	Total			

Subcatchment 13S: Shed A



Summary for Subcatchment 14S: Shed B

[48] Hint: Peak<CiA due to short duration

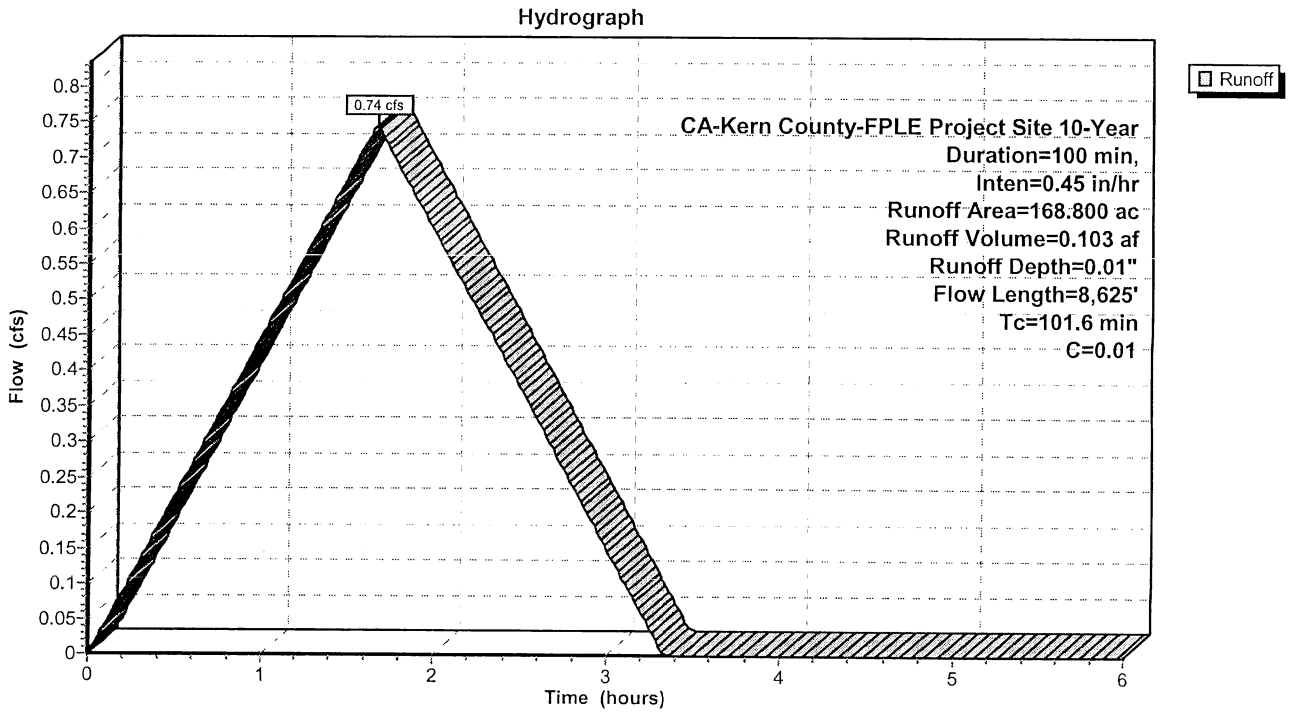
Runoff = 0.74 cfs @ 1.67 hrs, Volume= 0.103 af, Depth= 0.01"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
168.800	0.01	
168.800		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	300	0.0120	0.82		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
61.3	725	0.0120	0.20		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
34.2	7,600	0.0050	3.70	48.49	**Channel Flow,** Area= 13.1 sf Perim= 19.2' r= 0.68' n= 0.022
101.6	8,625	Total			

Subcatchment 14S: Shed B



Summary for Subcatchment 15S: Shed C

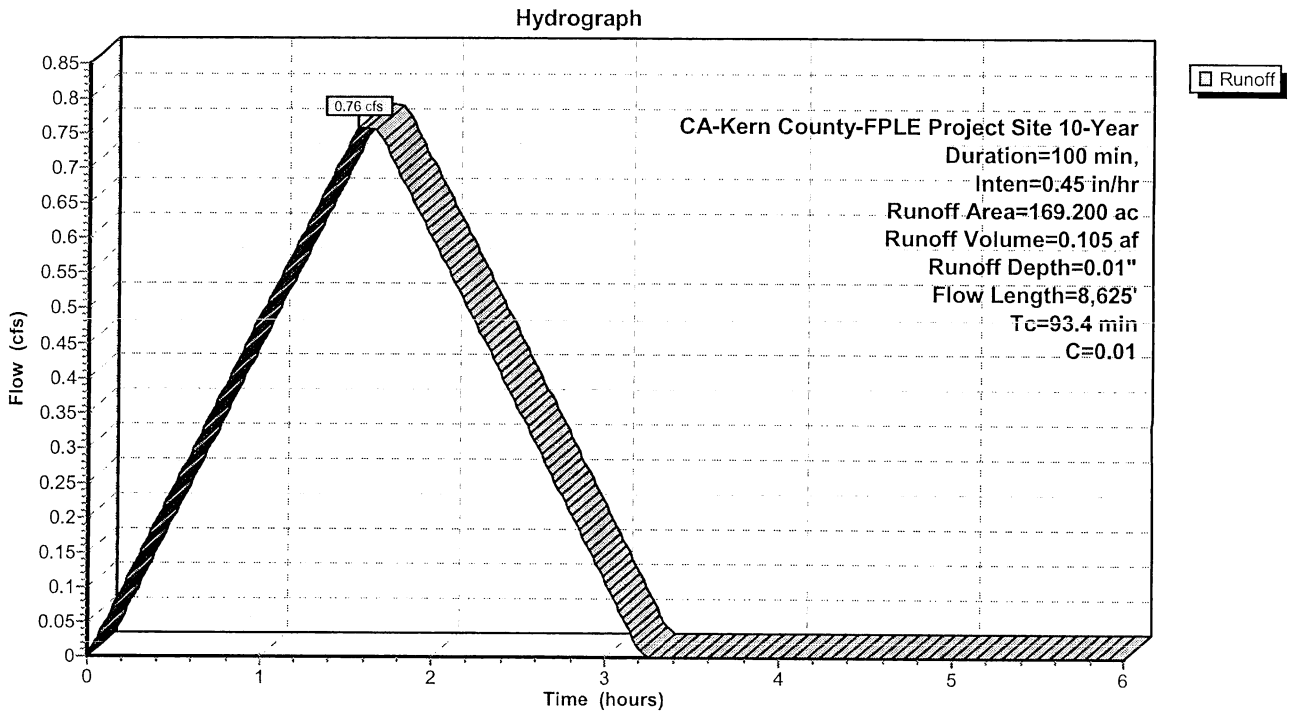
Runoff = 0.76 cfs @ 1.56 hrs, Volume= 0.105 af, Depth= 0.01"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
169.200	0.01	
169.200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
53.7	725	0.0140	0.22		**Shallow Concentrated Flow, Unpaved** Kv= 1.9 fps
34.0	7,600	0.0050	3.73	49.56	**Channel Flow,** Area= 13.3 sf Perim= 19.3' r= 0.69' n= 0.022
93.4	8,625	Total			

Subcatchment 15S: Shed C



Summary for Subcatchment 17S: Shed K

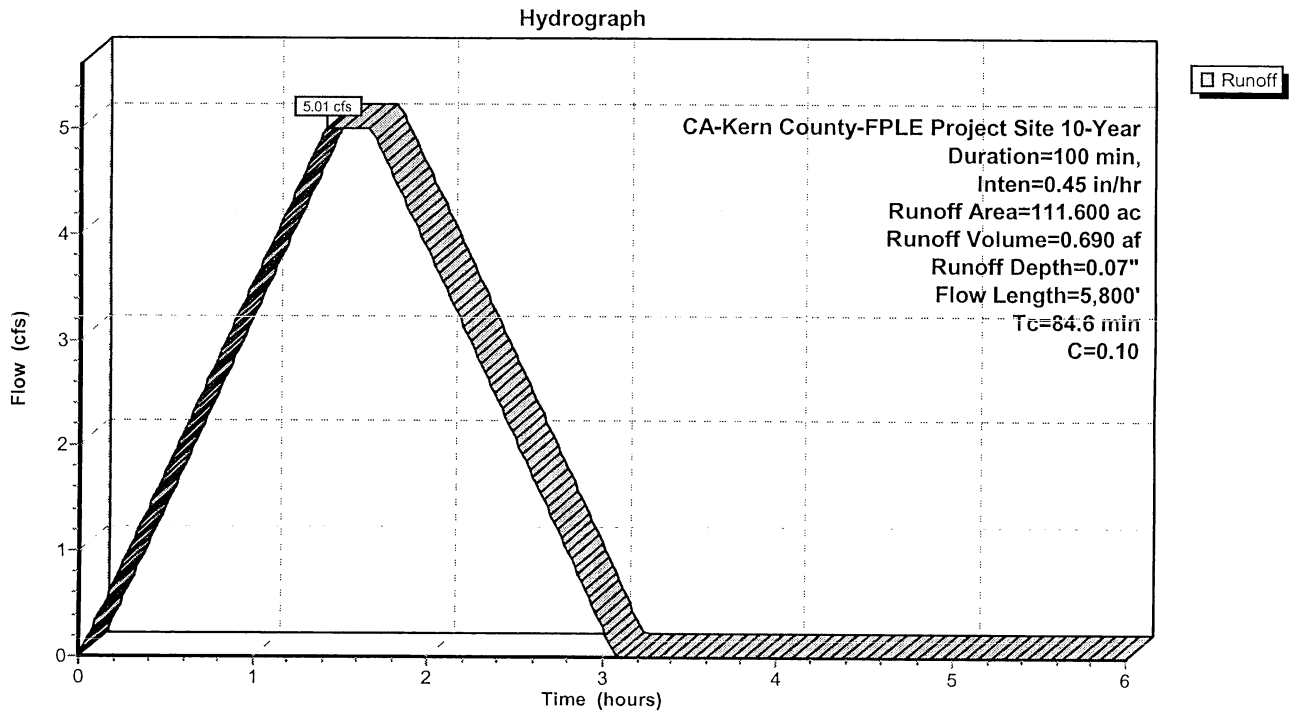
Runoff = 5.01 cfs @ 1.41 hrs, Volume= 0.690 af, Depth= 0.07"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
111.600	0.10	
111.600		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
57.1	730	0.0140	0.21		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
21.8	4,770	0.0050	3.64	36.45	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.022
84.6	5,800	Total			

Subcatchment 17S: Shed K



Summary for Subcatchment 18S: Shed J

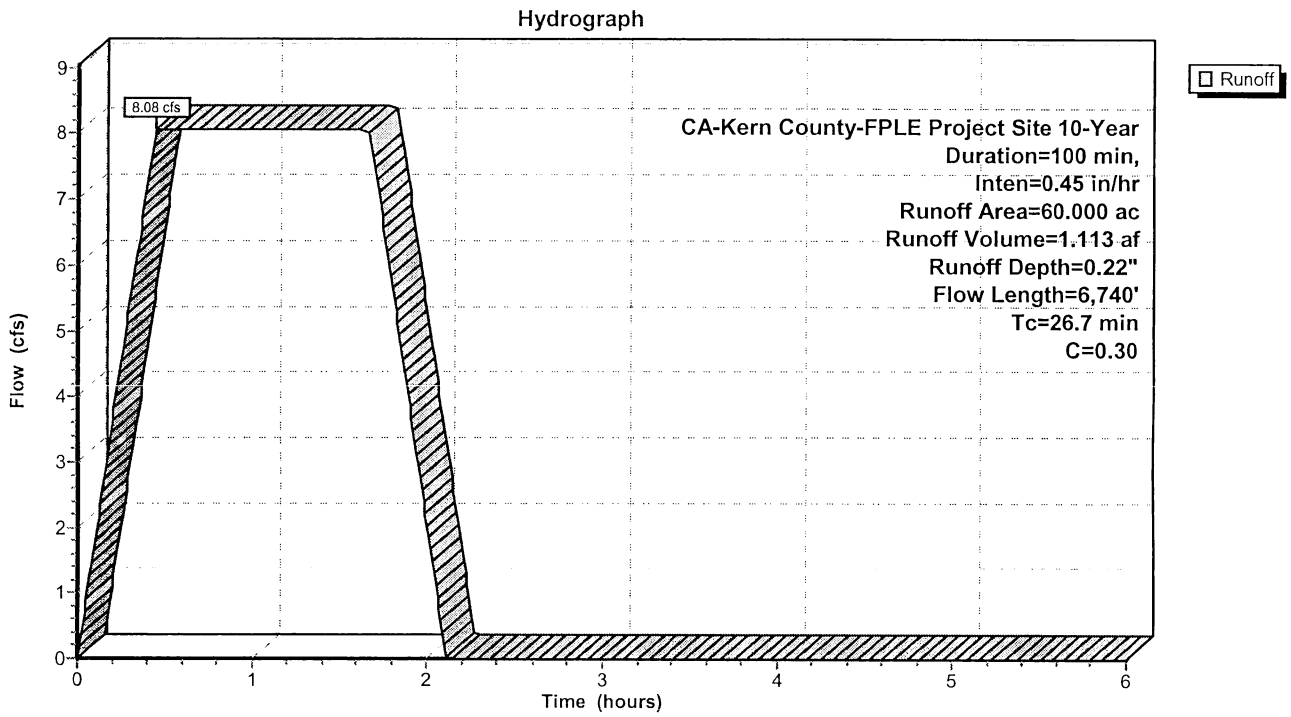
Runoff = 8.08 cfs @ 0.45 hrs, Volume= 1.113 af, Depth= 0.22"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
60.000	0.30	
60.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	100	0.0100	0.61		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
24.0	6,640	0.0080	4.61	46.10	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.022
26.7	6,740	Total			

Subcatchment 18S: Shed J



Summary for Subcatchment 19S: Shed E

[48] Hint: Peak<CiA due to short duration

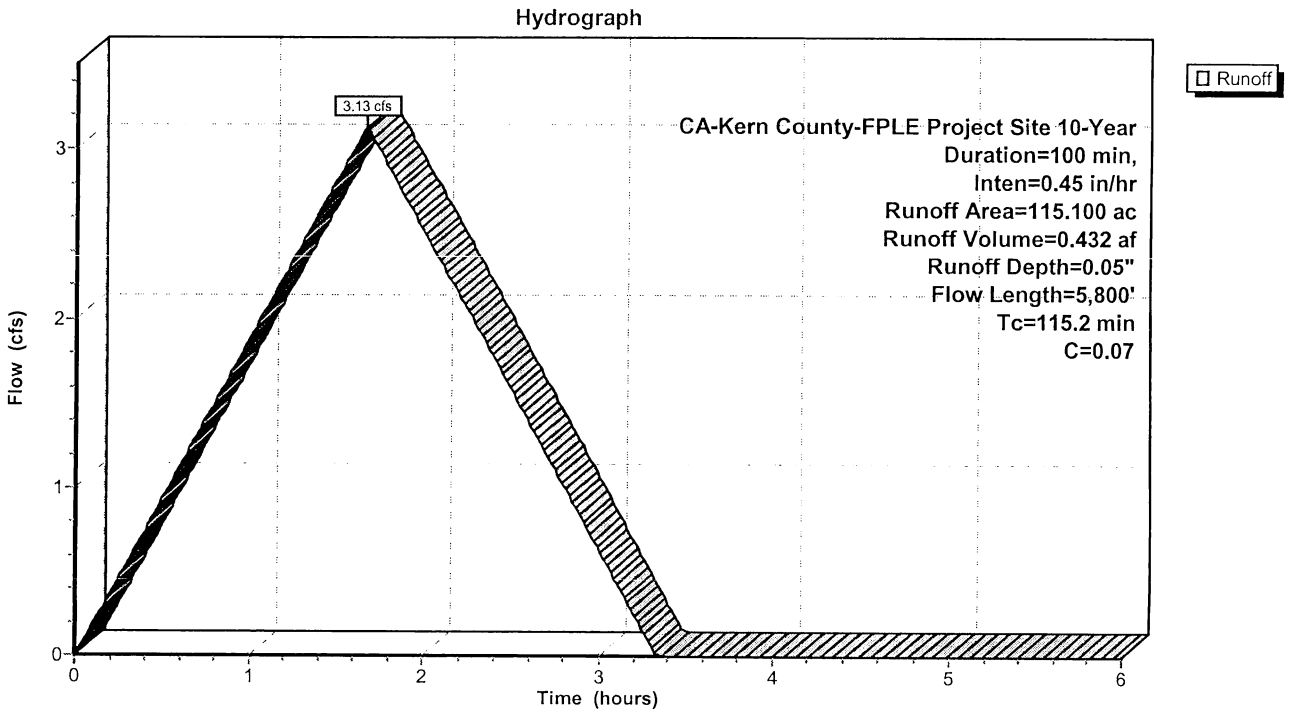
Runoff = 3.13 cfs @ 1.67 hrs, Volume= 0.432 af, Depth= 0.05"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
115.100	0.07	
115.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	300	0.0090	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
85.5	730	0.0090	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.5 fps
22.9	4,770	0.0050	3.48	39.28	**Channel Flow,** Area= 11.3 sf Perim= 18.2' r= 0.62' n= 0.022
115.2	5,800	Total			

Subcatchment 19S: Shed E



Summary for Subcatchment 20S: Shed F

[48] Hint: Peak<CiA due to short duration

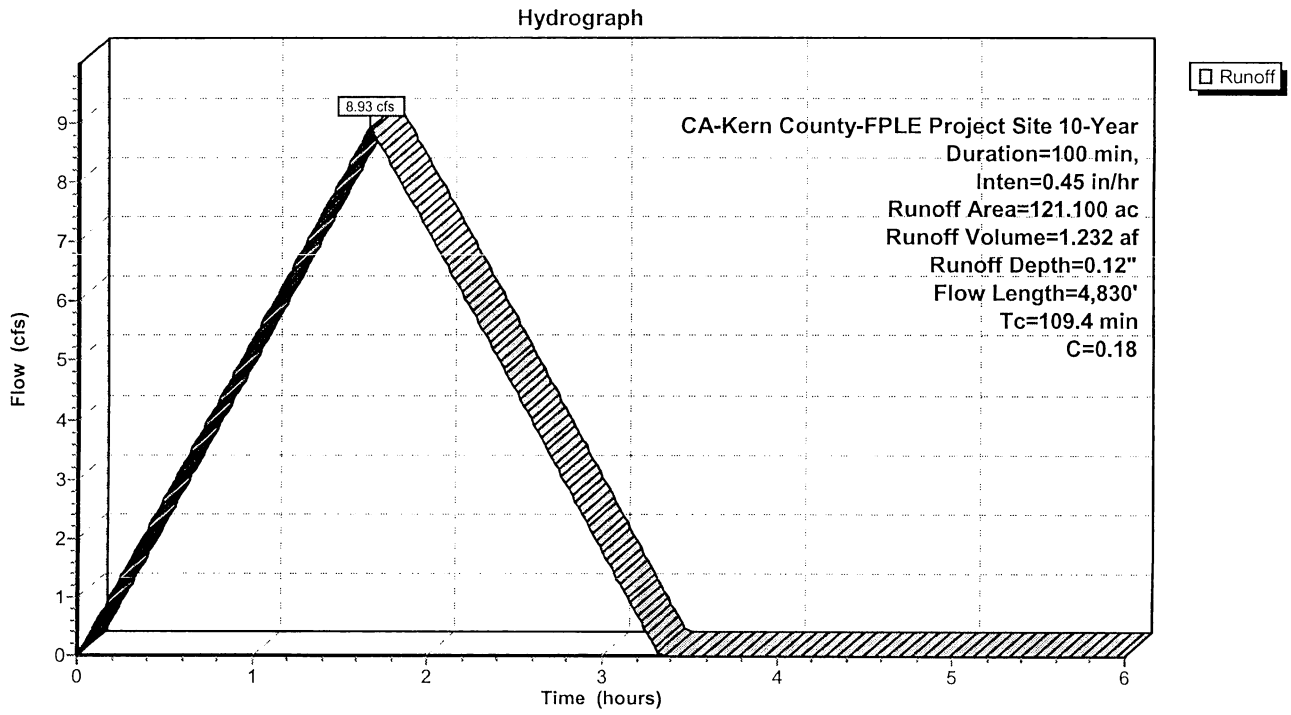
Runoff = 8.93 cfs @ 1.67 hrs, Volume= 1.232 af, Depth= 0.12"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
121.100	0.18	
121.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	300	0.0090	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
85.5	730	0.0090	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.5 fps
17.1	3,800	0.0050	3.71	48.94	**Channel Flow,** Area= 13.2 sf Perim= 19.3' r= 0.68' n= 0.022
109.4	4,830	Total			

Subcatchment 20S: Shed F



Summary for Subcatchment 21S: Shed G

[48] Hint: Peak<CiA due to short duration

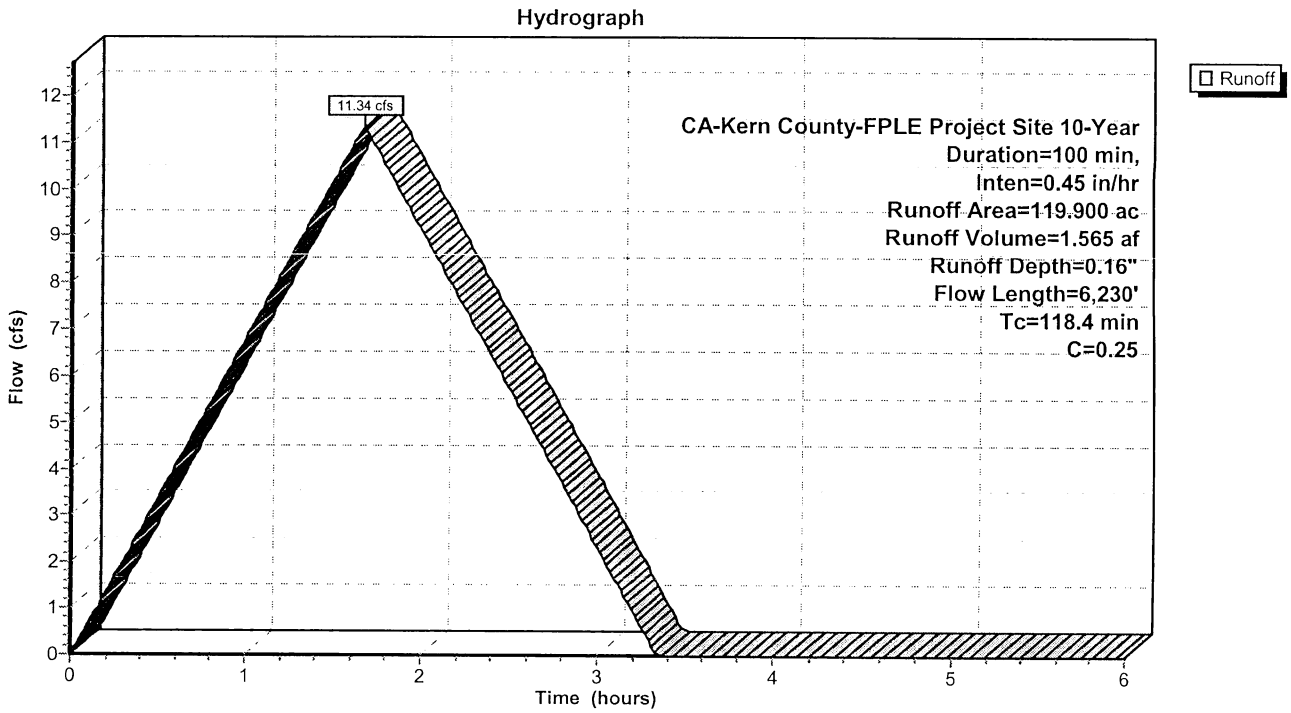
Runoff = 11.34 cfs @ 1.67 hrs, Volume= 1.565 af, Depth= 0.16"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
119.900	0.25	
119.900		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	300	0.0090	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
85.5	730	0.0090	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.5 fps
26.1	5,200	0.0050	3.32	33.86	**Channel Flow,** Area= 10.2 sf Perim= 17.6' r= 0.58' n= 0.022
118.4	6,230	Total			

Subcatchment 21S: Shed G



Summary for Subcatchment 22S: Shed H

[48] Hint: Peak<CiA due to short duration

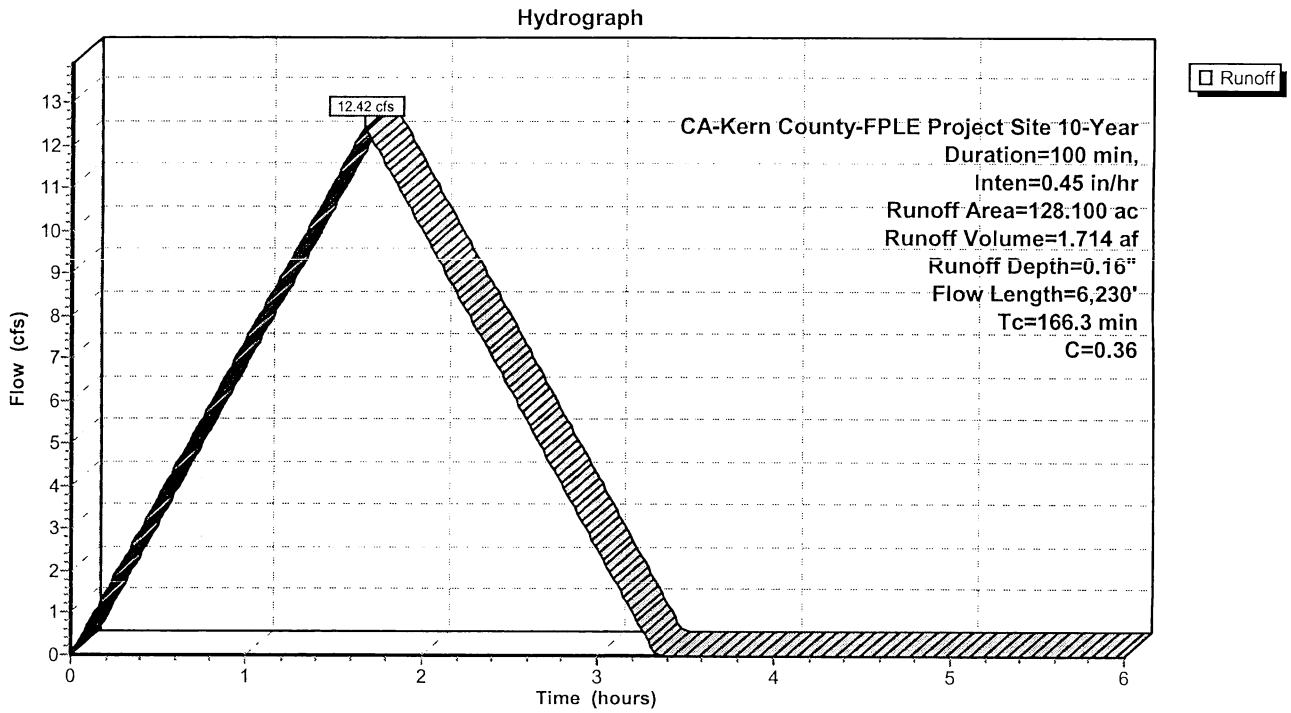
Runoff = 12.42 cfs @ 1.67 hrs, Volume= 1.714 af, Depth= 0.16"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
128.100	0.36	
128.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
130.9	730	0.0060	0.09		**Shallow Concentrated Flow, Unpaved** Kv= 1.2 fps
27.3	5,200	0.0050	3.17	29.18	**Channel Flow,** Area= 9.2 sf Perim= 17.0' r= 0.54' n= 0.022
166.3	6,230	Total			

Subcatchment 22S: Shed H



Summary for Subcatchment 23S: Shed I

[48] Hint: Peak<CiA due to short duration

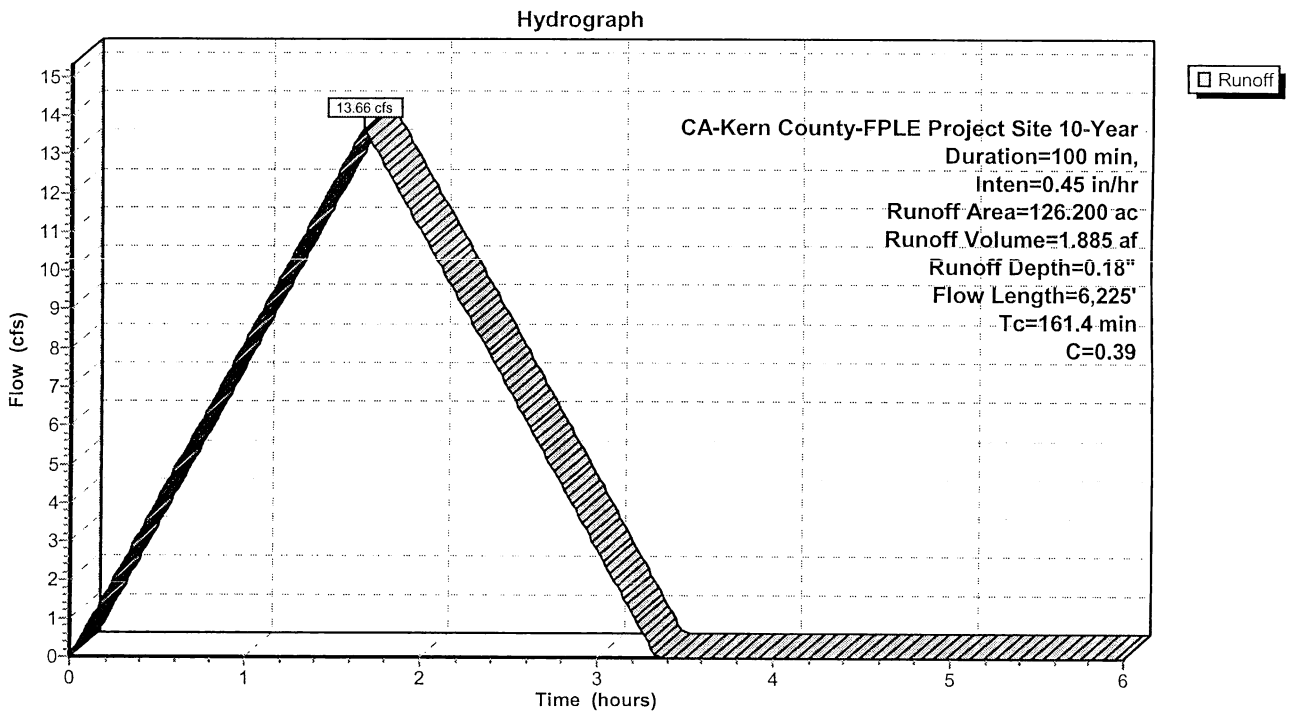
Runoff = 13.66 cfs @ 1.67 hrs, Volume= 1.885 af, Depth= 0.18"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
126.200	0.39	
126.200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	300	0.0063	0.63		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
130.0	725	0.0060	0.09		**Shallow Concentrated Flow, Unpaved** Kv= 1.2 fps
23.5	5,200	0.0065	3.68	34.96	**Channel Flow,** Area= 9.5 sf Perim= 17.1' r= 0.56' n= 0.022
161.4	6,225	Total			

Subcatchment 23S: Shed I



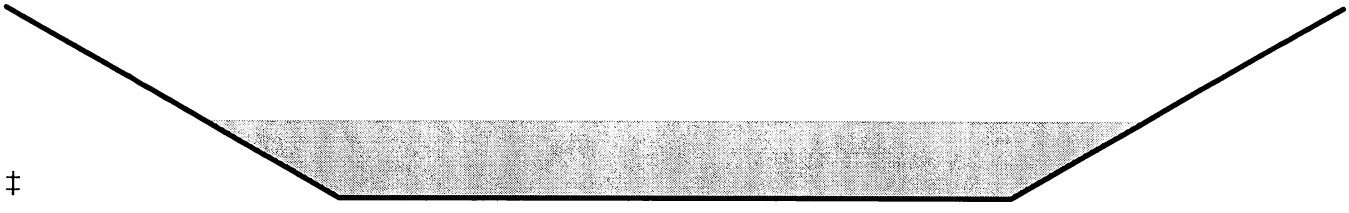
Summary for Reach 8R: Thru Shed K to Dry Wash

Inflow Area = 171.600 ac, 0.00% Impervious, Inflow Depth = 0.13" for 10-Year event
Inflow = 13.08 cfs @ 1.41 hrs, Volume= 1.802 af
Outflow = 12.14 cfs @ 2.24 hrs, Volume= 1.763 af, Atten= 7%, Lag= 49.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.50 fps, Min. Travel Time= 31.8 min
Avg. Velocity = 1.33 fps, Avg. Travel Time= 59.8 min

Peak Storage= 23,144 cf @ 1.71 hrs, Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 62.74 cfs

10.00' x 1.00' deep channel, n= 0.022
Side Slope Z-value= 5.0 '/' Top Width= 20.00'
Length= 4,770.0' Slope= 0.0057 '/'
Inlet Invert= 2,120.50', Outlet Invert= 2,093.30'



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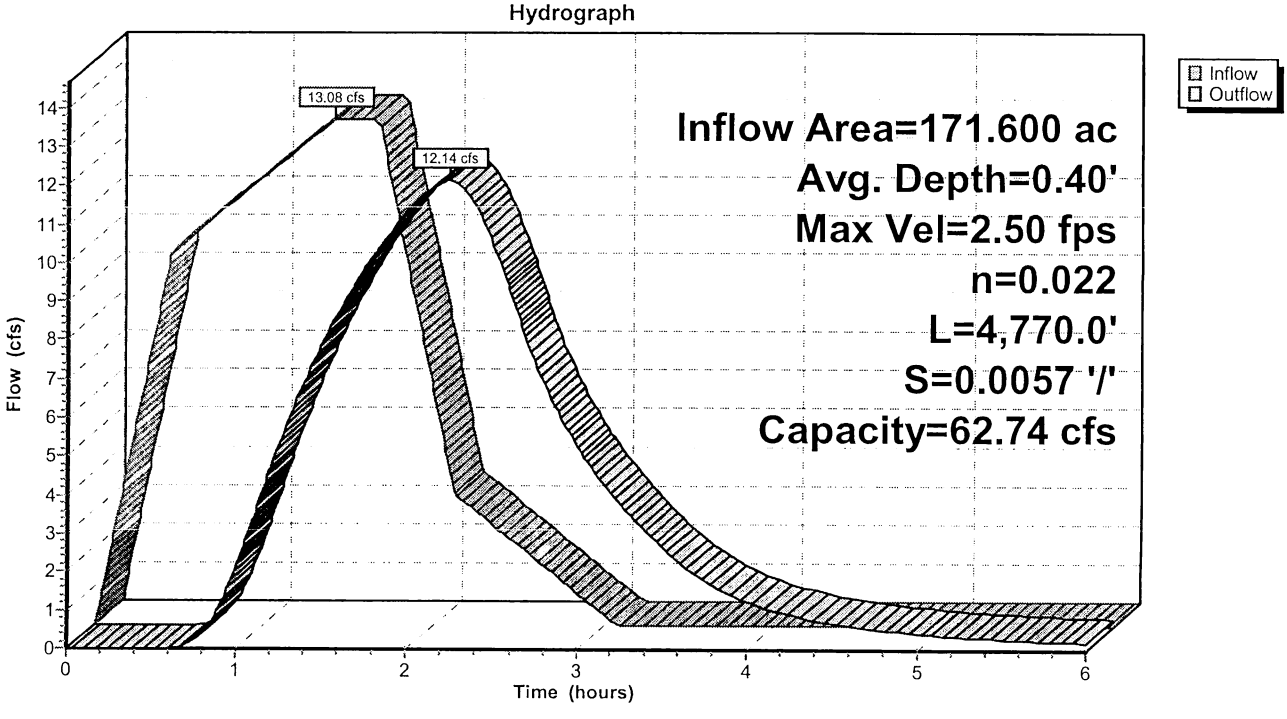
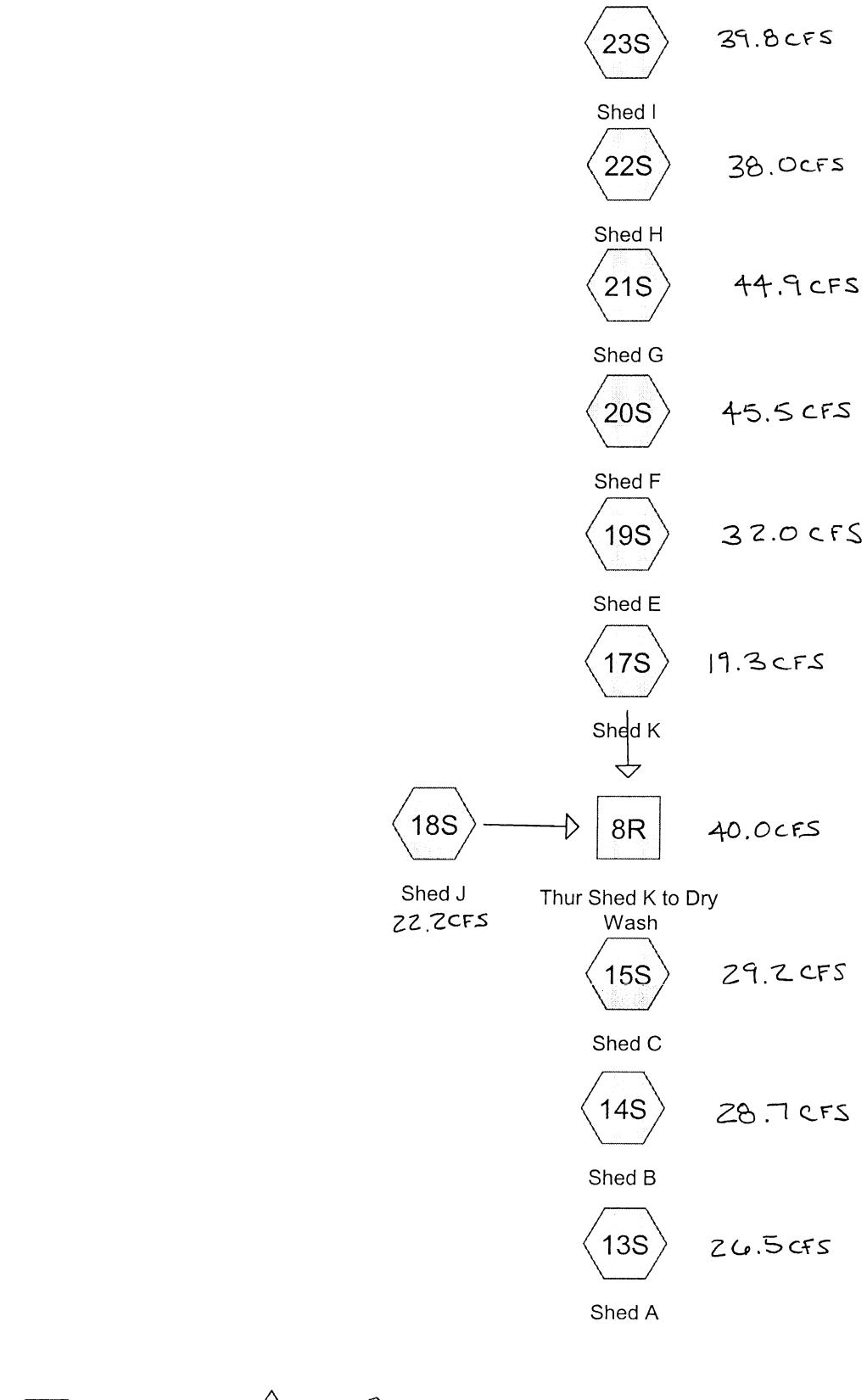
Reach 8R: Thru Shed K to Dry Wash





Drainage Diagram for POST 100 Yr Rational Method
Prepared by Carlton Engineering, Inc, Printed 01/23/2008
HydroCAD® 8.50 s/n 003190 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	C	Description (subcatchment-numbers)
604.700	0.21	(13S,14S,15S,17S)
115.100	0.39	(19S)
60.000	0.45	(18S)
121.100	0.50	(20S)
119.900	0.54	(21S)
128.100	0.60	(22S)
126.200	0.62	(23S)
1,275.100		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
1,275.100	Other	13S, 14S, 15S, 17S, 18S, 19S, 20S, 21S, 22S, 23S
1,275.100		**TOTAL AREA**

Time span=0.00-6.00 hrs, dt=0.01 hrs, 601 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 13S: Shed A Runoff Area=155.100 ac 0.00% Impervious Runoff Depth=0.28"
Flow Length=7,725' Tc=101.1 min C=0.21 Runoff=26.47 cfs 3.652 af

Subcatchment 14S: Shed B Runoff Area=168.800 ac 0.00% Impervious Runoff Depth=0.28"
Flow Length=8,625' Tc=101.6 min C=0.21 Runoff=28.67 cfs 3.955 af

Subcatchment 15S: Shed C Runoff Area=169.200 ac 0.00% Impervious Runoff Depth=0.29"
Flow Length=8,625' Tc=93.4 min C=0.21 Runoff=29.24 cfs 4.028 af

Subcatchment 17S: Shed K Runoff Area=111.600 ac 0.00% Impervious Runoff Depth=0.29"
Flow Length=5,800' Tc=84.6 min C=0.21 Runoff=19.29 cfs 2.657 af

Subcatchment 18S: Shed J Runoff Area=60.000 ac 0.00% Impervious Runoff Depth=0.61"
Flow Length=6,740' Tc=26.7 min C=0.45 Runoff=22.22 cfs 3.061 af

Subcatchment 19S: Shed E Runoff Area=115.100 ac 0.00% Impervious Runoff Depth=0.46"
Flow Length=5,800' Tc=115.2 min C=0.39 Runoff=32.01 cfs 4.417 af

Subcatchment 20S: Shed F Runoff Area=121.100 ac 0.00% Impervious Runoff Depth=0.62"
Flow Length=4,830' Tc=109.4 min C=0.50 Runoff=45.47 cfs 6.274 af

Subcatchment 21S: Shed G Runoff Area=119.900 ac 0.00% Impervious Runoff Depth=0.62"
Flow Length=6,230' Tc=118.4 min C=0.54 Runoff=44.93 cfs 6.199 af

Subcatchment 22S: Shed H Runoff Area=128.100 ac 0.00% Impervious Runoff Depth=0.49"
Flow Length=6,230' Tc=166.3 min C=0.60 Runoff=37.97 cfs 5.239 af

Subcatchment 23S: Shed I Runoff Area=126.200 ac 0.00% Impervious Runoff Depth=0.52"
Flow Length=6,225' Tc=161.4 min C=0.62 Runoff=39.83 cfs 5.496 af

Reach 8R: Thur Shed K to Dry Wash Avg. Depth=0.79' Max Vel=3.66 fps Inflow=41.51 cfs 5.718 af
n=0.022 L=4,770.0' S=0.0057 '/' Capacity=62.74 cfs Outflow=40.04 cfs 5.673 af

Total Runoff Area = 1,275.100 ac Runoff Volume = 44.980 af Average Runoff Depth = 0.42"
100.00% Pervious = 1,275.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 13S: Shed A

[48] Hint: Peak<CiA due to short duration

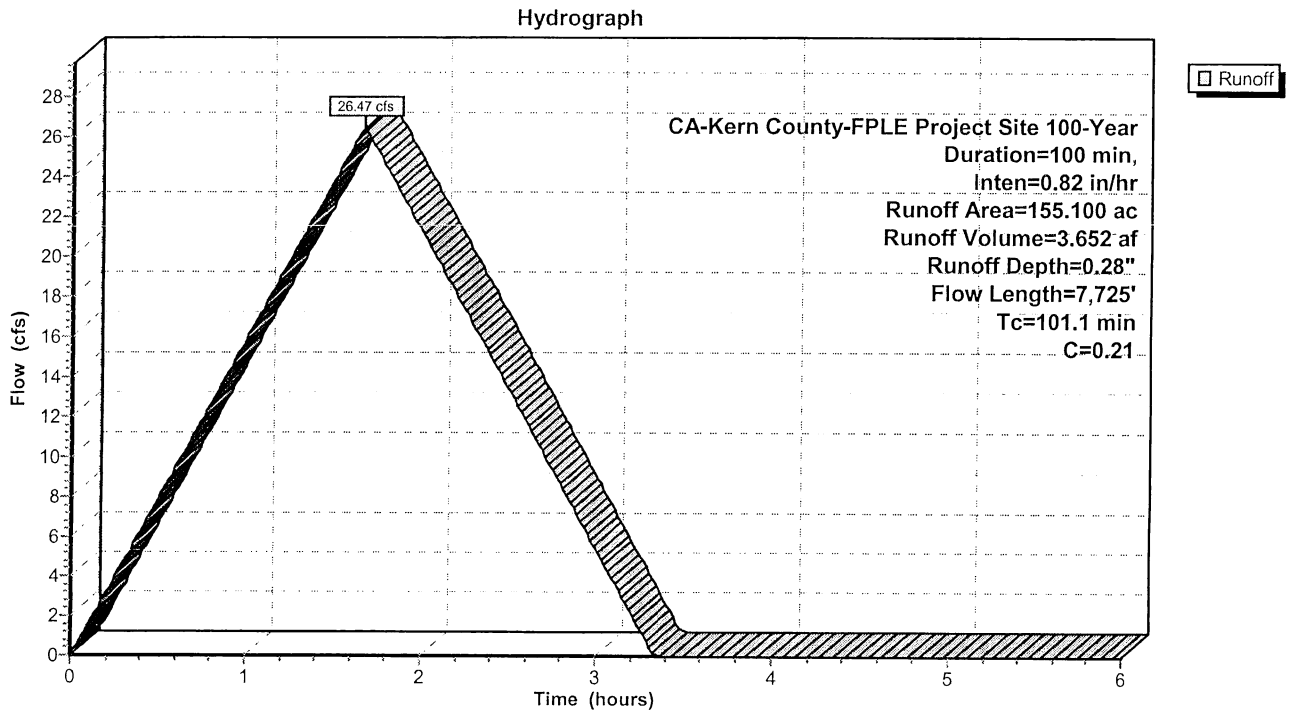
Runoff = 26.47 cfs @ 1.67 hrs, Volume= 3.652 af, Depth= 0.28"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
155.100	0.21	
155.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	300	0.0120	0.82		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
61.3	725	0.0120	0.20		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
33.7	6,700	0.0050	3.31	33.44	**Channel Flow,** Area= 10.1 sf Perim= 17.5' r= 0.58' n= 0.022 Earth, clean & straight
101.1	7,725	Total			

Subcatchment 13S: Shed A



Summary for Subcatchment 14S: Shed B

[48] Hint: Peak<CiA due to short duration

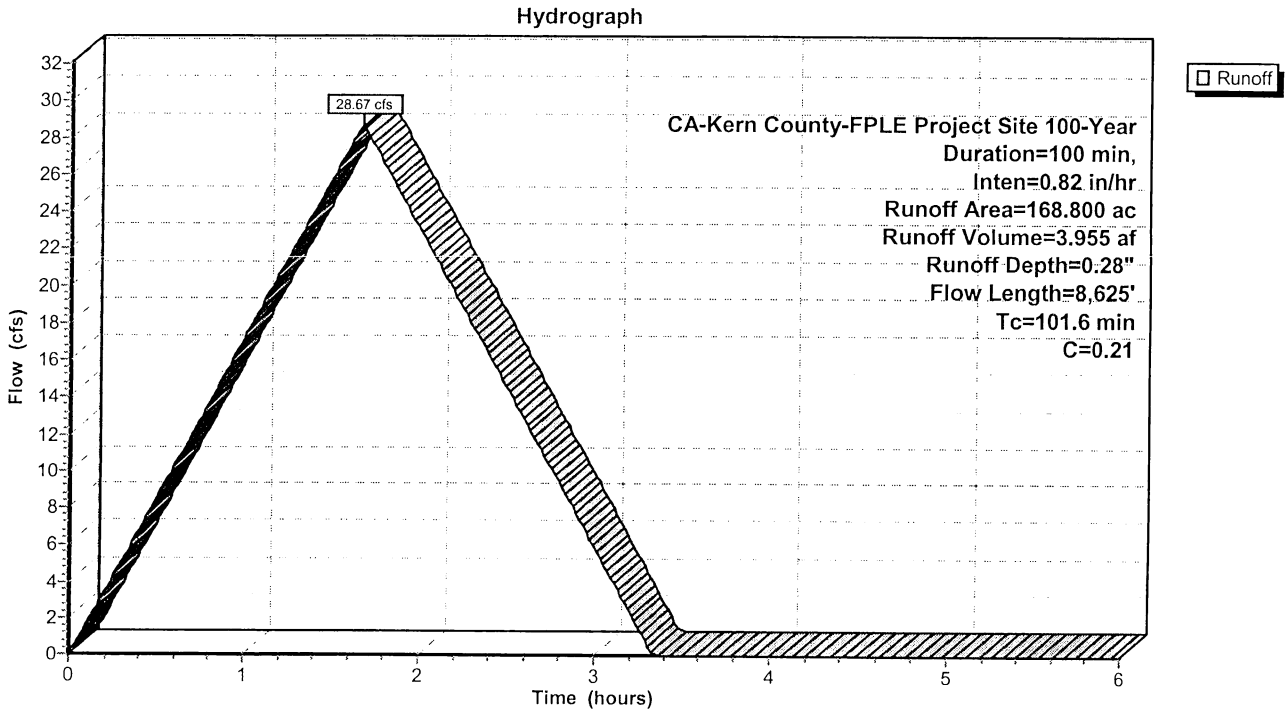
Runoff = 28.67 cfs @ 1.67 hrs, Volume= 3.955 af, Depth= 0.28"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
168.800	0.21	
168.800		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	300	0.0120	0.82		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
61.3	725	0.0120	0.20		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
34.2	7,600	0.0050	3.70	48.49	**Channel Flow,** Area= 13.1 sf Perim= 19.2' r= 0.68' n= 0.022
101.6	8,625	Total			

Subcatchment 14S: Shed B



Summary for Subcatchment 15S: Shed C

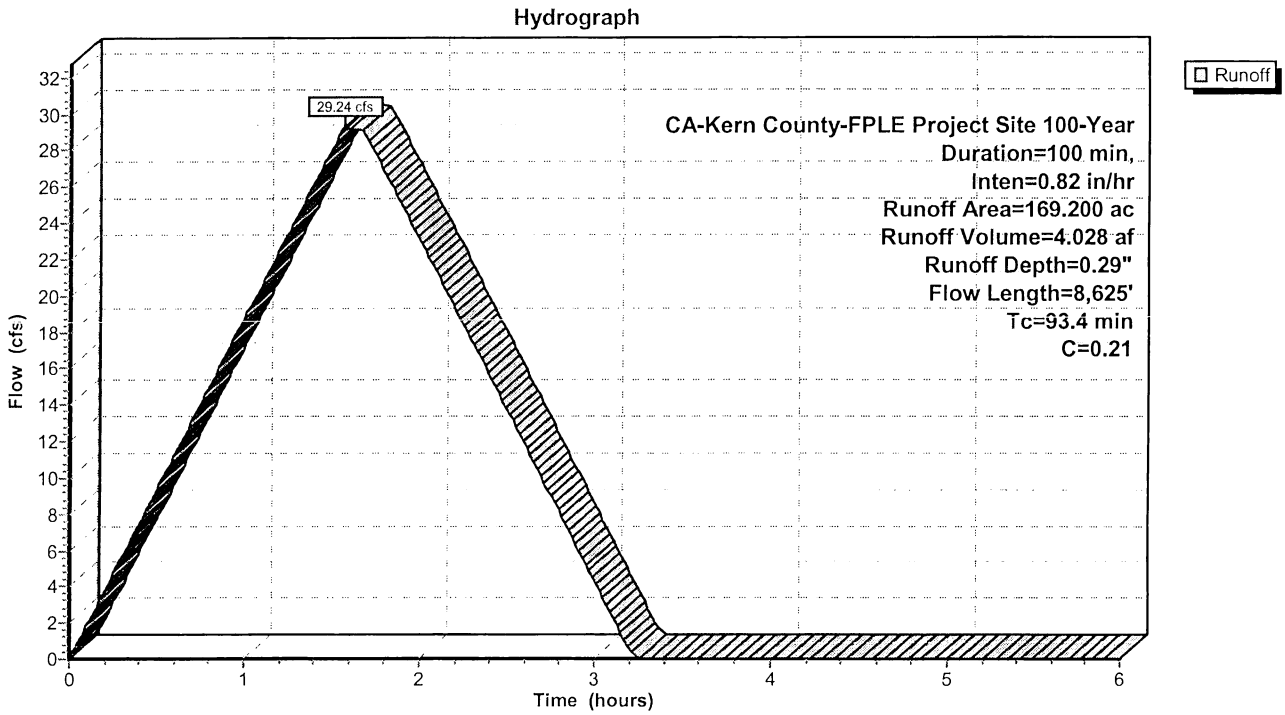
Runoff = 29.24 cfs @ 1.56 hrs, Volume= 4.028 af, Depth= 0.29"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
169.200	0.21	
169.200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
53.7	725	0.0140	0.22		**Shallow Concentrated Flow, Unpaved** Kv= 1.9 fps
34.0	7,600	0.0050	3.73	49.56	**Channel Flow,** Area= 13.3 sf Perim= 19.3' r= 0.69' n= 0.022
93.4	8,625	Total			

Subcatchment 15S: Shed C



Summary for Subcatchment 17S: Shed K

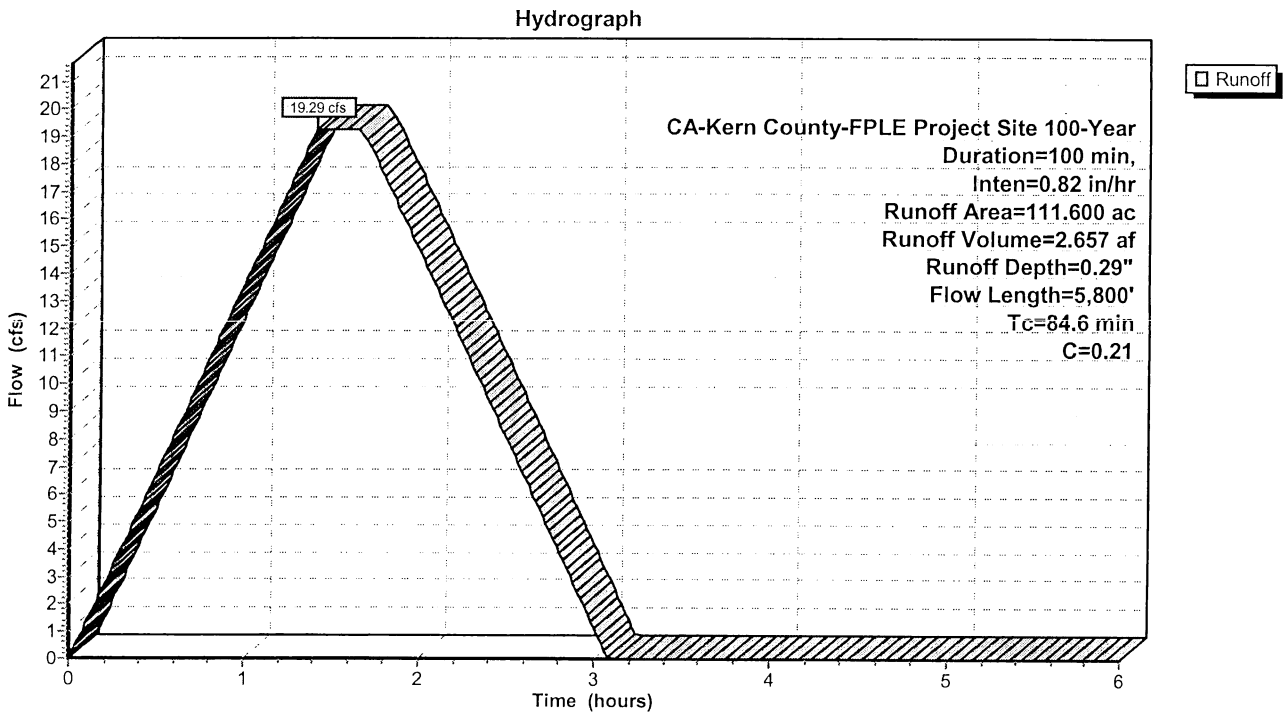
Runoff = 19.29 cfs @ 1.41 hrs, Volume= 2.657 af, Depth= 0.29"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
111.600	0.21	
111.600		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
57.1	730	0.0140	0.21		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
21.8	4,770	0.0050	3.64	36.45	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.022
84.6	5,800	Total			

Subcatchment 17S: Shed K



Summary for Subcatchment 18S: Shed J

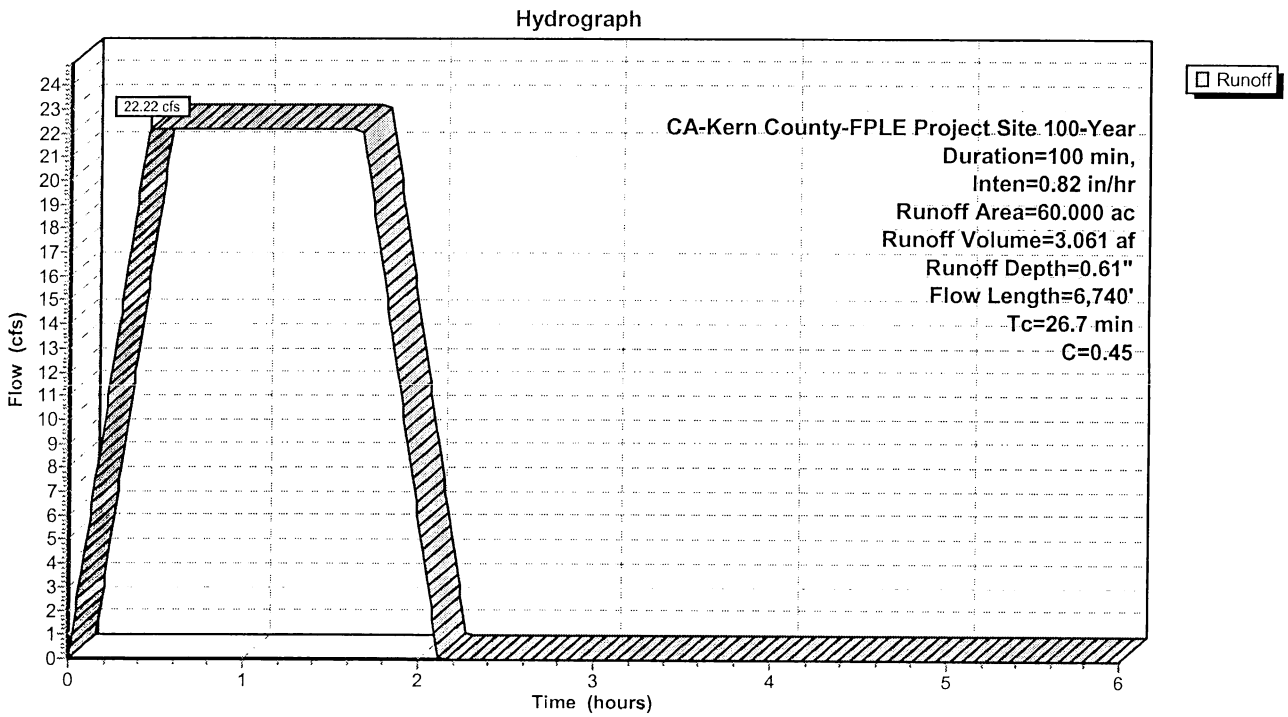
Runoff = 22.22 cfs @ 0.45 hrs, Volume= 3.061 af, Depth= 0.61"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
60.000	0.45	
60.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	100	0.0100	0.61		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
24.0	6,640	0.0080	4.61	46.10	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.022
26.7	6,740	Total			

Subcatchment 18S: Shed J



Summary for Subcatchment 19S: Shed E

[48] Hint: Peak<CiA due to short duration

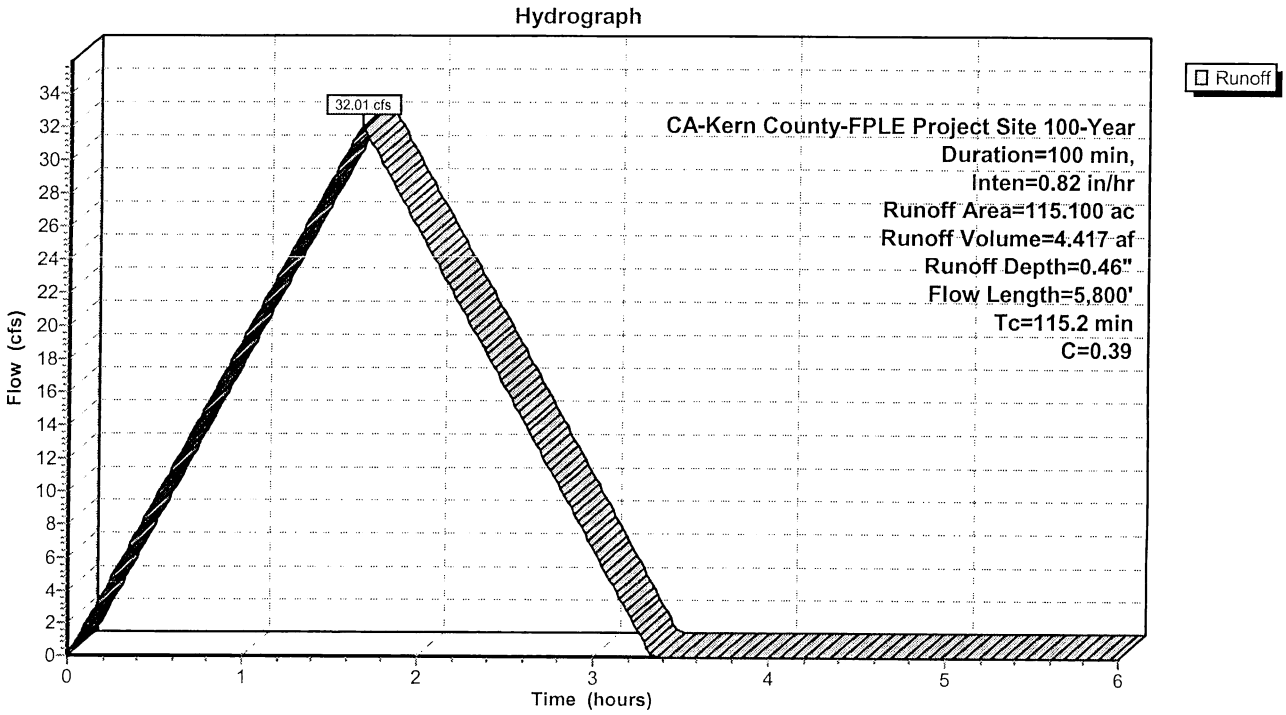
Runoff = 32.01 cfs @ 1.67 hrs, Volume= 4.417 af, Depth= 0.46"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
115.100	0.39	
115.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	300	0.0090	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
85.5	730	0.0090	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.5 fps
22.9	4,770	0.0050	3.48	39.28	**Channel Flow,** Area= 11.3 sf Perim= 18.2' r= 0.62' n= 0.022
115.2	5,800	Total			

Subcatchment 19S: Shed E



Summary for Subcatchment 20S: Shed F

[48] Hint: Peak<CiA due to short duration

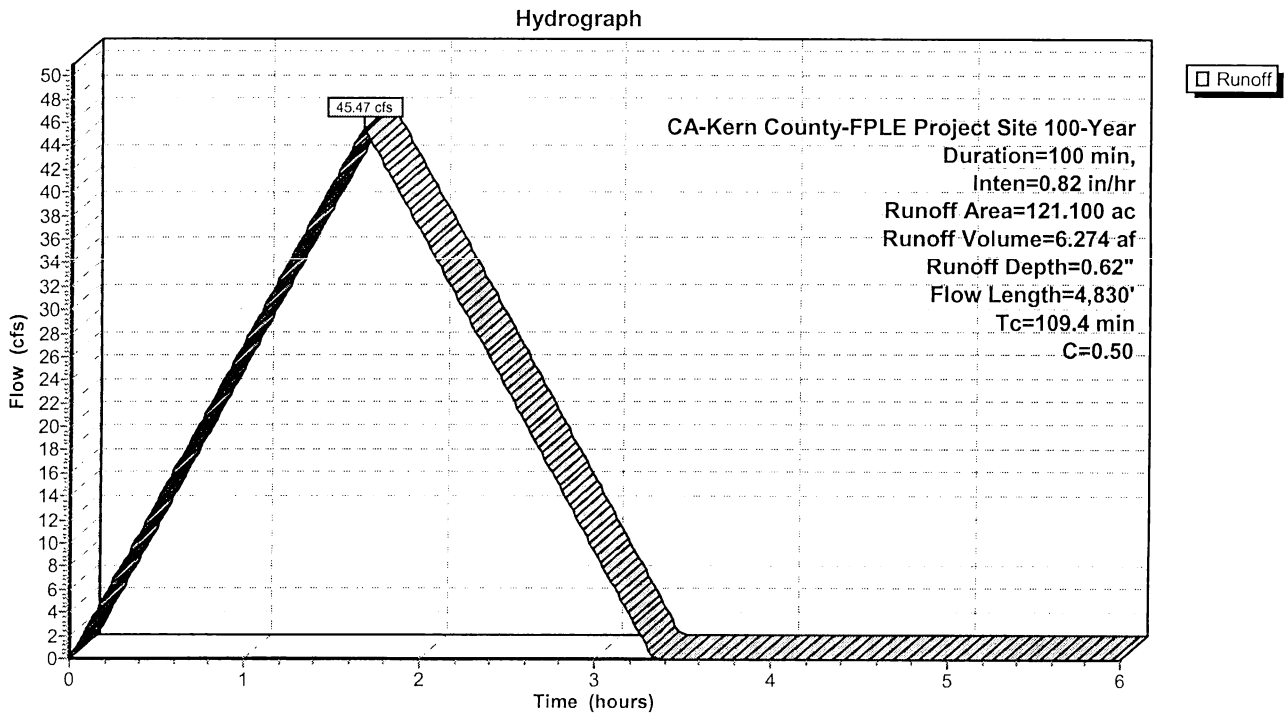
Runoff = 45.47 cfs @ 1.67 hrs, Volume= 6.274 af, Depth= 0.62"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
121.100	0.50	
121.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	300	0.0090	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
85.5	730	0.0090	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.5 fps
17.1	3,800	0.0050	3.71	48.94	**Channel Flow,** Area= 13.2 sf Perim= 19.3' r= 0.68' n= 0.022
109.4	4,830	Total			

Subcatchment 20S: Shed F



Summary for Subcatchment 21S: Shed G

[48] Hint: Peak<CiA due to short duration

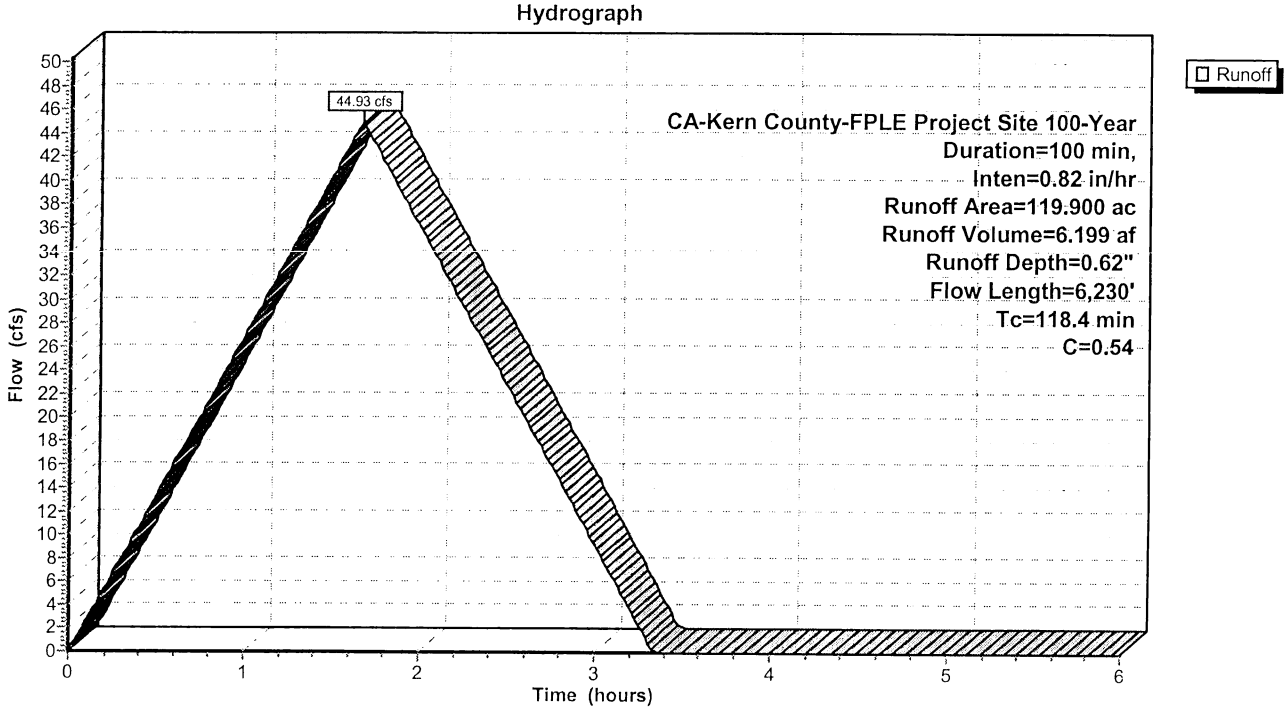
Runoff = 44.93 cfs @ 1.67 hrs, Volume= 6.199 af, Depth= 0.62"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
119.900	0.54	
119.900		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	300	0.0090	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
85.5	730	0.0090	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.5 fps
26.1	5,200	0.0050	3.32	33.86	**Channel Flow,** Area= 10.2 sf Perim= 17.6' r= 0.58' n= 0.022
118.4	6,230	Total			

Subcatchment 21S: Shed G



Summary for Subcatchment 22S: Shed H

[48] Hint: Peak<CiA due to short duration

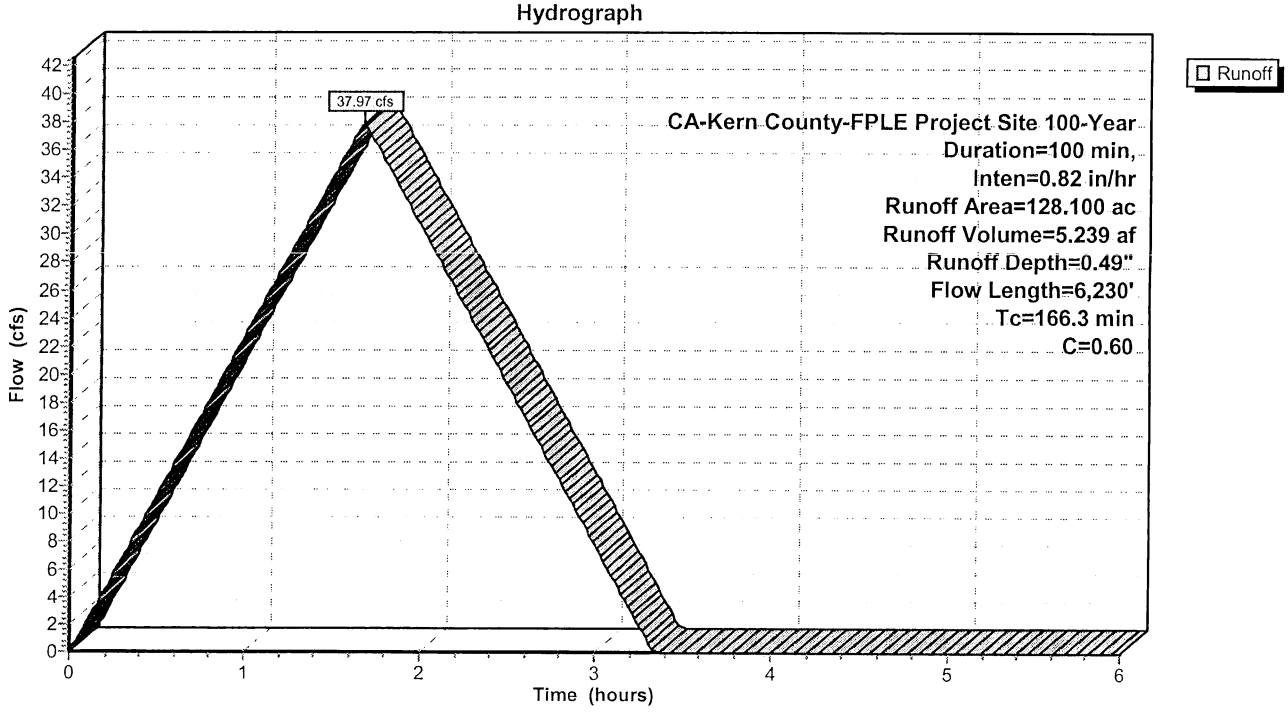
Runoff = 37.97 cfs @ 1.67 hrs, Volume= 5.239 af, Depth= 0.49"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
128.100	0.60	
128.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
130.9	730	0.0060	0.09		**Shallow Concentrated Flow, Unpaved** Kv= 1.2 fps
27.3	5,200	0.0050	3.17	29.18	**Channel Flow,** Area= 9.2 sf Perim= 17.0' r= 0.54' n= 0.022
166.3	6,230	Total			

Subcatchment 22S: Shed H



Summary for Subcatchment 23S: Shed I

[48] Hint: Peak<CiA due to short duration

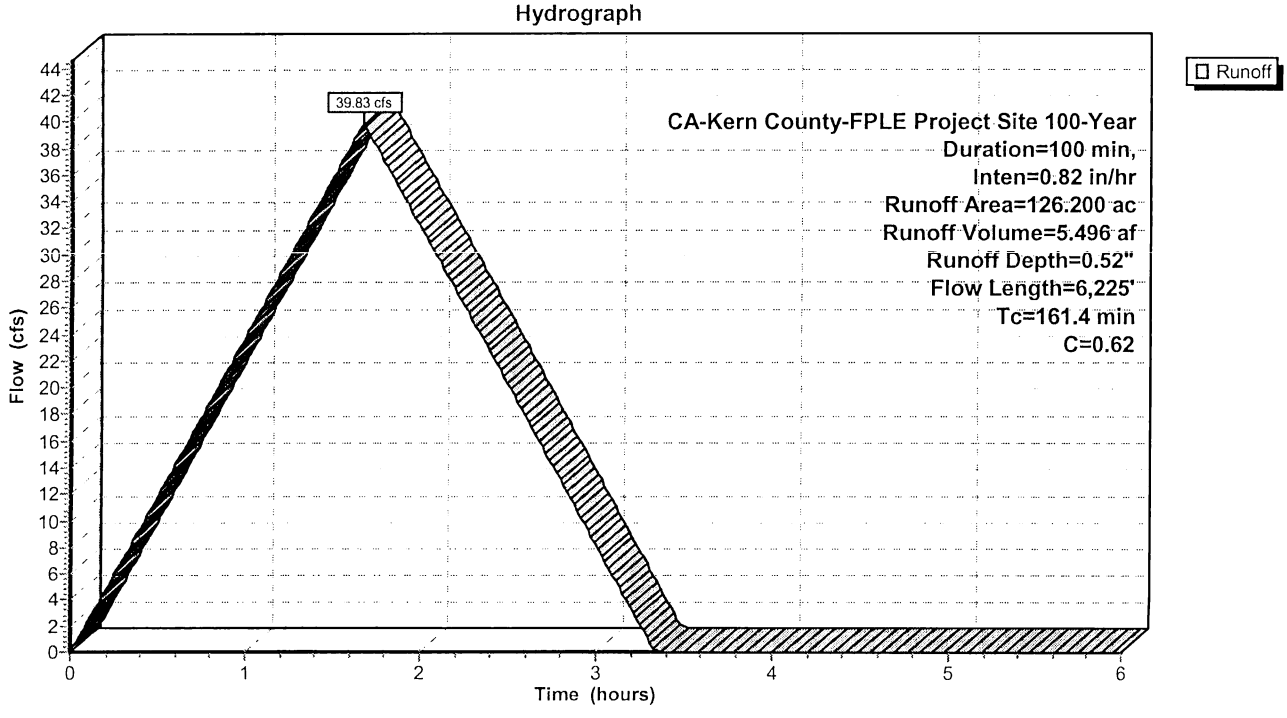
Runoff = 39.83 cfs @ 1.67 hrs, Volume= 5.496 af, Depth= 0.52"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
126.200	0.62	
126.200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	300	0.0063	0.63		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
130.0	725	0.0060	0.09		**Shallow Concentrated Flow, Unpaved** Kv= 1.2 fps
23.5	5,200	0.0065	3.68	34.96	**Channel Flow,** Area= 9.5 sf Perim= 17.1' r= 0.56' n= 0.022
161.4	6,225	Total			

Subcatchment 23S: Shed I



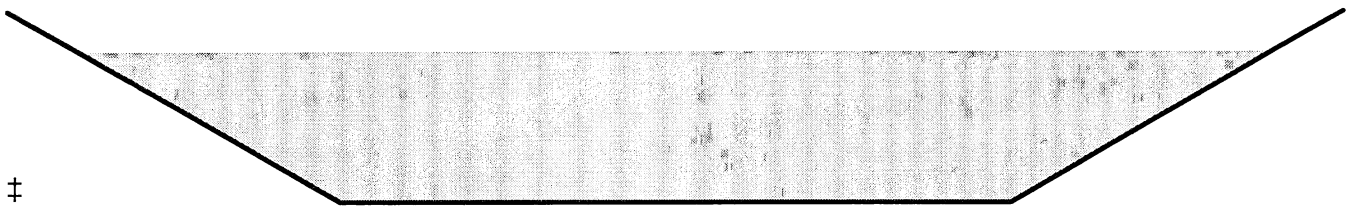
Summary for Reach 8R: Thur Shed K to Dry Wash

Inflow Area = 171.600 ac, 0.00% Impervious, Inflow Depth = 0.40" for 100-Year event
Inflow = 41.51 cfs @ 1.41 hrs, Volume= 5.718 af
Outflow = 40.04 cfs @ 2.05 hrs, Volume= 5.673 af, Atten= 4%, Lag= 38.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.66 fps, Min. Travel Time= 21.7 min
Avg. Velocity = 1.89 fps, Avg. Travel Time= 42.0 min

Peak Storage= 52,199 cf @ 1.69 hrs, Average Depth at Peak Storage= 0.79'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 62.74 cfs

10.00' x 1.00' deep channel, n= 0.022
Side Slope Z-value= 5.0 '/' Top Width= 20.00'
Length= 4,770.0' Slope= 0.0057 '/'
Inlet Invert= 2,120.50', Outlet Invert= 2,093.30'



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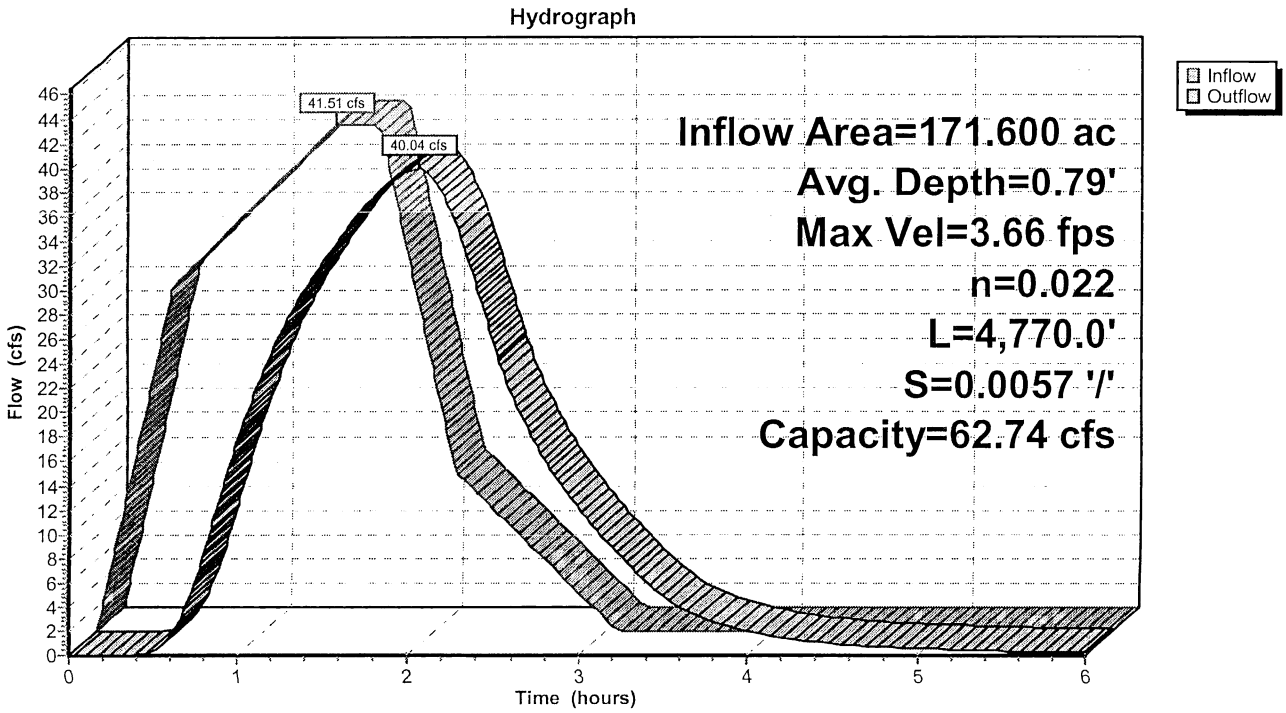
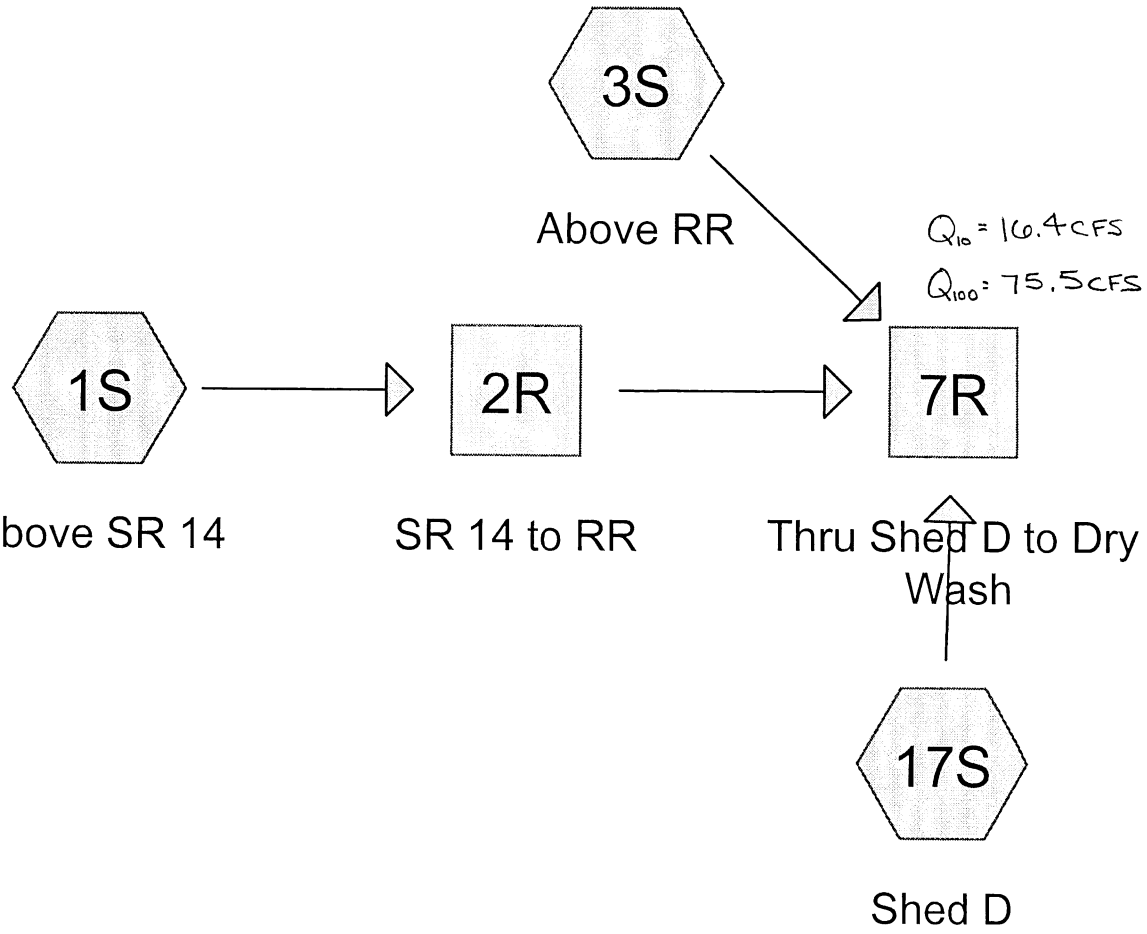
Reach 8R: Thur Shed K to Dry Wash



POST CONSTRUCTION



Subcat Reach Pond Link

Drainage Diagram for POST SCS - SHED D DRAINAGE
Prepared by Carlton Engineering, Inc, Printed 01/23/2008
HydroCAD® 8.50 s/n 003190 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
730.100	63	Desert shrub range, Fair, HSG A (1S,3S)
231.000	65	Desert shrub range, Poor, HSG A (17S)
207.300	88	Desert shrub range, Fair, HSG D (1S)
1,168.400		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
961.100	HSG A	1S, 3S, 17S
0.000	HSG B	
0.000	HSG C	
207.300	HSG D	1S
0.000	Other	
1,168.400		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Above SR 14 Runoff Area=548.000 ac 0.00% Impervious Runoff Depth>0.27"
Flow Length=13,530' Tc=29.5 min CN=72 Runoff=10.55 cfs 12.468 af

Subcatchment 3S: Above RR Runoff Area=389.400 ac 0.00% Impervious Runoff Depth>0.09"
Flow Length=8,690' Tc=32.0 min CN=63 Runoff=3.52 cfs 2.951 af

Subcatchment 17S: Shed D Runoff Area=231.000 ac 0.00% Impervious Runoff Depth>0.11"
Flow Length=8,625' Tc=93.6 min CN=65 Runoff=2.53 cfs 2.168 af

Reach 2R: SR 14 to RR Avg. Depth=0.68' Max Vel=3.83 fps Inflow=10.55 cfs 12.468 af
n=0.030 L=8,590.0' S=0.0180 '/' Capacity=296.80 cfs Outflow=10.54 cfs 11.521 af

Reach 7R: Thru Shed D to Dry Wash Avg. Depth=0.48' Max Vel=2.76 fps Inflow=16.44 cfs 16.640 af
n=0.022 L=4,770.0' S=0.0057 '/' Capacity=1,085.74 cfs Outflow=16.43 cfs 15.421 af

Total Runoff Area = 1,168.400 ac Runoff Volume = 17.587 af Average Runoff Depth = 0.18"
100.00% Pervious = 1,168.400 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Above SR 14

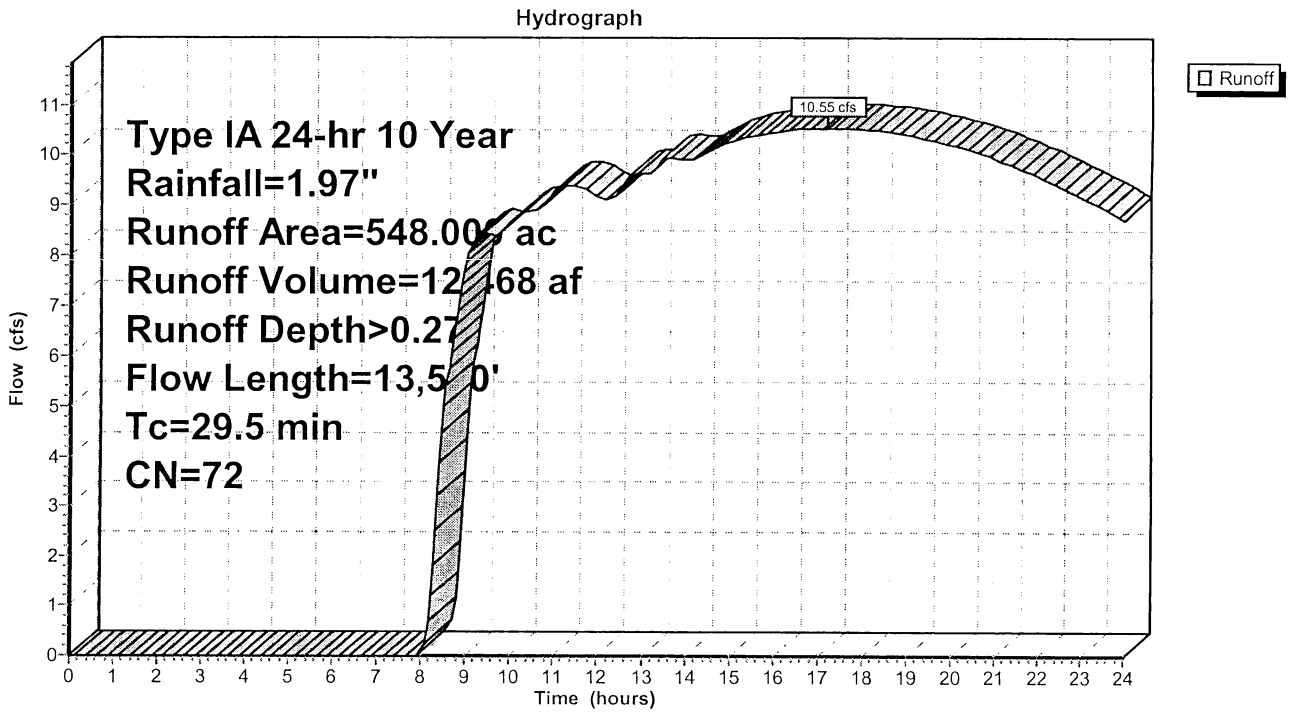
Runoff = 10.55 cfs @ 17.18 hrs, Volume= 12.468 af, Depth> 0.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
207.300	88	Desert shrub range, Fair, HSG D
340.700	63	Desert shrub range, Fair, HSG A
548.000	72	Weighted Average
548.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	200	0.0940	0.51		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
12.0	8,350	0.0940	11.59	115.90	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.0	4,980	0.0400	7.56	75.60	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
29.5	13,530	Total			

Subcatchment 1S: Above SR 14



Summary for Subcatchment 3S: Above RR

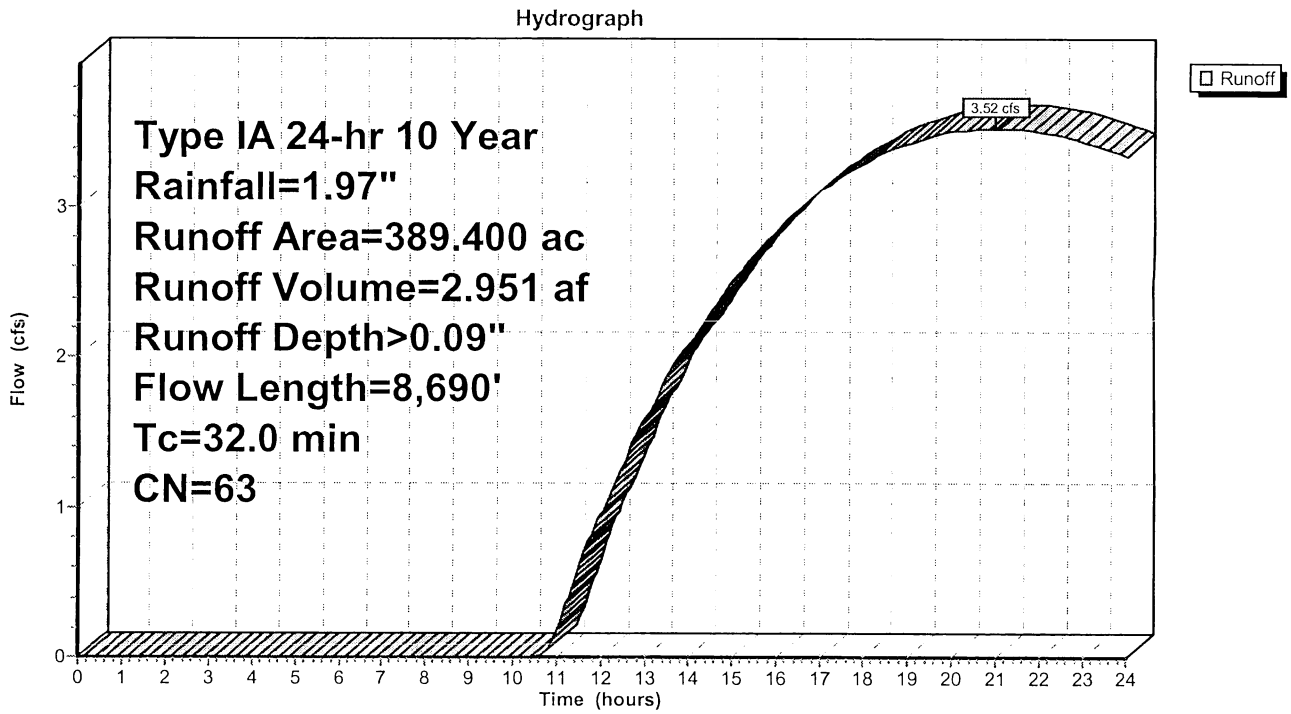
Runoff = 3.52 cfs @ 20.97 hrs, Volume= 2.951 af, Depth> 0.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
389.400	63	Desert shrub range, Fair, HSG A
389.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0200	0.36		**Sheet Flow,** n= 0.030 P2= 1.10"
16.1	5,180	0.0200	5.35	53.46	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.3	3,410	0.0150	5.01	75.12	**Channel Flow,** Area= 15.0 sf Perim= 20.0' r= 0.75' n= 0.030
32.0	8,690	Total			

Subcatchment 3S: Above RR



Summary for Subcatchment 17S: Shed D

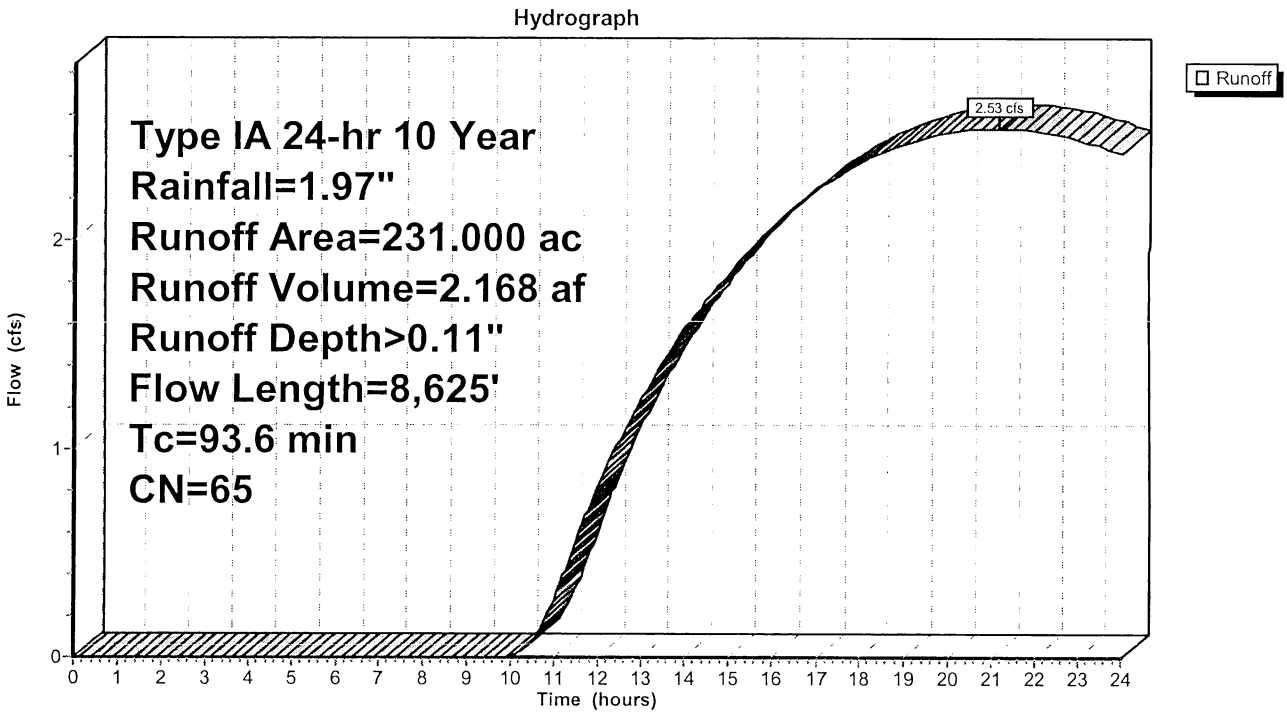
Runoff = 2.53 cfs @ 21.11 hrs, Volume= 2.168 af, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
231.000	65	Desert shrub range, Poor, HSG A
231.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
53.7	725	0.0140	0.22		**Shallow Concentrated Flow, Unpaved** Kv= 1.9 fps
34.2	7,600	0.0050	3.71	48.94	**Channel Flow,** Area= 13.2 sf Perim= 19.3' r= 0.68' n= 0.022
93.6	8,625	Total			

Subcatchment 17S: Shed D



Summary for Reach 2R: SR 14 to RR

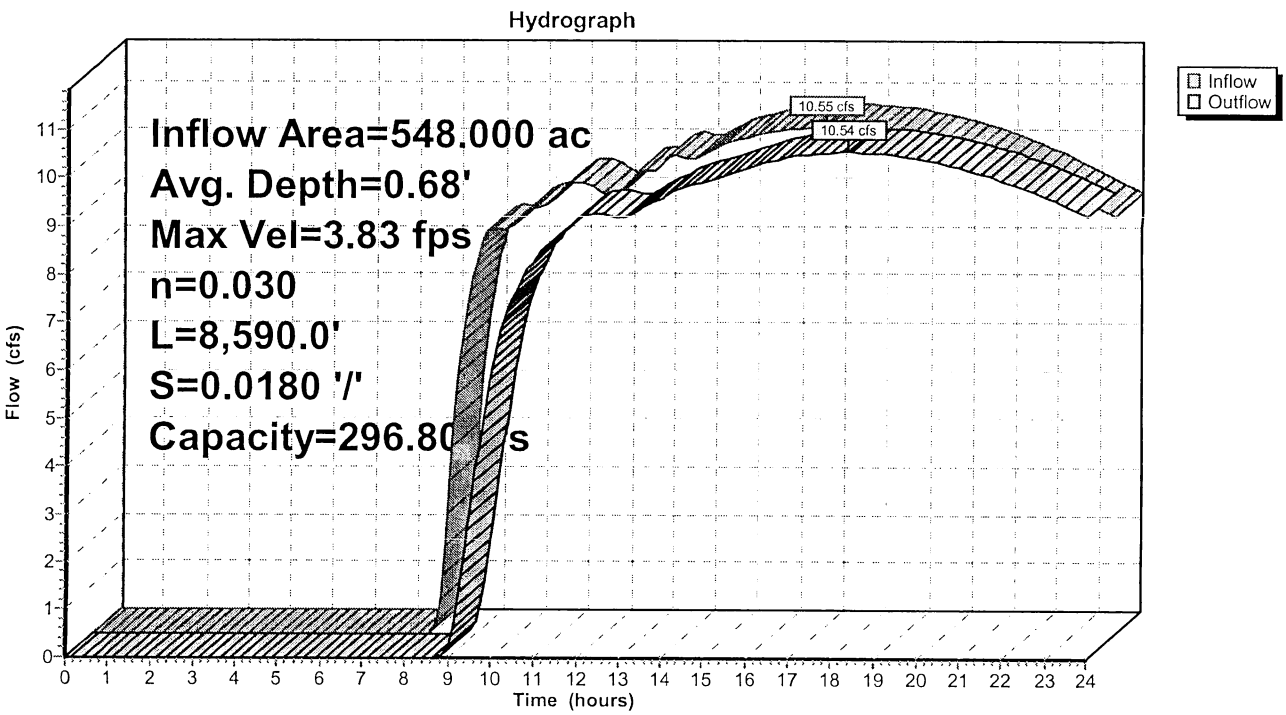
Inflow Area = 548.000 ac, 0.00% Impervious, Inflow Depth > 0.27" for 10 Year event
Inflow = 10.55 cfs @ 17.18 hrs, Volume= 12.468 af
Outflow = 10.54 cfs @ 18.35 hrs, Volume= 11.521 af, Atten= 0%, Lag= 70.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.83 fps, Min. Travel Time= 37.4 min
Avg. Velocity = 3.59 fps, Avg. Travel Time= 39.9 min

Peak Storage= 23,658 cf @ 17.71 hrs, Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 296.80 cfs

2.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 8,590.0' Slope= 0.0180 '/'
Inlet Invert= 2,326.75', Outlet Invert= 2,172.00'

Reach 2R: SR 14 to RR



Summary for Reach 7R: Thru Shed D to Dry Wash

Inflow Area = 1,168.400 ac, 0.00% Impervious, Inflow Depth > 0.17" for 10 Year event
Inflow = 16.44 cfs @ 19.64 hrs, Volume= 16.640 af
Outflow = 16.43 cfs @ 20.40 hrs, Volume= 15.421 af, Atten= 0%, Lag= 45.7 min

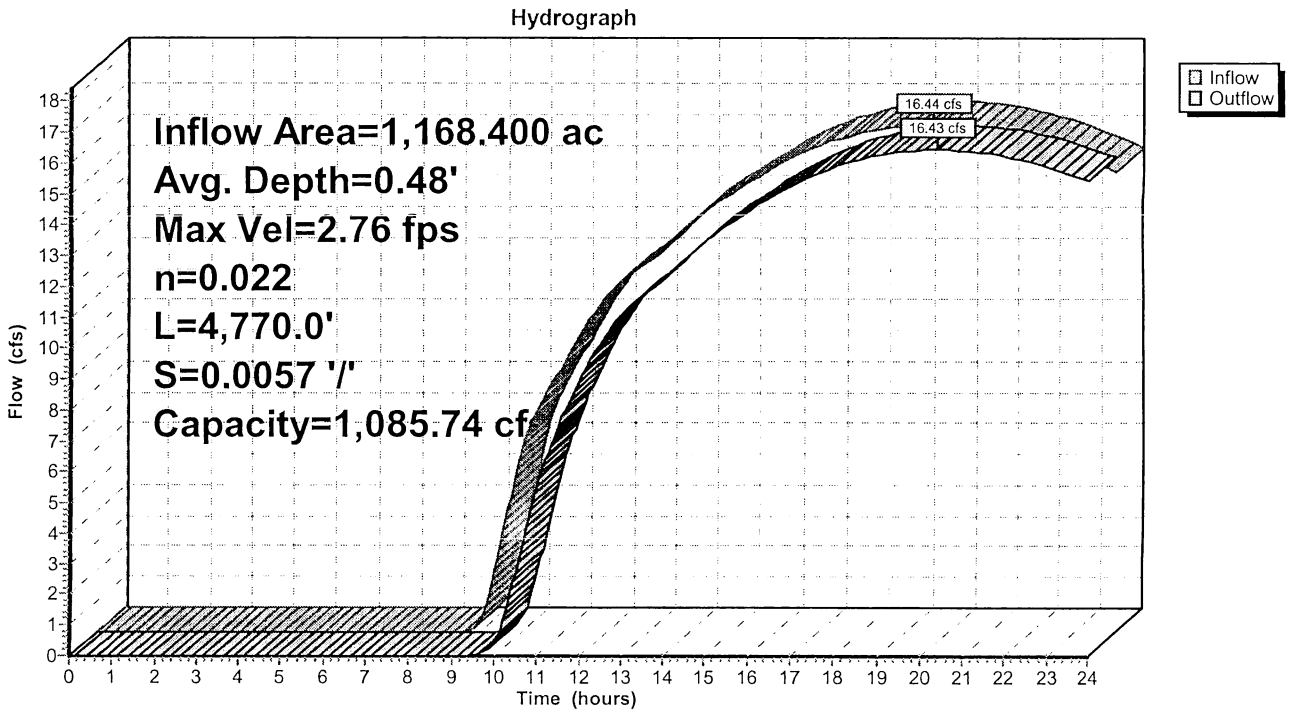
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.76 fps, Min. Travel Time= 28.8 min
Avg. Velocity = 2.44 fps, Avg. Travel Time= 32.6 min

Peak Storage= 28,339 cf @ 19.92 hrs, Average Depth at Peak Storage= 0.48'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 1,085.74 cfs

10.00' x 4.00' deep channel, n= 0.022
Side Slope Z-value= 5.0 '/' Top Width= 50.00'
Length= 4,770.0' Slope= 0.0057 '/'
Inlet Invert= 2,120.50', Outlet Invert= 2,093.30'

‡

Reach 7R: Thru Shed D to Dry Wash



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Above SR 14 Runoff Area=548.000 ac 0.00% Impervious Runoff Depth>0.94"
Flow Length=13,530' Tc=29.5 min CN=72 Runoff=74.42 cfs 43.110 af

Subcatchment 3S: Above RR Runoff Area=389.400 ac 0.00% Impervious Runoff Depth>0.53"
Flow Length=8,690' Tc=32.0 min CN=63 Runoff=13.95 cfs 17.154 af

Subcatchment 17S: Shed D Runoff Area=231.000 ac 0.00% Impervious Runoff Depth>0.58"
Flow Length=8,625' Tc=93.6 min CN=65 Runoff=9.44 cfs 11.161 af

Reach 2R: SR 14 to RR Avg. Depth=1.52' Max Vel=6.00 fps Inflow=74.42 cfs 43.110 af
n=0.030 L=8,590.0' S=0.0180 '/' Capacity=296.80 cfs Outflow=59.56 cfs 41.425 af

Reach 7R: Thru Shed D to Dry Wash Avg. Depth=1.10' Max Vel=4.42 fps Inflow=79.30 cfs 69.740 af
n=0.022 L=4,770.0' S=0.0057 '/' Capacity=1,085.74 cfs Outflow=75.52 cfs 67.439 af

Total Runoff Area = 1,168.400 ac Runoff Volume = 71.425 af Average Runoff Depth = 0.73"
100.00% Pervious = 1,168.400 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Above SR 14

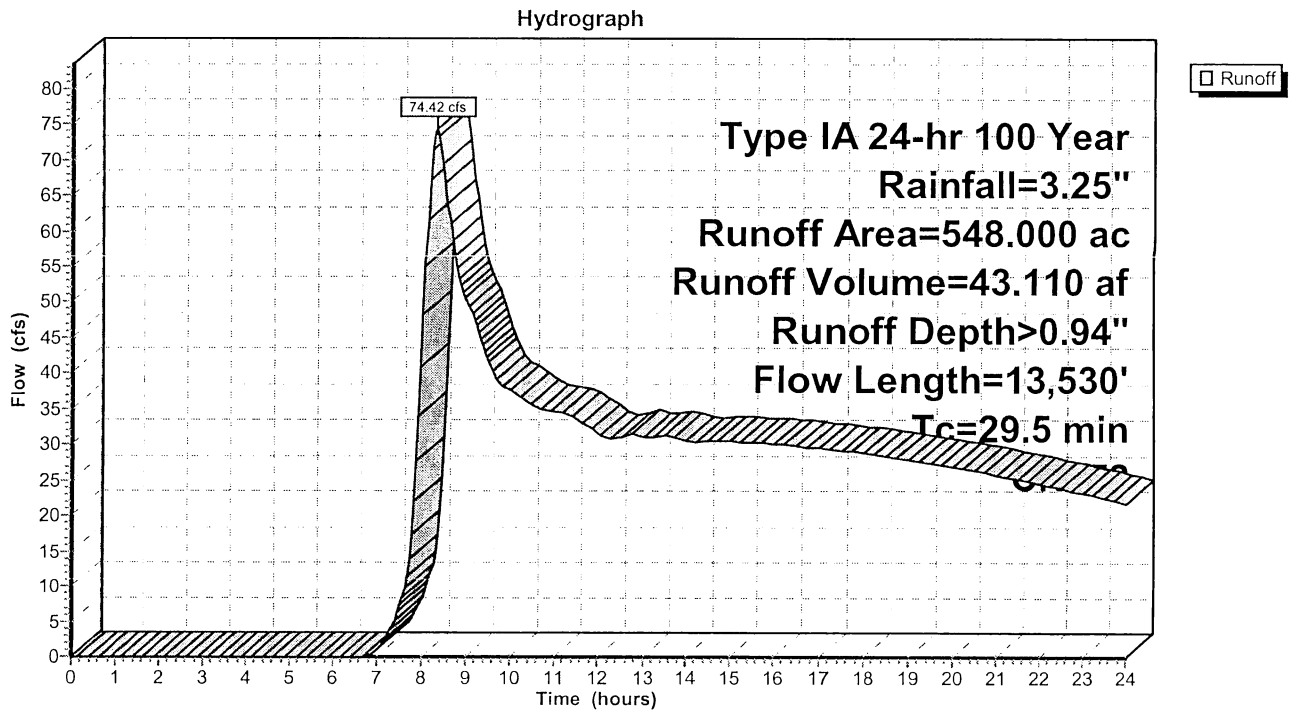
Runoff = 74.42 cfs @ 8.30 hrs, Volume= 43.110 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
207.300	88	Desert shrub range, Fair, HSG D
340.700	63	Desert shrub range, Fair, HSG A
548.000	72	Weighted Average
548.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	200	0.0940	0.51		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
12.0	8,350	0.0940	11.59	115.90	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.0	4,980	0.0400	7.56	75.60	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
29.5	13,530	Total			

Subcatchment 1S: Above SR 14



Summary for Subcatchment 3S: Above RR

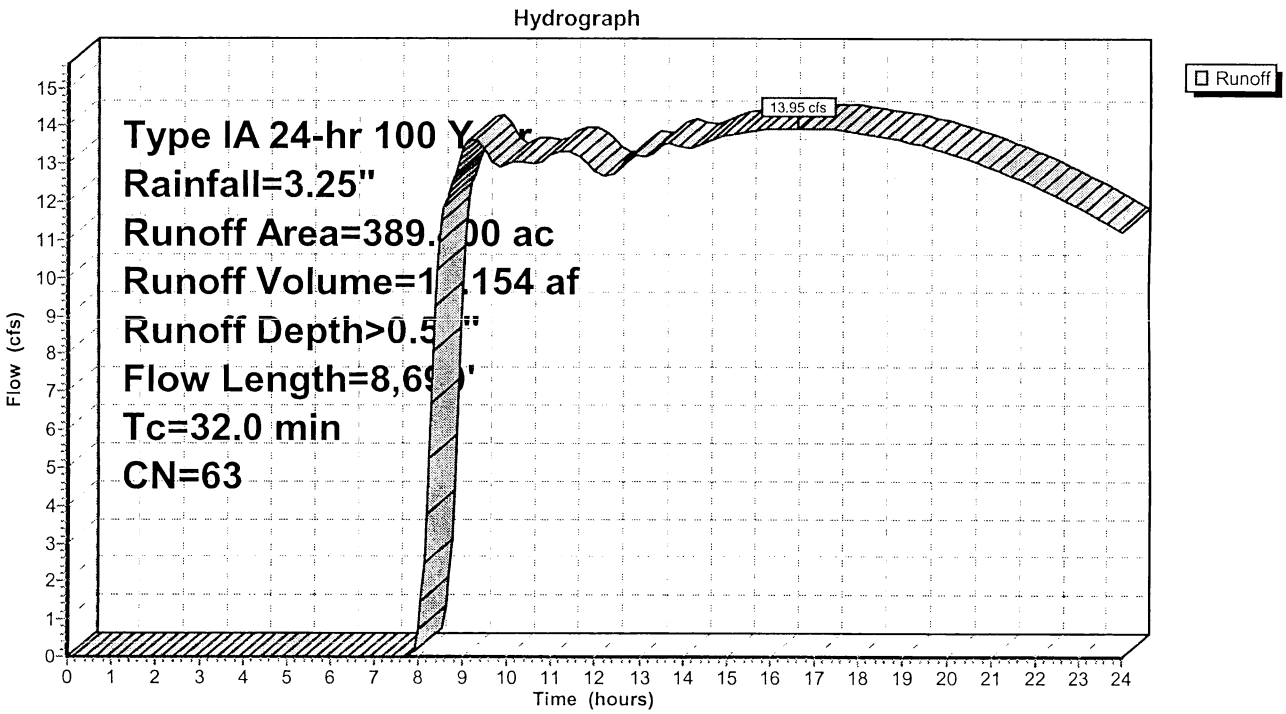
Runoff = 13.95 cfs @ 16.59 hrs, Volume= 17.154 af, Depth> 0.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
389.400	63	Desert shrub range, Fair, HSG A
389.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0200	0.36		**Sheet Flow,** n= 0.030 P2= 1.10"
16.1	5,180	0.0200	5.35	53.46	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.3	3,410	0.0150	5.01	75.12	**Channel Flow,** Area= 15.0 sf Perim= 20.0' r= 0.75' n= 0.030
32.0	8,690	Total			

Subcatchment 3S: Above RR



Summary for Subcatchment 17S: Shed D

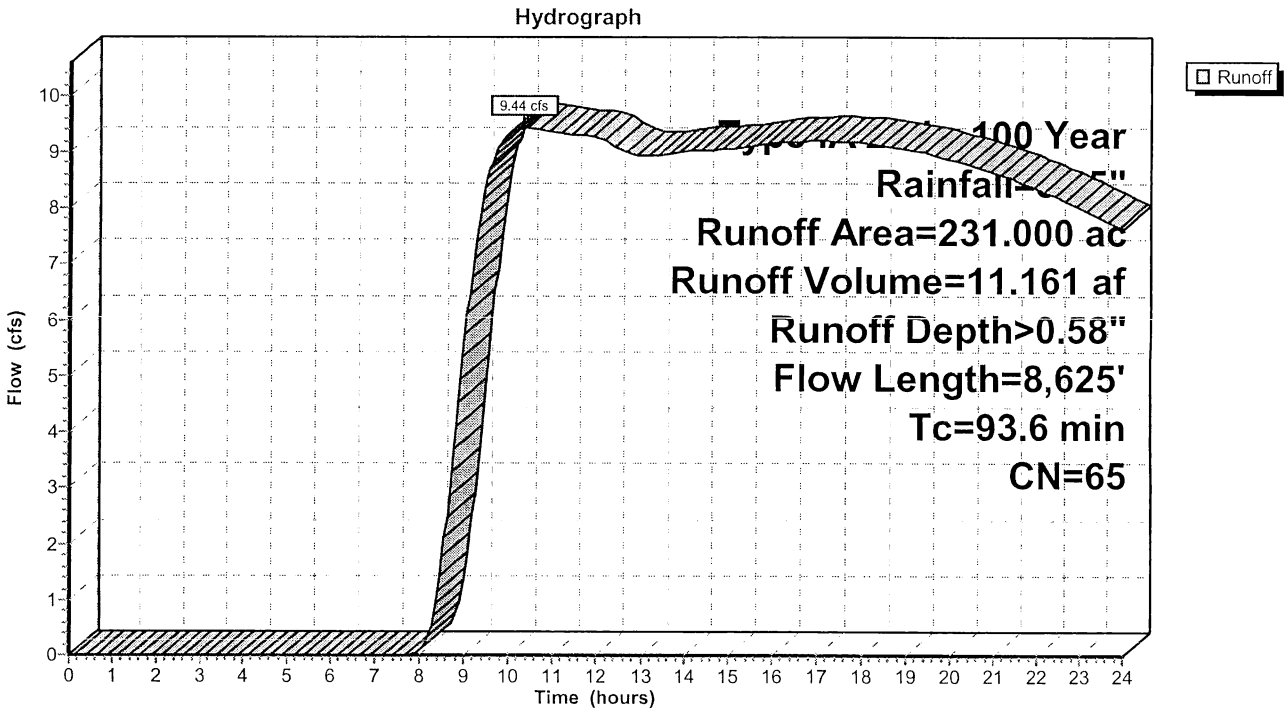
Runoff = 9.44 cfs @ 10.31 hrs, Volume= 11.161 af, Depth> 0.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
231.000	65	Desert shrub range, Poor, HSG A
231.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
53.7	725	0.0140	0.22		**Shallow Concentrated Flow, Unpaved** Kv= 1.9 fps
34.2	7,600	0.0050	3.71	48.94	**Channel Flow,** Area= 13.2 sf Perim= 19.3' r= 0.68' n= 0.022
93.6	8,625	Total			

Subcatchment 17S: Shed D



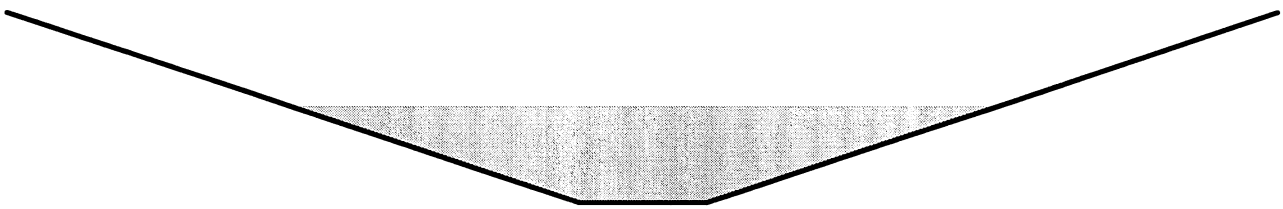
Summary for Reach 2R: SR 14 to RR

Inflow Area = 548.000 ac, 0.00% Impervious, Inflow Depth > 0.94" for 100 Year event
Inflow = 74.42 cfs @ 8.30 hrs, Volume= 43.110 af
Outflow = 59.56 cfs @ 9.03 hrs, Volume= 41.425 af, Atten= 20%, Lag= 43.8 min

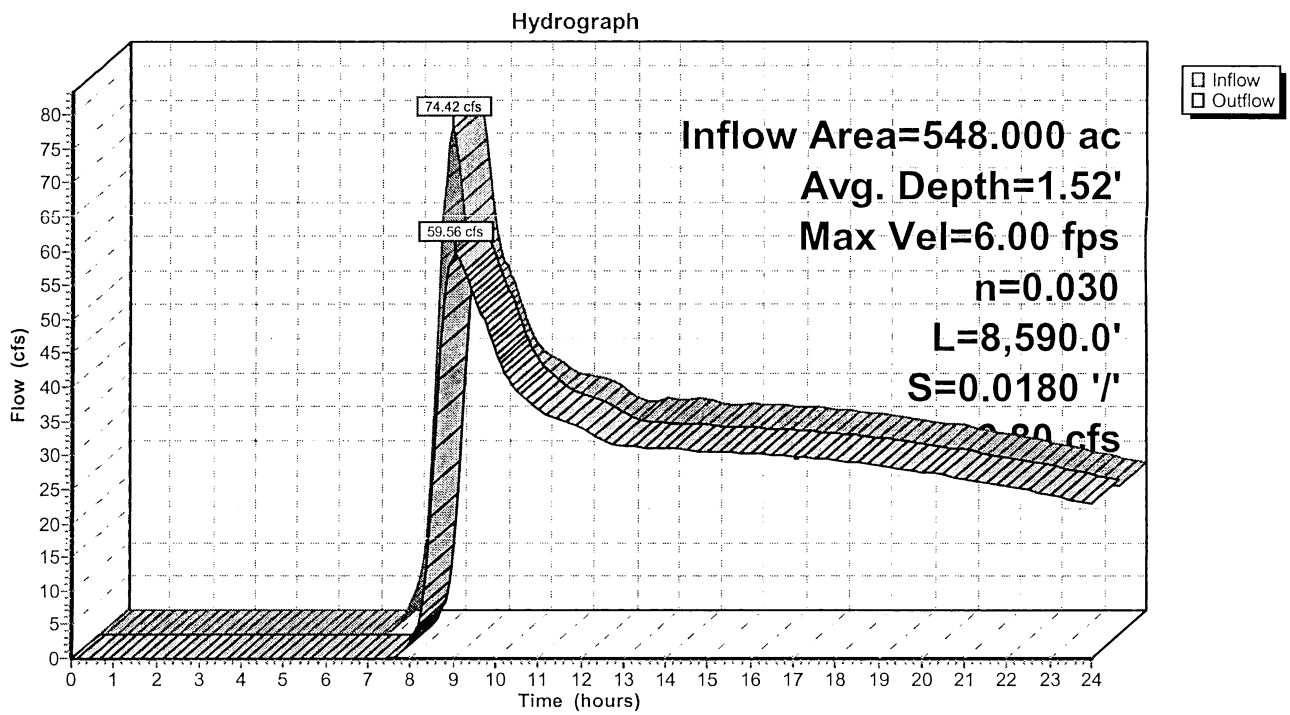
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.00 fps, Min. Travel Time= 23.9 min
Avg. Velocity = 4.83 fps, Avg. Travel Time= 29.6 min

Peak Storage= 85,311 cf @ 8.63 hrs, Average Depth at Peak Storage= 1.52'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 296.80 cfs

2.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 8,590.0' Slope= 0.0180 '/'
Inlet Invert= 2,326.75', Outlet Invert= 2,172.00'



Reach 2R: SR 14 to RR



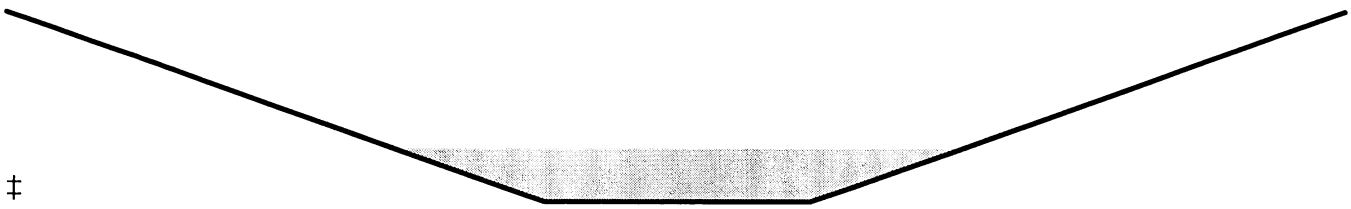
Summary for Reach 7R: Thru Shed D to Dry Wash

Inflow Area = 1,168.400 ac, 0.00% Impervious, Inflow Depth > 0.72" for 100 Year event
Inflow = 79.30 cfs @ 9.09 hrs, Volume= 69.740 af
Outflow = 75.52 cfs @ 9.76 hrs, Volume= 67.439 af, Atten= 5%, Lag= 40.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.42 fps, Min. Travel Time= 18.0 min
Avg. Velocity = 3.74 fps, Avg. Travel Time= 21.2 min

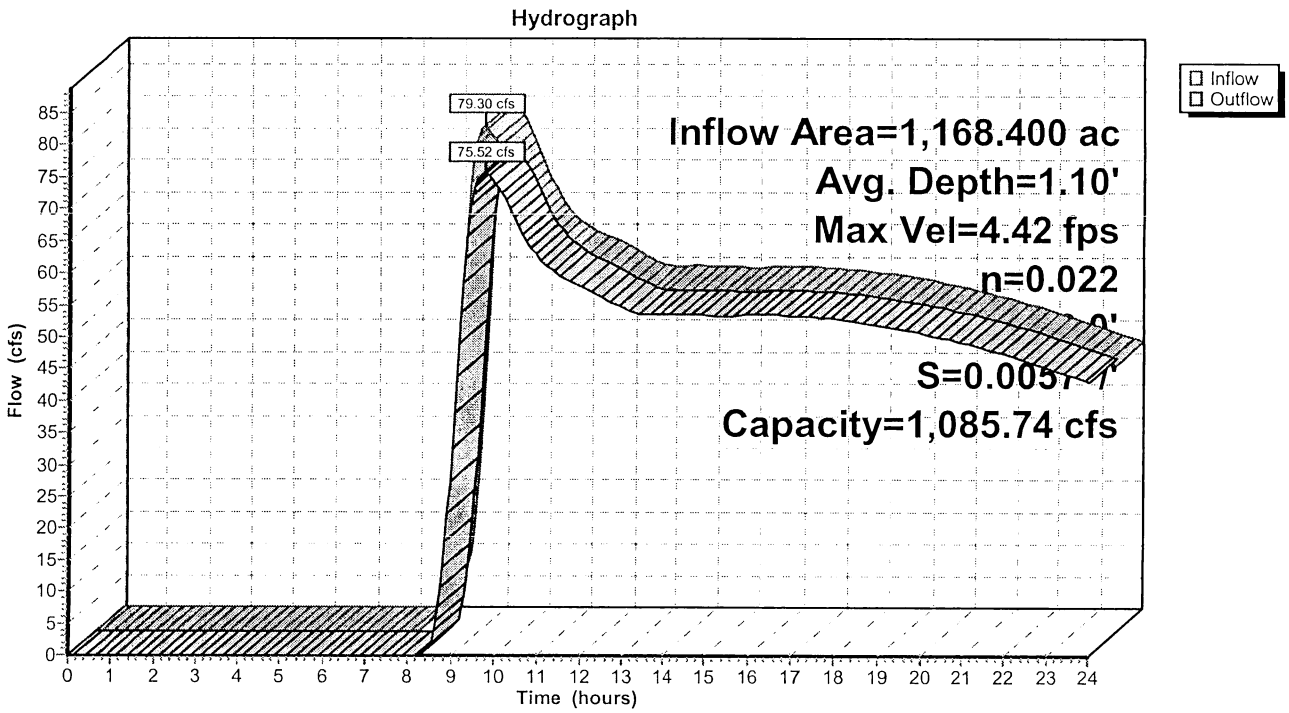
Peak Storage= 81,592 cf @ 9.46 hrs, Average Depth at Peak Storage= 1.10'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 1,085.74 cfs

10.00' x 4.00' deep channel, n= 0.022
Side Slope Z-value= 5.0 '/' Top Width= 50.00'
Length= 4,770.0' Slope= 0.0057 '/'
Inlet Invert= 2,120.50', Outlet Invert= 2,093.30'



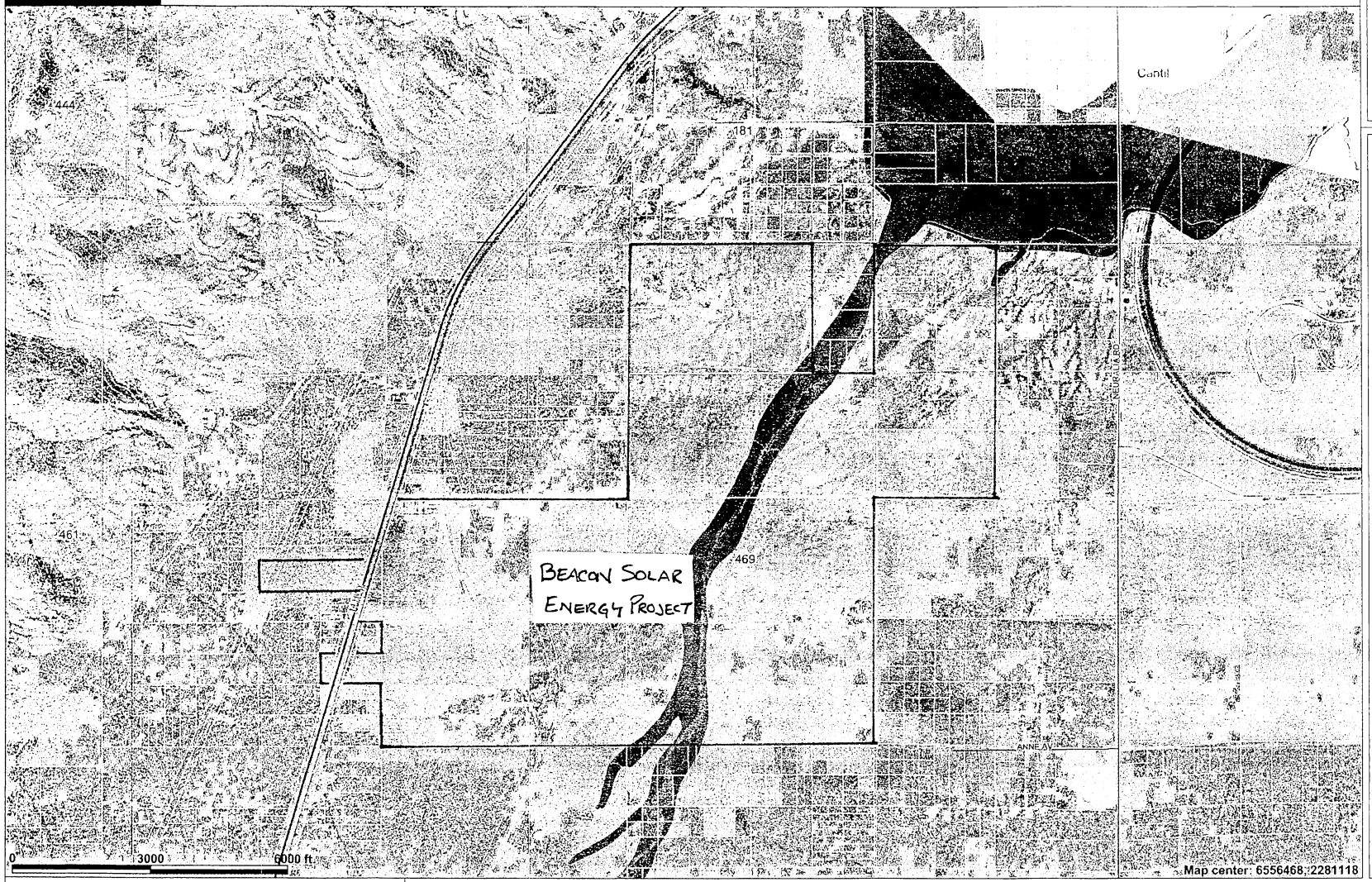
‡

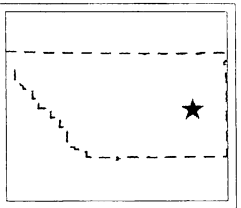
Reach 7R: Thru Shed D to Dry Wash



VIII. APPENDIX C: REFERENCES

Kern County Online Mapping





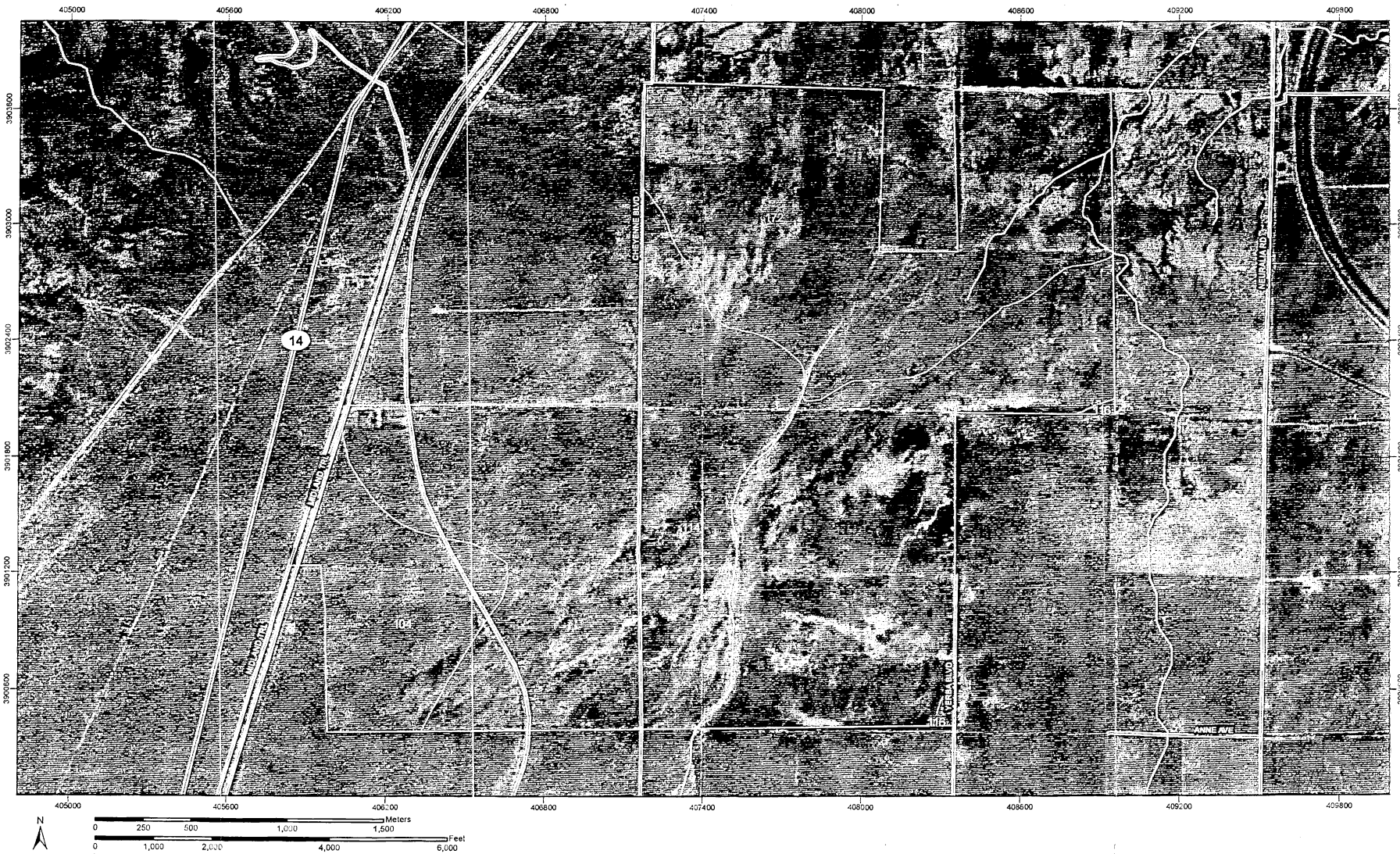
Legend

- Flood_Warning_Gage
- Hwy Symbols
  - California State
  - Interstate
  - US Route
- 100 ft Contours
- Roads
  - Arterial
  - Collector
  - Highway
  - Local
  - Ramp
  - Unpaved
- Railroads
- County of Kern
- Assessment Parcels
- Water Bodies
- Water Course
- Dry Lakes
- Assessor Map Books
- Spheres of Influence Cities
- Isabella_Failure_Innundation
  - Less than 2.6 hrs
  - 2.6 - 5.0 hrs
  - 5.0 - 7.3 hrs
  - 7.3 - 9.7 hrs
  - 9.7 - 12.1 hrs
  - 12.1 - 14.5 hrs
  - 14.5 - 16.9 hrs
  - 16.9 - 19.2 hrs

Scale: 1:25,438

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

146


405000
405600
406200
406800
407400
408000
408600
409200
409800
3903600
3903000
3902400
3901800
3901200
3900600
14
CHEYENNE BLVD
ANNE AVE
N
0 250 500 1,000 1,500 Meters
0 1,000 2,000 4,000 6,000 Feet

147

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features

- Gully
- Short Steep Slope
- Other

Political Features

Municipalities

- Cities
- Urban Areas

Water Features

- Oceans
- Streams and Canals

Transportation

- Rails

Roads

- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kern County, California, Southeastern Part
Survey Area Data: Version 3, Jan 9, 2007

Date(s) aerial images were photographed: 5/28/1994

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

148

Map Unit Legend

Kern County, California, Southeastern Part (CA670)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
104	ARIZO GRAVELLY LOAMY SAND, 2 TO 9 PERCENT SLOPES	228.9	10.0%
114	CAJON LOAMY SAND, 0 TO 5 PERCENT SLOPES	1,390.6	61.0%
116	CAJON GRAVELLY LOAMY SAND, 0 TO 9 PERCENT SLOPES	6.0	0.3%
172	ROSAMOND CLAY LOAM, SALINE-ALKALI	653.6	28.7%
Totals for Area of Interest (AOI)		2,279.1	100.0%

TABLE 14.--SOIL AND WATER FEATURES

[See text for definitions of terms. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that the data were not estimated]

Soil name and map symbol	Hydrologic group	Bedrock		Cemented pan		Risk of corrosion	
		Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
		In		In			
100*:							
Alko	D	>60	---	5-14	Rippable	High	Low.
Neuralia	C	>60	---	---	---	High	Low.
101 Anaheim Variant	B	24-35	Rippable	---	---	High	Low.
102, 103 Anaverde	B	>60	---	---	---	Moderate	Low.
104 Arizo	A	>60	---	---	---	Moderate	Low.
105 Arujo	B	40-60	Rippable	---	---	Moderate	Low.
106*, 107*, 108*:							
Arujo	B	40-60	Rippable	---	---	Moderate	Low.
Friant	D	6-20	Rippable	---	---	Moderate	Moderate.
Tunis	D	10-20	Rippable	---	---	Moderate	Low.
109, 110, 111 Arvin	B	>60	---	---	---	Moderate	Low.
112*:							
Badland.							
Orthents.							
113, 114 Cajon	A	>60	---	---	---	Moderate	Low.
115 Cajon	B	>60	---	---	---	High	High.
116 Cajon	A	>60	---	---	---	Moderate	Low.
117*:							
Cajon	B	>60	---	---	---	Moderate	Low.
Garlock	B	>60	---	---	---	High	Low.
118*:							
Chanac	B	>60	---	---	---	High	Low.
Badland.							
119*, 120*:							
Chanac	B	>60	---	---	---	High	Low.
Pleito	C	>60	---	---	---	High	Low.
121 Chino Variant	D	>60	---	---	---	High	Low.
122, 123 Cibo	D	24-36	Hard	---	---	High	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Bedrock		Cemented pan		Risk of corrosion	
		Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
		In		In			
124---------- Cinco	A	>60	---	---	---	Moderate----	Low.
125---------- DeStazo	B	>60	---	---	---	High--------	Low.
126---------- DeStazo	B	>60	---	---	---	High--------	Low.
127---------- DiGiorgio	B	>60	---	---	---	High--------	Low.
128*. Dumps							
129, 130, 131, 132---------- Edmundston	B	40-60	Rippable	---	---	Moderate----	Moderate.
133*, 134*:							
Edmundston-------	B	40-60	Rippable	---	---	Moderate----	Moderate.
Godde----------	D	10-20	Hard	---	---	Moderate----	Moderate.
Tollhouse--------	D	10-20	Rippable	---	---	Low---------	Moderate.
135*. Fluvents							
136---------- Friant	D	6-20	Rippable	---	---	Moderate----	Moderate.
137---------- Garlock	B	>60	---	---	---	High--------	Low.
138*:							
Godde----------	D	10-20	Hard	---	---	Moderate----	Moderate.
Tollhouse--------	D	5-15	Rippable	---	---	Low---------	Moderate.
139*. Haploxerolls							
140, 141, 142, 143---------- Havala	B	>60	---	---	---	High--------	Low.
144, 145, 146----- Hesperia	B	>60	---	---	---	High--------	Low.
147---------- Hi Vista	C	20-40	Hard	---	---	High--------	Low.
148---------- Jawbone	D	4-12	Rippable	---	---	Moderate----	Low.
149---------- Los Osos Variant	C	25-40	Hard	---	---	High--------	Low.
150---------- Muroc	D	20-30	Rippable	8-20	Rippable	High--------	Low.
151*:							
Muroc----------	D	20-30	Rippable	8-20	Rippable	High--------	Low.
Randsburg--------	D	8-20	Rippable	---	---	High--------	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Bedrock		Cemented pan		Risk of corrosion	
		Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
		In		In			
152*, 153*-------- Nacimiento	C	20-40	Rippable	---	---	High--------	Low.
154---------- Neuralia	C	>60	---	---	---	High--------	Low.
155*:							
Norob----------	C	>60	---	---	---	High--------	Moderate.
Neuralia---------	C	>60	---	---	---	High--------	Low.
156*:							
Pajuela----------	B	>60	---	---	---	Moderate----	Low.
Whitewolf--------	A	>60	---	---	---	High--------	Low.
157*. Pits							
158*. Playas							
159, 160---------- Pleito	C	>60	---	---	---	High--------	Low.
161*, 162*:							
Pleito----------	C	>60	---	---	---	High--------	Low.
Chanac----------	B	>60	---	---	---	High--------	Low.
163, 164---------- Porterville	D	>60	---	---	---	High--------	Low.
165*:							
Psamments.							
Xerolls.							
166*. Quarries							
167---------- Randsburg	D	8-20	Rippable	---	---	High--------	Low.
168, 169---------- Rescue Variant	C	>40	---	---	---	Moderate----	Low.
170*. Rock outcrop							
171, 172---------- Rosamond	C	>60	---	---	---	High--------	Low.
173---------- Rosamond Variant	B	>60	---	---	---	High--------	Low.
174---------- Steuber	B	>60	---	---	---	High--------	Low.
175, 176, 177----- Steuber	B	>60	---	---	---	High--------	Low.
178*:							
Sween Variant----	C	24-40	Hard	---	---	High--------	Low.
Rock outcrop.							

See footnote at end of table.

104—Arizo gravelly loamy sand, 2 to 9 percent slopes. This soil is very deep, excessively drained, and gently to moderately sloping. It is on alluvial fans and plains. It formed in mixed alluvium derived from granitic rock. Areas are irregular in shape and range from 60 to 3,000 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 2,500 to 4,000 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 63 degrees F. The average frost-free season ranges from 200 to 225 days.

Typically, the surface layer is very pale brown gravelly loamy sand about 3 inches thick. The underlying material to a depth of 65 inches is very pale brown very gravelly loamy coarse sand.

Included with this soil in mapping are areas of Cajon soils that make up about 15 percent of the unit. Near Jawbone Canyon there are a few areas of included soils similar to Arizo but which are calcareous throughout or are very stratified. Also included are a few areas that are dissected by many shallow channels. The soil in these areas is coarser.

Permeability of this Arizo soil is very rapid, and available water capacity is very low or low. Surface runoff is very slow, and the hazard of erosion and soil blowing is high. The effective rooting depth is 60 inches or more. Flooding occurs whenever rainfall is intense. Floods are usually of short duration.

Areas of this soil are used for recreation, wildlife habitat, and occasional grazing.

This soil is poorly suited for rangeland. The major limitations are low available water capacity, low annual precipitation, and lack of livestock water. Forage production is generally low. Indian ricegrass and desert needlegrass are the main forage plants. During favorable precipitation years, filaree may produce abundant quantities of high quality forage. Excessive surface disturbance of this soil can result in excessive soil blowing.

The estimated total annual forage production is 375 pounds per acre during favorable years, 250 pounds during normal years, and 200 pounds during unfavorable years. The range site is Gravelly Sandy (30).

This soil is in capability subclass VIIe (30), nonirrigated.

114—Cajon loamy sand, 0 to 5 percent slopes. This soil is very deep, somewhat excessively drained, and nearly level to gently sloping. It is on alluvial fans and plains. It formed in alluvial material derived mainly from granitic rock. Areas are irregular in shape and range from 60 to 20,000 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs with a few Joshua trees (fig. 8). Elevation ranges from 2,500 to 3,500 feet. The mean annual precipitation is dominantly between 4 and 6 inches but is as much as 12 inches along the eastern base of the Tehachapi Mountains. The mean annual air temperature is about 65 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is pale brown loamy sand about 4 inches thick. The underlying material to a depth of 20 inches is light yellowish brown loamy sand. Below that, it is stratified light yellowish brown gravelly loamy sand and gravelly sandy loam. Gravel content is as much as 20 percent by volume. Reaction is mildly or moderately alkaline throughout.

Included with this soil in mapping are small areas of Arizo, Garlock, Neuralia, and DeStazo soils. These areas make up 20 percent of the unit. Also included are a few areas of Cajon gravelly loamy sand.

116—Cajon gravelly loamy sand, 0 to 9 percent slopes. This soil is very deep, excessively drained, nearly level to moderately sloping. It is on alluvial fans and plains. It formed in alluvial material derived from granitic rock. Areas are irregular in shape and range from 200 to 1,500 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs. Elevation ranges from 2,000 to 3,500 feet. The mean annual precipitation is dominantly between 4 and 6 inches but is as much as 12 inches along the eastern base of the Tehachapi Mountains. The mean annual air temperature is about 65 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is pale brown and yellowish brown gravelly loamy sand about 36 inches thick. Gravel content ranges from 15 to 30 percent. The underlying material is light yellowish brown gravelly sand and gravelly fine sand. Gravel content ranges from 15 to 35 percent by volume.

Included with this soil in mapping are areas of Arizo soils and areas of Garlock soils. The Arizo soils make up about 10 percent of the unit, and the Garlock soils 5 percent.

Permeability of this Cajon soil is rapid, and available water capacity is very low or low. Surface runoff is slow, and the hazard of erosion and soil blowing is high. The effective rooting depth is 60 inches or more.

Areas of this soil are used for rangeland, recreation, and homesites. A few small areas are used for irrigated crops and pasture.

This soil is poorly suited to rangeland. Limitations are low available water capacity and the coarse surface texture. Forage production is low. Desert needlegrass and filaree are the major forage plants. Forage production is quite variable. In areas of high precipitation yields may be greater and more reliable than in drier areas. In years when precipitation is exceptionally favorable, annual grasses and filaree may produce abundant forage. Major browse species are white bursage and winterfat. Excessive disturbance of this soil can result in severe wind erosion.

This soil is suited to homesite development. Rapid permeability and the hazard of soil blowing are the main limitations. During construction, no larger an area should be disturbed than necessary, and disturbed areas should be reseeded as soon as possible to prevent soil blowing. Effluent from septic tank filter fields can contaminate gound water. Water supplies should be located a sufficient distance from leach fields. Because of the limited amount of precipitation and low or very low available water capacity, landscape plants should be watered frequently.

The estimated total annual forage production is 200 pounds per acre during favorable years, 150 pounds during normal years, and 100 pounds during unfavorable years. The range site is Gravelly Sandy (30).

This soil is in capability subclass VIIe (30), nonirrigated.

148—Jawbone gravelly loamy sand, 15 to 75 percent slopes. This shallow, excessively drained, hilly to very steep soil is on mountainous uplands. It formed in residual material weathered from granitic rock. Areas are irregular in shape and range from 1,700 to 6,500 acres in size. The vegetation is mainly annual grasses, forbs, shrubs, and scattered conifers. Elevation dominantly ranges from 3,000 to 4,000 feet. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 175 to 225 days.

Typically, the surface layer is a light yellowish brown gravelly loamy sand about 10 inches thick. Below this is highly weathered granite. In some places the surface layer is gravelly loamy coarse sand.

Included with this soil in mapping are small areas of Arizo, Cinco, and Hi Vista soils. These included areas make up about 20 percent of the unit. Also included are a few areas of rock outcrop and Jawbone soils on gently or moderately sloping ridgetops.

Permeability of this Jawbone soil is rapid, and available water capacity is very low. Surface runoff is rapid to very rapid, and the hazard of erosion is high or very high. The effective rooting depth is 4 to 12 inches.

Areas of this soil are used for rangeland and watershed.

This soil is poorly suited for rangeland. The shallow depth to bedrock, steep slopes, high or very high hazard of erosion, and very low available water capacity are the main soil limitations. Steep escarpments limit livestock distribution and excessive disturbance or overgrazing may result in a severe erosion problem. Forage production is low and livestock water is lacking. Fencing and the development of livestock water facilities will help to obtain proper livestock distribution. Winterfat, spiny hopsage, and junipers dominate the vegetation. Indian ricegrass, red brome, and filaree are the main forage plants. Rotation grazing may be beneficial to increase the amount of desert needlegrass and to control erosion.

The estimated total annual forage production is 1,000 pounds per acre during favorable years, 500 pounds during normal years, and 200 pounds during unfavorable years. The range site is Shallow Gravelly Loamy (29).

This soil is in capability subclass VIIe (29), nonirrigated.

172—Rosamond clay loam, saline-alkali. This very deep, well drained, nearly level soil is on alluvial plains. It formed in alluvial material derived from granitic rock. Slope ranges from 0 to 2 percent. Areas are irregular in shape and range from 2,000 to 3,500 acres in size. The vegetation is mainly shrubs and scattered annual grasses and forbs. Elevation ranges from 2,000 to 2,900 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is brown sandy loam about 2 inches thick. The underlying material to a depth of 12 inches is pale brown clay loam. Below that, to a depth of 60 inches, it is pale brown loam with thin layers of fine sandy loam and silt loam. This soil has an excessive amount of salts and sodium.

Included with this soil in mapping are small areas of Arizo, Cajon, and Rosamond soils that contain less salt and sodium. These included areas make up about 10 percent of the unit.

Permeability of this Rosamond soil is moderately slow, and the available water capacity is low to very low. Surface runoff is medium, and the hazard of erosion is moderate or high. The hazard of soil blowing is moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for rangeland, recreation, and wildlife habitat. A few places are used for homesites.

This soil is poorly suited for rangeland. It is limited for this use mainly by the saline-alkali conditions. Low annual precipitation and lack of available livestock water is also a problem. Forage production is low and limited to salt-tolerant species. The main plant community is allscale, alkali blite, and iodine bush. Excessive disturbance of this soil through overgrazing can result in severe wind erosion. Onsite evaluation is needed to determine feasibility for water development.

The nearness of Edwards Air Force Base has resulted in construction of houses on this soil. The hazard of erosion, saline-alkali conditions, moderately slow permeability, and moderate shrink-swell potentials are the main limitations for homesites. These limitations can cause failures or problems with foundations, septic tank absorption fields, sanitary landfields, and home gardening and landscaping. Soil limitations can be improved or corrected for homesites, however, by the use of proper design and installation procedures. Suitability of this soil for a particular urban use can be determined by onsite evaluation.

The estimated total annual forage production is 500 pounds per acre during favorable years, 300 pounds during normal years, and 200 pounds during unfavorable years. The range site is Alkali Flats (30).

This soil is in capability subclass VIIs (30), nonirrigated.

Permeability of this Cajon soil is rapid, and available ater capacity is low or moderate. Surface runoff is ow, and the hazard of erosion is slight. The hazard of oil blowing is high. The effective rooting depth is 60 ches or more.

Areas of this soil are mainly used for irrigated crops nd pasture. Alfalfa is the main crop. Areas not ltivated are used for desert range, recreation, and ildlife habitat. Some areas are used for homesites.

This soil is suited to most irrigated crops grown in the ea. The hazard of soil blowing and low available water apacity are the main limitations. Maintaining a plant over, utilizing all crop residues, and limiting tillage can elp to maintain or improve organic matter content and event soil blowing. Sprinkler type irrigation systems are est suited to this soil. Irrigation water should be applied a rate sufficient for maximum production but in mounts small enough to avoid excessive fertilizer loss, noff, or deep percolation.

This soil is poorly suited for rangeland. Major nitations are the low or moderate available water apacity and coarse surface texture. Excessive disturbance of this soil can result in severe wind erosion. Native forage production is low in quantity but high in quality. Desert needlegrass, Indian ricegrass, winterfat, shadscale, and white bursage are the main forage and browse plants. In years when precipitation is favorable, filaree and annual grasses produce abundant forage.

The estimated total annual forage production is 375 pounds per acre during favorable years, 250 pounds during normal years, and 150 pounds during unfavorable years. The range site is Sandy (30). Forage production is quite variable. In areas of high precipitation yields are more reliable and may be double those in drier areas.

This soil is suited to urban development. Rapid permeability and the hazard of soil blowing are the main limitations. During construction, no larger an area should be disturbed than is necessary. Disturbed areas should be reseeded as soon as possible to prevent soil blowing. Effluent from septic tank filter fields can contaminate ground water. Water supplies should be located a sufficient distance from leach fields.

This soil is in capability subclass VIIe (30), nonirrigated, and capability unit IVe-4 (30), irrigated.

Table 2-2a.—Runoff curve numbers for urban areas[1]

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)[5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1]Average runoff condition, and $I_a = 0.2S$.
[2]The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
[3]CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
[4]Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
[5]Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4, based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2d.—Runoff curve numbers for arid and semiarid rangelands[1]

Cover description		Curve numbers for hydrologic soil group—			
Cover type	Hydrologic condition[2]	A[3]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	7[illegible]
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

[1]Average runoff condition, and $I_a = 0.2S$. For range in humid regions, use table 2-2c.

[2]*Poor:* <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: >70% ground cover.

[3]Curve numbers for group A have been developed only for desert shrub.

APPENDIX II

EQUATIONS FOR CURVES AND FIGURES

Figure C-6: Infiltration Rate For Pervious Areas Versus SCS Curve Numbers

CN	Fp
20	1.00
25	1.00
30	0.985
35	0.96
40	0.92
45	0.87
50	0.82
55	0.76
60	0.70
65	0.63
70	0.55
75	0.47
80	0.38
85	0.29
90	0.20
95	0.10
98	0.00
73	0.502
81	0.362
83	0.3260
86	0.272
87	0.254

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

California 35.212 N 117.937 W 2326 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Fri Oct 19 2007

Confidence Limits | Seasonality | Location Maps | Other Info. | GIS data | Maps | Help | Docs | U.S. Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.08	0.13	0.16	0.21	0.26	0.36	0.44	0.58	0.72	0.90	0.96	1.07	1.17	1.29	1.48	1.72	1.98	2.18
2	0.11	0.16	0.20	0.27	0.34	0.47	0.57	0.75	0.94	~~1.18~~	1.27	1.43	1.57	1.73	2.00	2.33	2.71	2.97
5	0.15	0.23	0.29	0.39	0.48	0.65	0.78	1.02	1.28	1.64	1.77	2.04	2.25	2.47	2.88	3.37	4.02	4.42
10	0.19	0.29	0.36	0.48	0.60	0.80	0.94	1.24	1.54	1.97	2.13	2.50	2.76	3.02	3.51	4.11	5.00	5.51
25	0.25	0.38	0.48	0.64	0.79	1.02	1.19	1.56	1.90	2.42	2.62	3.13	3.45	3.74	4.33	5.07	6.32	7.01
50	0.31	0.47	0.58	0.78	0.96	1.22	1.39	1.81	2.17	~~2.77~~	2.98	3.62	3.99	4.30	4.95	5.80	7.36	8.19
100	0.37	0.56	0.69	0.94	1.16	1.44	1.62	2.08	2.46	~~3.12~~	3.36	4.14	4.56	4.88	5.57	6.53	8.44	9.44
200	0.44	0.67	0.82	1.11	1.37	1.68	1.86	2.38	2.76	3.48	3.75	4.68	5.14	5.46	6.19	7.26	9.55	10.73
500	0.54	0.83	1.02	1.38	1.71	2.04	2.23	2.82	3.19	3.96	4.26	5.42	5.95	6.25	7.01	8.22	11.08	12.53
1000	0.63	0.96	1.19	1.60	1.98	2.35	2.53	3.19	3.54	4.34	4.66	6.01	6.58	6.87	7.63	8.95	12.28	13.96

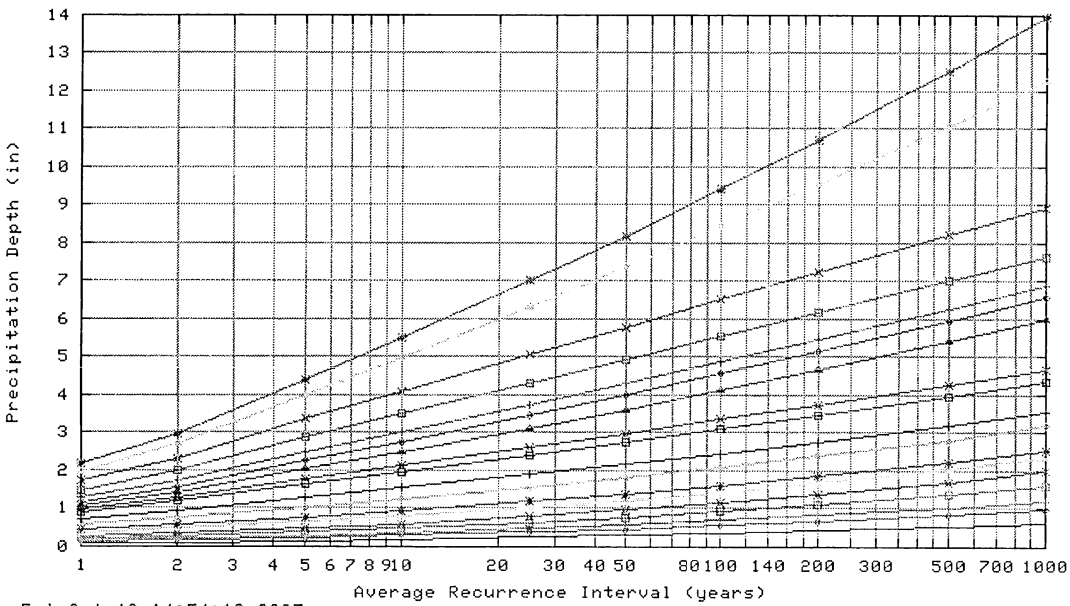
10YR 24HR = 1.97"

10YR 5-DAY = 2.59"

Text version of table

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval. Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

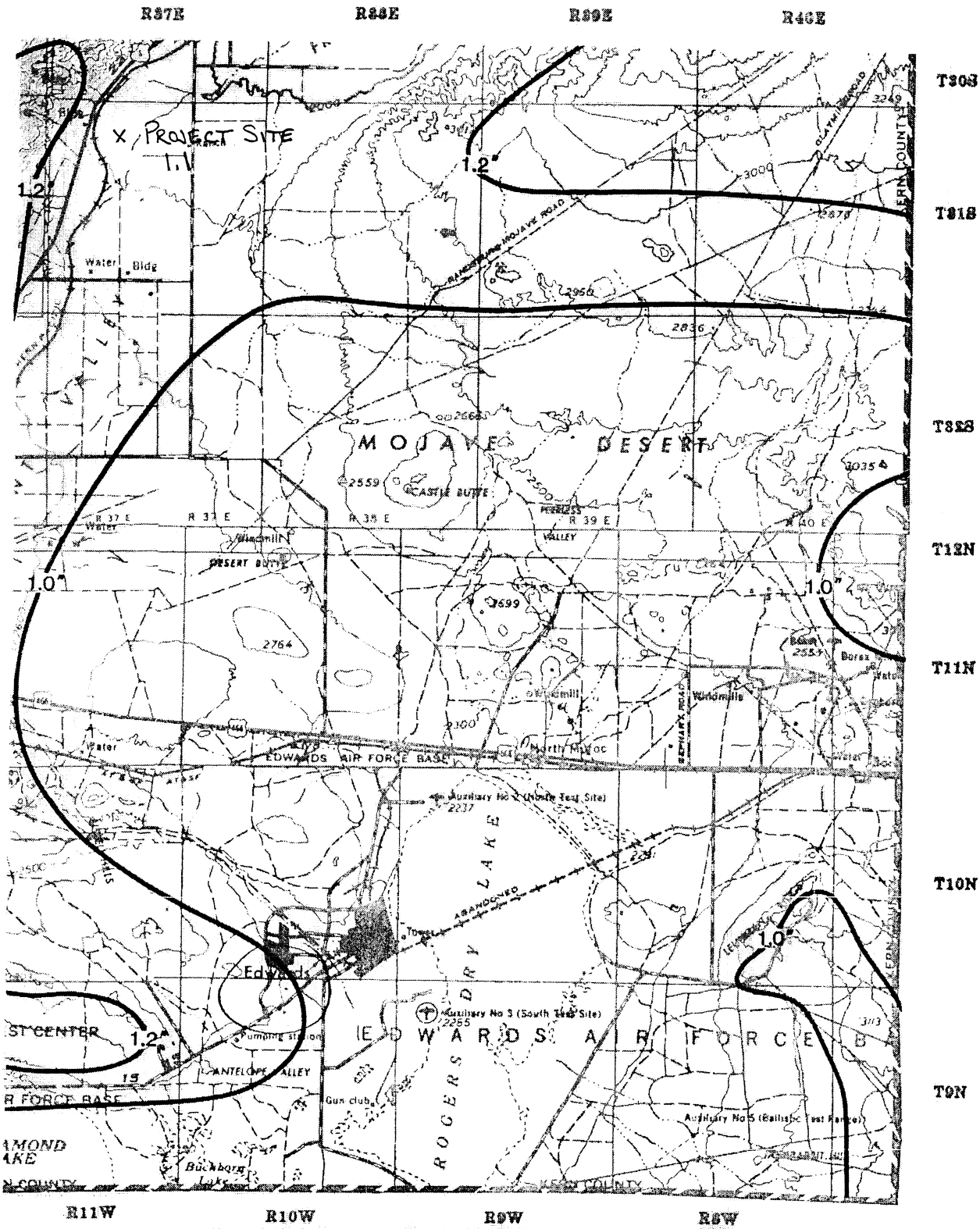
Partial duration based Point Precipitation Frequency Estimates Version: 4
35.212 N 117.937 W 2326 ft



Fri Oct 19 14:54:19 2007

Duration			
5-min	[illegible]	48-hr	30-day
10-min	3-hr	4-day	[illegible]
15-min	6-hr	7-day	60-day
30-min	12-hr	10-day	
60-min	24-hr	20-day	

160



KERN COUNTY HYDROLOGY MANUAL

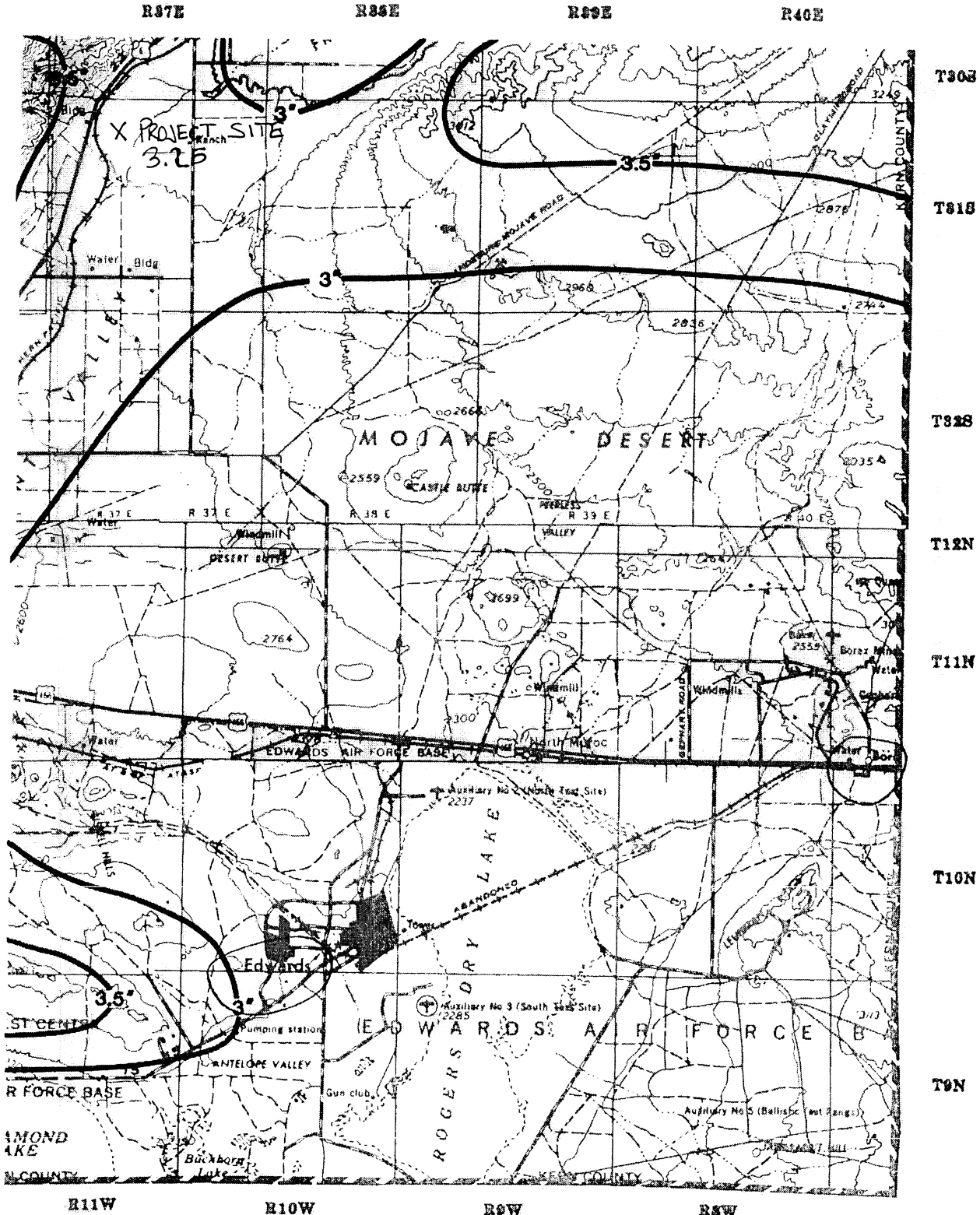
RAINFALL ISOHYET MAP

APPROXIMATE SCALE
1" = 4 miles

——— 2-Year, 24-Hour Isohyet

NORTH

FIGURE B- 22



KERN COUNTY HYDROLOGY MANUAL

RAINFALL ISOHYET MAP

APPROXIMATE SCALE
1"=4 miles

100-Year, 24-Hour Isohyet

NORTH

FIGURE B-55

IX. APPENDIX D: HYDRAULICS

TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT n (*continued*)

Type of channel and description	Minimum	Normal	Maximum
C. EXCAVATED OR DREDGED			
a. Earth, straight and uniform			
1. Clean, recently completed	0.016	0.018	0.020
2. Clean, after weathering	0.018	0.022	0.025
3. Gravel, uniform section, clean	0.022	0.025	0.030
4. With short grass, few weeds	0.022	0.027	0.033
b. Earth, winding and sluggish			
1. No vegetation	0.023	0.025	0.030
2. Grass, some weeds	0.025	0.030	0.033
3. Dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
4. Earth bottom and rubble sides	0.028	0.030	0.035
5. Stony bottom and weedy banks	0.025	0.035	0.040
6. Cobble bottom and clean sides	0.030	0.040	0.050
c. Dragline-excavated or dredged			
1. No vegetation	0.025	0.028	0.033
2. Light brush on banks	0.035	0.050	0.060
d. Rock cuts			
1. Smooth and uniform	0.025	0.035	0.040
2. Jagged and irregular	0.035	0.040	0.050
e. Channels not maintained, weeds and brush uncut			
1. Dense weeds, high as flow depth	0.050	0.080	0.120
2. Clean bottom, brush on sides	0.040	0.050	0.080
3. Same, highest stage of flow	0.045	0.070	0.110
4. Dense brush, high stage	0.080	0.100	0.140
D. NATURAL STREAMS			
D-1. Minor streams (top width at flood stage <100 ft)			
a. Streams on plain			
1. Clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
2. Same as above, but more stones and weeds	0.030	0.035	0.040
3. Clean, winding, some pools and shoals	0.033	0.040	0.045
4. Same as above, but some weeds and stones	0.035	0.045	0.050
5. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
6. Same as 4, but more stones	0.045	0.050	0.060
7. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080
8. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150

TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT n (*continued*)

Type of channel and description	Minimum	Normal	Maximum
b. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
1. Bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
2. Bottom: cobbles with large boulders	0.040	0.050	0.070
D-2. Flood plains			
a. Pasture, no brush			
1. Short grass	0.025	0.030	0.035
2. High grass	0.030	0.035	0.050
b. Cultivated areas			
1. No crop	0.020	0.030	0.040
2. Mature row crops	0.025	0.035	0.045
3. Mature field crops	0.030	0.040	0.050
c. Brush			
1. Scattered brush, heavy weeds	0.035	0.050	0.070
2. Light brush and trees, in winter	0.035	0.050	0.060
3. Light brush and trees, in summer	0.040	0.060	0.080
4. Medium to dense brush, in winter	0.045	0.070	0.110
5. Medium to dense brush, in summer	0.070	0.100	0.160
d. Trees			
1. Dense willows, summer, straight	0.110	0.150	0.200
2. Cleared land with tree stumps, no sprouts	0.030	0.040	0.050
3. Same as above, but with heavy growth of sprouts	0.050	0.060	0.080
4. Heavy stand of timber, a few down trees, little undergrowth, flood stage below branches	0.080	0.100	0.120
5. Same as above, but with flood stage reaching branches	0.100	0.120	0.160
D-3. Major streams (top width at flood stage >100 ft). The n value is less than that for minor streams of similar description, because banks offer less effective resistance.			
a. Regular section with no boulders or brush	0.025	.....	0.060
b. Irregular and rough section	0.035	.....	0.100

FROM KERN COUNTY FLOOD INSURANCE STUDY, 1995

Table 3. Summary of Roughness Coefficients

Flooding Source	Range of "n" Values: Channel	Range of "n" Values: Overbank
Region 1		
Little Dixie Wash (Lower Reach)	0.025-0.035	0.025-0.045
South El Poso Wash	0.030-0.035	0.040-0.045
North El Poso Wash	0.030-0.035	0.040-0.045
South Ridgecrest Wash	0.030	0.040
North Ridgecrest Wash	0.030	0.040
Calvert Wash	0.030	0.040
Boron Avenue	0.025-0.049	0.030-0.085
Twenty Mule Team Creek	0.013-0.075	0.016-0.075
Claymine Road	0.025-0.070	0.025-0.070
23 → Jawbone Canyon Wash	0.030-0.049	0.045
Shallow Flooding in Mojave	0.035-0.050	0.035-0.050
Region 2		
Kern River at Kernville	0.036-0.041	0.040-0.065
Kern River at Bakersfield	0.036-0.065	0.035-0.065
South Fork Kern River	0.032-0.055	0.042-0.062
Erskine Creek	0.035-0.070	0.035-0.070
Breckenridge	0.040-0.050	0.040-0.050
Doyle Street	0.010-0.060	0.010-0.060
Ward Street	0.025-0.030	0.025-0.045
Kelso Creek	0.035-0.050	0.035-0.050
Hawthorne	0.012-0.046	0.012-0.046
McFarland, East of State Highway 99	0.025-0.030	0.025-0.045

165

Pine Tree Creek Rerouted Channel S=0.5% 14,000 cfs

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

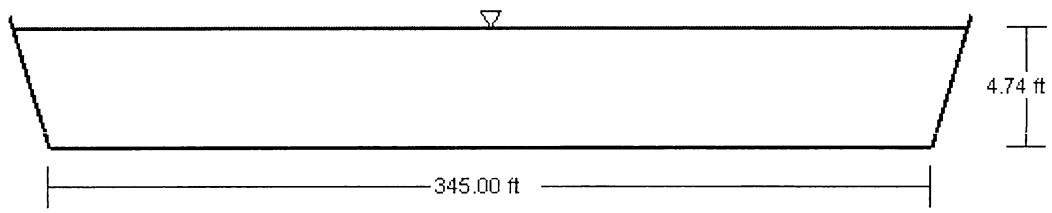
Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00500	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	345.00	ft
Discharge	14000.00	ft^3/s

Results

Normal Depth	4.74	ft
Flow Area	1701.46	ft^2
Wetted Perimeter	374.96	ft
Top Width	373.42	ft
Critical Depth	3.67	ft
Critical Slope	0.01174	ft/ft
Velocity	8.23	ft/s
Velocity Head	1.05	ft
Specific Energy	5.79	ft
Froude Number	0.68	
Flow Type	Subcritical	

Cross Section Image



V: 10
H: 1

Pine Tree Creek Rerouted Channel S=0.5% 20,000 cfs

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

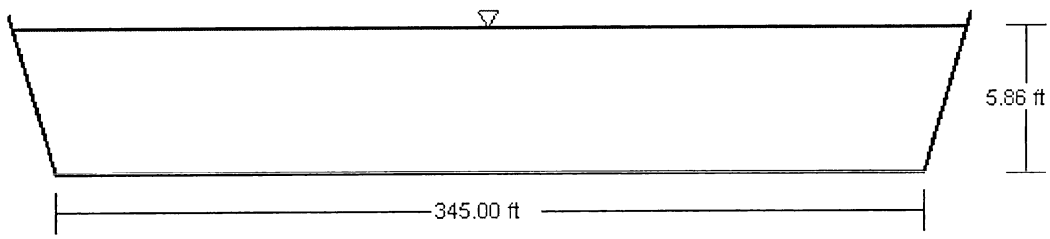
Input Data

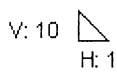
Roughness Coefficient	0.035	
Channel Slope	0.00500	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	345.00	ft
Discharge	20000.00	ft^3/s

Results

Normal Depth	5.86	ft
Flow Area	2123.31	ft^2
Wetted Perimeter	382.04	ft
Top Width	380.14	ft
Critical Depth	4.65	ft
Critical Slope	0.01089	ft/ft
Velocity	9.42	ft/s
Velocity Head	1.38	ft
Specific Energy	7.24	ft
Froude Number	0.70	
Flow Type	Subcritical	

Cross Section Image





Pine Tree Creek Rerouted Channel S=1.4% 14,000cfs

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

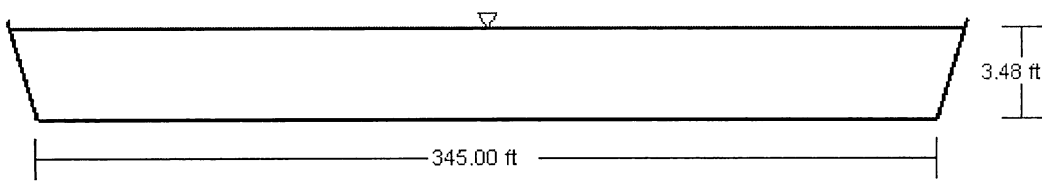
Input Data

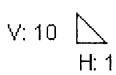
Roughness Coefficient	0.035	
Channel Slope	0.01400	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	345.00	ft
Discharge	14000.00	ft^3/s

Results

Normal Depth	3.48	ft
Flow Area	1238.70	ft^2
Wetted Perimeter	367.04	ft
Top Width	365.91	ft
Critical Depth	3.67	ft
Critical Slope	0.01174	ft/ft
Velocity	11.30	ft/s
Velocity Head	1.99	ft
Specific Energy	5.47	ft
Froude Number	1.08	
Flow Type	Supercritical	

Cross Section Image





Pine Tree Creek Rerouted Channel S=1.4% 20,000cfs

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

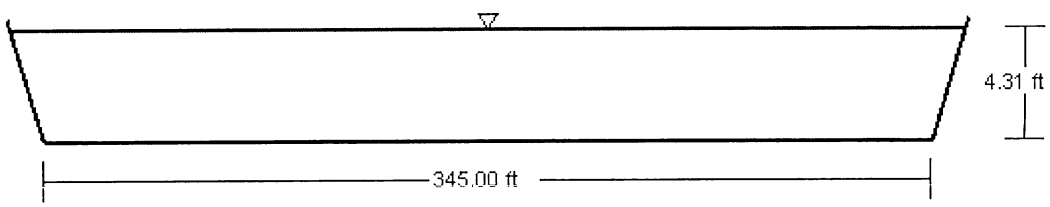
Input Data

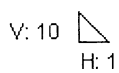
Roughness Coefficient	0.035	
Channel Slope	0.01400	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	345.00	ft
Discharge	20000.00	ft^3/s

Results

Normal Depth	4.31	ft
Flow Area	1542.99	ft^2
Wetted Perimeter	372.26	ft
Top Width	370.87	ft
Critical Depth	4.65	ft
Critical Slope	0.01089	ft/ft
Velocity	12.96	ft/s
Velocity Head	2.61	ft
Specific Energy	6.92	ft
Froude Number	1.12	
Flow Type	Supercritical	

Cross Section Image





Worksheet for 100 Yr Onsite Channel - SHED A

Project Description

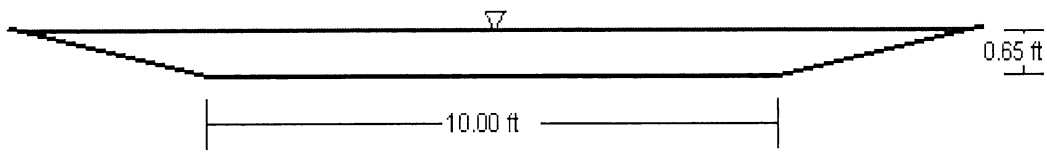
Friction Method	Manning Formula
Solve For	Normal Depth

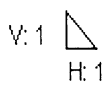
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	26.50	ft^3/s

Results

Normal Depth	0.65	ft
Flow Area	8.60	ft^2
Wetted Perimeter	16.62	ft
Top Width	16.50	ft
Critical Depth	0.55	ft
Critical Slope	0.00929	ft/ft
Velocity	3.08	ft/s
Velocity Head	0.15	ft
Specific Energy	0.80	ft
Froude Number	0.75	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED B

Project Description

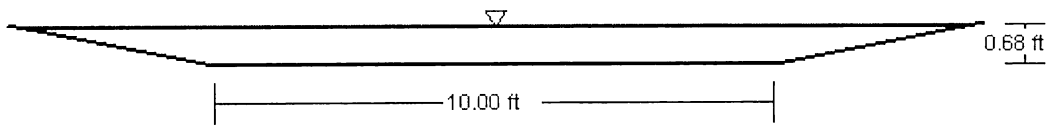
Friction Method	Manning Formula
Solve For	Normal Depth

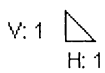
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	28.70	ft^3/s

Results

Normal Depth	0.68	ft
Flow Area	9.09	ft^2
Wetted Perimeter	16.92	ft
Top Width	16.79	ft
Critical Depth	0.57	ft
Critical Slope	0.00916	ft/ft
Velocity	3.16	ft/s
Velocity Head	0.15	ft
Specific Energy	0.83	ft
Froude Number	0.76	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED C

Project Description

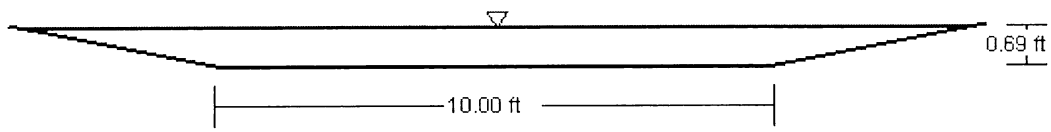
Friction Method	Manning Formula
Solve For	Normal Depth

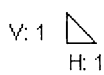
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	29.20	ft^3/s

Results

Normal Depth	0.69	ft
Flow Area	9.20	ft^2
Wetted Perimeter	16.99	ft
Top Width	16.85	ft
Critical Depth	0.58	ft
Critical Slope	0.00914	ft/ft
Velocity	3.17	ft/s
Velocity Head	0.16	ft
Specific Energy	0.84	ft
Froude Number	0.76	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED D

Project Description

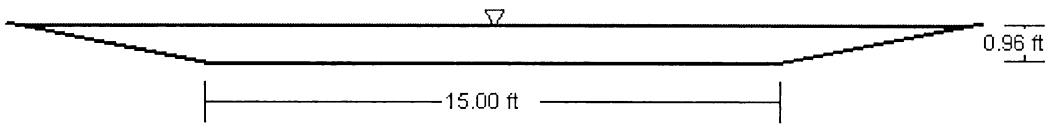
Friction Method	Manning Formula
Solve For	Normal Depth

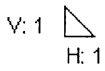
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	15.00	ft
Discharge	75.50	ft^3/s

Results

Normal Depth	0.96	ft
Flow Area	18.91	ft^2
Wetted Perimeter	24.75	ft
Top Width	24.56	ft
Critical Depth	0.84	ft
Critical Slope	0.00807	ft/ft
Velocity	3.99	ft/s
Velocity Head	0.25	ft
Specific Energy	1.20	ft
Froude Number	0.80	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED E

Project Description

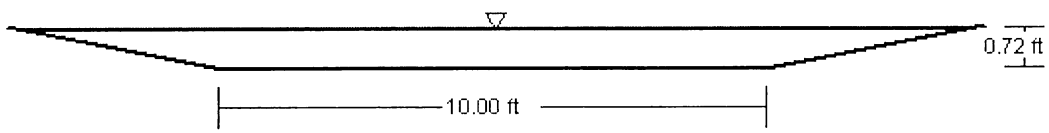
Friction Method	Manning Formula
Solve For	Normal Depth

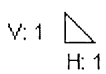
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	32.00	ft^3/s

Results

Normal Depth	0.72	ft
Flow Area	9.81	ft^2
Wetted Perimeter	17.35	ft
Top Width	17.21	ft
Critical Depth	0.61	ft
Critical Slope	0.00900	ft/ft
Velocity	3.26	ft/s
Velocity Head	0.17	ft
Specific Energy	0.89	ft
Froude Number	0.76	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED F

Project Description

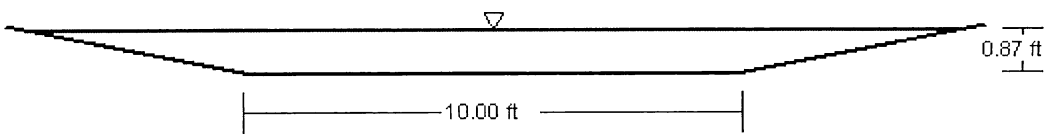
Friction Method	Manning Formula
Solve For	Normal Depth

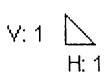
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	45.50	ft^3/s

Results

Normal Depth	0.87	ft
Flow Area	12.53	ft^2
Wetted Perimeter	18.90	ft
Top Width	18.73	ft
Critical Depth	0.76	ft
Critical Slope	0.00849	ft/ft
Velocity	3.63	ft/s
Velocity Head	0.20	ft
Specific Energy	1.08	ft
Froude Number	0.78	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED G

Project Description

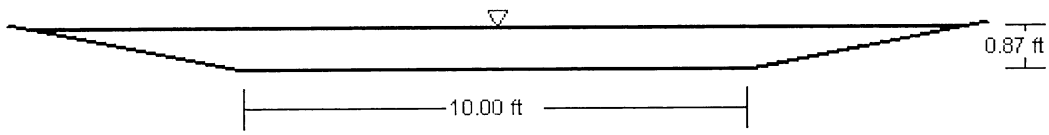
Friction Method	Manning Formula
Solve For	Normal Depth

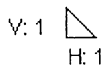
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	44.90	ft^3/s

Results

Normal Depth	0.87	ft
Flow Area	12.42	ft^2
Wetted Perimeter	18.84	ft
Top Width	18.66	ft
Critical Depth	0.75	ft
Critical Slope	0.00851	ft/ft
Velocity	3.62	ft/s
Velocity Head	0.20	ft
Specific Energy	1.07	ft
Froude Number	0.78	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED H

Project Description

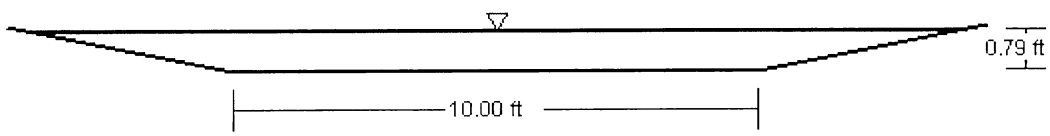
Friction Method	Manning Formula
Solve For	Normal Depth

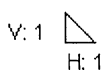
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	38.00	ft^3/s

Results

Normal Depth	0.79	ft
Flow Area	11.04	ft^2
Wetted Perimeter	18.07	ft
Top Width	17.91	ft
Critical Depth	0.68	ft
Critical Slope	0.00874	ft/ft
Velocity	3.44	ft/s
Velocity Head	0.18	ft
Specific Energy	0.98	ft
Froude Number	0.77	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED I

Project Description

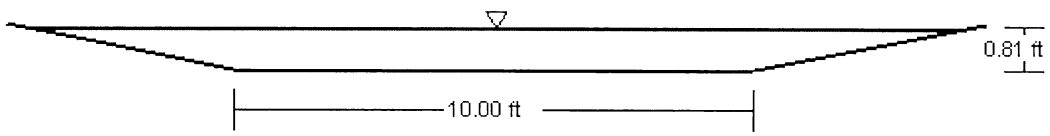
Friction Method	Manning Formula
Solve For	Normal Depth

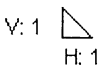
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	39.80	ft^3/s

Results

Normal Depth	0.81	ft
Flow Area	11.41	ft^2
Wetted Perimeter	18.28	ft
Top Width	18.12	ft
Critical Depth	0.70	ft
Critical Slope	0.00868	ft/ft
Velocity	3.49	ft/s
Velocity Head	0.19	ft
Specific Energy	1.00	ft
Froude Number	0.77	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED J

Project Description

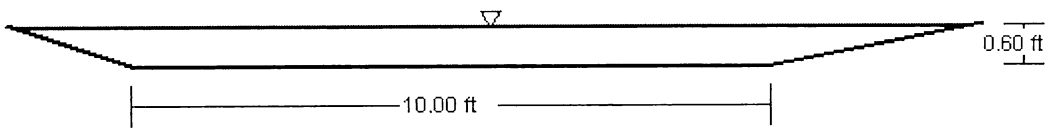
Friction Method	Manning Formula
Solve For	Normal Depth

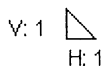
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	22.20	ft^3/s

Results

Normal Depth	0.60	ft
Flow Area	7.41	ft^2
Wetted Perimeter	14.94	ft
Top Width	14.79	ft
Critical Depth	0.50	ft
Critical Slope	0.00948	ft/ft
Velocity	2.99	ft/s
Velocity Head	0.14	ft
Specific Energy	0.74	ft
Froude Number	0.75	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED K

Project Description

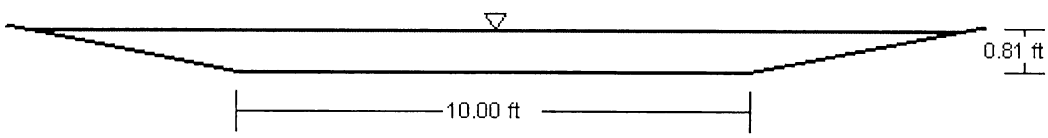
Friction Method	Manning Formula
Solve For	Normal Depth

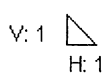
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	40.00	ft^3/s

Results

Normal Depth	0.81	ft
Flow Area	11.45	ft^2
Wetted Perimeter	18.30	ft
Top Width	18.14	ft
Critical Depth	0.70	ft
Critical Slope	0.00867	ft/ft
Velocity	3.49	ft/s
Velocity Head	0.19	ft
Specific Energy	1.00	ft
Froude Number	0.77	
Flow Type	Subcritical	





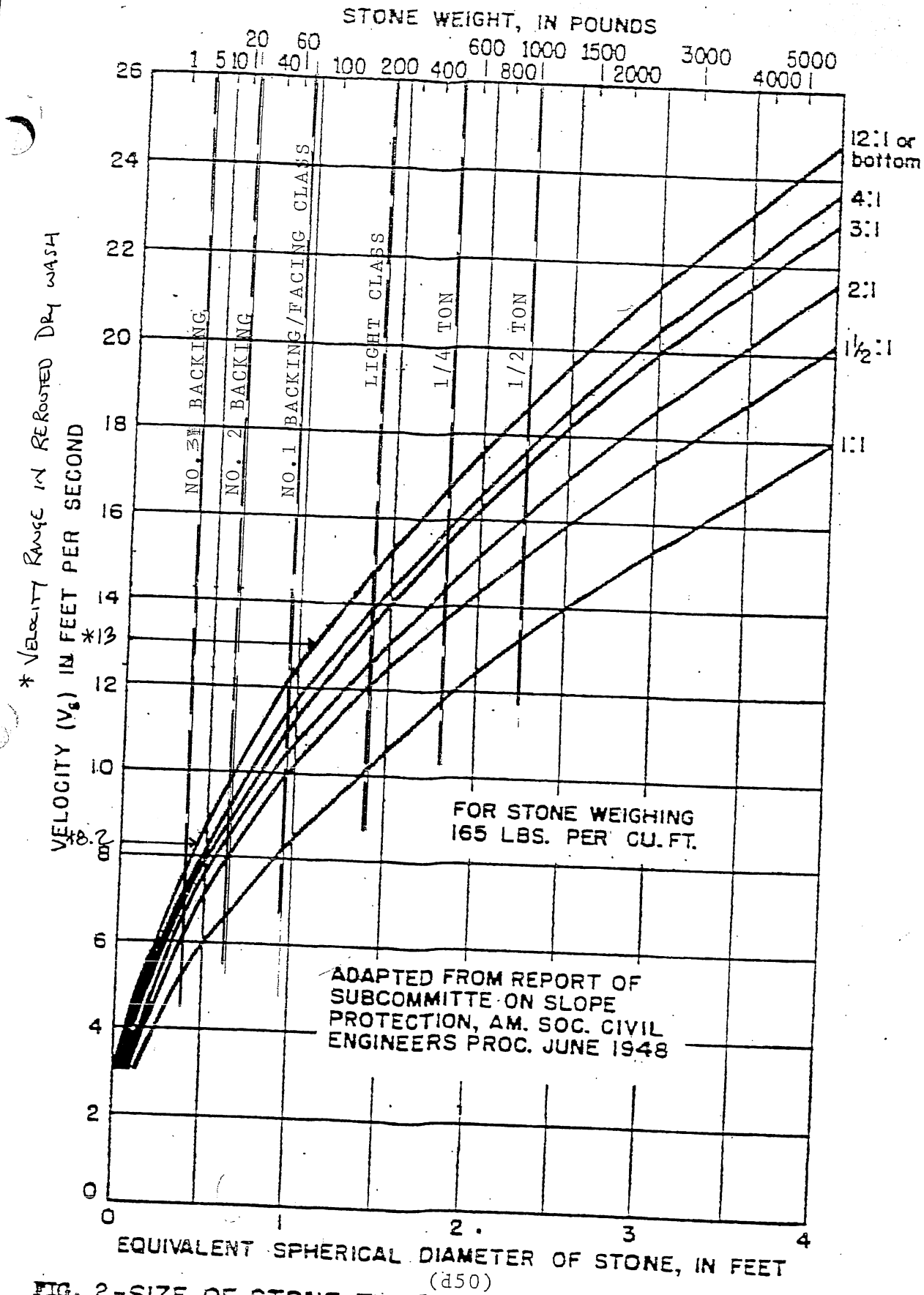
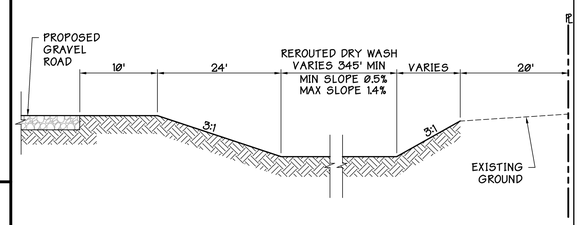


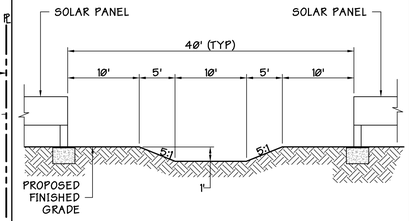
FIG. 2-SIZE OF STONE THAT WILL RESIST DISPLACEMENT FOR VARIOUS VELOCITIES AND SIDE SLOPES

1. Source: Bureau of Public Roads, USE OF RIPRAP FOR BANK PROTECTION
2. Caltrans recommends doubling the velocity before entering Figure 2.
3. Caltrans Standard Specifications relates type of rock to weight.
4. Hydraulic Engineering Circular No. 14 gives 2 d50 for inlets, and 3 d50 for outlets of culverts.



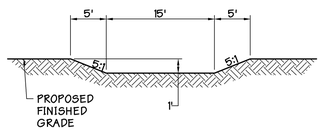
Rerouted Dry Wash

NTS **1**



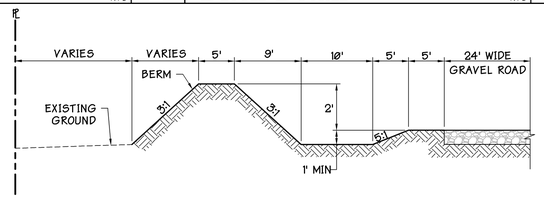
Ditch Detail

NTS **2**



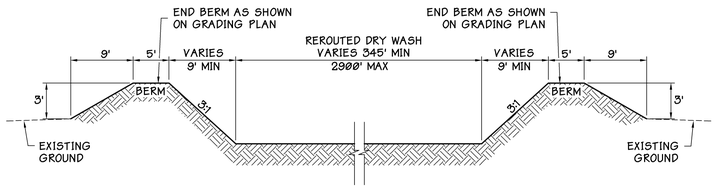
Ditch Detail

NTS **3**



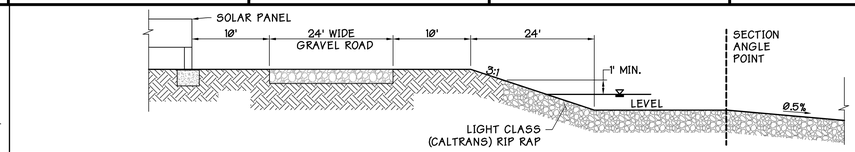
Berm

NTS **4**



Rerouted Dry Wash Channel Outlet

NTS **5**



Ditch Detail

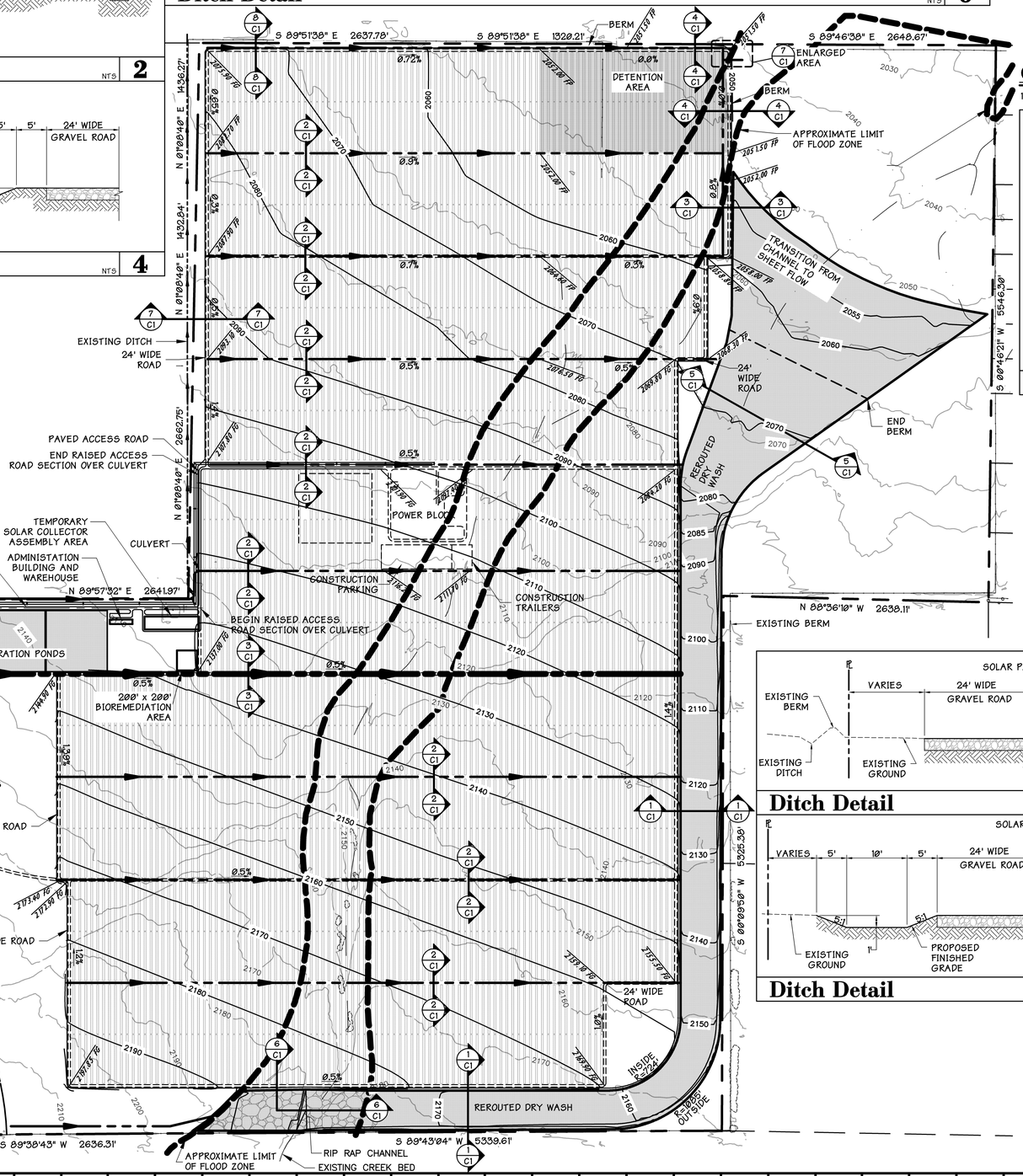
NTS **6**

DATE	CUT (YARDS)	FILL (YARDS)	TOTAL (YARDS)
01-16-2008	5,160,000	4,830,000	330,000 CUT *

* ASSUMES SHRINK OF APPOXIMATELY 7% BASED ON RELATIVE COMPACTION OF 90 PERCENT OF MAXIMUM DENSITY PER ASTM D1577

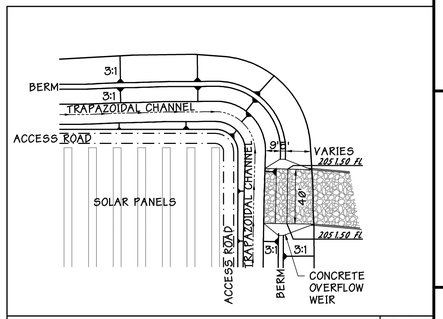
600 0 300 600 1200

1 inch = 600 ft.



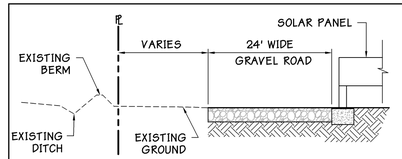
General Notes

1. ALL SLOPES ARE 3:1 UNLESS OTHERWISE SHOWN



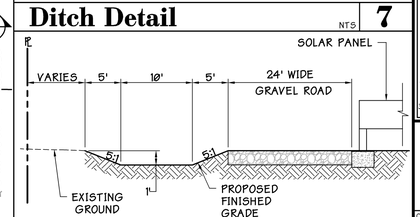
Enlarged Area

NTS **7**



Ditch Detail

NTS **7**



Ditch Detail

NTS **8**

WORKING DRAWING DATE 02/21/2008 REV

PRELIMINARY STATUS LDE	DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
APPROVED STATUS LDE	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL

DRAWN BY: PEM
CHECKED BY: JDT
LEAD DESIGNER: MDH
ENGINEER/TECH SPECIALIST: MDH
PROJECT ENGINEERING MANAGER: GEOFF BAXTER
PROJECT MANAGER:

PROFESSIONAL ENGINEER'S SEAL

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PE: STATE:
LIC. NO.: DATE:

Zero Harm — Leadership, No Incidents, Safe Behavior

TEAM DRIVEN SOLUTIONS FOR THE BUILT ENVIRONMENT
CARLTON Engineering Inc.
3883 Ponderosa Road, Shingle Springs, CA 95682
Voice 530.677.5515 Fax 530.677.6645

PRELIMINARY NOT FOR CONSTRUCTION

WorleyParsons resources & energy

CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR ENERGY PROJECT

DRAWING TITLE
CONCEPTUAL GRADING PLAN

SHEET NO: C1

SCALE 1" = 600'
DRAWING SIZE ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.
REV A

PROJECT MANAGER
PROJ ENGR MANAGER
LEAD DISC ENGINEER
ENGINEER/TECH. SPEC
LEAD DESIGNER
CHECKED
DRAWN
DATE
REV

FAC PIPING I & C ELECT MECH CIVIL STRUC

21Feb2008 11:59am pmckenna Z:\Worley Parsons\6199-01-07 FRE Project Beacon\Dwg\civil\619901_C1

Appeal of Inspection

State of California Business, Transportation and Housing Agency

M e m o r a n d u m

To:

Date: xx/xx/xx

(916) xxx-4176 - Ofc
(916) xxx-4198 - Mobil
(916) xxx-6366 - Fax

File No.: Contract No. 00-123456

From: Engineer:
Phone No.:

Subject: **Appeal of inspection performed on xx/xx/xx**

Rating:
Reason of Appeal:

INFORMATION SUMMARY SHEET and COMPLIANCE INSPECTION CHECKLIST COMMENTS	RESPONSE/COMMENT

ATTACHMENT 7

DRAINAGE, SEDIMENT, AND EROSION CONTROL PLAN

Administrative Draft

BEACON SOLAR ENERGY PROJECT
Construction Drainage, Erosion, and Sediment Control/ Stormwater Pollution Prevention Plan

Prepared for

BEACON ENERGY, LLC

March 2008

WorleyParsons

resources & energy

Stormwater Pollution Prevention Plan

For :

Beacon Solar Energy Project

Grading Permit No. XXXXXXXXX

Building Permit No. XXXXXXXXX

Tract No. XXXXXXXXXX

Prepared for :

Beacon Energy, LLC

Contractor:

Contractor's Company Name-TBD
Address
City, State, Zip
Telephone Number
Contractor's Representative's Name

Project Site Location/Address :

Beacon Solar Energy Project
Cheyenne Road
California City, CA 95955

Contractor's Storm Water Pollution Prevention Manager

SWPPM's Name
Telephone Number

SWPPP Prepared by :

Company Name
Address
City, State, ZIP
Telephone Number
Name and Title of Preparer

SWPPP Preparation Date :

Date

Estimated Project Dates :

Start of Construction : Date **Completion of Construction : Date**

WDID No. : XXXXXXXX

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SWPPP Attachments

Attachment A	Vicinity Map
Attachment B	Water Pollution Control Drawings
Attachment C	BMP Consideration Checklist
Attachment D	Computation Sheet for Determining Runoff Coefficients
Attachment E	Computation Sheet for Determining Run-on Coefficients
Attachment F	Notice of Intent (NOI)
Attachment G	Program for Maintenance, Inspection, and Repair of Construction Site BMPs
Attachment H	Storm Water Quality Construction Site Inspection Checklist
Attachment I	Trained Contractor Personnel Log
Attachment J	Subcontractor Notification Letter and Log
Attachment K	Notice of Non-Compliance
Attachment L	SWPPP and Monitoring Program Checklist
Attachment M	Annual Certification of Compliance Form
Attachment N	Other Plans/Permits
Attachment O	Water Pollution Control Cost Breakdown
Attachment P	Notice of Termination (NOT)
Attachment Q	Background and Sampling Activity Log
Attachment R	Construction Material and Pollutant Testing Guidance Table –Non-Visible Pollutants
Attachment S	Discharge Reporting Log

Tables

300.3-1	Project Schedule Major Milestones
300.4.2-1	Anticipated Project Schedule
300.3-1	Construction Site Estimates
300.5-1	Average Monthly Rainfall near the Proposed Project Site
600.5.4.1-1	Potential Non-Visible Pollutant and Water Quality Indicator Constituents
600.5.5.1-1	Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants

Figures

Attachment A	Vicinity Map
500-1	WEB Soils Survey

500.11-1 Beacon Conceptual Grading
500-5.1 Fault Zones 1
500-5.2 Fault Zones 2

Appendix

Appendix A BMP Fact Sheets
Appendix B Post-Construction Program

100 SWPPP Certifications and Approval

100.1 Initial SWPPP Certification by Contractor

Project Name: Beacon Solar Energy Project

Project Number:

Tract No. TBD

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Contractor's Signature	Date
Contractor's Name and Title	Telephone Number

100.2 Owner Approval and Certification of SWPPP

Owner
Approval and Certification of the
Storm Water Pollution Prevention Plan

Project Name: Beacon Solar Electric Project

Project Number:

Tract No. TBD

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Owner Representative Signature	Date
Owner Representative's Name and Title	Telephone Number

100.3 Annual Compliance Certification

By June 15 of each year, the Contractor will submit an Annual Certification of Compliance to the appropriate Regional Water Quality Control Board (RWQCB), stating compliance with the terms and conditions of the National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity and the Storm water Pollution Prevention Plan. The Annual Certification of Compliance Form is included in Attachment M.

200 Introduction

200.1 Introduction

This SWPPP draft is preliminary from the standpoint that the soils reporting on geotechnical issues have been launched but are not yet in the final version. The grading and drainage calculations and drawings are also in conceptual stages with additional work necessary to address detention/ retention areas and protection of adjacent properties as well as rerouting of the wash through the project properties. As these items become final, an erosion control document can be drafted addressing Best Management Practices (BMPs) and containment of discharge runoff for adjacent properties. As these documents are finalized, the Owner or Owner's Authorized Representative shall review and approve all SWPPP documents.

200.2 SWPPP Amendments

When changes to the approved SWPPP are required, the SWPPP Preparer shall prepare and certify an amendment. The Owner or Owner's Authorized Representative shall review and approve all amendments.

This SWPPP will be amended:

- Whenever there is a change in construction or operations that may affect the discharge of pollutants to surface waters or groundwater.
- If any condition of the General Permit is violated or the general objective of reducing or eliminating pollutants in stormwater discharges has not been achieved. If the RWQCB determines that a General Permit violation has occurred, the SWPPP will be amended and implemented within 14 calendar days after notification by the RWQCB.
- Reviewed and amended annually, as needed, prior to the defined rainy season.
- When deemed necessary by Beacon Energy, LLC's Construction Contractor(s).

  The following items will be included in each amendment:

  - The person(s) or agency who requested the amendment
  - The location of proposed change
  - The reason for change
  - The original BMP proposed, if any
  - The new BMP proposed
  - Describe any existing implemented BMP(s).

All SWPPP amendments shall include revised drawings as appropriate.

The amendments for this SWPPP, along with Beacon Energy, LLC's Contractor Certification follow. All Amendments shall be recorded in the SWPPP Amendment Log located in Section 200.2 of the SWPPP.

This SWPPP certification and approval form shall be used as a cover sheet for each amendment.

Cover sheet shall have Project name and number.

The Owner or Owner's Authorized Representative shall sign and date the certification form.

All necessary names shall be printed or legibly displayed along with their telephone numbers.

SWPPP Amendment No.

Project Name: Beacon Solar Electric Project

Project Number: _____

Contractor Certification of the
Stormwater Pollution Prevention Plan Amendment

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Contractor's Signature	Date
Contractor's Name and Title	Telephone Number

Owner/Developer Approval of the
Stormwater Pollution Prevention Plan Amendment

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Owner Representative Signature	Date
Owner Representative Name and Title	Telephone Number

200.3 Amendment Log

Project Name: Beacon Solar Energy Project

Project Number:

Amendment No.	Date	Brief Description of Amendment	Prepared By

200.3.1 Amendment Log Example

Amendment No.	Date	Brief Description of Amendment	Prepared By
001	Dec 21, 2006	Grading schedule changed to begin on Feb 10, 2009, and will include additional 2 acres. Amended plans attached to SWPPP	John Doe, Superintendent

200.3.2 Plan Availability

A copy of the SWPPP shall be maintained at the construction site during construction activity and be available to operating personnel. The SWPPP will be provided to the RWQCB upon request, is available to the public under Section 308(b) of the Clean Water Act, and will be made available to the public by the RWQCB upon request.

300 Introduction and Project Description

300.1 Introduction and Project Description

The proposed site is located approximately four miles north-northwest of California City's northern boundary, at an altitude of 2,220 - 2,025 feet (above mean-sea-level) decreasing from southwest to northeast. The Beacon Electric Solar Project is located in Kern County, in the Fremont Valley, on approximately 2,012 acres adjacent to Highway 14 (Midland Trail). The project included construction of a solar power plant which will generate approximately 250 Mega Watts of power using solar panels. In conjunction with the power plant, an administration building, warehouse and a paved access road from Highway 14 (Midland Trail) to the central power block will be constructed. An evaporation pond is planned in the western portion of the site.

Site Groundwater will be used for the power plant cooling system. The groundwater supply appears to be capable to support the project given that there are 13 wells reported on the site and that several of the wells can reportedly pump upwards of 1, 000 gallons per minute.

The project design includes construction of a small package sewage showers and toilet. Sewage sludge will be removed from site by a sanitary service. Recycled water will be used in local landscaping.

300.2 Unique Site Features

There is a mapped State-designated Alquist-Priolo Earthquake Fault Zone (AP zone) roughly coincident with the wash that runs down the approximate center of the CCSP site and the preliminary site plan shows the power block and evaporation pond within this fault zone. This fault is thought to be the active Cantil Valley fault (also known as Garlock West because it is part of the Garlock fault system); the Garlock East fault (also an AP zone) extends a short distance to the west of the CCSP site, with a finger of the zone extending into the northwestern portion of the site.

300.3 Construction Site Estimates

Table 300.3-1 lists estimates of the construction site:

TABLE 300.3-1
Construction Site Estimates

Construction site area	2,012 acres
Percentage impervious area before construction	0 *
Runoff coefficient before construction	0.01
Percentage impervious area after construction	0.15
Runoff coefficient after construction	0.15
Anticipated stormwater run-on for 10-year 6-hour storm	63.38 cfs

cfs = cubic feet per second, assuming I = 1/6 of total depth for a 10yr-6hr storm = 1.24in / 6hr = 0.21 in/hr. Rational Method,

Stormwater runoff at the site is predominantly sheet flow from the west out of the mountains to the northeast, eventually discharging into the dry lake bed (playa).

With exception of the power block areas, site development will maintain controlled collection of ditch flow exiting to the relocated channel and then offsite in an area very similar in location and manner as the undeveloped discharge.

To protect the power block from floods, a western diversion ditch flooding, the final grade will be slightly elevated. The diversions ditches and evaporation areas will be designed to pass flow from a 100 year storm event to prevent damage project facilities; the design will also include in its calculations stormwater run-on to the site.

Paved access roads will be protected from floods via ditches, culverts and local fords with reinforced concrete shoulders. Overall the project is being designed to maintain, to the extent possible, the existing sheet flow patterns on the site.

300.4 Project Schedule/Water Pollution Control Schedule

Beacon Energy, LLC's Contractor will mobilize and develop temporary construction facilities and lay down areas adjacent to the power block. Temporary facilities will include:

- 20 single-wide full-length trailer offices or equivalent
- Chemical toilets
- Parking for 400 vehicles
- 10 Tool sheds/containers
- Equipment parking for 40 pieces of construction equipment
- Construction material lay down area 400 feet by 800 feet
- Site equipment lay down area 400 feet by 1000 feet
- Batch plant (outside plant entrance gate).

The Contractor will perform clearing and grubbing of the construction areas via two scrapers or equivalent. Clearing and grubbing at the site area will last 4-5 months. Areas cleared and grubbed will be smoothed by earthwork equipment, possibly a grader or similar pieces of equipment, and select areas will be compacted with vibrating rollers.

300.4.1 Power Block, Administration Buildings, and Transmission Towers

Concrete, mechanical and electrical works will be performed over a period of 30 months, with the aid of graders, rollers, front loaders, dump trucks, trenching machines, concrete mixer and pump trucks, cranes, and pick-ups.

Some of the above areas may impinge on areas intended for the later stages of site erection. As site erection nears completion in the power block area, temporary construction mobilization areas will be reduced as required. Site equipment and materials lay down areas will be rotated through the site, on the quadrants currently being assembled.

Miscellaneous non-vehicle motorized equipment will also be used over the length of the job, such as vibrators, welding machines, etc.

300.4.2 Anticipated Project Schedule

Table 300.4.2-1 lists the anticipated project schedule and will be updated and supplemented by the Contractor. The rainy season in this region of California is defined as December 1 through March 1. 1.

TABLE 300.4.2-1
Anticipated Project Schedule-Pre-Construction

Activity	Approximate Date/Timeframe
Mobilization	March 3, 2009
Delineate and mark the boundaries of the construction zone.	March 25, 2009
Review BMP EC-1 and make adjustments if required. Install SE-1(silt fence) per manufacturer's instructions & align per Drawing SWPPP 1-2. Install SE-2 (check dams) per Drawing SWPPP 1-2.	April 3, 2009

TABLE 300.4.2-1
Anticipated Project Schedule-Start Grading Activities

Activity	Approximate Date/Timeframe
Site Construction	
Grading Mobilization	April 3, 2009
Review BMPs SE-1 & SE-2; Clear & Grub - Strip topsoil. Rough grade site, access roads, construction lay down areas, parking areas, etc. Stabilize construction entrance/exit and roadway (BMPs SE-3 thru SE-4, TC-1 &TC-2). Implement BMP EC-1.	April 2009– May 1, 2009
Establish parking and staging areas for vehicle and equipment storage, maintenance, and fueling in accordance with BMPs NS-8, NS-9, and NS-10. Implement BMPs EC-2, EC-3, EC-4 & EC-5. Build north Basin.	
Establish lay down area(s) for materials storage/staging in accordance with BMPs WM-1 through WM-6 and NS-12 & NS-14.	
Build Basin #2 and grade power block and switchyard areas.	
Review BMPs SE-1 & SE-2; Build basins #3 & #4. Review BMP EC-1. Implement BMP SE-5.	
Establish concrete washout area in accordance with BMPs WM-8, NS-12 and NS-14. Establish tire wash in accordance with BMP TC-3.	
Build out tire wash in accordance with BMP TC-3. Implement BMPs SE-5, TC-3, NS-6 & NS-7, working into recurring items list on BMP EC-1.	
Finish installation and implementation of BMP EC-6. Review EC-1 for errors and omissions.	
Verify that at least a minimum of 2 inches of erosion control	

Anticipated Project Schedule-Start Grading Activities

Activity	Approximate Date/Timeframe
stone was placed on disturbed areas.	
Establish tire wash in accordance with BMP TC-3 if needed.	
Establish Wind Erosion Control Bmps, WE-1and NS-1.	
Implement BMP SE-5, WM-8, WM-9, & WM10.	
Pave and or repave areas on site and off site. Implement BMPs NS-3 with recurring items list.	

TABLE 300. 4.2-1

Anticipated Project Schedule-Post -Construction

Activity	Approximate Date/Timeframe
Defined later	(Later)

300.5 Hydrology

The Beacon Electrical Solar Project will be located in the eastern Kern County, in the Central Valley South geographical region of the state. The project site is situated in Kern County approximately 0.3 miles to the east of Hwy-14 (Midland Trail), a primary north-south travel route connecting I-395 with Highway 58 outside of California City, CA. The site is approximately four miles north of the California City and 70 miles east of Bakersfield.

The approximate average monthly precipitation from 1971 to 2000 is shown in Table 300.5-1. Most of the precipitation in the project area falls during December through March. The rainfall for a 100-year 24-hour event is 3.25 inches and 2.08 inches for a 6-hour event; a 10-year 24-hour event is 1.97 inches and 1.24 inches for a 6-hour event (Source: NOAA Atlas 14). Average annual precipitation at the project site from 1971 to 2000 was 4.73 inches.

TABLE 300.5-1

Average Monthly Rainfall Inyokern, CA, near the Proposed Project Site (1971 to 2000)

Precipitation	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	4.73	0.89	1.11	0.81	0.19	0.10	0.02	0.12	0.34	0.25	0.07	0.28	0.55
Maximum	25.71	4.55	4.58	3.77	1.05	0.79	0.20	1.51	2.91	1.71	0.71	1.60	2.34
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

400 Construction Permitting, NOI letters, etc.

Not obtained at this time.

500 Body of SWPPP

500.1 Objectives

This Storm Water Pollution Plan (SWPPP) has six main objectives:

- Identify all pollutant sources, including sources of sediment that may affect the quality of storm water discharges associated with the construction activity (storm water discharges) from the construction site, and
- Identify non-storm water discharges, and
- Identify, construct, implement in accordance with a time schedule, and maintain Best Management Practices(BMPs) to reduce or eliminate pollutants in storm water discharges and authorized non-storm water discharges from the construction site during construction, and
- Develop a maintenance schedule for BMPs installed during construction designed to reduce or eliminate pollutants after construction is completed (post-construction BMPs).
- Identify a sampling and analysis strategy and sampling schedule for discharges from construction activity which discharge directly into water bodies listed on Attachment 3 of the Permit (Clean Water Act Section 303(d) [303(d)] Water Bodies listed for Sedimentation).
- For all construction activity, identifying a sampling and analysis strategy and sampling schedule for discharges that have been discovered through visual monitoring to be potentially contaminated by pollutants not visually detectable in runoff.

This SWPPP conforms to the required elements of the General Permit No. CAS 000002 issued by the State of California, State Water Resources Control Board (SWRCB). This SWPPP will be modified and amended to reflect any amendments to the Permit or any changes in construction or operations that may affect the discharge of pollutants from the construction site to surface waters, groundwater, or the municipal separate storm sewer system (MS4). The SWPPP will also be amended if it is in violation of any condition of the Permit or has not achieved the general objective of reducing pollutants in storm water discharges. The SWPPP shall be readily available on-site for the duration of the project.

This Stormwater Pollution Prevention Plan[1] (SWPPP) was developed to address the new construction activity associated with the Beacon Solar Energy Project (BSEP).

The construction activity does not discharge directly to a water body listed as impaired for sedimentation/siltation or turbidity under the Clean Water Act Section 303(d); therefore, a sampling and analysis strategy for turbidity or settable solids will not be established. Section 600 provides a sampling strategy for non-visible pollutants for background only, or as it becomes necessary.

Once a final design has been established, the selected Contractor will prepare site maps showing the construction project in detail. Site conditions, including paved areas, buildings, lots and roadways, general topography and drainage patterns for stormwater collection will be shown for the following phases of construction:

- **Existing Site Topography**—A plan showing existing site topography and drainage will be prepared.

- **Conceptual Rough Grading**—A plan with figures for interim grading and erosion control will be prepared. It will show the temporary onsite drainage patterns to be established by the grading of the project site, as well as any necessary erosion control features.
- **Stabilized Site**—A detailed finish grading and drainage plan with figures will be prepared showing the final conditions of the site as constructed.
- **Finished Project**—A conceptual image of the completed Beacon Solar Energy Project.

500.2 Implementation Schedule

Construction will take place over approximately 48 months, from the second quarter of 2009 to the second quarter 2011. Commercial operations are expected to commence in 2011. Major milestones are listed in Table 500.3-1. (Later)

TABLE 500.3-1
Project Schedule Major Milestones

Activity	Date
Begin Construction	Second Quarter 2009
Commercial Operation	Second Quarter 2011

Construction will generally be scheduled to occur between 5:00 a.m. and 7:00 p.m. on weekdays and Saturdays. Additional hours may be necessary to make up schedule deficiencies, or to complete critical construction activities (e.g., pouring concrete at night during hot weather, working around time-critical shutdowns and constraints). During some construction periods and during the startup phase of the project, some activities may continue 24 hours per day, 7 days per week.

500.3 Project Activities

The construction phases of the Beacon Solar Energy Project as they pertain to stormwater management are expected to be as follows:

- **Site Disturbance**—Within the power equipment areas, clearing and grubbing will be performed over the entire area. As much as possible, stripped topsoil will remain onsite and wasted as necessary in site designated/specific areas. Native vegetation may be harvested for possible reuse to obtain long term soil stabilization.
- **Preparation**—Parking areas for construction workers and lay down areas for construction materials will be prepared per appropriate drawings. Detailed information regarding the location within the site of the lay down and parking areas will be developed after a Contractor is hired, and incorporated into the SWPPP as appropriate and/or by amendment.
- **Access Road**—Primary access to the site is via a new paved road from state highway 14. The access roads to the plant will be paved from their point of connection to the power block area. Access road beds will typically be 20 feet wide with 6-foot-wide crushed stone shoulders all per CALTRANS specifications. A stabilized entrance/exit will be provided to clean vehicle wheels prior to exiting the construction area.
- **Site Grading**—The existing site has about a 2-3 percent relatively uniform natural slope down from west to east, located on a relatively small alluvial runoff drainage basin. Disturbance activities will include clearing and grubbing, topsoil stripping and the

development of compacted embankments. Extensive grading will be applied to the whole site including the power block areas, construction lay down areas, and the major access roads. Heavy equipment will be stored in designated areas to isolate drippage and for ease of cleanup of unwanted lubricating liquids.

- **Foundation**—All underground piping, conduits, and wiring will be installed, followed by installation of the foundations for the new power equipment, transmission pull-offs and towers to support, as necessary, overhead ground wire towers, and miscellaneous structures.
- **Station Construction**—Conceptual site design will be finalized and prior to any soil disturbance, the owner will be required to finalize the Drainage, Erosion and Sediment Control Plan / Construction SWPPP. During construction, the owner will be required to follow the Drainage, Erosion and Sediment Control Plan / Construction SWPPP to prevent the offsite migration of sediment and other pollutants and to reduce the effects of runoff from the construction site. BMPs to be used at the site will be fully addressed in the Drainage, Erosion and Sediment Control Plan / Construction SWPPP; this document will include the location of BMPs to be used, installation instructions, and maintenance schedules for each BMP.
- **Site Stabilization**— Finish subgrade areas in the power equipment areas will have temporary erosion protection in the form of well graded crushed stone spread in disturbed areas approximately 2 inches deep. During periods of heavy rain, collection basins may overflow into the respective armored ditches and catchments designed to return flow to sheet flow.
- **Demobilization**—All temporary construction facilities will be removed.

Surface water impacts, if any, are anticipated to be a by product of short-term construction activity and consist of increased turbidity due to erosion of newly excavated or placed soils. Activities such as grading can potentially increase rates of erosion during construction. In addition, construction materials could contaminate runoff or groundwater if not properly stored and used. Compliance with engineering and construction specifications, following approved grading and drainage plans, and adhering to proper material handling procedures will ensure effective mitigation of these short-term impacts. BMPs for erosion and sediment control, surface water pollution prevention measures, and other BMPs will be developed and implemented for both construction and operational phases. These plans will be prepared in accordance with the NPDES General Permit for Storm Water Discharges Associated with Construction Activity (General Permit) and local agency requirements.

A Notice of Intent to comply with the terms of the General Permit will be prepared and submitted to the SWRCB prior to commencement of construction. Once construction activities have been concluded and the site has been stabilized, a Notice of Termination will be submitted to the RWQCB.

Pipeline Construction:
The construction of the natural gas pipeline will consist of the following:

- **Trenching-**width depends on the type of soils encountered and requirements of the governing agencies. The optimal trench will be approximately 36 inches wide and 5 to 10 feet deep. With loose soil, a trench up to 8 feet wide at the top and 3 feet wide at the bottom may be required. The pipeline will be buried to provide a minimum cover of 36 inches. The excavated soil(s) will be piled on one side of the trench and used for backfilling after the pipe is installed.

- **Stringing** consists of trucking lengths of pipe and laying them on wooden skids beside the open trench.
- **Installation** consists of bending, welding, and coating the weld-joint areas of the pipe after it has been strung, padding the ditch with sand or fine spoil, and lowering the pipe string into the trench. Installation methods will vary and contractors are urged to use his acceptable method in combination with best management principles to accomplish installation. Bends will be made using a cold bending machine or shop-fabricated as required for various changes in bearing and elevation. All coating will be checked for defects and will be repaired before lowering the pipe into the trench.
- **Backfilling** consists of returning spoil back into the trench around and on top of the pipe, ensuring that the surface is returned to its original grade or level. The backfill will be compacted to protect the stability of the pipe and to minimize subsequent subsidence.
- **Plating** consists of covering any open trench in areas of foot or vehicle traffic at the end of a workday. Plywood plates will be used in areas of foot traffic and steel plates will be used in areas of vehicle traffic to ensure public safety. Plates will be removed at the start of each workday. Efforts will be made to minimize the length of trench open at any given time.
- **Hydrostatic testing** consists of filling the pipeline with fresh water, venting all air, increasing the pressure to the specified code requirements, and holding the pressure for a period of time. Stainless steel piping will tested with demineralized water, while carbon steel piping will be pressure tested using either demineralized water or potable water. Demineralized water would be trucked in. After hydrostatic testing, the test water will be chemically analyzed for contaminants and discharged to the evaporation basins, unless the analysis shows that the water is contaminated. In which case, the water would be trucked to an appropriate disposal facility. Temporary approvals for test water use and permits for discharge will be obtained by the construction Contractor, as required.
- **Cleanup** consists of restoring the surface of the roadway by removing any construction debris, grading to the original grade and contour, and repairing where required.
- **Commissioning** consists of cleaning and drying the inside of the pipeline, purging air from the pipeline, and filling the pipeline with natural gas.

500.4 Vicinity Map

The construction project vicinity map showing the project location, surface water boundaries, geographic features, construction site perimeter, and general topography, is located in Attachment A. The project's Title Sheet provides more detail regarding the project location and is also included in Attachment A.

500.5 Pollutant Source Identification and BMP Selection

500.5.1 Materials Lists

The following is a list of construction materials that will be used and activities that will be performed that will have the potential to contribute pollutants, other than sediment, to storm water runoff. Control practices for each activity are identified in the Water Pollution Control Drawings (WPCDs) Attachment B and /or in sections 500.5.3 through 500.5.9. Construction materials and activities include:

- Vehicle fluids, including oil, grease, petroleum, and coolants
- Asphaltic emulsions associated with asphalt-concrete paving operations
- Cement materials associated with portland cement concrete (PCC)
- Base and subbase material
- Joint and curing compounds
- Concrete curing compounds
- Paints
- Solvents, thinners, acids
- BMP materials
- Treated lumber (materials and waste)
- PCC rubble
- General litter

Construction activities that have the potential to contribute sediment to stormwater discharges include:

- Clear and grub operations
- Grading operations
- Paving operations
- Boring operations
- Delivery/transportation operations
- Utility excavation operations
- Foundation/structure construction operations
- Vehicle and equipment cleaning, fueling, and maintenance
- Painting

500.5.2 Related Construction Disturbance

The construction and operation of the Beacon Electrical Solar Project would not adversely affect the agricultural productivity of surrounding agricultural lands. BMPs will protect surrounding agricultural lands from flooding, erosion, sloughing, and sedimentation during both construction and operation. Because plant emissions during operation would not affect the re-vegetation potential of the soil, no effect on agricultural productivity would be expected from this source.

Temporary Erosion Control Measures

Temporary erosion control measures would be required during the construction period to help maintain water quality, protect property from erosion damage, and prevent accelerated soil erosion or dust generation. These measures will be installed before construction begins and will be removed after completion.

Typically, temporary erosion control measures include re-vegetation, slope stabilizers, dust suppression, construction of beams and ditches, and sediment barriers. Vegetation is the most efficient form of erosion control, because it stabilizes the soil and maintains the landscape. Vegetation reduces erosion by absorbing raindrop impact energy and holding soil in place with fibrous roots; it reduces runoff volume by increasing infiltration into the soil. Disturbed areas will be re-vegetated with rapidly growing groundcover as soon as possible after construction, and vehicle traffic will be restricted from re-vegetated areas.

During construction of the proposed project, dust erosion control measures will be employed to minimize the wind-blown erosion of soil from the site. Clean water will be sprayed on the soil in construction areas to suppress dust and/or re-vegetation.

Sediment barriers, such as straw bales or silt fences, slow runoff and trap sediment. They are generally placed below disturbed areas, at the base of exposed slopes, below the disturbed area. Sediment barriers are often placed around sensitive areas, such as wetlands or creeks, to prevent contamination by sediment-laden water. Barriers will be placed around the proposed project and the active construction area of the BESP to prevent sediment from leaving the site. Because the BESP site is relatively level to gently sloping, standard surface erosion control techniques should be effective. Runoff detention/retention basins, drainage diversions, and other large-scale sediment traps are not expected to be needed because of the topography. Soil stockpiles generated during construction will be covered and protected from rainfall if left on site for long periods of time.

Permanent Erosion Control Measures

Permanent erosion control measures include drainage systems and/or, as required, re-vegetation. Re-vegetation will follow planting for short-term erosion control. Seed mixes will contain annuals that establish ground cover quickly, perennials and reseeding annuals for long-term vegetation, and legumes to provide a source of nitrogen to the plant community. Due to the site's gently sloping nature, additional long-term measures should not be required.

500.5.3 Inventory of Materials and Activities that May Pollute Stormwater

Construction materials and activities that have the potential to contribute pollutants, other than sediment, to stormwater runoff are listed below. Control practices for each activity are identified in the Water Pollution Control Drawings (Attachment B – to be provided by Contractor) and Sections 500.5.4 through 500.2.10. Construction materials and activities include:

- Vehicle fluids, including oil, grease, petroleum, and coolants
- Asphaltic emulsions associated with asphalt-concrete paving operations
- Cement materials associated with portland cement concrete (PCC)
- Base and subbase material
- Joint and curing compounds
- Concrete curing compounds
- Paints
- Solvents, thinners, acids
- BMP materials
- Treated lumber (materials and waste)
- PCC rubble
- General litter

Construction activities that have the potential to contribute sediment to stormwater discharges include:

- Clear and grub operations
- Grading operations
- Paving operations
- Boring operations
- Delivery/transportation operations
- Utility excavation operations
- Foundation/structure construction operations

- Vehicle and equipment cleaning, fueling, and maintenance
- Painting

500.5.3.1 Site Earthwork

Earthwork activities with heavy equipment will be required to grade a level area, cut new channels and to manage the no compressible soils for the power generation facility and switchyard. The volume of cut and fill is estimated to be approximately 5,160,000 cubic yards.

Earthwork on the power plant site will consist of removal of poor soils, topsoil, vegetation, and debris; excavation and compaction of earth to create the plant grade; and excavation for foundations and underground systems. Materials suitable for compaction will be stored in stockpiles within designated locations on the site using proper erosion prevention methods and then reused on site (e.g., plant power block). Materials unsuitable for compacted fills will be stored in separate stockpiles and reused on the site, where appropriate. Any contaminated materials encountered during excavation will be disposed in accordance with applicable laws, ordinances, regulations, and standards.

Maximum soil densities will be achieved by rolling or roller vibrating soils having the optimum conditions and uniform layers of specified thickness. Materials in each layer will be properly moistened to facilitate compaction to the specified density. To verify compaction, representative density and moisture content tests will be performed in the field during compaction. Structural fill material supporting foundations, roads, parking areas, etc., will be compacted. Prior to placing fill materials, sub grades will be examined for loose or soft areas and further excavated as necessary.

In an attempt to reduce erosion of alluvial soils, project construction will minimize land disturbance by limiting construction activities only to areas that are designated as being essential to the installation and operation of the project. In addition, disturbed soils will be compacted to reduce the rainfall absorptive capacity and vegetative productivity of the soils that are permanently covered by project facilities.

It will be necessary to segregate and stockpile surface soils and organic matter during construction and excavation. In areas of substantial grading, native vegetation may be harvested for possible reuse to obtain long term soil stabilization. All excavated soils are to be reused during construction at the site to prevent subsequent erosion and sedimentation issues. Materials suitable for backfill will be stored in stockpiles at designated locations using proper erosion and sediment control methods.

Electrical conduits will be placed underground by means of open cut trenches and, as needed, installed in precast concrete trenches or continuous boxes for protection from heavy loads and/or flooding.

500.5.3.2 Linear Construction

Construction of the natural gas lines will be by open trench. Trench excavation will consist of making subgrade to the depth, width, and grade necessary for construction of the utilities. Excavated topsoil will be stockpiled separately from the underlying excavated soils using proper erosion and sediment control

methods. The stockpiled topsoil would then be placed and compacted over the backfilled trench. Excess materials (i.e., sand, gravel, loose rock) will be incorporated into the unused portion of the site.

500.5.4 Existing (Pre-Construction) Control Measures

Initial BMPs possibly could include silt fence and/ or check dams. (SE-1, SE-2)

In areas that have initial construction erosional action potential, a row of silt fence (SE-1) and rip rap check dams (SE-4) will be installed per BMP fact sheets and referenced BMPs as depicted in the attachment (later).

500.5.5 Nature of Fill material and Existing Data Describing Soil

500.5.5.1 Soil Types

Soil types in the vicinity of the proposed BESP site are shown on attached figures. Soils are described and mapped at the level of “mapping unit” which are defined to the approximate level of detail appropriate for making decisions about soil management. The location and properties of the soil mapping units were identified from draft maps of the area using an aerial photograph base and from preliminary drafts of soil property descriptions, both prepared by the Natural Resources Conservation Service. Of the various soil mapping units illustrated, only 5 will potentially be affected by the construction of the solar plant. Table (later) summarizes the physical and chemical characteristics of these 5 soil mapping units and provides interpretations for erosion (erosion hazard index and re-vegetation potential) and agricultural productivity (Storie index, land capability, and prime agricultural land status). The following paragraphs provide a brief description of the soil types potentially affected by BESP construction.

The soils descriptions from the Beacon Grading and Drainage Report are as follows:

104—Arizo gravelly loamy sand, 2 to 9 percent slopes. This soil is very deep, excessively drained, and gently to moderately sloping. It is on alluvial fans and plains. It formed in mixed alluvium derived from granitic rock. Areas are irregular in shape and range from 60 to 3,000 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 2,500 to 4,000 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 63 degrees F. The average frost-free season ranges from 200 to 225 days.

Typically, the surface layer is very pale brown gravelly loamy sand about 3 inches thick. The underlying material to a depth of 65 inches is very pale brown very gravelly loamy coarse sand.

Included with this soil in mapping are areas of Cajon soils that make up about 15 percent of the unit. Near Jawbone Canyon there are a few areas of included soils similar to Arizo but which are calcareous throughout or are very stratified. Also included are a few areas that are dissected by many shallow channels. The soil in these areas is coarser.

Permeability of this Arizo soil is very rapid, and available water capacity is very low or low. Surface runoff is very slow, and the hazard of erosion and soil blowing is high. The effective rooting depth is 60 inches or more. Flooding occurs whenever rainfall is intense. Floods are usually of short duration.

Areas of this soil are used for recreation, wildlife habitat, and occasional grazing.

This soil is poorly suited for rangeland. The major limitations are low available water capacity, low annual precipitation, and lack of livestock water. Forage production is generally low. Indian ricegrass and desert needlegrass are the main forage plants. During favorable precipitation years, filaree may produce abundant quantities of high quality forage. Excessive surface disturbance of this soil can result in excessive soil blowing.

The estimated total annual forage production is 375 pounds per acre during favorable years, 250 pounds during normal years, and 200 pounds during unfavorable years. The range site is Gravelly Sandy (30).

This soil is in capability subclass VIIe (30), nonirrigated.

114—Cajon loamy sand, 0 to 5 percent slopes. This soil is very deep, somewhat excessively drained, and nearly level to gently sloping. It is on alluvial fans and plains. It formed in alluvial material derived mainly from granitic rock. Areas are irregular in shape and range from 60 to 20,000 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs with a few Joshua trees (fig. 3). Elevation ranges from 2,500 to 3,500 feet. The mean annual precipitation is dominantly between 4 and 6 inches but is as much as 12 inches along the eastern base of the Tehachapi Mountains. The mean annual air temperature is about 65 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is pale brown loamy sand about 4 inches thick. The underlying material to a depth of 20 inches is light yellowish brown loamy sand. Below that, it is stratified light yellowish brown gravelly loamy sand and gravelly sandy loam. Gravel content is as much as 20 percent by volume. Reaction is mildly or moderately alkaline throughout.

Included with this soil in mapping are small areas of Arizo, Garlock, Neuralia, and DeStazo soils. These areas make up 20 percent of the unit. Also included are a few areas of Cajon gravelly loamy sand.

116—Cajon gravelly loamy sand, 0 to 9 percent slopes. This soil is very deep, excessively drained, nearly level to moderately sloping. It is on alluvial fans and plains. It formed in alluvial material derived from granitic rock. Areas are irregular in shape and range from 200 to 1,500 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs. Elevation ranges from 2,000 to 3,500 feet. The mean annual precipitation is dominantly between 4 and 6 inches but is as much as 12 inches along the eastern base of the Tehachapi Mountains. The mean annual air temperature is about 65 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is pale brown and yellowish brown gravelly loamy sand about 36 inches thick. Gravel content ranges from 15 to 30 percent. The underlying material is light yellowish brown gravelly sand and gravelly fine sand. Gravel content ranges from 15 to 35 percent by volume.

Included with this soil in mapping are areas of Arizo soils and areas of Garlock soils. The Arizo soils make up about 10 percent of the unit, and the Garlock soils 5 percent.

Permeability of this Cajon soil is rapid, and available water capacity is very low or low. Surface runoff is slow, and the hazard of erosion and soil blowing is high. The effective rooting depth is 60 inches or more.

Areas of this soil are used for rangeland, recreation, and homesites. A few small areas are used for irrigated crops and pasture.

This soil is poorly suited to rangeland. Limitations are low available water capacity and the coarse surface texture. Forage production is low. Desert needlegrass and filaree are the major forage plants. Forage production is quite variable. In areas of high precipitation yields may be greater and more reliable than in drier areas. In years when precipitation is exceptionally favorable, annual grasses and filaree may produce abundant forage. Major browse species are white bursage and winterfat. Excessive disturbance of this soil can result in severe wind erosion.

This soil is suited to homesite development. Rapid permeability and the hazard of soil blowing are the main limitations. During construction, no larger an area should be disturbed than necessary, and disturbed areas should be reseeded as soon as possible to prevent soil blowing. Effluent from septic tank filter fields can contaminate gound water. Water supplies should be located a sufficient distance from leach fields. Because of the limited amount of precipitation and low or very low available water capacity, landscape plants should be watered frequently.

The estimated total annual forage production is 200 pounds per acre during favorable years, 150 pounds during normal years, and 100 pounds during unfavorable years. The range site is Gravelly Sandy (30).

This soil is in capability subclass VIIe (30), nonirrigated.

172—Rosamond clay loam, saline-alkali. This very deep, well drained, nearly level soil is on alluvial plains. It formed in alluvial material derived from granitic rock. Slope ranges from 0 to 2 percent. Areas are irregular in shape and range from 2,000 to 3,500 acres in size. The vegetation is mainly shrubs and scattered annual grasses and forbs. Elevation ranges from 2,000 to 2,900 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is brown sandy loam about 2 inches thick. The underlying material to a depth of 12 inches is pale brown clay loam. Below that, to a depth of 60 inches, it is pale brown loam with thin layers of fine sandy loam and silt loam. This soil has an excessive amount of salts and sodium.

Included with this soil in mapping are small areas of Arizo, Cajon, and Rosamond soils that contain less salt and sodium. These included areas make up about 10 percent of the unit.

Permeability of this Rosamond soil is moderately slow, and the available water capacity is low to very low. Surface runoff is medium, and the hazard of erosion is moderate or high. The hazard of soil blowing is moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for rangeland, recreation, and wildlife habitat. A few places are used for homesites.

This soil is poorly suited for rangeland. It is limited for this use mainly by the saline-alkali conditions. Low annual precipitation and lack of available livestock water is also a problem. Forage production is low and limited to salt-tolerant species. The main plant community is allscale, alkali blite, and iodine bush. Excessive disturbance of this soil through overgrazing can result in severe wind erosion. Onsite evaluation is needed to determine feasibility for water development.

The nearness of Edwards Air Force Base has resulted in construction of houses on this soil. The hazard of erosion, saline-alkali conditions, moderately slow permeability, and moderate shrink-swell potentials are the main limitations for homesites. These limitations can cause failures or problems with foundations, septic tank absorption fields, sanitary landfields, and home gardening and landscaping. Soil limitations can be improved or corrected for homesites, however, by the use of proper design and installation procedures. Suitability of this soil for a particular urban use can be determined by onsite evaluation.

The estimated total annual forage production is 500 pounds per acre during favorable years, 300 pounds during normal years, and 200 pounds during unfavorable years. The range site is Alkali Flats (30).

This soil is in capability subclass VIIs (30), nonirrigated.

Permeability of this Cajon soil is rapid, and available ater capacity is low or moderate. Surface runoff is ow, and the hazard of erosion is slight. The hazard of oil blowing is high. The effective rooting depth is 60 ches or more.

Areas of this soil are mainly used for irrigated crops nd pasture. Alfalfa is the main crop. Areas not ultivated are used for desert range, recreation, and ildlife habitat. Some areas are used for homesites.

This soil is suited to most irrigated crops grown in the ea. The hazard of soil blowing and low available water apacity are the main limitations. Maintaining a plant over, utilizing all crop residues, and limiting tillage can elp to maintain or improve organic matter content and event soil blowing. Sprinkler type irrigation systems are est suited to this soil. Irrigation water should be applied a rate sufficient for maximum production but in nounts small enough to avoid excessive fertilizer loss, inoff, or deep percolation.

This soil is poorly suited for rangeland. Major nitations are the low or moderate available water apacity and coarse surface texture. Excessive disturbance of this soil can result in severe wind erosion. Native forage production is low in quantity but high in quality. Desert needlegrass, Indian ricegrass, winterfat, shadscale, and white bursage are the main forage and browse plants. In years when precipitation is favorable, filaree and annual grasses produce abundant forage.

The estimated total annual forage production is 375 pounds per acre during favorable years, 250 pounds during normal years, and 150 pounds during unfavorable years. The range site is Sandy (30). Forage production is quite variable. In areas of high precipitation yields are more reliable and may be double those in drier areas.

This soil is suited to urban development. Rapid permeability and the hazard of soil blowing are the main limitations. During construction, no larger an area should be disturbed than is necessary. Disturbed areas should be reseeded as soon as possible to prevent soil blowing. Effluent from septic tank filter fields can contaminate ground water. Water supplies should be located a sufficient distance from leach fields.

This soil is in capability subclass VIIe (30), nonirrigated, and capability unit IVe-4 (30), irrigated.

148—Jawbone gravelly loamy sand, 15 to 75 percent slopes. This shallow, excessively drained, hilly to very steep soil is on mountainous uplands. It formed in residual material weathered from granitic rock. Areas are irregular in shape and range from 1,700 to 6,500 acres in size. The vegetation is mainly annual grasses, forbs, shrubs, and scattered conifers. Elevation dominantly ranges from 3,000 to 4,000 feet. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 175 to 225 days.

Typically, the surface layer is a light yellowish brown gravelly loamy sand about 10 inches thick. Below this is highly weathered granite. In some places the surface layer is gravelly loamy coarse sand.

Included with this soil in mapping are small areas of Arizo, Cinco, and Hi Vista soils. These included areas make up about 20 percent of the unit. Also included are a few areas of rock outcrop and Jawbone soils on gently or moderately sloping ridgetops.

Permeability of this Jawbone soil is rapid, and available water capacity is very low. Surface runoff is rapid to very rapid, and the hazard of erosion is high or very high. The effective rooting depth is 4 to 12 inches.

Areas of this soil are used for rangeland and watershed.

This soil is poorly suited for rangeland. The shallow depth to bedrock, steep slopes, high or very high hazard of erosion, and very low available water capacity are the main soil limitations. Steep escarpments limit livestock distribution and excessive disturbance or overgrazing may result in a severe erosion problem. Forage production is low and livestock water is lacking. Fencing and the development of livestock water facilities will help to obtain proper livestock distribution. Winterfat, spiny hopsage, and junipers dominate the vegetation. Indian ricegrass, red brome, and filaree are the main forage plants. Rotation grazing may be beneficial to increase the amount of desert needlegrass and to control erosion.

The estimated total annual forage production is 1,000 pounds per acre during favorable years, 500 pounds during normal years, and 200 pounds during unfavorable years. The range site is Shallow Gravelly Loamy (29).

This soil is in capability subclass VIIe (29), nonirrigated.

500.5.5.2 Web Soil Survey

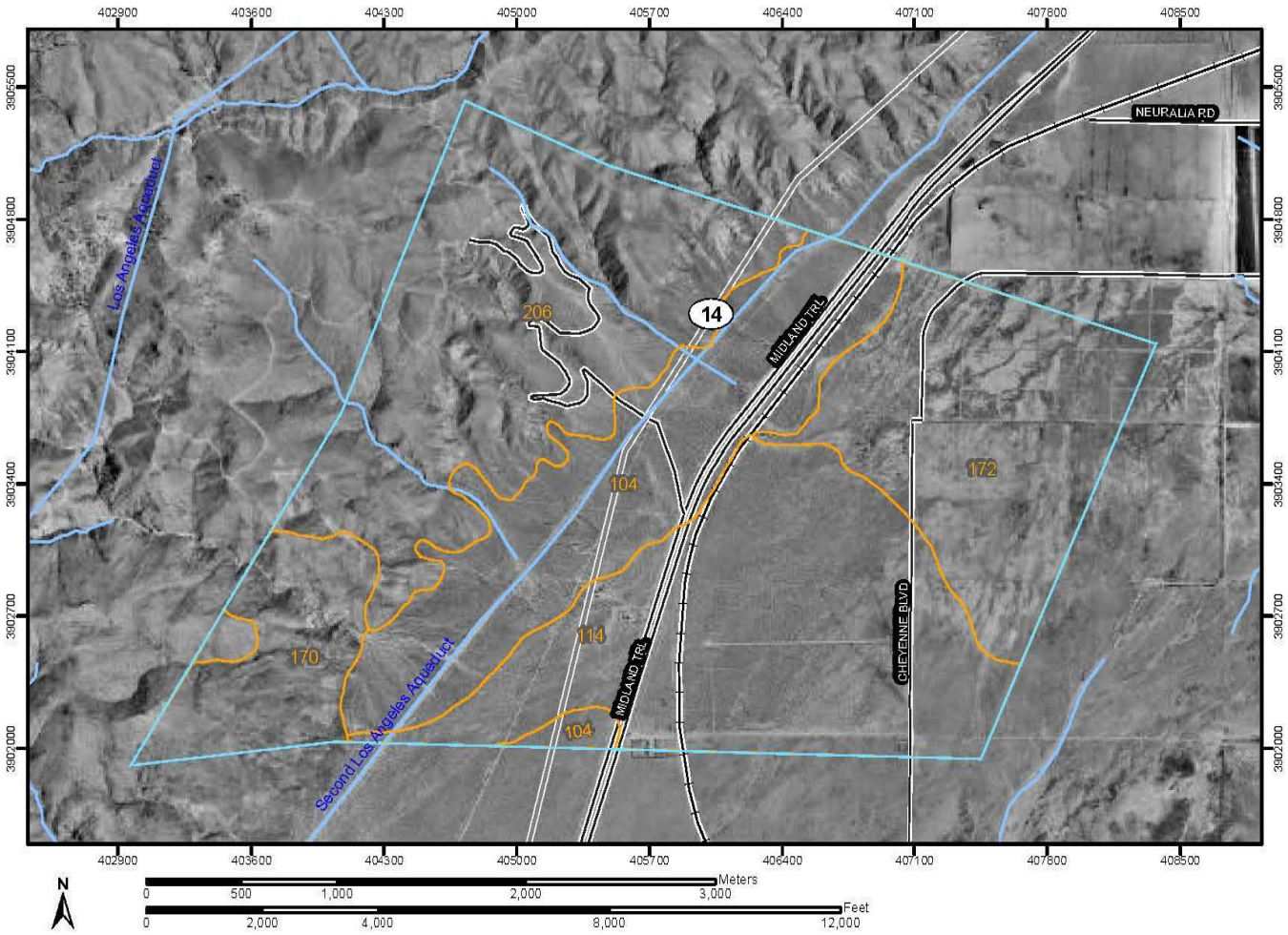
In addition to the above soils information, Figure 500-1.3 has been attached to show soils information as listed in the Web Soil Survey. Predominant soil is Altamont clays (ch),(172) a silty clay listed as covering approximately 60 % of the construction area.

500.5.5.3 Soil Loss and Erosion

The Universal Soil Loss Equation is typically used to quantify water-induced soil loss in agricultural areas. The Universal Soil Loss Equation was used to estimate the potential amount of soil erosion from the project area for pre-development, during construction and post-development conditions. The existing site is characterized as perimeter lake bed. Under the existing conditions the estimated soil erosion is one ton per acre per year. During construction, the plant site area, the construction lay down area, and the pipeline alignments will be disturbed. At that time, the surface will be void of vegetation and there will be the highest potential for erosion. Estimated soil erosion is approximately 150 tons per acre per year (too be verified with final geotech report from Kleinfelder). However, the use of Best Management Practices (BMPs) such as straw bales, silt fences, limiting exposed areas, etc., will minimize the potential for soil erosion so that the impact would not be significant. Once the project has been constructed, the construction lay down area and various utility alignments will be reseeded and returned to pre-construction conditions. The project site will either be covered with facilities or paved, and therefore, there would be no potential for soil erosion from the completed site. In summary, during construction, the potential for erosion would be greater than for the existing conditions but will be managed to minimize impacts; and after construction, the potential for erosion will be negligible compared with the existing conditions.

A review of the Kern County Online Mapping System (2007) and the Alquist-Priolo Earthquake Fault maps (Division of Mines and Geology, 2000) indicate that an AP fault zone crosses the BESP site diagonally, from the southwest corner to the uppermost northeast corner (**Figure 500.5-1**). The available maps show the fault as buried beneath recent alluvial soils with its projected surface trace trending in a northeasterly direction. As shown on **Figure 500.5-2**, the mapped AP zone crosses areas shown in the preliminary BESP site plan for the power block and evaporation pond, as well as the solar array field, although the administration building and warehouse as shown on the site plan are outside the AP zones.

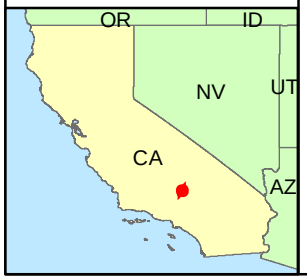
Soil Map–Kern County, California, Southeastern Part



Map Unit Legend

Kern County, California, Southeastern Part (CA670)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
104	ARIZO GRAVELLY LOAMY SAND, 2 TO 9 PERCENT SLOPES	584.3	20.1%
114	CAJON LOAMY SAND, 0 TO 5 PERCENT SLOPES	759.4	26.1%
170	ROCK OUTCROP	218.2	7.5%
172	ROSAMOND CLAY LOAM, SALINE-ALKALI	518.1	17.8%
206	XERIC TORRIORTHENTS, VERY STEEP	824.9	28.4%
Totals for Area of Interest (AOI)		2,904.8	100.0%

Map Location



Legend

- Fault
- Alquist-Priolo Fault Zone
- BSEP Plant Site Boundary
- Plant_Features

N
W E
S

Note: Fault locations are approximate

0 1,000 2,000 3,000 4,000 Feet

1:24,000

BSEP

Figure 5.5-3
Plant Site Layout vs.
Alquist-Priolo Fault Zones

Beacon Solar

ENSR | AECOM

Project: 10056-014
Date: March 2008

J:\2007 Projects\10056-FPL\014-CCSPVAFC Beacon Energy LLC GIS\March 08\Figure 5.5-3.mxd

TABLE 14.--SOIL AND WATER FEATURES

[See text for definitions of terms. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that the data were not estimated]

Soil name and map symbol	Hydrologic group	Bedrock		Cemented pan		Risk of corrosion	
		Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
		In		In			
100*:							
Alko	D	>60	---	5-14	Rippable	High	Low.
Neuralia	C	>60	---	---	---	High	Low.
101 Anaheim Variant	B	24-35	Rippable	---	---	High	Low.
102, 103 Anaverde	B	>60	---	---	---	Moderate	Low.
104 Arizo	A	>60	---	---	---	Moderate	Low.
105 Arujo	B	40-60	Rippable	---	---	Moderate	Low.
106*, 107*, 108*:							
Arujo	B	40-60	Rippable	---	---	Moderate	Low.
Friant	D	6-20	Rippable	---	---	Moderate	Moderate.
Tunis	D	10-20	Rippable	---	---	Moderate	Low.
109, 110, 111 Arvin	B	>60	---	---	---	Moderate	Low.
112*:							
Badland.							
Orthents.							
113, 114 Cajon	A	>60	---	---	---	Moderate	Low.
115 Cajon	B	>60	---	---	---	High	High.
116 Cajon	A	>60	---	---	---	Moderate	Low.
117*:							
Cajon	B	>60	---	---	---	Moderate	Low.
Garlock	B	>60	---	---	---	High	Low.
118*:							
Chanac	B	>60	---	---	---	High	Low.
Badland.							
119*, 120*:							
Chanac	B	>60	---	---	---	High	Low.
Pleito	C	>60	---	---	---	High	Low.
121 Chino Variant	D	>60	---	---	---	High	Low.
122, 123 Cibo	D	24-36	Hard	---	---	High	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Bedrock		Cemented pan		Risk of corrosion	
		Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
		In		In			
152*, 153*: Nacimiento	C	20-40	Rippable	---	---	High	Low.
154: Neuralia	C	>60	---	---	---	High	Low.
155*:							
Norob	C	>60	---	---	---	High	Moderate.
Neuralia	C	>60	---	---	---	High	Low.
156*:							
Pajuela	B	>60	---	---	---	Moderate	Low.
Whitewolf	A	>60	---	---	---	High	Low.
157*. Pits							
158*. Playas							
159, 160: Pleito	C	>60	---	---	---	High	Low.
161*, 162*:							
Pleito	C	>60	---	---	---	High	Low.
Chanac	B	>60	---	---	---	High	Low.
163, 164: Porterville	D	>60	---	---	---	High	Low.
165*:							
Psamments.							
Xerolls.							
166*. Quarries							
167: Randsburg	D	8-20	Rippable	---	---	High	Low.
168, 169: Rescue Variant	C	>40	---	---	---	Moderate	Low.
170*. Rock outcrop							
171, 172: Rosamond	C	>60	---	---	---	High	Low.
173: Rosamond Variant	B	>60	---	---	---	High	Low.
174: Steuber	B	>60	---	---	---	High	Low.
175, 176, 177: Steuber	B	>60	---	---	---	High	Low.
178*:							
Sween Variant	C	24-40	Hard	---	---	High	Low.
Rock outcrop.							

See footnote at end of table.

Report—Physical Soil Properties

Physical Soil Properties– Kern County, California, Southeastern Part														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
104—ARIZO GRAVELLY LOAMY SAND, 2 TO 9 PERCENT SLOPES														
Arizo	0-3	—	—	5-12	1.40-1.55	42.00-42.00	0.05-0.07	0.0-2.9	0.0-0.5	.10	.32	5	2	134
	3-65	—	—	0-5	1.45-1.65	141.00-141.00	0.04-0.06	0.0-2.9	0.0-0.5	.10	.32			
114—CAJON LOAMY SAND, 0 TO 5 PERCENT SLOPES														
Cajon	0-20	—	—	0-8	1.60-1.70	42.00-141.00	0.06-0.10	0.0-2.9	0.5-1.0	.15	.20	5	2	134
	20-60	—	—	0-5	1.60-1.70	42.00-141.00	0.04-0.08	0.0-2.9	0.0-0.5	.10	.17			
116—CAJON GRAVELLY LOAMY SAND, 0 TO 9 PERCENT SLOPES														
Cajon	0-36	—	—	0-8	1.60-1.70	42.00-141.00	0.04-0.07	0.0-2.9	0.5-1.0	.10	.20	5	2	134
	36-60	—	—	0-5	1.60-1.70	42.00-141.00	0.04-0.06	0.0-2.9	0.0-0.5	.15	.17			

FIGURE 500.5-4

Physical Soil Properties– Kern County, California, Southeastern Part														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
171—ROSAMOND CLAY LOAM														
Rosamond	0-2	—	—	10-20	1.40-1.50	14.00-42.00	0.10-0.15	0.0-2.9	0.5-1.0	.28	.28	5	3	0
	2-14	—	—	—	1.50-1.60	1.40-4.00	0.15-0.18	3.0-5.9	0.5-1.0	.37	.37			
	14-60	—	—	18-25	1.45-1.55	4.00-14.00	0.14-0.16	3.0-5.9	0.4-0.5	.37	.37			
172—ROSAMOND CLAY LOAM, SALINE-ALKALI														
Rosamond	0-2	—	—	10-20	1.50-1.60	1.40-4.00	0.02-0.06	3.0-5.9	0.5-1.0	.28	.28	5	3	0
	2-12	—	—	18-35	1.40-1.50	1.40-4.00	0.03-0.07	3.0-5.9	0.5-1.0	.37	.37			
	12-60	—	—	18-25	1.45-1.55	4.00-14.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
206—XERIC TORRIORTHENTS, VERY STEEP														
Xeric torriorthents	0-20	—	—	—	—	—	0.00-0.00	—	1.0-2.0			1		
	20-24	—	—	—	—	—	—	—	—					

Data Source Information

Soil Survey Area: Kern County, California, Southeastern Part
Survey Area Data: Version 3, Jan 9, 2007

FIGURE 500.5-5

500.5.6 Erosion Control

Erosion control, also referred to as soil stabilization, consists of source control measures designed to prevent soil particles from detaching and becoming transported in stormwater runoff. Erosion control BMPs protects the soil surface by covering or binding soil particles. The project will incorporate erosion control measures required by regulatory agency permits, contract documents, and other measures selected by the Contractor. Site-specific BMPs will be implemented by the construction contractor and associated figures are to be included in Attachment B. Attachment C is to be revised and will list the BMPs selected for this project. Appendix A contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for temporary and final erosion control based on BMPs from Appendix A:

Year-round:

- SWPPM to monitor the weather using National Weather Service reports to track conditions and alert crews to the onset of rainfall events.
- Preserve existing vegetation where required and when feasible. Conduct clearing and grading only in areas necessary for project activities and equipment traffic. Install temporary fencing prior to construction along the boundaries of the construction zone to clearly mark this zone, preventing vehicles or personnel from straying onto adjacent offsite habitat.
- Within designated site development areas, all vegetation will be removed. Areas to remain undisturbed shall be clearly marked and existing foliage will remain in place to anchor the soil reducing the potential for erosion. All cut vegetation is to mulched, buried, burned or composted onsite to limit waste disposal. In areas of substantial grading, native vegetation may be harvested for possible reuse to obtain long-term soil stabilization.
- Sequence construction activities with the installation of both erosion control and sediment control measures. Arrange the construction schedule as much as practicable to leave existing vegetation undisturbed until immediately prior to grading.
- Protect slopes susceptible to erosion by installing controls.
- Stabilize non-active areas as soon as feasible after construction is complete and no later than 14 days after construction in that portion of the site has temporarily or permanently ceased. Reapply as necessary to maintain effectiveness.
- Place covers over stockpiles prior to forecasted storm events and during windy conditions. Place sediment controls (fiber rolls or gravel bags) around the perimeter of stockpiled materials year-round.
- Maintain sufficient erosion control materials onsite to allow implementation in conformance with General Permit requirements and as described in this SWPPP. This includes implementation requirements for active areas and non-active areas that require deployment before the onset of rain.
- Repair and reapply BMPs in areas where erosion is evident as soon as possible.

During the rainy season:

- Implement temporary erosion control measures at regular intervals throughout the defined rainy season and as needed determined by site conditions.
- Inspect and stabilize disturbed areas with temporary or permanent erosion control measures before rain events.

During the non-rainy season:

- Conduct construction activities that will have an impact on waters of the United States during the dry season to the extent feasible to minimize erosion.

Appendix A provides fact-sheets on implementation of each BMP – these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. A combination of the following erosion controls may be used at the site:

- EC-1, Scheduling
- EC-2, Preservation of Existing Vegetation
- EC-3, Straw Mulch
- EC-4, Earth Dikes and Drainage Swales
- EC-5, Velocity Dissipation Devices
- EC-6, Hydro seeding

BMPs will be deployed in a sequence to follow the progress of grading and construction. As the locations of soil disturbance change, erosion controls will be adjusted accordingly to control stormwater runoff at the downgrade perimeter.

500.5.7 Sediment Control

Sediment controls are intended to complement and enhance the selected erosion control measures and reduce sediment discharges from active construction areas. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water. The project will incorporate sediment control measures required by regulatory agency permits, contract documents, and other measures selected by the Contractor. Site-specific BMPs will be designed and are shown in Attachment B. Attachment C is to be updated as required and lists the BMPs selected for this project. Appendix A contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for temporary sediment control:

Year-round:

- The power block area for each phase will be graded with moderate slopes to direct runoff and diverted stormwater to an infiltration/evaporation area before overflowing through native stone rip-rap to reinstate natural sheet flow conditions. Relatively small rock filters and local diversion berms through the sites will discourage water from concentrating to maintain sheet flow. The diversions ditches and infiltration/evaporation areas will be designed to pass flow from a 100 year storm event to prevent damage to the power block and tower areas; the design will also include in its calculations stormwater run-on to the site.
- Maintain the following temporary sediment control materials onsite: silt fence materials, gravel bags for linear barriers, and fiber rolls in sufficient quantities throughout the project

to implement temporary sediment controls in the event of predicted rain and to respond to failures or emergencies, in conformance with General Permit requirements and as described in this SWPPP.

- Install gravel filter berms at the base of slopes adjacent to delineated sensitive areas (i.e., wetlands, dry washes) – if any.
- Native onsite stones/rocks will be used in construction of gravel filter berms or check dams.
- Install gravel filter berms along the boundaries of delineated sensitive areas – if any – within the boundaries of the project site or receiving runoff from the project site.
- Native onsite stones/rocks will be used in construction of gravel filter berms or check dams.

During the rainy season:

- During the rainy season, implement temporary sediment controls at the draining perimeter of disturbed soil areas, at the toe of slopes, and at outfall areas.

During the non-rainy season:

- During the non-rainy season, implement temporary sediment controls at the draining perimeter of disturbed soil areas.

Appendix A provides fact-sheets on implementation of each BMP – these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. A combination of the following sediment controls may be used at the site:

- SE-1, Silt Fence
- SE-2, Check Dam
- SE-3, Fiber Rolls
- SE-4, Gravel Bag Berm
- SE-5, Street Sweeping and Vacuuming

BMPs will be deployed in a sequence to follow the progress of grading and construction. As the locations of soil disturbance change, sedimentation controls will be adjusted accordingly to control stormwater runoff at the downgrade perimeter.

500.5.8 Tracking Control

Site-specific BMPs will be designed and are shown in Attachment B. Attachment C is to be updated as required and lists the BMPs selected for this project. Appendix A contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for tracking control:

Year-round:

- The access roads to the plants will be paved from their point of connection to Dirks Road. Maintain all public roadways free from dust, dirt and debris caused by construction

activities. Sweep streets at the end of the day if visible soil materials are carried onto adjacent public paved roads.

- Clearly mark the driving areas within the site for limited speed to control dust.
- The Entrance /Outlet Tire Wash shall be a flooded basin type with gray water and supply water pushed and pulled from Sediment Basin #4 using portable pumps. Makeup water will be furnished by tanker truck. Details of basin design may be found in Appendix A.

Appendix A provides fact-sheets on implementation of each BMP – these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. A combination of the following tracking controls may be used at the site:

- TC-1, Stabilized Construction Entrance/Exit
- TC-2, Stabilized Construction Roadway
- TC-3, Entrance/Outlet Tire Wash
- SE-5, Street Sweeping and Vacuuming

500.5.9 Wind Erosion Control

Site-specific BMPs will be designed and are shown in Attachment B. Attachment C is to be updated as required and lists the BMPs selected for this project. Appendix A contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for wind erosion control:

Year-round:

- Apply potable water (groundwater) to disturbed soil areas of the project site to control dust and maintain optimum moisture levels for compaction as needed. Apply the water using water trucks. NS-1 - Minimize water application rates as necessary to prevent runoff and ponding.
- During windy conditions (forecast or actual wind conditions of approximately 25 mph or greater), apply dust control to disturbed areas, including haul roads, to adequately control wind erosion. Cover exposed stockpiled material areas.
- Suspend excavation and grading during periods of high winds.
- Cover all trucks hauling soil and other loose material or maintain at least 2 feet of freeboard.

Appendix A provides fact-sheets on implementation of each BMP – these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. The following BMPs have been selected to control dust at the construction site:

- WE-1, Wind Erosion Control
- NS-1, Water Conservation Practices

500.5.10 Non-Stormwater Control

Site-specific BMPs will be designed and are shown in Attachment B. Attachment C is to be updated as required and lists the BMPs selected for this project. Appendix A contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for non-stormwater control:

Year-round:

- Dispose of Portland cement concrete and asphalt concrete waste in accordance with NS-3.
- Regularly inspect vehicles and equipment for signs of leaks. Have vehicles and equipment on a regular maintenance schedule.
- Place drip pans or absorbent materials under paving equipment when not in use. Park paving equipment over plastic to prevent soil contamination.
- Locate staging areas for construction equipment so that spills of oil grease or other petroleum by-products will not be discarded into watercourses or sensitive habitat. Protect the staging area with berms and/or dikes to prevent run-on, runoff, and to contain spills.
- Fuel, clean, and maintain vehicles and other equipment only within designated areas.
- A dedicated fueling area will be protected with berms and/or dikes to prevent run-on, runoff, and to contain spills. Self-propelled vehicles will be fueled offsite or at the temporary fueling area. Fuel trucks will be used for onsite fueling, whether at the temporary fueling area or for mobile fueling elsewhere on the site. Drip pans will be used for mobile fueling. Each fuel truck will be equipped with absorbent spill cleanup materials and a spill containment boom at all times.
- Drip pans or absorbent pads will be used for vehicle and equipment maintenance activities that involve grease, oil, solvents, or other vehicle fluids.
- Machinery will be properly maintained and cleaned to prevent spills and leaks.
- Inform workers of the importance of preventing spills and measures to take should a spill occur. Clean up spills immediately in accordance with applicable local, state, or federal regulations. Such spills will be reported in the post-construction compliance reports.
- Use proper storage and handling techniques for concrete curing compounds.
- Clean offsite vehicles that regularly enter and leave the site.
- Inspect all vehicles and equipment for leaks before coming onsite.

Appendix A provides fact-sheets on implementation of each BMP – these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. An inventory of construction activities and potential non-stormwater discharges is provided in Section 500.5.10. The BMP consideration checklist in Attachment C and the following list indicates the BMPs that have been selected to control non-stormwater pollution on the construction site. Implementation and locations of some non-stormwater control BMPs are shown on the Water Pollution Control Drawings (WPCDs) in Attachment B. An additional narrative and pictorial description of each BMP is presented in Appendix A.

A combination of the following non-stormwater controls may be used at the site:

- NS-1, Water Conservation Practices
- NS-3, Paving and Grinding Operations
- NS-6, Illicit Connection/Illegal Discharge Detection and Reporting
- NS-7, Potable Water/Irrigation
- NS-8, Vehicle and Equipment Cleaning
- NS-9, Vehicle and Equipment Fueling
- NS-10, Vehicle and Equipment Maintenance
- NS-12, Concrete Curing
- NS-14, Concrete Finishing

500.5.11 Waste Management and Materials Pollution Control

The project will incorporate waste management and materials pollution control measures required by contract documents, supplemented with other measures selected by the Contractor as needed to meet General Permit objectives. Site-specific BMPs will be designed and are shown in Attachment B. Attachment C is to be updated as required and lists the BMPs selected for this project. Appendix A contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for waste management and materials pollution control:

Year-round:

In general, implement BMPs WM-1 and WM-2 to help prevent discharges of construction materials during delivery, storage, and use. Provide the following types of storage/containment facilities to minimize stormwater contact with construction materials:

1. Use a watertight container to store hand tools and other items such as small parts.
2. Provide cover and secondary containment for any stored hazardous materials. Store hazardous materials in appropriate containers.
    2.1. Temporary containment facilities for hazardous materials should provide for a spill containment volume able to contain precipitation from a 25-year storm event, plus 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater. It should be impervious to the materials stored therein for a minimum contact time of 72 hours.
3. Store large non-hazardous items, such as framing materials, in the general storage area. Elevate such materials with wood blocks to minimize contact with stormwater. Prevent run-on (i.e., with earthen dike, trench) into the general storage area.

Inspect storage areas for signs of spills and/or leakage.

Handle and dispose of hazardous wastes in accordance with applicable laws, ordinances, regulations, and standards, including licensing, personnel training, accumulation limits and times, and reporting and recordkeeping.

Collect hazardous wastes in satellite accumulation containers near the points of generation. Store hazardous wastes in appropriate and clearly marked containers and segregate from other non-waste materials. Move used waste containers daily to the Contractor's 90-day hazardous waste storage area, located at the site construction lay down area. Provide cover and secondary containment for the hazardous waste storage area. Remove the waste from the site by a certified hazardous waste collection company and deliver to an authorized hazardous waste management facility, prior to expiration of the 90-day storage limit.

In the unlikely event that even larger volumes of potentially hazardous material must be temporarily held awaiting disposition, a containment area will be constructed. Plastic sheeting will be laid on the ground prior to placement of the contaminated material and the material itself will be covered.

Store only enough products required to do the job.

Keep products in their original containers with the original manufacturer's label.

Follow manufacturers' recommendations for the storage, use and disposal of all materials.

At a minimum, follow the following practices for spill prevention and cleanup:

- Manufacturers' recommended methods for spill cleanup will be clearly posted and personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- Maintain spill cleanup materials, material safety data sheets, a material inventory, and emergency contact numbers in all storage areas.
- Spill cleanup materials should include at a minimum: 1) absorbent materials (granular, socks, pillows), 2) tools to manage/contain smaller spills such as brooms/shovels/rakes/squeegees, 3) a spill-berm that would hold the amount of the largest container, 4) appropriate, water-tight disposal containers for used spill cleanup materials, and 5) personal protective gear.
- Clean up spills immediately after discovery.
- Keep spill area well ventilated.
- The Project Manager (or designee) will be the Spill Prevention and Cleanup Coordinator. The names of additional responsible spill personnel and authorized Contractors will be posted in various areas.
- Report spills of toxic or hazardous materials to the Project Manager (or designee), regardless of the size.
- Report spills of hazardous materials that exceed their reportable quantities to all appropriate local, state and federal government agencies. The Project Manager (or designee) will be responsible for investigating spills and determining whether the reportable quantity has been exceeded. Regulations defining the reportable quantity levels for oil and hazardous substances are found in 40 CFR Part 110, Part 117 or Part 302.
- Place covers over stockpiles prior to forecasted storm events and during windy conditions. Place sediment controls at the foot of stockpiled materials.

- Load solid wastes directly into trucks for offsite disposal. When onsite storage is necessary, store solid wastes in watertight covered dumpsters in the general storage area. Have licensed waste hauler remove solid waste at least weekly and dispose of offsite.
- Provide weekly maintenance for portable toilets by a licensed sanitary service and dispose of wastes offsite.
- Locate portable toilets away from concentrated flow paths and traffic flow.
- Anchor portable toilets during periods of heavy winds.
- Establish concrete washout area in accordance with WM-8.

Appendix A provides fact-sheets on implementation of each BMP – these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. A combination of the following waste management and materials pollution controls may be used at the site:

- WM-1, Material Delivery and Storage
- WM-2, Material Use
- WM-3, Stockpile Management
- WM-4, Spill Prevention and Control
- WM-5, Solid Waste Management
- WM-6, Hazardous Waste Management
- WM-8, Concrete Waste Management
- WM-9, Sanitary/Septic Waste Management
- WM-10, Liquid Waste Management

500.5.12 Cost Breakdown for Water Pollution Control

A cost breakdown itemizing the contract lump sum for water pollution control has been developed for this project and included in Attachment O. The cost breakdown reflects the items of work, quantities and costs for BMPs shown in the SWPPP, except for those construction site BMPs and permanent BMPs that are shown on the project plans and for which there is a contract item of work.

500.5.13 Contaminated Soil

Although there is no known contaminated soil at the project site, it may be possible that contaminated soil is encountered during construction. Operators and construction personnel will be trained on the identification of contaminated soils and will be asked to report unusual conditions to an approved registered geologist. If soils require temporary stockpiling, piles will be placed on plastic sheeting, covered with plastic sheeting or tarp, secured safely with gravel bags and bermed with fiber rolls or silt fencing to prevent runoff from leaving the area. If required, samples will be collected and sent to a certified analytical laboratory for characterization. If contamination is detected, the waste will be handled accordingly and properly disposed of at an authorized waste management facility.

500.6 Water Pollution Control Drawings (WPCDs)

The WPCDs can be found in Attachment B of the SWPPP.

500.7 Construction BMP Maintenance, Inspection, and Repair

500.7.1 Inspection

Inspections will be conducted as follows:

- Prior to forecast storms
- After rain events that cause runoff from the construction site
- At 24-hour intervals during extended rain events
- At other time(s) or intervals of time specified in the contract documents

Completed inspection checklists will be submitted to the Project Manager within 24 hours of inspection. Copies of the completed checklists will be kept with the SWPPP.

500.7.2 Maintenance and Repair

A tracking or follow-up process will follow an inspection that identifies deficiencies in BMPs. A Maintenance, Inspection, and Repair Program of BMPs is to be implemented by the construction contractor; a template is shown in Attachment G. BMP fact-sheets in Appendix A will be referenced for inspection and maintenance measures for each selected BMP.

Erosion and sediment controls must be maintained to remain effective. Features that are washed out or damaged will be repaired as soon as possible, contingent at all times on worker safety. At a minimum, erosion and sediment controls should be cleaned, repaired, or replaced:

- In advance of the rainy season and prior to a storm event.
- When sediment or other debris has accumulated to greater than 1/3 the height of the barrier.
- When sediment accumulation reaches 1/3 of the trap capacity.
- When more than 1/3 of the cross-section of a conveyance structure, such as a drainage swale or ditch, is plugged or blocked.

500.8 Post-Construction Stormwater Management

500.8.1 Post-Construction Control Practices

Initial design will dictate requirements and special needs for post-construction BMPs. Once a final project design has been established, post-construction BMPs will be revised accordingly. A review of existing controls will be required with amendments to the SWPPP as required. The post–construction controls associated final site layout will be available from Appendix B.

Some re-grading for maintenance will most likely be required within the access road due to soil erosion and regular use. The occasional cutting of vegetation will be required to control plant re-growth.

Lists (later)

- EC-2, Preservation of Existing Vegetation

- EC-2, Preservation of Existing Vegetation
- NS-1, Water Conservation Practices

500.8.2 Operation/Maintenance of Post-Construction Control Practices

The post-construction BMPs described above will be funded and maintained by Beacon Energy, LLC.

500.9 Training

Prior to project startup, all designated onsite representatives will participate in a pre-project stormwater training workshop. The workshop will cover basic stormwater information, the requirements of the General Permit, and the SWPPP. Specifically, the workshop will focus on implementation, inspection, and maintenance of stormwater controls.

- Contractors are responsible for familiarizing their personnel with the information contained in the SWPPP. Contractors will be informed of this obligation.
- All new employees will be trained by staff familiar with these topics.
- Contractors are responsible for familiarizing subcontractors with information contained in the SWPPP.

As required by the SWRCB, individuals responsible for SWPPP preparation, implementation, and permit compliance will be appropriately trained, and the training will be documented. This includes those personnel responsible for installation, inspection, maintenance, and repair of BMPs. Those responsible for overseeing, revising, and amending the SWPPP shall also receive and document their training. Monitoring and inspection activities will only be conducted by individuals who have had additional training specific for this purpose.

Ongoing, formal training sessions will be selected from one of the following organizations:

- California Regional Water Quality Control Board
- International Erosion Control Association
- U.S. Environmental Protection Agency (EPA)
- Recognized municipal stakeholder organizations throughout California
- Professional organizations and societies in building and construction

Contractor personnel attending tailgate training will document attendance using the form in Attachment I. Informal training will include tailgate site briefings to be conducted bi-weekly and will address proper installation methods and maintenance for the following topics:

- Erosion control BMPs
- Sediment control BMPs
- Tracking control BMPs
- Wind erosion control BMPs

- Non-stormwater BMPs
- Waste management and materials pollution control BMPs
- Emergency procedures specific to the construction site stormwater management

The SWPPM has received the following training:

- To Be Determined

500.10 List of Subcontractors

Contractors and subcontractors will be notified of the requirements for stormwater management measures during the project. A list of subcontractors will be maintained and included in the SWPPP. If subcontractors change during the project, the list will be updated accordingly. The subcontractor notification letter and log is included in Attachment J.

500.11 Other Plans/Permits

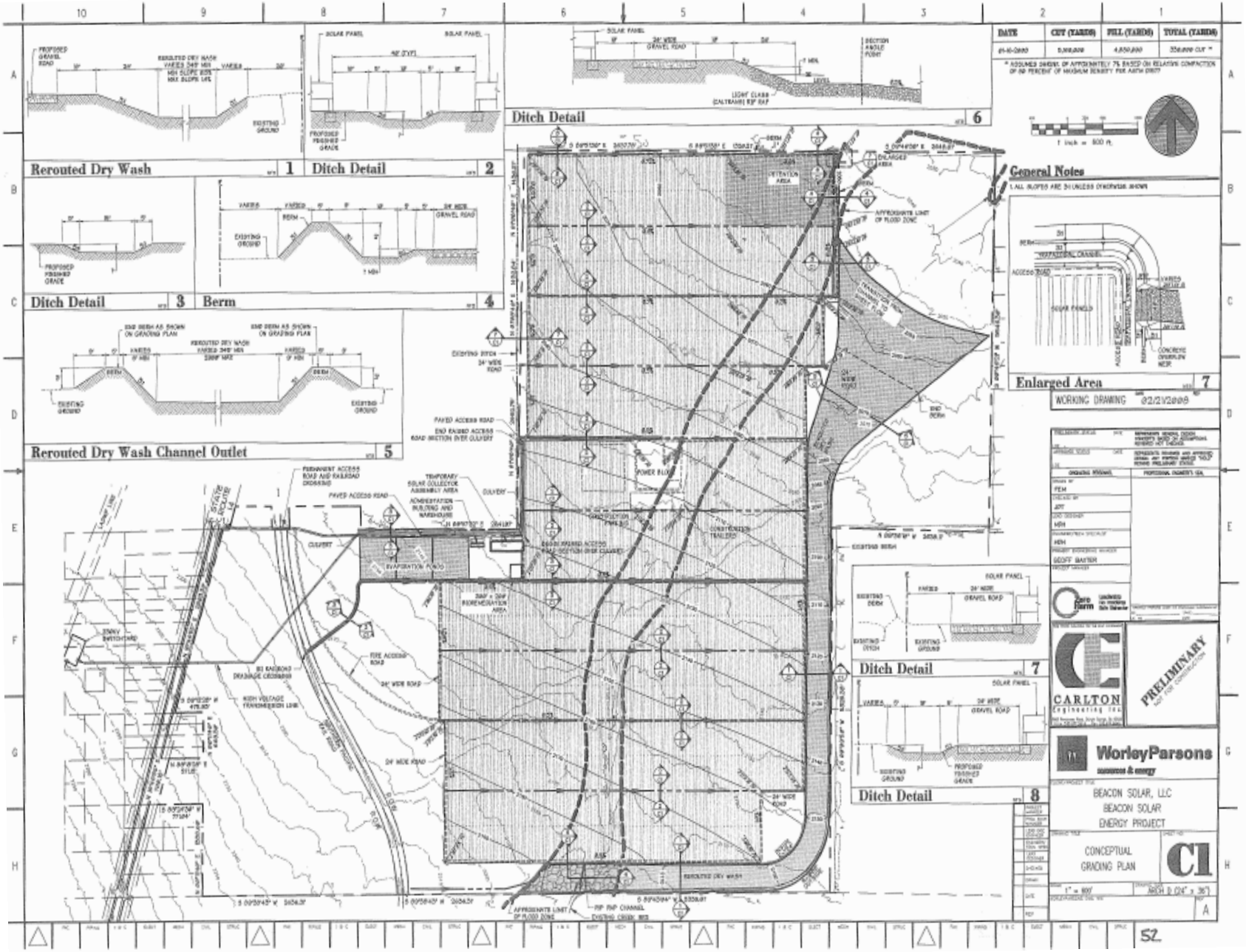
Attachment N includes copies of the following local, state, and federal plans and permits:

- SWRCB Order No. 99-08-DWQ, NPDES General Permit No. CASA000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity.

OTHER PLANS AND PERMITS WILL BE INCLUDED AS APPLICABLE

FIGURE 500.11-1

Conceptual Grading Plan


Rerouted Dry Wash 1
Ditch Detail 2
Ditch Detail 3
Berm 4
Rerouted Dry Wash Channel Outlet 5
Ditch Detail 6
Enlarged Area 7
Ditch Detail 7
Ditch Detail 8
General Notes
WORKING DRAWING 02/21/2008
CARLTON Engineering Inc
PRELIMINARY NOT FOR CONSTRUCTION
WorleyParsons resources & energy
BEACON SOLAR, LLC
BEACON SOLAR ENERGY PROJECT
CONCEPTUAL GRADING PLAN
C1
52

600 Monitoring Program and Reports

600.1 Site Inspections

The SWPPM or designated representative will inspect the site prior to forecast storms, after rain events that cause runoff from the construction site, at 24-hour intervals during extended rain events, and as specified in the contract documents. SWPPP inspections may be conducted in conjunction with other facility inspections. For instance, if a regulated amount of petroleum materials is onsite and there is a Spill Prevention, Control and Countermeasures Plan (SPCC), the SWPPP inspections may be conducted in conjunction with SPCC inspections.

The goals of these inspections are: (1) to identify areas contributing to a stormwater discharge; (2) to evaluate whether measures to reduce pollutant loadings identified in the SWPPP are adequate, properly installed and functioning in accordance with the terms of the General Permit; and (3) whether additional control practices or corrective maintenance activities are needed.

The results of inspections and assessments will be documented, a copy will be provided to the Project Manager within 24 hours of the inspection, and copies of the completed inspection checklists will be maintained with the SWPPP. Site inspections conducted for monitoring purposes will be performed using the inspection checklist shown in Attachment L.

The name(s) and contact number(s) of the assigned inspection personnel are listed below:

Assigned inspector: To Be Determined Contact phone: To Be Determined

600.2 Non-Compliance Reporting

If a discharge occurs or if the project receives a written notice of non-compliance, the Contractor will immediately notify the Project Manager, file a written report to Beacon Energy, LLC within 7 days of the discharge or notice, and file a written report to the RWQCB within 30 days of identification of non-compliance. Corrective measures will be implemented immediately following the discharge, notice, or order. A sample Notice of Non-Compliance (NONC) form is provided in Attachment K. Discharges will be documented on a Discharge Reporting Log using the example form in Attachment T.

The report to the Owner/Developer and to the RWQCB will contain the following items:

- The date, time, location, nature of operation, and type of unauthorized discharge, including the cause or nature of the notice or order
- The BMPs deployed before the discharge event, or prior to receiving the notice or order
- The date of deployment and type of BMPs deployed after the discharge event, or after receiving the notice or order, including additional measures installed or planned to reduce or prevent re-occurrence
- An implementation and maintenance schedule for affected BMPs.

600.3 Record Keeping and Reports

Records will be retained for a minimum of 3 years for the following items:

- Site inspections
- Compliance certifications
- Discharge reports
- Approved SWPPP document and amendments

600.4 Sampling and Analysis Plan for Sediment

This project does **not** receive run-on with the potential to combine with storm water that discharges directly to a water body listed as impaired due to sedimentation/siltation or turbidity pursuant to Clean Water Act, Section 303(d); therefore a Sampling and Analysis Plan for sedimentation is not required.

600.5 Sampling and Analysis Plan for Non-Visible Pollutants

This section describes the sampling and analysis strategy for monitoring non-visible pollutants in stormwater discharges from the project site and offsite activities directly related to the project, in accordance with the requirements of Section B of the General Permit, including SWRCB Resolution 2001-046.

600.5.1 Scope of Monitoring Activities

The following construction materials, wastes, or activities are potential sources of non-visible pollutants to stormwater discharges from a project. Identification, storage, use, and operational locations of potential sources of non-visible pollutants at this project site will be updated, identified on site maps, and incorporated into this SWPPP by the Contractor.

- Vehicle batteries
- Concrete curing
- Sealants
- Adhesives
- Cleaning products
- Solvents; Thinners
- Fertilizers; Herbicides
- Dust palliatives
- Soil binders
- Painting products
- Line flushing products
- Masonry products

No soil amendments are anticipated to be used on the project site that has the potential to change the chemical properties, engineering properties, or erosion resistance of the soil.

Stormwater run-on to this site does not have the potential to contribute non-visible pollutants to stormwater discharges from the project.

600.5.2 Background Monitoring Strategy

600.5.2.1 Background Sampling Schedule

Samples for the applicable non-visible pollutant(s) and a sufficiently large uncontaminated background sample will be collected during the first 2 hours of discharge from rain events that result in a sufficient discharge for sample collection. Samples will be collected during daylight hours (sunrise to sunset) and will be collected regardless of the time of year, status of the construction site, or day of the week.

In conformance with the EPA definition, a minimum of 72 hours of dry weather will be used to distinguish between separate rain events.

Collection of discharge samples for non-visible pollutant monitoring will be triggered when any of the following conditions are observed during inspections conducted before or during rain events:

- Materials or wastes containing potential non-visible pollutants are not stored under watertight conditions. Watertight conditions are defined as (1) storage in a watertight container, (2) storage under a watertight roof or within a building, or (3) storage protected by temporary cover and containment that prevents stormwater contact and runoff from the storage area.
- Materials or wastes containing potential non-visible pollutants are stored under watertight conditions, but (1) a breach, malfunction, leakage, or spill is observed, (2) the leak or spill is not cleaned up prior to the rain event, and (3) there is the potential for discharge of non-visible pollutants to surface waters or a storm sewer system.
- An operational activity with the potential to contribute non-visible pollutants (1) occurred during or within 24 hours prior to the rain event, (2) caused applicable BMPs to be breached, malfunction, or be improperly implemented, and (3) could result in a discharge of non-visible pollutants to surface waters or a storm sewer system.
- Soil amendments that have the potential to change the chemical properties, engineering properties, or erosion resistance of the soil have been applied, and there is the potential for discharge of non-visible pollutants to surface waters.

600.5.2.2 Background Sampling Locations

- Sampling locations will be determined by the Storm Water Pollution Prevention Plan Manager (SWPPPM).

600.5.3 Monitoring Preparation

Samples on the project site will be collected by the following Contractor sampling personnel:

Name/Telephone Number: To Be Determined

Prior to the rainy season, sampling personnel and alternates will review the Sampling and Analysis Plan.

An adequate stock of monitoring supplies and equipment for monitoring non-visible pollutants will be available on the project site in case of a 'need to sample' event arises. Monitoring supplies and equipment will be stored in a cool-temperature environment that will not contact rain or direct sunlight. Sampling personnel shall be made available to collect samples as the need arises.

Supplies maintained at the project site will include surgical gloves, sample collection equipment, coolers, appropriate number and volume of sample bottles, identification labels, re-sealable storage bags, paper towels, personal rain gear, ice, Sampling Activity Log forms, and Chain of Custody (COC) forms. The Contractor will obtain and maintain the field-testing instruments for analyzing samples in the field by sampling personnel.

Safety practices for sample collection will be in accordance with the Contractor's Health and Safety Plan.

The SWPPM will contact sampling personnel on an as needed basis. This will ensure that adequate sample collection personnel, supplies, and field test equipment for monitoring non-visible pollutants are available and mobilized to collect samples on the project site in accordance with the project needs.

Maintenance of the field-testing instruments for analyzing samples in the field will be the requirement of the SWPPM.

600.5.4 Analytical Constituents

600.5.4.1 Identification of Non-Visible Pollutants

Table 600.5.4.1-1 lists specific sources and types of potential non-visible pollutants anticipated to be on the project site and the applicable water quality indicator constituent(s) for that pollutant. The list of types of non-visible pollutants will be updated at a later time.

TABLE 600.5.4.1-1
Potential Non-Visible Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent
Batteries	Sulfuric acid, lead	pH
Cleaners (acid/TSP)	Acid/Phosphate	pH/Phosphate
Solvent	VOC, COD, SVOC	COD, VOC, SVOC
Thinners	VOC, COD	COD, VOC
Sealant	Methyl Methalcrylate, Cobalt, Zinc	Methyl Methalcrylate, Cobalt, Zinc

TABLE 600.5.4.1-1
Potential Non-Visible Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent
Concrete Curing /Compound	Base, VOC, SVOC	pH, VOC, SVOC
Herbicides	Herbicide	Herbicide – check lab
Fertilizers	Nitrate, Phosphate, Organic Nitrogen, Potassium, TOC, COD	Nitrate, Phosphate
Dust palliatives	Chloride, TDS, Cations (Na, Mg, Ca)	Chloride, TDS
Adhesives	Phenols, COD, SVOC	COD, Phenols, SVOC

600.5.5 Sample Collection and Handling

600.5.5.1 Sample Collection Procedures

Samples of discharge will be collected at the designated sampling locations for observed breaches, malfunctions, leakages, spills, operational areas, soil amendment application areas, and/or historical site usage areas that triggered the sampling event.

Grab samples will be collected and preserved in accordance with the methods identified in Table 600.5.5.1-1. Only personnel trained in proper water quality sampling will collect samples.

Samples will be collected by placing a separate lab-provided sample container directly into a stream of water down gradient and close to the potential non-visible pollutant discharge location. This separate lab-provided sample container will be used to collect water, which will be transferred to sample bottles for laboratory analysis. The up gradient and uncontaminated background samples will be collected prior to collecting the down gradient sample to minimize cross-contamination. Sampling personnel will collect the water up gradient of where they are standing. Once the separate lab-provided sample container is filled, the water sample will be poured directly into sample bottles provided by the laboratory for the analyte(s) being monitored.

To maintain sample integrity and prevent cross-contamination, sampling collection personnel will:

- Wear a clean pair of surgical gloves prior to the collection and handling of each sample at each location.
- Prevent the inside of the sample bottle from contacting any material other than the water sample.
- Discard sample bottles or sample lids that have been dropped onto the ground prior to sample collection.
- Prevent the cooler lid from remaining open for an extended period of time once samples are placed inside.

- Avoid sampling near a running vehicle where exhaust fumes may affect the sample.
- Avoid touching the exposed end of a sampling tube, if applicable.
- Prevent rainwater from rain gear or other surfaces from dripping into sample bottles.
- Avoid eating, smoking, or drinking during sample collection.
- Avoid sneezing or coughing in the direction of an open sample bottle.
- Minimize the exposure of the samples to direct sunlight, as sunlight may cause biochemical transformation of the sample to take place.
- Decontaminate sampling equipment prior to sample collection using a TSP-soapy water wash, distilled water rinse, and final rinse with distilled water.
- Dispose of decontamination water/soaps appropriately; i.e., avoid discharge to the receiving water.

TABLE 600.5.5.1-1
Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants

Constituent	Analytical Method	Minimum Sample Volume	Sample Bottle	Sample Preservation	Reporting Limit	Maximum Holding Time
VOCs-Solvents	EPA 8260B	3 x 40 mL	VOA-glass	Store at 4˚ C, HCl to pH<2	1 µg/L	14 days
SVOCs	EPA 8270C	1 x 1 L	Glass-Amber	Store at 4˚ C	10 µg/L	7 days
Pesticides	EPA 8151A	1 x 1 L	Glass-Amber	Store at 4˚ C	Check Lab	7 days
Herbicides	EPA 8151A	1 x 1 L	Glass-Amber	Store at 4˚ C	Check Lab	7 days
COD	EPA 410.4	1 x 250 mL	Glass-Amber	Store at 4˚ C, H_2SO_4 to pH<2	5 mg/L	28 days
TDS	EPA 160.1 (TDS)	1 x 100 mL	Polypropylene	None	ppm	Immediate
pH	EPA 150.1	1 x 100 mL	Polypropylene	None	Unitless	Immediate
Alkalinity	SM 2320B	1 x 250 mL	Polypropylene	Store at 4˚ C	1 mg/L	14 days
Metals (Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, Se, Na, Th, Va, Zn)	EPA 6010B/7470A	1 x 250 mL	Polypropylene	Store at 4˚ C, HNO_3 to pH<2	0.1 mg/L	6 months
Metals (Chromium VI)	EPA 7199	1 x 500 mL	Polypropylene	Store at 4˚ C	1 µg/L	24 hours

TABLE 600.5.5.1-1
Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants

Constituent	Analytical Method	Minimum Sample Volume	Sample Bottle	Sample Preservation	Reporting Limit	Maximum Holding Time

Notes:

°C	–	Degrees Celsius	µg/L	–	Micrograms per Liter
COD	–	Chemical Oxygen Demand	mL	–	Milliliter
DO	–	Dissolved Oxygen	ppm	–	Parts per million
EPA	–	Environmental Protection Agency	PCB	–	Polychlorinated Biphenyl
HCl	–	Hydrogen Chloride	SVOC	–	Semi-Volatile Organic Compound
H_2SO_4	–	Hydrogen Sulfide	TDS	–	Total Dissolved Solids
HNO_3	–	Nitric Acid	VOA	–	Volatile Organic Analysis
L	–	Liter	VOC	–	Volatile Organic Compound
mg/L	–	Milligrams per Liter			

600.5.5.2 Sample Handling Procedures

Immediately following collection, sample bottles for laboratory analytical testing will be capped, labeled, documented on a COC form provided by the analytical laboratory; sealed in a re-sealable storage bag; placed in an ice-chilled cooler, as close to 4ºC as practicable; and delivered within 24 hours to a California-certified laboratory.

Immediately following collection, samples for field analysis (pH) will be tested in accordance with the field instrument manufacturer's instructions and results will be recorded on the Sampling Activity Log, Attachment R.

600.5.6 Sample Documentation Procedures

Original data documented on sample bottle identification labels, COC forms, Sampling Activity Logs, and Inspection Checklists will be recorded using waterproof ink. These will be considered accountable documents. If an error is made on an accountable document, the individual will make corrections by lining through the error and entering the correct information. The erroneous information will not be obliterated. Corrections will be initialed and dated. Copies of the Sampling Activity Log and Chain of Custody form are provided in Attachments R and (LATER).

Sampling and field analysis activities will be documented using the following:

- **Sample Bottle Identification Labels:** Sampling personnel will attach an identification label to each sample bottle. At a minimum, the following information will be recorded on the label:

  Project name

  Project number

  Unique sample identification number and location:

  a. [Project Number]-[Six digit sample collection date]-[Location](*Example:* 0G5304-081801-Inlet472)

  b. QA/QC samples will be identified similarly using a unique sample number or designation (*Example:* 0G5304-081801-DUP1)

Collection date/time (no time applied to QA/QC samples)

Analysis constituent

- **Sampling Activity Logs:** A log of sampling events will identify:

  Sampling date
  Separate times for collected samples and QA/QC samples recorded to the nearest minute
  Unique sample identification number and location
  Analysis constituent
  Names of sampling personnel
  Weather conditions (including precipitation amount)
  Field analysis results
  Other pertinent data

- **Chain of Custody (COC) Forms:** Samples to be analyzed by a laboratory will be accompanied by a COC form provided by the laboratory. Only the sample collectors will sign the COC form over to the lab. COC procedures will be strictly adhered to for QA/QC purposes.

- **Stormwater Quality Construction Inspection Checklists:** When applicable, the Contractor's stormwater inspector will document on the checklist that sample for non-visible pollutants were taken during a rain event.

600.5.7 Sample Analysis

Samples will be analyzed for the applicable constituents using the analytical methods identified in Table 600.5.5.1-1. For samples collected for field analysis, collection, analysis, and equipment calibration will be in accordance with the field instrument manufacturer's specifications.

600.5.8 Quality Assurance/Quality Control

For an initial verification of laboratory or field analysis, duplicate samples will be collected at a rate of 10 percent or 1 duplicate per sampling event. The duplicate sample will be collected, handled, and analyzed using the same protocols as primary samples. A duplicate sample will be collected at each location immediately after the primary sample has been collected. Duplicates will be collected where contamination is likely, not on the background sample. Duplicate samples will not influence evaluations or conclusions; however, they will be used as a check on laboratory quality assurance.

600.5.9 Data Management and Reporting

A copy of water quality analytical results and QA/QC data will be submitted to the Project Manager and Beacon Energy, LLC within 5 days of sampling (for field analyses) and within 30 days (for laboratory analyses).

Lab reports and COCs will be reviewed for consistency between lab methods, sample identifications, dates, and times for both primary samples and QA/QC samples. Data, including COC forms and Sampling Activity Logs, will be kept with the SWPPP.

600.5.9.1 Data Evaluation

If for whatever reason, a sample is taken and shows the runoff/down gradient sample has an increased level of the tested analyte relative to the background

sample, the BMPs, site conditions, and surrounding influences will be assessed to determine the probable cause for the increase. As determined by the site and data evaluation, appropriate BMPs will be repaired or modified to mitigate discharges of non-visual pollutant concentrations. Revisions to the BMPs will be recorded as an amendment to the SWPPP. Any evaluation of the water quality analytical results sampling, including figures with sample locations, will be submitted to the Project Manager and Beacon Energy, LLC.

600.6 Change of Conditions

Whenever SWPPP monitoring, pursuant to Section B of the General Permit, indicates a change in site conditions that might affect the appropriateness of sampling locations or introduce additional non-visible pollutants of concern, testing protocols will be revised accordingly. Revisions will be recorded as amendments to the SWPPP.

600.7 Mitigation Monitoring Plan

As required, a mitigation monitoring plan will also be developed in conjunction with California Energy Commission staff to set performance standards and monitor the effectiveness of mitigation measures. This plan will address the timing and methods of such measures, as well as reporting and response requirements. Personnel will receive training to conduct their jobs properly and recognize and report abnormal/adverse situations so that they can be quickly corrected.

700 References

California Stormwater Quality Association. California Stormwater BMP Handbook – Construction. January 2003.

CALTRANS Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Review Guidance Manual, December 2003.

Kern County Hydrology Manual, Hromadka II, T.V., 1992.

National Resource Conservation Service (NRCS). 2007. Soil Survey: Kern County California. Soil Web Survey Webpage at: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

NOAA Atlas 14 as appropriate.

State of California Department of Transportation (Caltrans). 2003, 2007. Caltrans Storm Water Quality Handbooks.

SWRCB Order No. 99-08-DWQ, NPDES General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity.

Attachment A

VICINITY MAP - LATER

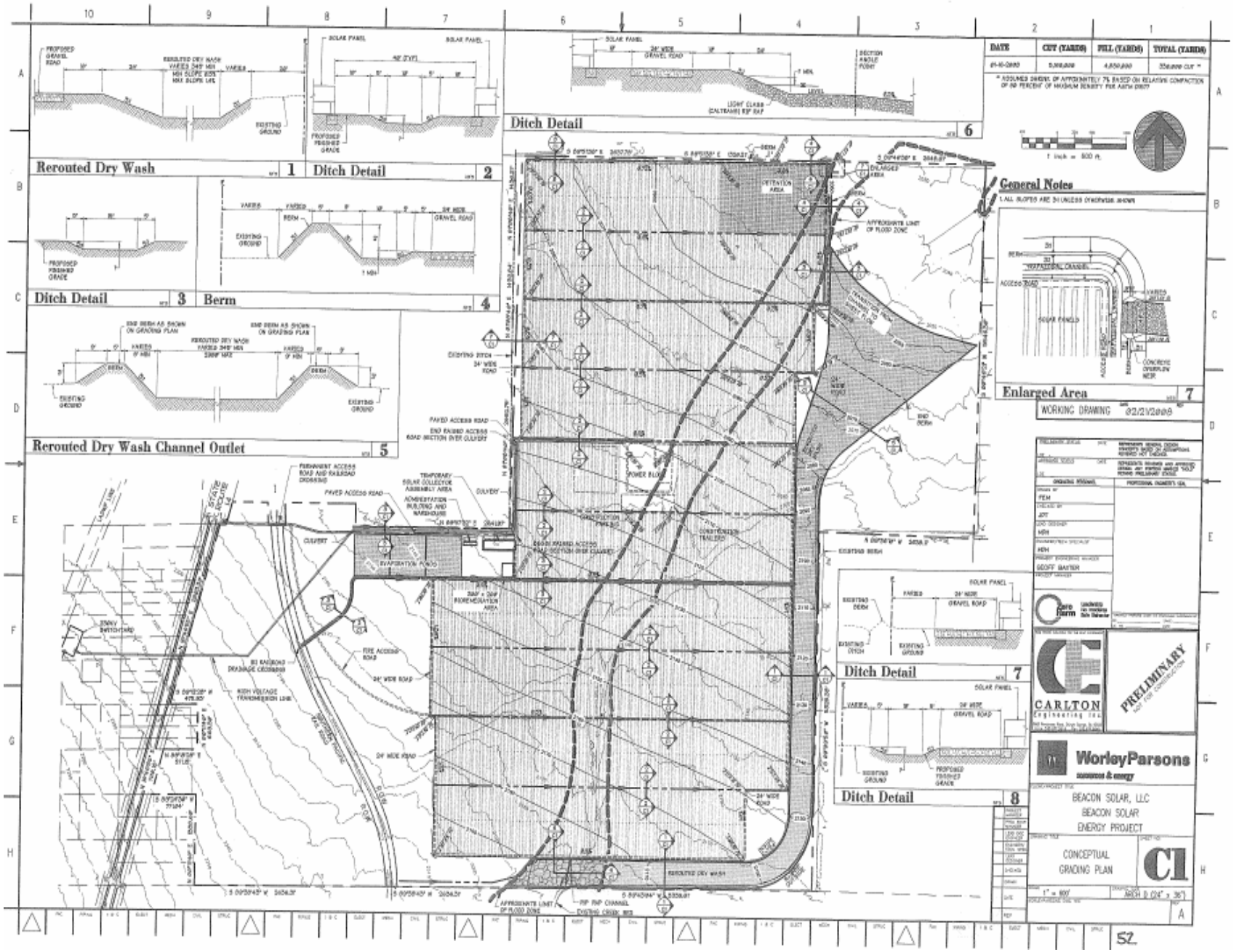
Attachment B

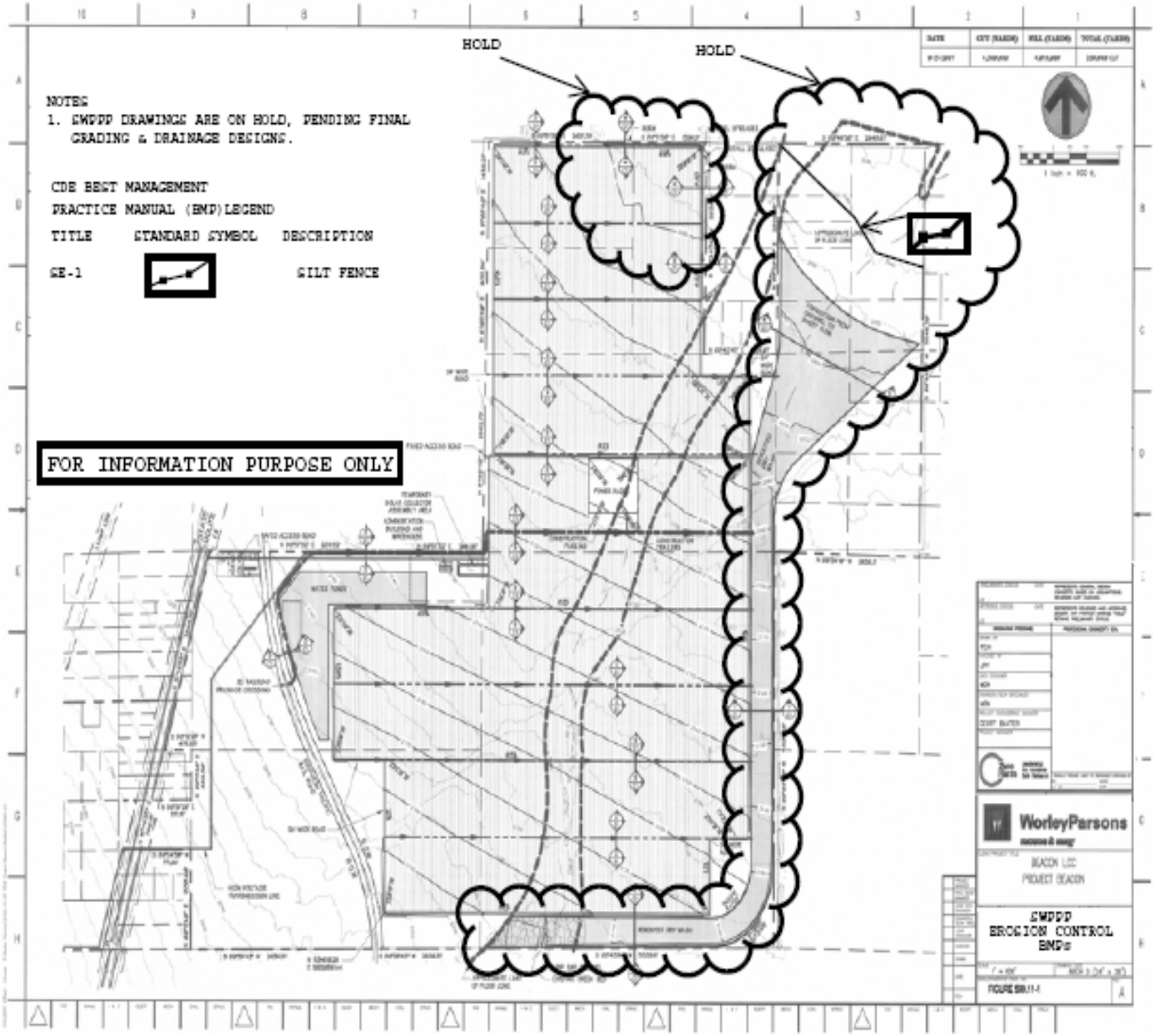
Water Pollution Control Drawings

To Be Provided (LATER)

Five sheets of BMPs:

Title	Sheet Number
Non storm water	SWPPP 2-2
Sediment control	SWPPP 2-3
Tracking control	SWPPP 2-4
Waste Mgmt /Materials Pollution	SWPPP 2-5
Wind erosion	SWPPP 2-6


Rerouted Dry Wash 1
Ditch Detail 2
Ditch Detail 3
Berm 4
Rerouted Dry Wash Channel Outlet 5
Ditch Detail 6
Enlarged Area 7
Ditch Detail 7
Ditch Detail 8
General Notes
1. ALL SLOPES ARE 3:1 UNLESS OTHERWISE SHOWN
WORKING DRAWING 02/21/2008
PRELIMINARY
NOT FOR CONSTRUCTION
CARLTON Engineering Inc.
WorleyParsons
BEACON SOLAR, LLC
BEACON SOLAR
ENERGY PROJECT
CONCEPTUAL
GRADING PLAN
C1
1" = 800'
ARCH D (24" x 36")
A
52


HOLD
HOLD
NOTES
1. SWPPP DRAWINGS ARE ON HOLD, PENDING FINAL GRADING & DRAINAGE DESIGNS.
CDE BEST MANAGEMENT
PRACTICE MANUAL (BMP) LEGEND
TITLE
STANDARD SYMBOL
DESCRIPTION
SE-1
SILT FENCE
FOR INFORMATION PURPOSE ONLY
WorleyParsons
BEACON LLC
PROJECT BEACON
SWPPP
EROSION CONTROL
BMPs

Attachment C

BMP Consideration Checklist

CONSTRUCTION SITE BMPs
CONSIDERATION CHECKLIST

The contractor shall consider using all BMPs listed hereon. Those BMPs which are not included in the SWPPP shall be checked as "Not Used" with a brief statement describing why it is not being used.
All selected BMPs shall be included in the schedule of values, except for those items shown on the plans and paid for as a separate item or work

TEMPORARY SOIL STABILIZATION BMPs

BMP No.	BMP	MINIMUM REQUIREMENT (2)	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
SE-1	Scheduling	✓				
SE-2	Preservation of Existing Vegetation	✓				
SE-3	Hydraulic Mulch	✓(1)				
SE-4	Hydroseeding	✓(1)				
SE-5	Soil Binders	✓(1)				
SE-6	Straw Mulch	✓(1)				
SE-7	Geotextiles, Plastic Covers, & Erosion Control Blankets/Mats	✓(1)				
SE-8	Wood Mulching					
SE-9	Earth Dikes/Drainage Swales & Lined Ditches					
SE-10	Outlet Protection/ Velocity Dissipation Devices					
SE-11	Slope Drains					
SE-12	Stream Bank Stabilization					

(1) The Contractor shall select one of the five measures listed or a combination thereof to achieve and maintain the contract's rainy season disturbed soil area (DSA) requirements.

CONSTRUCTION SITE BMPs
CONSIDERATION CHECKLIST

The Contractor shall consider using all BMPs listed hereon. Those BMPs which are not included in the SWPPP shall be checked as "Not Used" with a brief statement describing why it is not being used.
All selected BMPs shall be included in the Schedule of Values, except for those items shown on the plans and paid for as a separate item or work

BMP No.	BMP	MINIMUM REQUIREMENT (2)	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
TEMPORARY SEDIMENT CONTROL BMPs						
SE-1	Silt Fence	✓				
SE-2	Sediment/Desilting Basin					
SE-3	Sediment Trap					
SE-4	Check Dam					
SE-5	Fiber Rolls	✓				
SE-6	Gravel Bag Berm					
SE-7	Street Sweeping and Vacuuming	✓				
SE-8	Sand Bag Barrier					
SE-9	Straw Bale Barrier					
SE-10	Storm Drain Inlet Protection	✓				
WIND EROSION CONTROL BMPs						
WE-1	Wind Erosion Control	✓				
TRACKING CONTROL BMPs						
TC-1	Stabilized Construction Entrance/Exit					
TC-2	Stabilized Construction Roadway					
TC-3	Entrance/Outlet Tire Wash					

(2) The contractor shall select either sediment control measure or a combination thereof to achieve and maintain the contract's disturbed soil area (DSA) protection requirements.

CONSTRUCTION SITE BMPs
CONSIDERATION CHECKLIST

The Contractor shall consider using all BMPs listed hereon. Those BMPs which are not included in the SWPPP shall be checked as "not used" with a brief statement describing why it is not being included.
All selected BMPs shall be included in the Schedule of Values, except for those items shown on the plans and paid for as a separate item or work

NON-STORM WATER MANAGEMENT BMPs

BMP No.	BMP	MINIMUM REQUIREMENT (2)	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
NS-1	Water Conservation Practices					
NS-2	Dewatering Operations					
NS-3	Paving and Grinding Operations					
NS-4	Temporary Stream Crossing					
NS-5	Clear Water Diversion					
NS-6	Illicit Connection/Illegal Discharge Detection and Reporting	✓				
NS-7	Potable Water/Irrigation					
NS-8	Vehicle and Equipment Cleaning	✓				
NS-9	Vehicle and Equipment Fueling	✓				
NS-10	Vehicle and Equipment Maintenance	✓				
NS-11	Pile Driving Operations					
NS-12	Concrete Curing					
NS-13	Material and Equipment Use Over Water					
NS-14	Concrete Finishing					
NS-15	Structure Demolition/Removal					

CONSTRUCTION SITE BMPs
CONSIDERATION CHECKLIST

The Contractor shall consider using all BMPs listed hereon. Those BMPs which are not included in the SWPPP shall be checked as "not used" with a brief statement describing why it is not being used.
All selected BMPs shall be included in the Schedule of Values, except for those items shown on the plans and paid for as a separate item or work

WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BMPs

BMP No.	BMP	MINIMUM REQUIREMENT (2)	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
WM-1	Material Delivery and Storage	✓				
WM-2	Material Use	✓				
WM-3	Stockpile Management	✓				
WM-4	Spill Prevention and Control	✓				
WM-5	Solid Waste Management	✓				
WM-6	Hazardous Waste Management					
WM-7	Contaminated Soil Management					
WM-8	Concrete Waste Management					
WM-9	Sanitary/Septic Waste Management	✓				
WM-10	Liquid Waste Management					

Attachment D

Attachment E

Computation Sheet for Determining Run-on Discharges

Figure 819.2A

Runoff Coefficients for Undeveloped Areas
Watershed Types

	Extreme	High	Normal	Low
Relief	**.28 -.35** Steep, rugged terrain with average slopes above 30%	**.20 -.28** Hilly, with average slopes of 10 to 30%	**.14 -.20** Rolling, with average slopes of 5 to 10%	**.08 -.14** Relatively flat land, with average slopes of 0 to 5%
Soil Infiltration	**.12 -.16** No effective soil cover, either rock or thin soil mantle of negligible infiltration capacity	**.08 -.12** Slow to take up water, clay or shallow loam soils of low infiltration capacity, imperfectly or poorly drained	**.06 -.08** Normal; well drained light or medium textured soils, sandy loams, silt and silt loams	**.04 -.06** High; deep sand or other soil that takes up water readily, very light well drained soils
Vegetal Cover	**.12 -.16** No effective plant cover, bare or very sparse cover	**.08 -.12** Poor to fair; clean cultivation crops, or poor natural cover, less than 20% of drainage area over good cover	**.06 -.08** Fair to good; about 50% of area in good grassland or wood-land, not more than 50% of area in cultivated crops	**.04 -.06** Good to excellent; about 90% of drainage area in good grassland, woodland or equivalent cover.
Surface Storage	**.10 -.12** Negligible surface depression few and shallow; drainageways steep and small, no marshes	**.08 -.10** Low; well defined system of small drainageways; no ponds or marshes	**.06 -.08** Normal; considerable surface depression storage; lakes and pond marshes	**.04 -.06** High; surface stor-age, high; drainage system not sharply defined; large flood plain storage or large number of ponds or marshes.

Given An undeveloped watershed consisting of;

1) rolling terrain with average slopes of 5%,
2) clay type soils,
3) good grassland area, and
4) normal surface depressions.

Solution:

Relief	0.14
Soil Infiltration	0.08
Vegetal Cover	0.04
Surface Storage	0.06
C=	0.32

Find The runoff coefficient, C, for the above watershed.

Table 819.2B

Runoff Coefficients for Developed Areas

Type of Drainage Area	Runoff Coefficient
Business:	
Downtown areas	0.70 - 0.95
Neighborhood areas	0.50 - 0.70
Residential:	
Single-family areas	0.30 - 0.50
Multi-units, detached	0.40 - 0.60
Multi-units, attached	0.60 - 0.75
Suburban	0.25 - 0.40
Apartment dwelling areas	0.50 - 0.70
Industrial:	
Light areas	0.50 - 0.80
Heavy areas	0.60 - 0.90
Parks, cemeteries:	0.10 - 0.25
Playgrounds:	0.20 - 0.40
Railroad yard areas:	0.20 - 0.40
Unimproved areas:	0.10 - 0.30
Lawns:	
Sandy soil, flat, 2%	0.05 - 0.10
Sandy soil, average, 2-7%	0.10 - 0.15
Sandy soil, steep, 7%	0.15 - 0.20
Heavy soil, flat, 2%	0.13 - 0.17
Heavy soil, average, 2-7%	0.18 - 0.25
Heavy soil, steep, 7%	0.25 - 0.35
Streets:	
Asphaltic	0.70 - 0.95
Concrete	0.80 - 0.95
Brick	0.70 - 0.85
Drives and walks	0.75 - 0.85
Roofs:	0.75 - 0.95

Attachment F

Notice of Construction (NOC) / Notice of Intent (NOI)

Attachment G

Program for Maintenance, Inspection, and Repair of Construction Site BMPs

SWPPP Inspection, Maintenance and Repair Program			
BEST MANAGEMENT PRACTICES (BMPs)	**INSPECTION FREQUENCY**		**MAINTENANCE/REPAIR PROGRAM**
	Rainy	**Non-Rainy**	
TEMPORARY SOIL STABILIZATION BMPs			
TEMPORARY SEDIMENT CONTROL BMPs			
WIND EROSION CONTROL BMPs			
TRACKING CONTROL BMPs			

SWPPP Inspection, Maintenance and Repair Program			
BEST MANAGEMENT PRACTICES (BMPs)	**INSPECTION FREQUENCY**		**MAINTENANCE/REPAIR PROGRAM**
	Rainy	**Non-Rainy**	
NON-STORM WATER MANAGEMENT BMPs			
WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BMPs			

Attachment H

Stormwater Quality Construction Site Inspection Checklist

GENERAL INFORMATION				
Project Name				
Contract No.				
Contractor				
Inspector's Name				
Inspector's Title				
Signature				
Date of Inspection				
Inspection Type (Check Applicable)	❒ Prior to forecast rain ❒ 24-hr intervals during extended rain		❒ After a rain event ❒ Other _____	
Season (Check Applicable)	❒ Rainy		❒ Non-Rainy	
Storm Data	Storm Start Date & Time:		Storm Duration (hrs):	
	Time elapsed since last storm (Circle Applicable Units)	Min. Hr. Days	Approximate Rainfall Amount (mm)	

PROJECT AREA SUMMARY AND DISTURBED SOIL AREA (DSA) SIZE LIMITS FROM SPECIAL PROVISIONS				
Total Project Area	_____	Hectares	_____	Acres
Rainy Season DSA Limit	_____	Hectares	_____	Acres
Field Estimate of Non-Active DSAs	_____	Hectares	_____	Acres
Field Estimate of Active DSAs	_____	Hectares	_____	Acres

OTHER REQUIREMENTS				
Requirement	**Yes**	**No**	**N/A**	**Corrective Action**
Preservation of Existing Vegetation				
Is temporary fencing provided to preserve vegetation in areas where no construction activity is planned?				
Location:				
Location:				
Location:				
Location:				
Temporary Soil Stabilization				
Does the applied temporary soil stabilization provide 100% coverage for the required areas?				
Are any non-vegetated areas that may require temporary soil stabilization?				
Is the area where temporary soil stabilization required free from visible erosion?				
Location:				
Location:				
Location:				
Location:				
Temporary Linear Sediment Barriers				
Are temporary linear sediment barriers properly installed in accordance with the details, functional and maintained?				
Are temporary linear sediment barriers free of accumulated litter?				
Is the built-up sediment less than 1/3 the height of the barrier?				
Are cross barriers installed where necessary and properly spaced?				
Are fiber rolls installed and maintained on required slopes in accordance with the details, functional and maintained?				
Location:				
Location:				
Location:				
Location:				
Location:				
Storm Drain Inlet Protection				
Are storm drain inlets internal to the project properly protected with either Type 1, 2 or 3 inlet protection?				
Are storm drain inlet protection devices in working order and being properly maintained?				
Location:				
Location:				
Location:				
Location:				
Location:				

OTHER REQUIREMENTS				
Requirement	**Yes**	**No**	**N/A**	**Corrective Action**
Desilting Basins				
Are basins maintained to provide the required retention/detention?				
Are basin controls (inlets, outlets, diversions, weirs, spillways, and racks) in working order?				
Location:				
Location:				
Location:				
Location:				
Stockpiles				
Are all locations of temporary stockpiles, including soil, hazardous waste, and construction materials in approved areas?				
Are stockpiles protected from run-on, run-off from adjacent areas and from winds?				
Are stockpiles located at least 50 ft from concentrated flows, downstream drainage courses and storm drain inlets?				
Are required covers and/or perimeter controls in place?				
Location:				
Location:				
Location:				
Location:				
Concentrated Flows				
Are concentrated flow paths free of visible erosion?				
Location:				
Location:				
Location:				
Location:				
Tracking Control				
Are points of ingress/egress to public/private roads inspected, swept, and vacuumed daily?				
Are all paved areas free of visible sediment tracking or other particulate matter?				
Is rock at Temporary Construction Entrance(s) 12-inches or more in thickness?				
Does sediment need to be removed from the rock, or does the rock need to be replaced?				
For Type 2 Construction Entrance, does sediment need to be removed from ribbed plates?				
Location:				
Location:				
Location:				
Location:				

OTHER REQUIREMENTS				
Requirement	**Yes**	**No**	**N/A**	**Corrective Action**
Wind Erosion Control				
Is dust control implemented in conformance with Section 10 of the Standard Specifications?				
Location:				
Location:				
Location:				
Location:				
Dewatering Operations				
Is dewatering handled in conformance with the dewatering permit issued by the RWQCB?				
Is required treatment provided for dewatering effluent?				
Location:				
Location:				
Location:				
Location:				
Vehicle & Equipment Fueling, Cleaning, and Maintenance				
Are vehicle and equipment fueling, cleaning and maintenance areas reasonably clean and free of spills, leaks, or any other deleterious material?				
Are vehicle and equipment fueling, cleaning and maintenance activities performed on an impermeable surface in dedicated areas?				
If no, are drip pans used?				
Are dedicated fueling, cleaning, and maintenance areas located at least 15 m away from downstream drainage facilities and watercourses, and protected from run-on and runoff?				
Is wash water contained for infiltration/ evaporation and disposed of outside the highway right of way?				
Is on-site cleaning limited to washing with water (no soap, soaps substitutes, solvents, or steam)?				
On each day of use, are vehicles and equipment inspected for leaks and if necessary, repaired?				
Location:				
Location:				
Location:				
Location:				
Waste Management & Materials Pollution Control				
Are material storage areas and washout areas protected from run-on and runoff, and located at least 50 ft from concentrated flows and downstream drainage facilities?				
Are all material handling and storage areas clean; organized; free of spills, leaks, or any other deleterious material; and stocked with appropriate clean-up supplies?				
Are liquid materials, hazardous materials, and hazardous wastes stored in temporary containment facilities?				

OTHER REQUIREMENTS				
Requirement	**Yes**	**No**	**N/A**	**Corrective Action**
Are bagged and boxed materials stored on pallets?				
Are hazardous materials and wastes stored in appropriate, labeled containers?				
Are proper storage, clean-up, and spill-reporting procedures for hazardous materials and wastes posted in open, conspicuous and accessible locations adjacent to storage areas?				
Are temporary containment facilities free of spills and rainwater?				
Are temporary containment facilities and bagged/boxed materials covered?				
Are temporary concrete washout facilities designated and being used?				
Are temporary concrete washout facilities functional for receiving and containing concrete waste and are concrete residues prevented from entering the drainage system?				
Do temporary concrete washout facilities provide sufficient volume and freeboard for planned concrete operations?				
Are the temporary concrete washout facilities' PVC liners free from punctures and holes?				
Are concrete wastes, including residues from cutting and grinding, contained and disposed of off-site or in concrete washout facilities?				
Are spills from mobile equipment fueling and maintenance properly contained and cleaned up?				
Is the site free of litter?				
Are trash receptacles provided in the Contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods?				
Is litter from work areas within the construction limits of the project site collected and placed in watertight dumpsters?				
Are waste management receptacles free of leaks?				
Are the contents of waste management receptacles properly protected from contact with storm water or from being dislodged by winds?				
Are waste management receptacles filled at or beyond capacity?				
Location:				
Location:				
Location:				
Location:				
Temporary Water Body Crossing or Encroachment				
Are temporary water body crossings and encroachments constructed as shown on the plans or as approved by the engineer?				
Does the project conform to the requirements of the 404 permit and/or 1601agreement?				
Location:				
Location:				
Location:				
Location:				

OTHER REQUIREMENTS				
Requirement	**Yes**	**No**	**N/A**	**Corrective Action**
Illicit Connection/Illegal Discharge Detection and Reporting				
Is there any evidence of illicit discharges or illegal dumping on the project site?				
If yes, has the Engineer been notified?				
Location:				
Location:				
Location:				
Location:				
Discharge Points				
Are discharge points and discharge flows free from noticeable pollutants?				
Are discharge points free of any significant erosion or sediment transport?				
Location:				
Location:				
Location:				
Location:				
WPCP/SWPPP Update				
Do the WPCP/SWPPP, Project Schedule/Water Pollution Control Schedule and WPCDs adequately reflect the current site conditions and contractor operations?				
Are all BMPs shown on the WPCDs installed in the proper location(s) and according to the details for the plan?				
Location:				
Location:				
Location:				
Location:				
General				
Are there any other potential water pollution control concerns at the site?				
Location:				
Location:				
Location:				
Location:				
Storm Water Monitoring				
Does storm water discharge directly to an water body listed as impaired for sediment/sedimentation or turbidity in the General Construction Activity Permit?				
If yes, were samples for sediment/sedimentation or turbidity collected pursuant to the sampling and analysis plan, if required, during rain events?				

OTHER REQUIREMENTS				
Requirement	**Yes**	**No**	**N/A**	**Corrective Action**
Were there any BMPs not properly implemented, or breaches, malfunctions, leakages or spills observed, which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water?				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan during rain events?				
Were soil amendments (e.g., gypsum) used on the project?				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan during rain events?				
Did storm water contact stored materials or waste and resulted in a discharge from the construction site? (Materials not in watertight containers, etc.)				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan during rain events?				

ATTACHMENT I
Trained Contractor Personnel Log Attachment I

Trained Contractor Personnel Log

Stormwater Management Training Log

Project Name: _____

Contract Number: _____

Storm Water Management Topic: (check as appropriate)

- ❑ Temporary Soil Stabilization
- ❑ Temporary Sediment Control
- ❑ Wind Erosion Control
- ❑ Tracking Control
- ❑ Non-storm water management
- ❑ Waste Management and Materials Pollution Control
- ❑ Storm Water Sampling

Specific Training Objective: _____

Location: _____ Date: _____

Instructor: _____ Telephone: _____

Course Length (hours): _____

Attendee Roster (attach additional forms if necessary)

Name	Company	Phone

Name	Company	Phone

COMMENTS:

Attachment J
Subcontractor Notification Letter Attachment J

Subcontractor Notification Letter (Sample) and Notification Log

SWPPP Notification

ABC Construction Inc,
123 Sunset Blvd., Suite 456
Hollywood, CA 90000

Dear Sir/Madam,

Please be advised that the California State Water Resources Control Board has adopted the NPDES Statewide Storm Water Permit, and the General Permit (General Permit) for Storm Water Discharges Associated with Construction Activity (CAS000002, Order No. 99-08-DWQ), and modifications thereto. The goal of these permits is prevent the discharge of pollutants associated with construction activity from entering the storm drain system, ground and surface waters.

[Contractor] has developed a Storm Water Pollution Prevention Plan (SWPPP) in order to implement the requirements of the Permits.

As a subcontractor, you are required to comply with the SWPPP and the Permits for any work that you perform on site. Any person or group who violates any condition of the Permits may be subject to substantial penalties in accordance with state and federal law. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP and the Permits. A copy of the Permits and the SWPPP are available for your review at the construction office. Please contact me if you have further questions.

Sincerely,

John Doe
Project Superintendent

Attachment K

NOTICE OF NON-COMPLIANCE

To: Name of [City] Engineer/Regional Board Staff Date: Insert Date

Subject: Notice of Non-Compliance

Project Name: Insert Project Name

Project Number/Location: Project number

In accordance with the NPDES Statewide Permit for Storm Water Discharges Associated with Construction Activity, the following instance of discharge is noted:

Date, time, and location of discharge
Insert description and date of event

Nature of the operation that caused the discharge
insert description of operation

Initial assessment of any impact cause by the discharge
insert assessment

Existing BMP(s) in place prior to discharge event
list BMPs in place

Date of deployment and type of BMPs deployed after the discharge.
BMPs deployed after the discharge (with dates)

Steps taken or planned to reduce, eliminate and/or prevent recurrence of the discharge
insert steps taken to prevent recurrence

Implementation and maintenance schedule for any affected BMPs
insert implementation and maintenance schedule

If further information or a modification to the above schedule is required, notify the contact person below.

Name of Contact Person	*Title*
Company	*Telephone Number*
Signature	*Date*

Attachment M

Annual Certification of Compliance Form

Annual Certification of Compliance for the Construction Contractor

Project Name: _____

Contract Number: _____

Contractor Company Name: _____

Contractor Address: _____

Annual Certification Inspection Date: _____

Description of Work:

description of work

Work Now in Progress:

work in progress

Work Planned for Next 12 Months:

work planned

Water Pollution Control Manager Findings

I, and/or personnel acting under my direction and supervision, have inspected the project site and the work described above and certify:

1. ☐ YES ☐ NO Stormwater pollution control measures are being implemented in accordance with the SWPPP approved for the project.

2. ☐ YES ☐ NO The project site and activities thereon are in compliance with the NPDES General Permit No. xxxxxxx, or local NPDES permits, which ever is applicable.

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations

Contractor Signature: _____ Date: _____

Approval by the Engineer for the Annual Certification of Compliance

Engineer’s Findings

I, and/or personnel acting under my direction and supervision, have inspected the project site and the work described above and find as follows:

1. ☐ YES ☐ NO Stormwater pollution control measures are being implemented in accordance with the SWPPP approved for the project.

2. ☐ YES ☐ NO The project site and activities thereon are in compliance with the NPDES General Permit No. xxxxxxxx, or local NPDES permits, which ever is applicable.

When both 1 and 2 above are checked “yes”, the engineer must complete the annual certification below.

If either 1 or 2 above are checked “no”, the engineer must:

- File a notice of non-compliance within 30 days of identification of the noncompliance;
- Document follow up actions below;
- Notify the contractor; and
- Initiate corrective actions in accordance with the contract.

Is a Local Agency administering the project?

☐ Yes ☐ No

Engineer's Follow up Actions:

I, and or personnel acting under my direction and supervision, have reviewed and approved of the Contractor's Annual Certification of Compliance. However, the Contractor remains responsible and liable at all times for compliance with applicable requirements for which compliance is ultimately determined by the Regional Water Quality Control Board and/or the State Water Resources Control Board, and/or the EPA.

CERTIFICATION BY LOCAL AGENCY / PRIVATE ENTITY ENGINEER

_____ _____

Engineer's Name and Signature Date

CERTIFICATION BY OVERSIGHT ENGINEER (IF LOCAL AGENCY / PRIVATE ENTITY IS ADMINISTERING PROJECT)

_____ _____

OVERSIGHT ENGINEER'S NAME AND SIGNATURE

Annual Certification of Compliance Form

As applicable

Attachment N

Other Plans/Permits/Agreements

- RWQCB Waiver of Clean Water Act Section 401 Water Quality Certification.

Attachment O

Water Pollution Control Cost Breakdown

Project Name: _____

Contract Number: _____

ITEM	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	VALUE	AMOUNT
SS-3	Hydraulic Mulch	M^2			
SS-4	Hydroseeding	M^2			
SS-5	Soil Binders	M^2			
SS-6	Straw Mulch	M^2			
SS-7	Geotextiles	M^2			
SS-7	Plastic Covers	M^2			
SS-7	Erosion Control Blankets/Mats				
SS-8	Wood Mulching	M^2			
SS-9	Earth Dikes/Drainage Swales & Lined Ditches	M			
SS-10	Outlet Protection/Velocity Dissipation Devices	EA			
SS-11	Slope Drains	EA			
SS-12	Stream Bank Stabilization	LS			
SC-1	Silt Fence	M			
SC-2	Sediment/Desilting Basin	EA			
SC-3	Sediment Trap	EA			
SC-4	Check Dam	EA			
SC-5	Fiber Rolls	M			
SC-6	Gravel Bag Berm	M			
SC-7	Street Sweeping and Vacuuming	LS			
SC-8	Sandbag Barrier	M			
SC-9	Straw Bale Barrier	M			
SC-10	Storm Drain Inlet Protection – Type 1	EA			
SC-10	Storm Drain Inlet Protection – Type 2	EA			
SC-10	Storm Drain Inlet Protection – Type 3	EA			
WE-1	Wind Erosion Control	LS			
TC-1	Stabilized Construction Entrance/Exit	EA			

ITEM	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	VALUE	AMOUNT
TC-2	Stabilized Construction Roadway	EA			
TC-3	Entrance/Outlet Tire Wash	EA			
NS-1	Water Conservation Practices	LS			
NS-2	Dewatering Operations	EA			
NS-3	Paving and Grinding Operations	LS			
NS-4	Temporary Stream Crossing	EA			
NS-5	Clear Water Diversion	EA			
NS-6	Illicit Connection/Illegal Discharge Detection and Reporting	LS			
NS-7	Potable Water/Irrigation	LS			
NS-8	Vehicle and Equipment Cleaning	LS			
NS-9	Vehicle and Equipment Fueling	LS			
NS-10	Vehicle and Equipment Maintenance	LS			
NS-11	Pile Driving Operations	LS			
NS-12	Concrete Curing	LS			
NS-13	Material and Equipment Use Over Water	LS			
NS-14	Concrete Finishing	LS			
NS-15	Structure Demolition/Removal	LS			
WM-1	Material Delivery and Storage	LS			
WM-2	Material Use	LS			
WM-3	Stockpile Management	LS			
WM-4	Spill Prevention and Control	LS			
WM-5	Solid Waste Management	LS			
WM-6	Hazardous Waste Management	LS			
WM-7	Contaminated Soil Management	LS			
WM-8	Concrete Waste Management	LS			
WM-9	Sanitary/Septic Waste Management	LS			
WM-10	Liquid Waste Management	LS			
			TOTAL		

Attachment P

Notice of Completion of Construction / Notice of Termination

Local Agency / Private Entity Administered Projects:
The Notice of Termination (NOT) will be provided by the Local Agent

Attachment Q

Sampling Activity Log and Chain-of-Custody Forms

RAIN EVENT GENERAL INFORMATION				
Project Name				
Contract N°				
Contractor				
Sampler's Name				
Signature				
Date of Sampling				
Season (Check Applicable)	❒ Rainy		❒ Non-Rainy	
Storm Data	Storm Start Date & Time:		Storm Duration (hrs):	
	Time elapsed since last storm (Circle Applicable Units)	Min. Hr. Days	Approximate Rainfall Amount (mm)	

For rainfall information: http://cdec.water.ca.gov/weather.html or http://www.wrh.noaa.gov/wrhq/nwspage.html

SAMPLE LOG		
Sample Identification	**Sample Location**	**Sample Collection Date and Time**

Specific sample locations descriptions may include: 30m upstream from discharge at eastern boundary, runoff from northern waste storage area, downgradient of inlet 57 at kilometer post 36, etc.

FIELD ANALYSIS		
	Yes No	
Sample Identification	**Test**	**Result**

Attachment R

Pollutant Testing Guidance Table

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
Asphalt Products (Sections 37, 39, 92, 93, 94, and Special Provisions)	Hot Asphalt	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		
	Asphalt Emulsion				
	Liquid Asphalt (tack coat)				
	Cold Mix				
	Crumb Rubber	Yes – Black, solid material	Visually Observable - No Testing Required		
	Asphalt Concrete (Any Type)	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		
Cleaning Products	Acids	No	**pH** Acidity Anions (acetic acid, phosphoric acid, sulfuric acid, nitric acid, hydrogen chloride)	pH Meter Acidity Test Kit	EPA 150.1 (pH)
					SM 2310B (Acidity)
					EPA 300.0 (Anion)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
	Bleaches	No		Chlorine	SM 4500-CL G (Res. Chlorine)
	Detergents	Yes - Foam	Visually Observable - No Testing Required		
	TSP	No		Phosphate	EPA 365.3 (Phosphate)
	Solvents	No	**VOC**	None	EPA 601/602 or EPA 624 (VOC)
			SVOC	None	EPA 625 (SVOC)
Portland Concrete Cement & Masonry Products (Section 27, 28,	Portland Cement (PCC)	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Masonry products	No	**pH**	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
			Alkalinity		SM 2320 (Alkalinity)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
29, 40, 41, 42, 49, 50, 51, 53, 63, 65, 72, 73, 80, 81, 83, 90, and Special Provisions)	Sealant (Methyl Methacrylate - MMA)	No		None	EPA 625 (SVOC)
			Cobalt		EPA 200.8 (Metal)
			Zinc		
	Incinerator Bottom Ash Bottom Ash Steel Slag Foundry Sand Fly Ash Municipal Solid Waste	No	**Aluminum** **Calcium** **Vanadium** **Zinc**	Calcium Test	EPA 200.8 (Metal) EPA 200.7 (Calcium)
	Mortar	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Concrete Rinse Water	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Non-Pigmented Curing Compounds	No	Acidity	pH Meter Alkalinity or Acidity Test Kit	SM 2310B (Acidity)
			Alkalinity		SM 2320 (Alkalinity)
			pH		EPA 150.1 (pH)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
Landscaping and Other Products (Section 20, 24, and Special Provisions)	Aluminum Sulfate	No	Aluminum	TDS Meter Sulfate	EPA 200.8 (Metal)
					EPA 160.1 (TDS)
			Sulfate		EPA 300.0 (Sulfate)
	Sulfur-Elemental	No		Sulfate	EPA 300.0 (Sulfate)
	Fertilizers-Inorganic [4]	No		Nitrate	EPA 300.0 (Nitrate)
			Phosphate	Phosphate	EPA 365.3 (Phosphate)
			Organic Nitrogen	None	EPA 351.3 (TKN)
			Potassium	None	EPA 200.8 (Metal)
	Fertilizers-Organic	No	TOC	Nitrate	EPA 415.1 (TOC)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
					EPA 300.0 (Nitrate)
			Organic Nitrogen		EPA 351.3 (TKN)
			COD		EPA 410.4 (COD)
	Natural Earth (Sand, Gravel, and Topsoil)	Yes - Cloudiness and turbidity	Visually Observable - No Testing Required		
	Herbicide	No		None	Check lab for specific herbicide or pesticide
	Pesticide		**Pesticide**		
	Lime		Alkalinity	pH Meter Alkalinity or Acidity Test Kit	SM 2320 (Alkalinity)
			pH		EPA 150.1 (pH)
Painting Products (Section 12-3.08, 20-2.32, 50-1.05, 59, 91, and Special Provisions)	Paint	Yes	Visually Observable - No Testing Required		
	Paint Strippers	No		None	EPA 601/602 or EPA 624 (VOC)
			SVOC	None	EPA 625 (SVOC)
	Resins	No		None	EPA 410.4 (COD)
			SVOC		EPA 625 (SVOC)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
	Sealants	No		None	EPA 410.4 (COD)
	Solvents	No		None	EPA 410.4 (COD)
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
	Lacquers, Varnish, Enamels, and Turpentine	No		None	EPA 410.4 (COD)
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
	Thinners	No	VOC	None	EPA 601/602 or EPA 624 (VOC)
					EPA 410.4 (COD)
Portable Toilet Waste Products	Portable Toilet Waste	Yes	Visually Observable - No Testing Required		
Contaminated Soil [5]	Aerially Deposited Lead[3]	No		None	EPA 200.8 (Metal)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
	Petroleum	Yes – Rainbow Surface Sheen and Odor	Visually Observable - No Testing Required		
	Mining or Industrial Waste, etc.	No		Contaminant Specific – Check with laboratory	Contaminant Specific – Check with laboratory
Line Flushing Products	Chlorinated Water	No		Chlorine	SM 4500-CL G (Res. Chlorine)
Adhesives	Adhesives	No	COD	None	EPA 410.4 (COD)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
				Phenol	EPA 420.1 (Phenol)
			SVOC	None	EPA 625 (SVOC)
Dust Palliative Products (Section 18)	Salts (Magnesium Chloride, Calcium Chloride, and Natural Brines)	No	Chloride	Chloride	EPA 300.0 (Chloride)
				TDS Meter	EPA 160.1 (TDS)
			Cations (Sodium, Magnesium, Calcium)	None	EPA 200.7 (Cations)
Vehicle	Antifreeze and Other Vehicle Fluids	Yes - Colored Liquid	Visually Observable - No Testing Required		
	Batteries	No	Sulfuric Acid	None	EPA 300.0 (Sulfate)
			Lead	None	EPA 200.8 (Metal)
			pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
	Fuels, Oils, Lubricants	Yes - Rainbow Surface Sheen and Odor	Visually Observable - No Testing Required		

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
Soil Amendment/Stabilization Products	Polymer/Copolymer [6, 7]	No		None	EPA 351.3 (TKN)
			BOD	None	EPA 405.1 (BOD)
			COD	None	EPA 410.4 (COD)
			DOC	None	EPA 415.1 (DOC)
			Nitrate	Nitrate	EPA 300.0 (Nitrate)
			Sulfate	Sulfate	EPA 300.0 (Sulfate)
			Nickel	None	EPA 200.8 (Metal)
	Straw/Mulch	Yes - Solids	Visually Observable - No Testing Required		
	Lignin Sulfonate	No	Alkalinity	Alkalinity	SM 2320 (Alkalinity)
				TDS Meter	EPA 160.1 (TDS)
	Psyllium	No	COD	None	EPA 410.4 (COD)
					EPA 415.1 (TOC)
	Guar/Plant Gums	No	COD	None	EPA 410.4 (COD)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
					EPA 415.1 (TOC)
			Nickel		EPA 200.8 (Metal)
	Gypsum	No	pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
			Calcium	Calcium	EPA 200.7 (Calcium)
				Sulfate	EPA 300.0 (Sulfate)
			Aluminum	None	EPA 200.8 (Metal)
			Barium		
			Manganese		
			Vanadium		
Treated Wood Products (Section 58, 80-3.01B(2), and Special Provisions)	Ammoniacal-Copper-Zinc-Arsenate (ACZA) Copper-Chromium-Arsenic (CCA) Ammoniacal-Copper-Arsenate (ACA) Copper Naphthenate	No	Arsenic	Total Chromium	EPA 200.8 (Metal)
			Total Chromium		
			Zinc		

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
	Creosote	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		

Notes:

1. 1 If specific pollutant is known, analyze only for that specific pollutant. See MSDS to verify.
2. For each construction material, test for one of the pollutant indicators. Bolded pollutant indicates lowest analysis cost or best indicator. However, the composition of the specific construction material, if known, is the first criterion for selecting which analysis to use.
3. See www.hach.com, www.lamotte.com, www.ysi.com and www.chemetrics.com for some of the test kits
4. If the type of inorganic fertilizer is unknown, analyze for all pollutant indicators listed.
5. Only if special handling requirements are required in the Standard Special Provisions for aerially deposited lead (ADL)
6. If used with a dye or fiber matrix, it is considered visually observable and no testing is required.
7. Based upon research conducted by Caltrans, the following copolymers/polymers do not discharge pollutants and water quality sampling and analysis is **not** required: Super Tak™, M-Binder™, Fish Stik™, Pro40dc™, Fisch-Bond™, and Soil Master WR™.

ACRONYMS:

BOD – Biochemical Oxygen Demand
COD – Chemical Oxygen Demand
DOC – Dissolved Organic Carbon
EPA – Environmental Protection Agency
HACH – Worldwide company that provides advanced analytical systems and technical support for water quality testing.
SM – Standard Method
SVOC – Semi-Volatile Organic Compounds
TDS – Total Dissolved Solids
TKN – Total Kjeldahl Nitrogen
TOC – Total Organic Carbon
TSP – Tri-Sodium Phosphate
VOC - Volatile Organic Compounds

REFERENCES:

Construction Storm Water Sampling and Analysis Guidance Document, California Stormwater Quality Task Force, October 2001.
Environmental Impact of Construction and Repair Materials on Surface and Ground Waters, Report 448, National Cooperative Highway Research Program, 2001
Soil Stabilization for Temporary Slopes, Environmental Programs, California Department of Transportation, October 1, 1999.
Statewide Storm Water Management Plan, Division of Environmental Analysis, California Department of Transportation, April 2002.
Statewide Storm Water Quality Practice Guidelines, Environmental Program, California Department of Transportation, August 2000.
Soil Stabilization for Temporary Slopes and District 7 Erosion Control Pilot Study, June 2000.
Stormwater Monitoring Protocols, Guidance Manual, California Department of Transportation, May 2000.

Attachment S

Discharge Reporting Log

RAIN EVENT GENERAL INFORMATION				
Project Name				
Contract N^{o}				
Contractor				
Sampler's Name				
Signature				
Date of Sampling				
Season (Check Applicable)	❒ Rainy		❒ Non-Rainy	
Storm Data	Storm Start Date & Time:		Storm Duration (hrs):	
	Time elapsed since last storm (Circle Applicable Units)	Min. Hr. Days	Approximate Rainfall Amount (mm)	

SAMPLE LOG		
Sample Identification	**Sample Location**	**Sample Collection Date and Time**

Specific sample locations descriptions may include: 30m upstream from discharge at eastern boundary, runoff from northern waste storage area, downgradient of inlet 57 at kilometer post 36, etc.

FIELD ANALYSIS		
	Yes No	
Sample Identification	**Test**	**Result**

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the

information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Contractor's Signature	Date
Contractor's Name and Title	Contractor's Telephone Number

Appendix A

BMP FACT SHEETS ARE ON HOLD

Erosion Control
EC-1 to EC-6

Tracking Control
TC-1 to TC-3, SE-5

Non-stormwater
NS-1, NS-3, NS-6 to NS-12

Sediment Control
SE-1 to SE-5

Waste Mgmt…and MTLS Pol…..
WM-1 to WM-10

See Appendix A attachments

Appendix B
Post-Construction Control Practices

September 2008

TABLE OF CONTENTS

1.0 INTRODUCTION
2.0 POST-CONSTRUCTIONCONTROLPRACTICES
3.0 COMPLIANCE REVIEW METHODS
4.0 PROJECT PRIORITY STATUS AND INSPECTION FREQUENCY
5.0 PROJECT REVIEW CRITERIA
6.0 PROJECT PERFORMANCE REPORTING

LIST OF FIGURES

FIGURE 1 DESIGNATION OF RAINY SEASONS

LIST OF TABLES

TABLE 1 INSPECTION PARAMETERS BY PRIORITY STATUS

TABLE 2 RAINFALL AREA DESIGNATIONS

ATTACHMENTS

ATTACHMENT 1 - Project Information Summary Sheets and Inspection Checklist for rainy season

ATTACHMENT 2 - Project Information Summary Sheets and Inspection Checklist for non-rainy season

ATTACHMENT 3 - Appeal of Inspection

1.0 INTRODUCTION

The Annual Construction Compliance Review Plan (ACCRP) describes the program implemented by the Department for storm water compliance inspections at construction sites for the period of January 1, 2009 to (Date TBD (later)). This ACCRP has been prepared in accordance with the Project Storm Water Management Plan (PSWMP) to comply with the self-auditing and monitoring requirements of the permit. The ACCRP provides the Department and the State Water Resources Control Board (SWRCB) with information necessary to ensure that an appropriate level of water pollution control is being achieved on construction project sites.

2.0 COMPLIANCE REVIEW OBJECTIVES

Activities will focus on achieving the following objectives:

Continue to evaluate the compliance of the construction project with long term BMPs and requirements of the permit Storm Water Pollution Prevention Plan (SWPPP).
Report compliance status to Department management.
Implement a new compliance ratings system designed to use more objective criteria when describing the project's level of compliance.
Implement a new appeal process to resolve disputed ratings.
Monitor the use of the new ratings system, appeals process, and inspection forms to determine whether the new procedures reduce disputes between Contractors, compliance inspectors, and Department staff.

3.0 COMPLIANCE REVIEW METHODS

The Department will continue to use the following proven methods to achieve the compliance review objectives:

- Update the Project Information Summary Sheets and Compliance Inspection Checklists to incorporate any new requirements in NPDES permit(s), SWMP, and Storm Water Quality Handbooks (Handbooks). Attachments 1 and 2 provide inspection forms to be utilized in the Rainy and Non-Rainy Seasons, respectively.
- Use the updated checklists to inspect and document the compliance status of selected construction projects statewide.
- Review compliance results with Engineers or designated inspectors, at the time of the inspection.
- Analyze implemented BMPs for positive and negative trends.
- Prepare separate performance reports for each of the two review cycles (generally corresponding to the rainy season and the non-rainy season) that summarize area-wide results for the cycle.
- Prepare a year-end performance report that summarizes project-wide

results for the two review cycles.

4.0 PROJECT PRIORITY STATUS AND INSPECTION FREQUENCY

Once a project has been selected for inspection, it is assigned a priority status establishing inspection team size and inspection frequency. Table 1 indicates the planned inspection frequency by priority status for the rainy and non-rainy seasons. Rainy season dates are identified in Figure 1.

Priority Status Criteria: The initial priority status is determined by evaluating specific project parameters that impact the level of water pollution control requirements on the construction site: size of disturbed soil area, potential for polluting receiving waters, and designated rainfall area as shown in Figure 1 and defined in Table 2 of this report.

Initial priority status is determined regardless of the current season (rainy or non-rainy) using the following criteria:

- Priority 1 status is assigned to a SWPPP construction project with a high potential for storm water discharge into a receiving water, or any potential for storm water discharge into a receiving water that is on the EPA 303(d) list as an impaired water body. In general, this criterion encompasses projects with greater than 1 acre of soil disturbance, projects located within ¼ mile of a water body, all projects located within the Central Lahontan region, and SWPPP projects in Rainfall Areas 1 or 6.
- Priority 2 status is given to a SWPPP construction project not designated with a Priority 1 status that is located in Rainfall Areas 2, 3, 4, or 5.
- Priority 3 status is assigned to all remaining SWPPP construction projects initially selected for compliance inspection.

Inspection Parameters: The Department may adjust the project's priority status based on the results of compliance inspections, as outlined in Table 1.

Table 1 Inspection Parameters by Priority Status

Project Priority Status	Inspection Team Size	Rainfall Areas	Routine Inspection Frequency	Follow-up Inspection by Compliance Rating	Priority Status Adjustment Criteria
	Rating		Frequency *		

1	1	2, 3, 4, and 5	**Non-Rainy**	Every 2 months	1	Routine inspection	
					2	Routine inspection, or as determined by inspector	Following three consecutive rainy season inspections with a 1 or 2 rating, a project may be modified to Priority 2 status.
					3	Within two weeks	
					4	Within one week	
			Rainy	Every month			
	1 & 6		**Non-Rainy**	Every 1½ months			
			Rainy	Every month			
2	1	2, 3, 4, and 5	**Non-Rainy**	Every 3 months			Following two 3 or 4 ratings within a six-month period, a project may be modified to Priority 1 status. Following an uncontested Notice of Violation from a Regional Water Quality Control Board, the project will be modified to a priority 1 status.
			Rainy	Every 2 ½ months			
	1 & 6		**Non-Rainy**	Every 2 months			
			Rainy	Every 2 month			
3	1	2, 3, 4, and 5	**Non-Rainy**	Every 3 months			
			Rainy	Every 3 months			

1 & 6	**Non-Rainy**	Every 3 months
	Rainy	Every 3 months

* These frequencies are approximate time periods

6.0 PROJECT REVIEW CRITERIA

The project will be inspected in accordance with the NPDES permit (CAS000003), based on the criteria established in Sections 4 and 5 of this plan. Two inspection checklists have been developed to incorporate the applicable BMP requirements for inspections performed in either the Non-Rainy Season or the Rainy Season. Copies of the inspection checklists are provided in Attachments (later).

The results of each inspection is recorded on the appropriate checklist with a cover page that summarizes the findings of the inspection. This project information summarizes the overall effectiveness of BMPs on the project and critical areas in need of attention. Inspectors assign a numeric rating that identifies overall project compliance and may be used to adjust project priority status, if necessary. The rating represents a composite assessment of the following factors: level of construction activity, potential for discharges, extent of discharges observed, and implementation of BMPs.

Compliance Rating Criteria

1 Rating

There are no significant deficiencies that require correction. Criteria meeting this rating include:

- The approved SWPPP appropriately addresses all categories of BMPs and is applicable to the current project operations and season.
- Appropriate treatment control provided for dewatering operations.
- Non-storm water and waste management BMPs properly implemented.
- Sediment tracking is minimal to non-existent.
- No evidence of wind erosion.
- All temporary soil stabilization BMPs implemented in accordance with the project's SWPPP requirements.
- Sediment controls are implemented in accordance with the approved SWPPP.

2 Rating

The project has minor deficiencies. The inspector will list each of the minor deficiencies and can include corrective actions to be taken prior to the next scheduled inspection. Minor deficiencies include the following:

- Site inspections by project staff are not being conducted in accordance with expected frequencies
- Approved SWPPP does not reflect current operations and an amendment is recommended.
- Any non storm water or waste management BMPs improperly maintained
- Soil stabilization or sediment controls are not properly maintained.
- Evidence of active wind erosion on unstabilized slopes/stock piles.
- Minor tracking less than approximately 50 feet from project entrance or exit points.

3 Rating

Excessive **minor** deficiencies and/or **major** deficiencies are encountered. This rating will be applied if either a total of six or more minor deficiencies requiring correction are observed and/or **Major** deficiencies exist on the project.

Major deficiencies are defined as follows:

- Approved SWPPP does not reflect current operations and amending of the document is past due or needed ASAP.
- Hazardous materials or waste is stored within the project without implementation of BMPs.
- Any discharge of sediment or other deleterious substances resulting from dewatering operations conducted without implementation of required BMPs for dewatering.
- Sediment tracking from the project construction equipment or vehicles approximately 50 feet from project entrances or exits.
- Expansion of the active disturbed soil area limit without RE written approval.
- Soil stabilization and sediment controls are not installed in accordance with applicable construction site best management practices (BMPs) manual.
- Dust from construction visibly blowing off the site and into drainage conveyances or adjacent water bodies.

4 Rating

There are **critical** deficiencies that would likely result in a violation of the permit if a storm water runoff event were to occur. The inspector will note the deficiencies and make recommendations for corrective action. Critical deficiencies are defined as follows:

- No Approved SWPPP
- Any observed discharge of storm water or non-storm water from the project that, in the judgment of the inspector, is generated by the construction activity, and is uncontrolled.

- Absence of linear barriers and/or perimeter controls required by the applicable BMP implementation manual.
- There are identified storm water inlets or receiving waters within or adjacent to the project site in close proximity to DSAs without control measures in place that pose an immediate threat of untreated storm water discharges.
- Working in an active stream channel or other water body without proper implementation of required BMPs.
- No corrective action taken for potential hazardous materials / waste deficiencies noted in (3) above.
- Sampling and analysis plan (SAP) requirements have not been properly implemented.

5.0 PROJECT PERFORMANCE REPORTING

The Department will prepare a performance report that presents the area wide results of the construction project compliance inspections.

The performance report will include:

A description of the projects that were inspected during the cycle.
An assessment of overall compliance, including a compilation of all ratings received during the cycle, a summary of any items receiving Notice of Violations or observed uncontrolled discharges, an evaluation of individual BMP implementation and effectiveness, and a comparison with the results for the same period from previous fiscal years
A discussion of BMP implementation trends, including observations of good storm water pollution control practices and challenges encountered during project inspections.
A list of ongoing challenges to the construction storm water control program and possible solutions to the challenges.
An expanded inspection log that provides the entire compliance review ratings history of each project inspected during the review cycle.

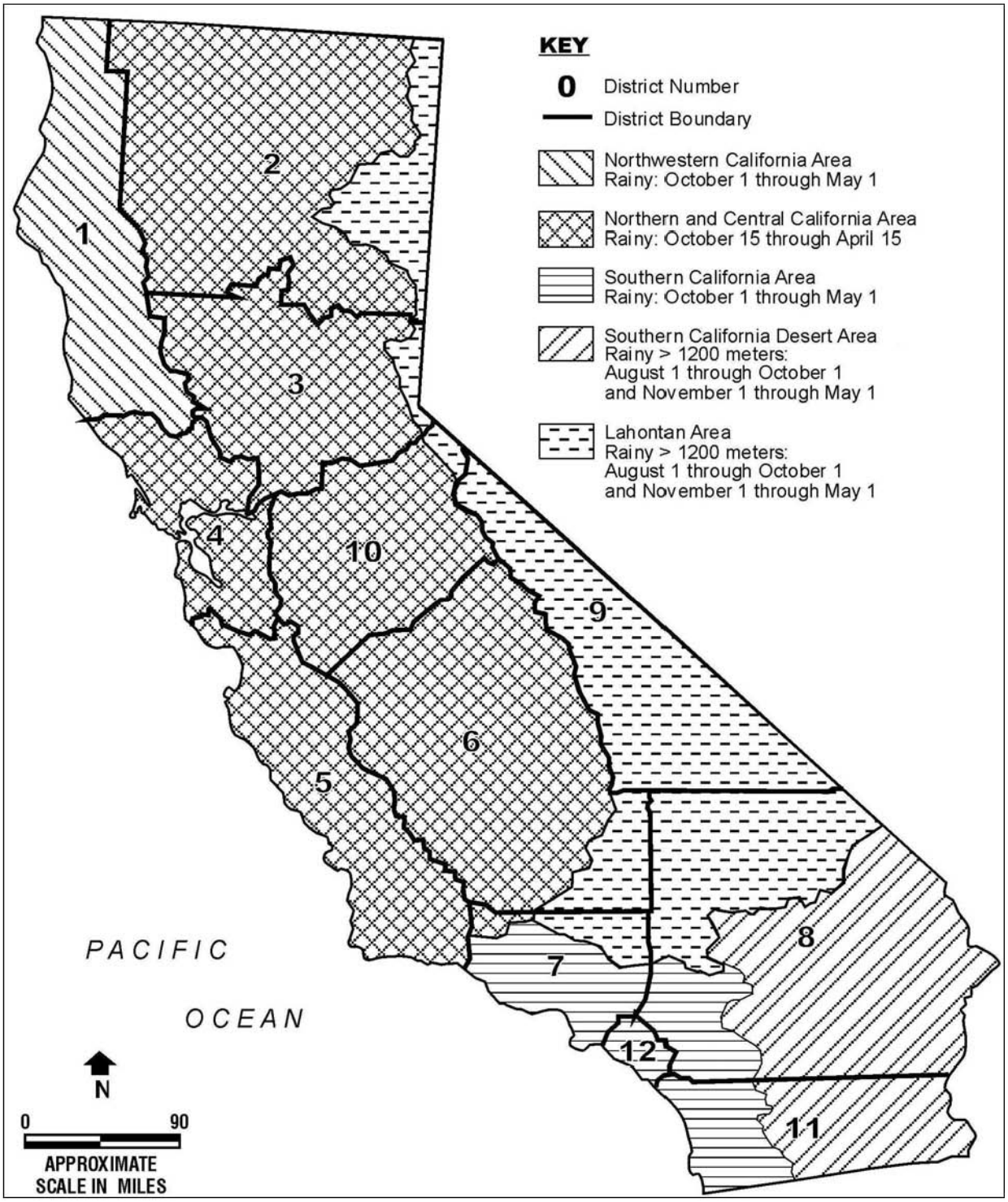


Figure 1 Designation of Rainy Seasons

Table 2 Rainfall Area Designations

RAINFALL AREA		DESCRIPTION
	Applicability	**Elevation**
1	District 1 within the following areas: all of Del Norte and Humboldt Counties and within 20 miles of the coast in Mendocino County	≤1200m
2	District 1 (except within Area 1) District 2 District 3 District 4 District 5	<250m
3	District 1 (except within Area 1) District 2 District 3 District 4 District 5	250m–1200m
4	District 6 within the Central Valley RWQCB jurisdiction District 7 within the Central Coast, Los Angeles, and Central Valley RWQCB jurisdictions District 8 within the Santa Ana and San Diego RWQCB jurisdictions District 10 District 11 within the San Diego RWQCB jurisdiction District 12	<500m
5	District 6 within the Central Valley RWQCB jurisdiction District 7 within the Central Coast, Los Angeles, and Central Valley RWQCB jurisdictions District 8 within the Santa Ana and San Diego RWQCB jurisdictions District 10 District 11 within the San Diego RWQCB jurisdiction District 12	500m–1200m
6	Statewide	>1200m

m – meters
RWQCB – Regional Water Quality Control Board

Attachment 1

Project Information Summary Sheet

and

Compliance Inspection Checklist for the Rainy Season

SWPPP RAINY SEASON

CONSTRUCTION INSPECTION FORM

PROJECT INFORMATION SUMMARY SHEET **Rainfall Area Designation -**

Contract No: RE:

Co./ Rte / PM: Phone:

Project Description : Fax:

SW Inspector(s) :

Estimate Disturbed Soil Area (DSA) _____ Acres **Contractor:**

SWPPP Approved? **YES** **NO** WPCM:

Last Construction Site Inspection conducted by Construction Contractor on:

Last Construction Site Inspection conducted by Department personnel on:

Other Permits: Date of Inspection:

Inspection Participant(s): CSWC Superintendent **Storm Inspection Type:**

Other(s)–Name &Title: **None Pre During Post**

Inspection Description: Initial Revisit **Last Inspection Rating:**

PROJECT COMPLIANCE RATING **(See Rating Guidelinesfor detailed construction compliance criteria)**

1 FULL COMPLIANCE: The project has no significant deficiencies that require correction. Anticipated revisit date: _____

2 MINOR DEFICIENCIES: The project has minor deficiencies. There are no major deficiencies observed. Anticipated revisit date: _____

3 MAJOR DEFICIENCIES AND / OR

MINOR DEFICIENCIES: Excessive minor deficiencies and or major deficiencies are encountered. Total of six or more minor deficiencies and or one or more major deficiencies are observed. **Revisit within two (2) weeks**. Anticipated revisit date: _____

4 CRITICAL DEFICIENCIES: There are critical deficiencies that would likely result in a violation of the permit if there were a storm water runoff event to occur. **Revisit within one (1) week**. Anticipated revisit date: _____

UNCONTROLLED DISCHARGE OBSERVED; NOTIFY INSPECTOR'S MANAGER, R.E., AND DISTRICT CONSTRUCTION STORM WATER COORDINATOR ASSISTANCE RECOMMENDED

INNOVATIVE BMP USED (provide description below in comments)

SW Inspector Comments:

SWPPP Rainy Season - COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

1. SOIL STABILIZATION PRACTICES

For **NON-ACTIVE DSAs (ALL AREAS)**: Are soil stabilization measures properly implemented throughout all non-active DSAs?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation

For **ACTIVE DSAs (AREA 3 ONLY)** with a slope rate > 1:2 and a slope length > 15.0 m (50 ft): Are soil stabilization measures properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation

For **ACTIVE DSAs (AREAS 1 AND 6 ONLY)** with a slope rate > 1:20 and a slope length > 3.0 m (10 ft): Are soil stabilization measures properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation

For required DSAs: Are fiber rolls or gravel bag berms properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation

Are conveyances, top of slope diversions, and discharge points for concentrated storm water flows protected with additional BMPs, if needed, to reduce erosion?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation

For inspection during or immediately following a rain event, are the BMPs implemented at the site effective in controlling erosion?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Erosion Observed: None Minor Localized Widespread Major

Number of BMPs Observed: ***No. deficient due to:**
(1)_____ **(2)**_____ **(3)**_____ **(4)**_____ **(5)**_____

Comments / BMPs Observed:

Approved Soil Stabilization Measure(s): (A) Hydraulic Mulch, (B) Hydroseeding, (C) Soil Binders, (D) Straw Mulch, (E) Geotextiles, (F) Final Erosion Control Per Contract Plans & Specifications

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

SWPPP Rainy Season - COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

2. SEDIMENT CONTROL PRACTICES

For DSAs with a slope rate > 1:20 and a slope length > 3.0 m (10 ft). Are linear sediment barriers properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Are sediment controls used in flow paths/conveyances properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Desilting Basins Only -For **ACTIVE AND NON-ACTIVE DSAs (AREAS 1 AND 6 ONLY)** with slope rate >1:20: and a slope length > 3.0 m (10 ft). Are desilting basins properly implemented in addition to linear sediment barriers?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Are sediment controls used in flow paths/conveyances properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Desilting Basins Only -For **ACTIVE** DSAs **(AREAS 2 ,3 ,4 , AND 5 ONLY)** with a slope rate > 1:2 and a slope length > 15.0 m (50 ft). Are desilting basins properly implemented in addition to linear sediment barriers?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Are desilting basins properly implemented in addition to other sediment controls?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Inspection performed during or immediately following a rain event, are the implemented BMPs effective in controlling sediment discharge? **YES** **NO**

Further Explanation:

Sediment Discharged: None Minor Localized Widespread Major

Number of BMPs observed: ***No. deficient due to:**
(1)_____ **(2)**_____ **(3)**_____ **(4)**_____ **(5)**_____

Comments / BMPs Observed:

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

SWPPP Rainy Season - COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

3. WIND EROSION CONTROL

Are wind erosion control BMPs properly implemented throughout the construction site?

YES NO Deficiencies: No Significant Minor Major Critical

For active wind during time of inspection, are implemented BMPs effective in controlling wind erosion?

YES NO Deficiencies: No Significant Minor Major Critical

Number of BMPs observed: ***No. deficient due to:**
(1)_____ (2)_____ (3)_____ (4)_____ (5)_____

Comments / BMPs Observed:

Approved wind erosion control: (A) Hydraulic Mulch, (B) Hydroseeding, (C) Soil Binders, (D) Straw Mulch,
(E) Geotextiles, (F) Final Erosion Control Per the Plans and Specifications

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

4. TRACKING CONTROL PRACTICES

Project Related Non-Project Related

Are sediment tracking control BMPs properly implemented throughout the construction site?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For active construction during inspection, are implemented BMPs effective in controlling sediment tracking?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Number of BMPs observed: ***No. deficient due to:**
(1)_____ (2)_____ (3)_____ (4)_____ (5)_____

Further Explanation:

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

SWPPP Rainy Season - COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

5. NON-STORM WATER CONTROL &

6. WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL

Are the following BMPs properly implemented where required?

Temporary Stream Crossing **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Clear Water Diversion **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Spill Prevention and Control **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Solid Waste Management **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Hazardous Waste Management **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Contaminated Soil Management **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Concrete Waste Management **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Sanitary/Septic Waste Management **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Liquid Waste Management **YES NO** **Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Materials Handling (Material Delivery & Storage and Material Use)

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Vehicle and Equipment Operations (Cleaning, Fueling, and Maintenance)

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Paving Operation **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Stockpile Management **Deficiencies: No Significant Minor Major Critical**

Further Explanation:

SWPPP Rainy Season - COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

5. NON-STORM WATER CONTROL &

6. WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL (Continued)

Are the following BMPs properly implemented where required?

Water Conservation **Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Potable Water/Irrigation **Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Dewatering Operation **Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Illicit Discharge/Illegal Dumping Observed? **YES NO**

Further Explanation:

Pile Driving Operations **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Concrete Curing **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Material and Equipment Use Over Water **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Concrete Finishing **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Structure Demolition/Removal Over or Adjacent to Water

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Were there any Non-Storm water discharges observed? **YES NO**

If Yes, Were implemented BMPs effective in controlling water pollution?

N /A Deficiencies: No Significant Minor Major Critical l

Further Explanation:

Number of BMPs observed: ***No. deficient due to:**
(1)_____ (2)_____ (3)_____ (4)_____ (5)_____

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

SWPPP Rainy Season - COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

6. Project File Review

Documentation File Review Checklist:

Yes No N/A Documentation in Project Files:

All Contractor Inspection Reports as of 2 weeks prior to today's inspection
Last Inspection report dated:
Signed/Dated SWPPP (by Contractor in SECTION 100.1).
Approved Amendments for variances observed during inspection
Annual Certification(s)
Active DSAs comply with limits in Special Provisions?
If No, is RE approval of DSA modification on file? Date of approval:
Sampling and Analysis Plan

Dewatering:

Does Special Provisions and approved SWPPP address dewatering if applicable for project?
If yes, does plan address:

Discharge Points?
BMPs/Control Measures?
Monitoring Protocols?

Attachment 2

Project Information Summary Sheet

and

Compliance Inspection Checklist for the Non-Rainy Season

SWPPP NON-RAINY SEASON

CONSTRUCTION INSPECTION FORM

PROJECT INFORMATION SUMMARY SHEET **Rainfall Area Designation -**

Contract No.: RE:

CO. / RTE / PM.: Phone:

Project Description : Fax:

SW Inspector(s) :

Estimate Disturbed Soil Area (DSA) _____ Acres **Contractor:**

SWPPP Approved? **YES** **NO** WPCM:

Last Construction Site Inspection conducted by Construction Contractor on :

Last Construction Site Inspection conducted by Department personnel on :

Other Permits: **Date of Inspection:**

Inspection Participant(s): RE CSWC Superintendent **Storm Inspection Type: None Pre During Post**

Other(s)–Name/Title:

Inspection Description: Initial Revisit **Last Inspection Rating :**

PROJECT COMPLIANCE RATING **(See Rating Guidelines for detailed construction compliance criteria)**

1 FULL COMPLIANCE: The project has no significant deficiencies that require correction. Anticipated revisit date: _____

2 MINOR DEFICIENCIES: The project has minor deficiencies. There are no major deficiencies observed. Anticipated revisit date: _____ **3 MAJOR DEFICIENCIES AND / OR MINOR DEFICIENCIES:** Excessive minor deficiencies and or major deficiencies are encountered. Total of six or more minor deficiencies and or one or more major deficiencies are observed. **Revisit within two (2) weeks**. Anticipated revisit date: _____

4 CRITICAL DEFICIENCIES: There are critical deficiencies that would likely result in a violation of the permit if there were a storm water runoff event to occur. **Revisit within one (1) week**. Anticipated revisit date: _____

UNCONTROLLED DISCHARGE OBSERVED; NOTIFY INSPECTOR'S MANAGER, R.E., AND DISTRICT CONSTRUCTION STORM WATER COORDINATOR ASSISTANCE RECOMMENDED

INNOVATIVE BMP USED (provide description below in comments)

SW Inspector Comments:

SWPPP NON-RAINY SEASON- COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

1. SOIL STABILIZATION PRACTICES

For all DSAs: Are soil stabilization measures properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For all **NON-ACTIVE DSAs**: **(AREAS 1 AND 6 ONLY)** Are soil stabilization measures properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For required DSAs: Are fiber rolls or gravel bag berms properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Are conveyances, top of slope diversions, and discharge points for concentrated storm water flows protected with additional BMPs, if needed, to reduce erosion?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For inspection during or immediately following a rain event, are the BMPs implemented at the site effective in controlling erosion?

YES NO

Further Explanation:

Erosion Observed: None Minor Localized Widespread Major

Number of BMPs observed: ***No. deficiencies due to:**

(1)_____ **(2)**_____ **(3)**_____ **(4)**_____ **(5)**_____

Comments / BMPs Observed :

Approved Soil Stabilization Measure(s): (A) Hydraulic Mulch, (B) Hydroseeding, (C) Soil Binders, (D) Straw Mulch, (E) Geotextiles, (F) Final Erosion Control Per Contract Plans & Specifications

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

SWPPP NON-RAINY SEASON- COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

2. SEDIMENT CONTROL PRACTICES

For DSAs **(AREAS 1 and 6 ONLY)** with a slope rate > 1:20 and a slope length > 3.0 m (10 ft): Are linear sediment barriers properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For **NON-ACTIVE DSAs (AREAS 3 AND 5 ONLY)** with a slope rate > 1:2 and a slope length > 3.0 m (10 ft): Are linear sediment barriers properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For **ACTIVE AND NON-ACTIVE DSAs (AREA 6 ONLY & DESILTING BASIN ONLY)** with slope rate > 1:2 and a slope length > 3.0 m (10 ft): Are desilting basins properly implemented in addition to linear sediment barriers?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For inspection performed during or immediately following a rain event, are the implemented BMPs effective in controlling sediment discharge?

YES NO

Further Explanation:

Sediment Discharged: None Minor Localized Widespread Major

Number of BMPs observed:

***No. deficiencies due to:**
(1)_____ (2)_____ (3)_____ (4)_____ (5)_____

Comments / BMPs Observed :

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

3. WIND EROSION CONTROL

Are wind erosion control BMPs properly implemented throughout the construction site?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For active wind during time of inspection, are implemented BMPs effective in controlling wind erosion?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Number of BMPs observed:

***No. deficiencies due to:**
(1)_____ (2)_____ (3)_____ (4)_____ (5)_____

Further Explanation:

Approved wind erosion control: (A) Hydraulic Mulch, (B) Hydroseeding, (C) Soil Binders, (D) Straw Mulch,
(E) Geotextiles, (F) Final Erosion Control Per the Plans and Specifications

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

SWPPP NON-RAINY SEASON- COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

4. TRACKING CONTROL PRACTICES

Project Related Non- Project Related

Are sediment tracking control BMPs properly implemented throughout the construction site?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For active construction during inspection, are implemented BMPs effective in controlling sediment tracking?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Number of BMPs observed: ***No. deficiencies due to:**
(1)_____ (2)_____ (3)_____ (4)_____ (5)_____

Further Explanation:

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

5. NON-STORM WATER CONTROL &

6. WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL

Are the following BMPs properly implemented where required?
Temporary Stream Crossing

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Clear Water Diversion

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Spill Prevention and Control

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Solid Waste Management

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Hazardous Waste Management

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

SWPPP NON-RAINY SEASON- COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

5. NON-STORM WATER CONTROL &

6. WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL

Are the following BMPs properly implemented where required?
(Continued)

Contaminated Soil Management

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Concrete Waste Management

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Sanitary/Septic Waste Management

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Liquid Waste Management

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Materials Handling (Material Delivery & Storage and Material Use)

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Vehicle and Equipment Operations (Cleaning, Fueling, and Maintenance)

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Paving Operations

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Stockpile Management

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Water Conservation

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

SWPPP NON-RAINY SEASON- COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

5. NON-STORM WATER CONTROL &

6. WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL

Are the following BMPs properly implemented where required?
(Continued)
Potable Water/Irrigation

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Dewatering Operations

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Illicit Discharge/Illegal Dumping Observed?

YES NO

Further Explanation:

Pile Driving Operations **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Concrete Curing **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Material and Equipment Use Over Water **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Concrete Finishing **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Structure Demolition/Removal Over or Adjacent to Water

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Were there any Non-Storm water discharges observed?

YES NO

If Yes, were implemented BMPs effective in controlling water pollution?

N /A YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Number of BMPs observed: ***No. deficiencies due to:**
(1)_____ **(2)**_____ **(3)**_____ **(4)**_____ **(5)**_____

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

SWPPP NON-RAINY SEASON- COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

6. Project File Review

Documentation File Review Checklist:

Yes No N/A Documentation in Project Files:

All Contractor Inspection Reports as of 2 weeks prior to today's inspection
Last Inspection report dated:
Signed/Dated
Approved Amendments for variances observed during inspection
Annual Certification(s)
Active DSAs comply with limits in Special Provisions?
If No, is RE approval of DSA modification on file? Date of approval:
Sampling and Analysis Plan

Dewatering:

Does Special Provisions and approved SWPPP address dewatering if applicable for project?
If Yes, does plan address:
Discharge Points?
BMPs/Control Measures?
Monitoring Protocols?

Attachments (later)

ATTACHMENT 8

CONCEPTUAL MITIGATION PLAN

BEACON SOLAR ENERGY PROJECT
MITIGATION PLAN
FOR
IMPACTS TO JURISDICTIONAL WATERS OF THE STATE OF CALIFORNIA
KERN COUNTY, CALIFORNIA

Prepared for:

Beacon Solar, LLC
700 Universe Boulevard
Juno Beach, Florida 33408

Prepared by:

EDAW, Inc.
1420 Kettner Boulevard, Suite 500
San Diego, California 92101
Phone: (619) 233-1454
Fax: (619) 233-0952

July 2008

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CHAPTER 1
INTRODUCTION

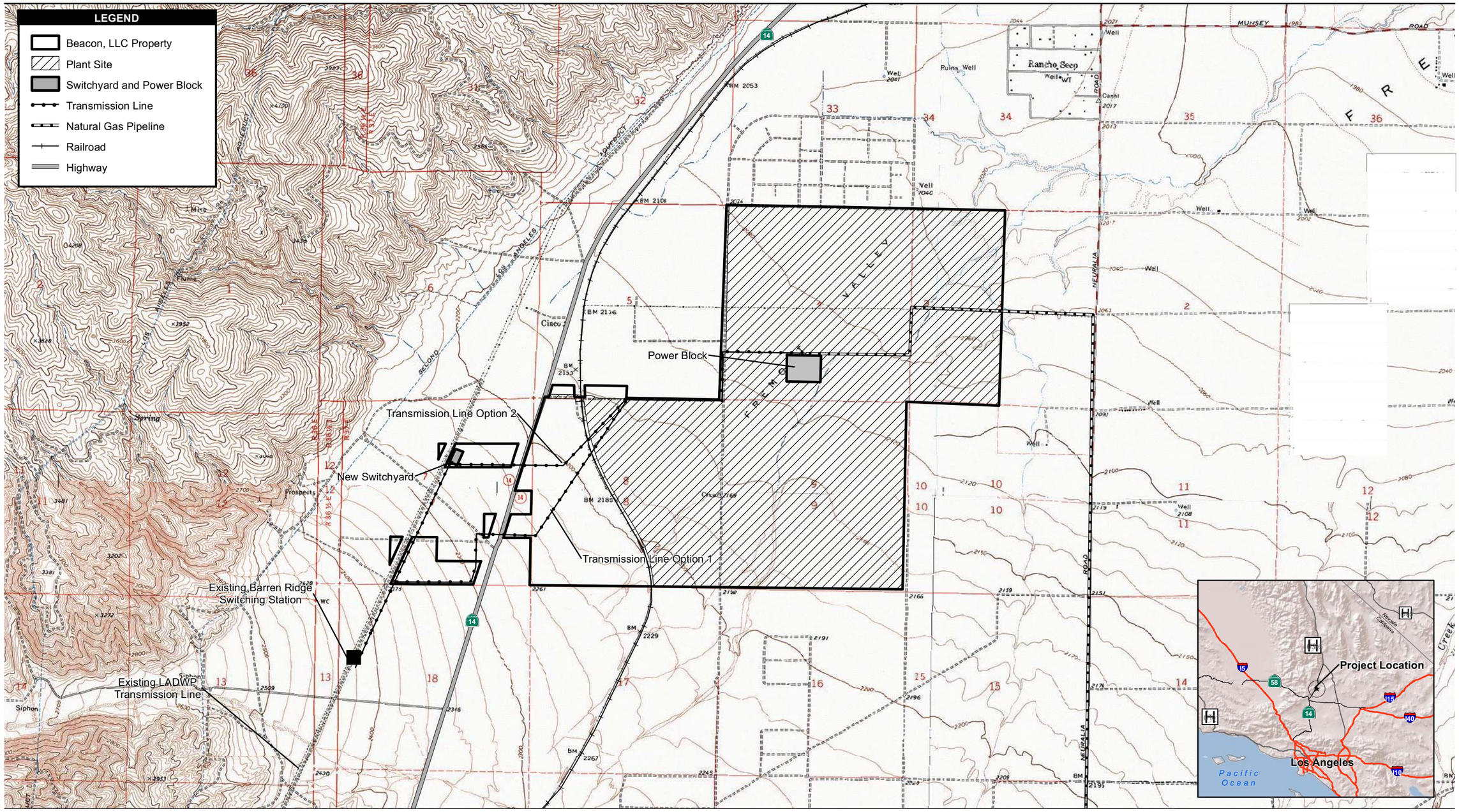
1.1 PROJECT BACKGROUND

This mitigation plan has been prepared to address permanent impacts to jurisdictional waters of the State of California that would result from the Beacon Solar Energy Project (BSEP or Project) proposed by Beacon Solar, LLC (Beacon Solar). The Project property is located approximately four miles north-northwest of California City, approximately 15 miles north of the Town of Mojave, and approximately 24 miles northeast of the City of Tehachapi, in Kern County, California. The primary access to the Project property is from California State Route 14 (SR-14) just north of where Pine Tree Creek Wash crosses SR-14 (Figures 1 and 2).

The purpose of this plan is to provide a mitigation approach to be submitted with the California Department of Fish and Game (CDFG) Streambed Alteration Agreement (SAA) application defining Beacon Solar's responsibility for and commitment to compensatory mitigation related to the proposed Project. Included in this document are an introduction, including a discussion of the proposed impacts; proposed mitigation and implementation; proposed maintenance and monitoring activities; and completion of mitigation.

The Project's Delineation of Jurisdictional Wetlands identifies two dry desert washes as CDFG jurisdictional areas within the proposed Plant Site boundary (EDAW, 2008; Figure 5 of Attachment 1 and Attachment 3). The Plant Site impact footprint contains the solar array, power generating equipment, support facilities, evaporation ponds, a cooling tower, and access roads. It was determined that the linear components of the Project (i.e., transmission line, switchyard, and natural gas supply pipeline) will not impact waters of the state; therefore, they are not addressed in this mitigation plan.

The extent and distribution of the cumulative area of state waters occurring within the Plant Site boundary were defined based on the presence of bed and bank. In specific areas within the dry wash channels, where evidence of scour or shelving was absent, subsurface investigations were undertaken to identify established channel banks. These washes exhibit a bed and bank (i.e., a distinct channel) with approximately 8 percent riparian vegetation, predominately scale-broom (*Lepidospartum squamatum*). When no vegetation was present in the drainage, the ordinary high water mark (OHWM) was determined in the field to delineate the limits of the CDFG jurisdictional area. A total of 16.0 acres of jurisdictional waters of the state occur within the Plant Site boundary (13.6 acres unvegetated and 2.4 acres vegetated) that are under the jurisdiction of CDFG.



Source: TetraTech 2007; Kern County 2007; USGS 2007; WorleyParsons 2007

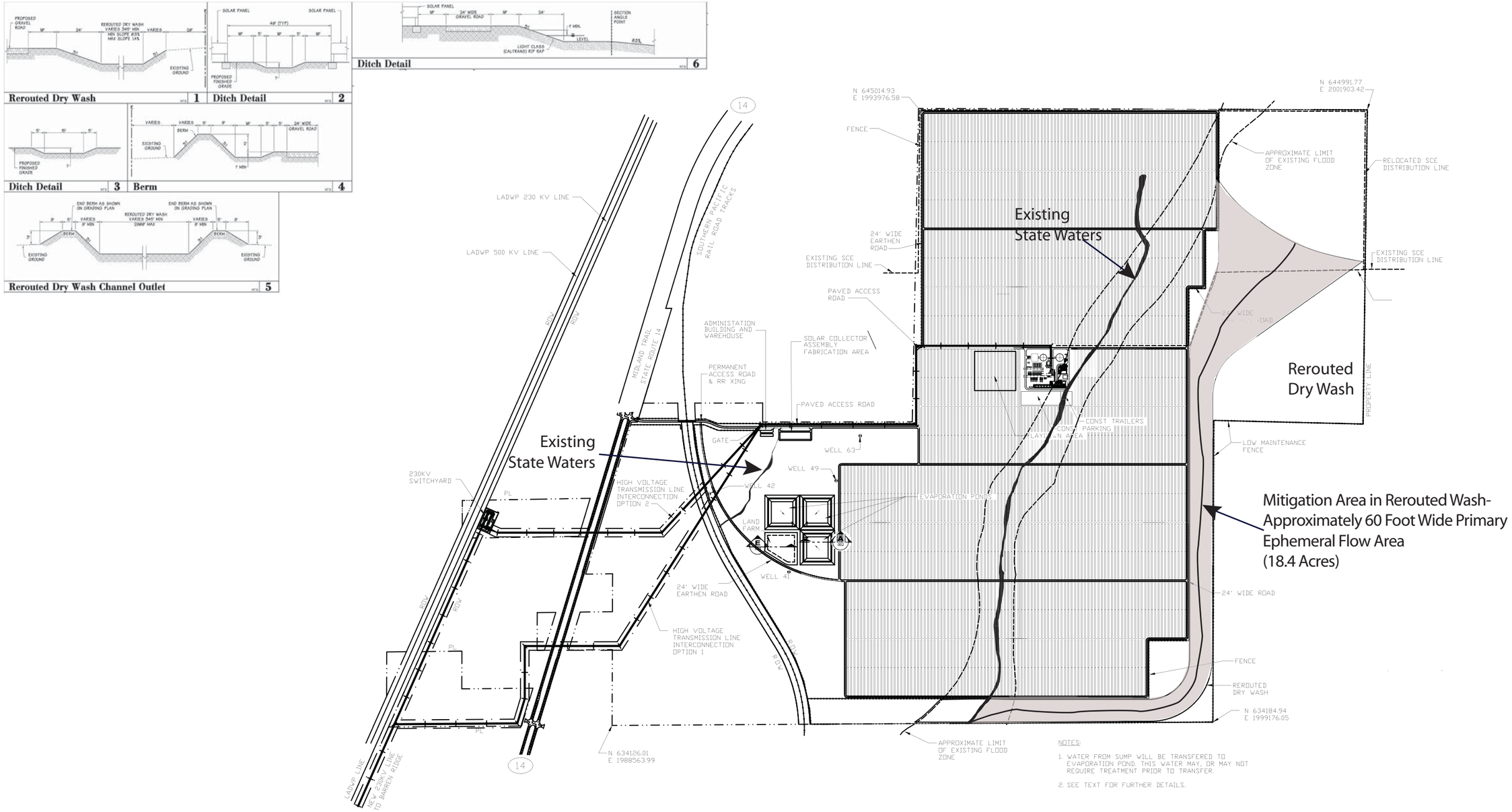
2,750 1,375 0 2,750 Feet

Scale: 1:33,000; 1 inch = 2,750 feet

Figure 1
Property Boundary and Plant Site

Beacon Solar Energy Project - Conceptual Mitigation Plan

Path: P:\2008\08080001 Beacon Solar\5GIS\MXD\State Waters\Vicinity Map.mxd, 06/25/08, LeeJ



Source: Worley Parsons Resources & Energy 2007

1,800 900 0 1,800 Feet

Scale: 1 inch = 1,800 feet

Figure 2
Facilities Layout
and Mitigation Area Within Rerouted Wash

Analysis of these drainages determined that they did not fall within U.S. Army Corps of Engineers (USACE) regulatory jurisdiction. This determination was confirmed in a letter from the USACE, dated February 5, 2008 (USACE, 2008). This letter is included as an attachment in the Project Delineation of Jurisdictional Waters for the State of California (EDAW, 2008; Attachment 3). Drainages within the Project area flow east into the Mojave Desert and ultimately into an inland lake called Koehn Lake, a dry lake bed. Koehn Lake is located approximately 12 miles north of California City and approximately six miles north of the Project site. This lake has no distributary or other outlet and the USACE therefore determined that no jurisdictional waters of the U.S. would be affected by the proposed Project.

1.2 PROPOSED PROJECT IMPACTS

The Project would cause direct impacts to 16.0 acres of jurisdictional waters of the state in the form of the dry desert washes all within the Plant Site boundary. Of these 16.0 acres, 2.4 acres (15 percent) are vegetated with an alluvial fan scrub habitat association dominated by the native shrub, scale-broom (generally at a height of 3 to 5 feet), and 13.6 acres are unvegetated waters of the state (i.e., riverine unconsolidated bottom – ephemeral wash).

Scale-broom is confined to the ephemeral wash sections onsite demonstrating its dependence on this aquatic feature. The vegetated state waters are dominated by scale-broom (monotypic stands) with a limited understory of nonnative species including redstem stork's bill (*Erodium cicutarium*) and Mediterranean grass (*Schismus barbatus*). This vegetation community type is best represented by southern alluvial fan scrub (Code 63330 adapted from Magney, 1992) and Mojave desert wash scrub (Code 63700 from Holland, 1986). For the purposes of this document, this habitat type will be referred to only as southern alluvial fan scrub. Although the habitat within the Plant Site boundary has been previously disturbed by agricultural activities, this scale-broom habitat contributes positively to physical, chemical, and biological functions in the Project vicinity. The unvegetated waters of the state also provide positive functions (e.g., occasional surface flow and subsurface recharge, sediment transport and nutrient cycling).

Based on the types of jurisdictional habitat that would be impacted and the discussion with CDFG during the site meeting on June 12, 2008, the Project proposes to apply an onsite mitigation replacement ratio of 1:1 for the direct impacts to 13.6 acres of unvegetated state waters. For the 2.4 acres of higher value, vegetated southern alluvial fan scrub, the Project proposes to apply an onsite mitigation ratio of 2:1 (for a total of 4.8 acres of replacement acreage).

<u>Rerouted Pine Tree Creek Wash</u>

To make efficient use of the Plant Site for solar facilities, it is necessary to reroute Pine Tree Creek Wash and a portion of the smaller, unnamed wash around the site. Pine Tree Creek

Wash will be rerouted to follow the southern and eastern boundaries of the Plant Site and ultimately match the original sheet flow drainage pattern just northeast of the Plant Site. The rerouted channel will be approximately 14,000 feet long. The realigned dry wash will be a trapezoidal channel with 3:1 gradient slopes, with a minimum bottom width of 345 feet (to a maximum of about 2,900 feet at the end of transition to match the sheet flow path). The average depth of the proposed rerouted wash is approximately eight feet. The rerouted wash will have an earthen bottom and banks with riprap reinforcement in areas prone to erosion.

Channel side dirt berms will be used to accomplish the transition from the eight-foot depth of the channel bottom to the existing ground at the northeast corner of the Plant Site. The slope of the berms for the rerouted Pine Tree Creek Wash ranges from 5:1 to 3:1 (approximately 11 to 17 angle degrees) and have been designed to accommodate desert tortoise movement, which requires slopes less than 2:1 (approximately 26 to 30 degrees) (Karl, 2008 pers. comm.). The western, unnamed and mostly unvegetated dry wash is proposed to be rerouted to a swale north of the proposed evaporation ponds, then follow the northern and western boundaries of the Plant Site, pass through the Plant Site between solar arrays, and join the rerouted Pine Tree Creek Wash outflow east of the Plant Site. The swale will be approximately 9,000 feet long with an average depth of one foot and a minimum bottom width of 15 feet. The swale will be completely within the Plant Site boundary, which includes protective fencing to exclude desert tortoise from the facility; therefore, slopes for desert tortoise movement have not been a factor. Each rerouted wash will have an earthen bottom.

The proposed rerouted channels will meet the requirements of Kern County through use of the methodology outlined in the *Kern County Hydrology Manual* and *County Division Four Standards for Drainage*. The rerouted channels will be sized to convey Capital Storm Design Discharge for a 100-year event with a minimum of one foot of freeboard above the water surface elevation. Mean annual rainfall for the site is 5.3 inches (Carlton Engineering, 2008) and rainfall is 1.1 inches for a two-year storm and 3.25 inches for a 100-year storm (Carlton Engineering, 2008). In the Drainage Study, the calculated 24-hour storm peak flow for a 10-year storm and 100-year storm are the same at predevelopment and postdevelopment (Carlton Engineering, 2008). A Manning's n value of 0.035 was assumed for the design of the rerouted wash. This takes in account some rock in the channel bottom and revegetation with native species (Carlton Engineering, 2008). Therefore, natural recruitment of native species in the mitigation area is accounted for in the flood capacity calculations for the rerouted wash.

CHAPTER 2
PROPOSED MITIGATION APPROACH

2.1 MITIGATION REQUIREMENTS AND PROPOSED APPROACH

Permanent impacts to the two washes require a permit from CDFG. This plan proposes a 1:1 replacement ratio for permanent Project impacts to unvegetated waters of the state and a 2:1 replacement ratio for permanent Project impacts to an ephemeral wash vegetated with southern alluvial fan scrub (i.e., scale-broom association). The proposed jurisdictional habitat mitigation approach, including creating appropriate physical conditions and promoting natural processes and native revegetation in the rerouted wash, was reviewed with Julie Means of CDFG during a SAA preapplication meeting onsite on June 12, 2008. The permanent Project impacts would be the result of the proposed removal of the washes and construction of the rerouted dry washes. Based on the proposed mitigation ratios presented for each of these jurisdictional habitat conditions, a total of 18.4 acres of mitigation would be required for these permanent impacts (Table 1).

Table 1
Review of Maximum CDFG Jurisdictional Impacts
and Proposed Mitigation Requirements

CDFG Wetlands and Waters	Permanent Impacts		
	CDFG Permanent Impacts acres)	**Mitigation Ratios**	**Mitigation[1] (acres)**
Vegetated Wetlands			
Southern Alluvial Fan Scrub	2.4	2:1	4.8
Unvegetated State Waters			
Unconsolidated bottom (Ephemeral Wash – Streambed)	13.6	1:1	13.6
Total Impacts	**16.0**		**18.4**

[1] 13.6 acres of unvegetated state waters will be mitigated (at 1:1 ratio) and 4.8 acres of vegetated state waters will be mitigated (at a ratio of 2:1 to mitigate for the 2.4 impacted acres) within the proposed rerouted wash.

Of the 18.4 acres of mitigation needed for permanent impacts, 13.6 acres of unvegetated waters of the state are planned to occur within the Plant Site within a section of the rerouted Pine Tree

Creek Wash (Figure 2). In addition, the designated mitigation area in the rerouted wash will include an additional 4.8 acres (i.e., 18.4 acres total) to accommodate revegetation of southern alluvial fan scrub (e.g., scale-broom association). Because of ephemeral and highly variable conditions within a desert setting, establishing physical conditions that promote natural recruitment is considered ecologically preferable for establishing appropriate self-sustaining habitat as compared to planting and use of temporary irrigation. A goal of the Project is to create physical conditions to promote natural successional processes and native plant recruitment onsite—and attain 4.8 acres (equivalent to 26 percent cover within the 18.4-acre mitigation area) at the end of five years. If 4.8 acres of southern alluvial fan scrub habitat volunteers and establishes within the 18.4-acre mitigation area in the rerouted channel within five years, this will accomplish the 2:1 mitigation ratio for this habitat. If 4.8 acres of alluvial fan scrub does not establish within the rerouted channel within five years (e.g., due to below average rainfall, etc.), the monitoring will continue until success criteria are reached.

Within the rerouted Pine Tree Creek Wash, the goal of the 18.4-acre mitigation area is to mimic the existing conditions of the wash to promote natural processes to provide replacement functions for unvegetated waters of the state and alluvial fan scrub (habitat). The rerouted wash would encompass approximately 80 acres. The 18.4 acres of mitigation area is proposed to be located in the center portion of the rerouted wash and will run the length of the rerouted wash. The width of the mitigation area is expected to vary from about 40 to 70 feet and will average approximately 60 feet wide based on the width of the existing jurisdictional wash onsite (Pine Tree Creek Wash). Based on an average width of 60 feet (expected jurisdictional area based on hydrology), the mitigation area would be approximately 13,358 feet long to accomplish the 18.4 acres of mitigation.

The existing wash is mostly unvegetated (approximately 85 percent within the Plant Site boundary) with scattered patches of scale-broom, which are found on interfluves or small raised areas within Pine Tree Creek Wash. As water flows in the existing wash, scouring leads to the development of multiple small channels (anastomosing) and interfluves where scattered scale-broom occurs. The design of the mitigation area within the rerouted channel would mimic the existing landform by initially establishing a meandering low flow and subtle depressions and hummocks (i.e., +/- 1 foot) with a balanced cut and fill approach.

Some of the hummocks could act as water bars perpendicular to the flow to promote channel meandering, braiding, and topographic complexity. This initial subtle grading and contouring within the wash would be expected to slow runoff within the wash and create microhabitats, including seasonal pockets of moisture retention that would promote functions such as nutrient cycling and subsurface recharge. In addition, creating topographic variation and favorable conditions for germination could lead to the natural recruitment of desirable native species such as scale-broom. The proposed wash bottom contouring is intended to establish and promote continued microtopographic complexity when the rerouted wash experiences future storm

events. Lichvar et al. (2006) have described “ordinary” events that define bed and bank limits in Arid West channels as typically corresponding to the five- to eight-year event, as opposed to the one- and two-year event in temperate climates (USACE, 2007).

In summary, the proposed mitigation for permanent Project impacts includes:

- Designation of 18.4 acres of the rerouted wash (within the central portion of the channel bottom, between toe-of-slopes of channel banks) as mitigation area.
- Of the 18.4 acres, 13.6 acres will be mitigation for unvegetated waters of the state and 4.8 acres would be mitigation of alluvial fan scrub habitat.
- Perform contour grading in the rerouted wash mitigation area to establish a meandering low flow channel and microtopographic variation.
- During the rainy season, hand-seed alluvial fan scrub species in scattered locations (totaling 2.4 acres) in the wash bottom interfluves and microsites that appear favorable for plant germination and establishment.
- Remove problematic invasive nonnative species in the rerouted wash mitigation area for five years.
- Prepare five succinct annual monitoring reports for submittal to Beacon Solar and CDFG that review the status of the rerouted wash (regarding invasive nonnative plant control, native alluvial fan scrub habitat recruitment and establishment, and other potential site issues).
- Request and receive confirmation from CDFG that the mitigation requirement has been met and completed when the 18.4-acre mitigation area in the rerouted wash has completed its five-year monitoring program.

In addition to onsite mitigation for impacts to the dry desert washes, the Project is currently determining appropriate acreage and locations of habitat that would be purchased and preserved offsite in the Project vicinity to provide mitigation for desert tortoise (*Gopherus agassizii*), Mohave ground squirrel (*Spermophilus mohavensis*), and western burrowing owl (*Athene cunicularia*). It is expected that these off-site compensation lands will have desert wash features associated with them which will serve as additional mitigation for onsite impacts to jurisdictional state waters above and beyond the onsite mitigation described above.

2.2 PROPOSED REPLACEMENT OF FUNCTIONS FOR THE REROUTED WASH

The rerouted wash will eventually replicate the functions and wildlife values of a natural desert wash because the soils, morphology, hydrology, and resulting biota (soil organisms and plants)

of the rerouted wash will interact in a similar manner as a natural desert wash. The measures proposed (i.e., microtopographic grading, seeding, and control of invasive exotic plants) will promote colonization of biological soil crusts and native desert wash vegetation.

The rerouted wash will be established within the same two native soil types, Cajon loamy sand and Rosamond clay loam (NRCS, 2008), such that permeability and other soil characteristics will replicate the existing desert washes onsite. In addition, since hydrology, geomorphology, and microtopography will be replicated in the rerouted wash as they occur in the existing washes, it is expected that beneficial biological soil crust will develop over time in the rerouted wash improving soil stability, atmospheric nitrogen-fixation, nutrient contributions to plants, soil-plant-water relations, infiltration, seeding germination, and plant growth (USGS Canyonlands Research Station www.soilcrust.org).

The rerouted wash has been designed and sized to convey Capital Storm Discharge for a 100-year event (as much as 20,000 cubic feet per second) with a minimum of one foot of freeboard above water surface elevation. The calculated 24-hour storm peak flow for a 10-year and 100-year storm is the same at predevelopment and postdevelopment. The delineated waters of the state in the existing Pine Tree Creek Wash varies from approximately 40 to 70 feet wide, with a 60-foot-wide average. The minimum 345-foot-wide wash bottom-floodplain (between toe-of-slopes of wash banks) in the rerouted wash will provide extensive lateral area for ephemeral flows to meander and develop multiple small channels in a natural braided pattern. The unconfined flows in the rerouted wash between the gentle outer banks (3:1 to 5:1 gradient) will result in positive hydrologic functions, transport of organic material and nutrients, nutrient cycling, creation of microtopographic complexity (morphology processes), and support of hydrophytic vegetation (Carlton Engineering, 2008).

As water flows in the existing wash segments within the Plant Site boundary, scouring and sediment movement (including deposition) leads to the development of multiple small channels (anastomosing) and interfluves where scattered scale-broom and other species occurs. The design of the mitigation area in the rerouted channel will include contour grading to mimic the existing wash landform by initially establishing a meandering low flow and subtle depressions and hummocks (+/- 1.5 feet) with a balanced cut and fill approach. The proposed wash bottom contouring is intended to establish and promote continued microtopographic complexity when the rerouted wash experiences future storm events. The contour grading is intended to create a range of physical conditions that will promote natural processes and functions in the mitigation area.

It is understood and considered desirable that storm events occurring after the contour grading in the mitigation area will result in shifts in the low flow and secondary drainage paths (braided pattern) over time. The positive effects of storm events (including creating interfluves and microhabitats with seasonal pockets of moisture retention) are expected to create conditions

that will promote scattered natural plant recruitment over time. To supplement naturally occurring seed in the rerouted wash, the mitigation plan includes conducting hand-seeding with an alluvial fan scrub seed mix during the rainy season (between November and February) in scattered locations favorable for germination. The mitigation area will not receive temporary irrigation, such that germination and establishment of native species will be dependent on rainfall and natural successional processes. The mitigation plan includes maintenance and monitoring to verify 4.8 acres of native desert wash habitat establishes within the rerouted wash (i.e., 26 percent cover within 18.4 acres). Establishment of native species in the mitigation is accounted for in the flood capacity calculations for the rerouted wash (a Manning's n value of 0.035 was assumed for the design) (Carlton Engineering, 2008). The mitigation plan also includes eradication of any problematic nonnative species (defined as "moderate" or "high" threats to California wildlands by the California Invasive Pest Council (CAL-IPC) (2006).

In regard to wildlife, the banks of the rerouted wash range from 3:1 to 5:1 (approximately 11 to 17 degrees) and have been designed to accommodate desert tortoise movement, which requires slopes less than 2:1 (less than approximately 26 to 30 degrees) (Karl, 2008 pers. comm.). Fencing will be installed between the rerouted wash and the Plant Site boundary to prevent desert tortoise (and other wildlife) from entering the Plant. Overall, the native desert wash habitat will provide beneficial functions and values for wildlife including providing food, water, refuge and shelter, and nesting and breeding habitat. Wildlife species that use the existing desert wash habitat and surrounding habitat, which will also utilize the native habitat in the rerouted wash, include, but are not limited to, desert tortoise, western burrowing owl, LeConte's thrasher (*Toxostoma lecontei*), and desert cottontail.

In summary, the newly created channel (rerouted wash) will eventually replicate the functions and wildlife values of a natural desert wash.

CHAPTER 3
PROPOSED IMPLEMENTATION

The proposed mitigation for permanent Project impacts includes designation of an 18.4-acre mitigation area in the rerouted wash onsite. Proposed activities within the onsite mitigation area in the rerouted wash include contour grading to provide microtopographic complexity, hand-seeding scattered locations in the wash totaling approximately 2.4 acres, and performing follow-up maintenance for five years to remove problematic invasive nonnative species. Proposed contour grading and hand-seeding are reviewed below. Nonnative plant control is reviewed in Chapter 4.0.

3.1 REROUTED WASH CONTOUR GRADING

Once the mitigation limits in the rerouted wash are finalized and the initial wash grades are established (i.e., wash bottom and channel banks), follow-up contour grading would occur to establish an initial meandering low flow channel and various subtle depressions and hummocks (i.e., +/- 1 foot). The contour grading is intended to create a range of physical conditions that will help promote natural processes and functions in the mitigation area.

The grading would be balanced cut and fill, with no soil import or export. The Project's restoration ecologist and hydraulics engineer would coordinate to agree on the initial low flow alignment, which would be marked in the field for personnel conducting grading. Scattered locations for depressions and hummocks would also be flagged. Small groupings of rock could also be placed in scattered locations within the wash bottom and certain channel bank sections for erosion control and physical diversity (to contribute to microhabitat diversity). Once the restoration ecologist agrees that the contour grading in the mitigation site has been successfully conducted, this phase of implementation will be complete. It is understood and considered desirable that storm events occurring after the contour grading is complete will result in shifts in the low flow and secondary drainage paths (braided pattern) over time. The positive effects of storm events (including creating interfluves and microlocations that retain moisture) are expected to create conditions that will promote scattered natural plant recruitment over time.

3.2 HAND-SEEDING IN WASH BOTTOM

Once contour grading is complete in the rerouted wash mitigation area, hand-seeding with an alluvial fan scrub mix will occur during the rainy season (between November and February) in scattered locations totaling approximately 2.4 acres within the 18.4 acre mitigation area. The hand-seeding will supplement native seed that would be naturally transported into the rerouted wash from animals, wind, and periodic storm flows. The Project's restoration ecologist will direct where hand-seeding would occur and select areas favorable for seed germination. The

mitigation area will not receive temporary irrigation, such that germination and establishment of native species will depend on rainfall and natural successional processes. Table 2 includes the proposed alluvial scrub seed mix.

Table 2
Alluvial Fan Scrub Seed Mix[1/2]

Scientific Name	Common Name	Pounds Per Acre	Minimum Percent Purity/ Germination[3]	Pounds of Pure Live Seed (PLS) Per Acre
Ambrosia acanthicarpa	annual bursage	4	85/25	0.85
Artemisia tridentata ssp. *parishii*	big basin sagebrush	4	10/65	0.26
Chilopsis lineraris	desert willow	1	95/75	0.71
Hymenoclea salsola	white burrowbush	1	90/50	0.45
Lepidospartum squamatum	scale-broom	10	20/30	0.60
	Total	**20**		**2.87**

[1] Seed will be from sources within 20 miles of the Project site.
[2] Seed substitutions will not be made without approval of the Project's restoration ecologist.
[3] If the available seed has lower minimum percent purity and germination rates than specified, the pounds per acre will be increased accordingly to provide the specified pounds of PLS per acre.

The steps related to seed application include the following:

- Native seed will be provided from a qualified seed company from documented sources within 20 miles of the Project site. If seed is not commercially available from source locations within 20 miles of the Project site, a seed collection program will be contractually established with a qualified seed supplier at least 14 months prior to the time when the seed would be applied.
- Seed will be delivered to the site in separate containers with labels listing species, collection date and location, purity and germination percentage rates, and poundage. The Project's restoration ecologist will confirm the specified seed species and quantities are delivered to the site before they are mixed together.
- After the site has received rain (i.e., approximately 0.2 inch) toward the beginning of the rainy season, seed will be hand-applied in areas in the wash favorable for germination. The Project's restoration ecologist will coordinate with the Project's landscape contractor to designate scattered areas (totaling 2.4 acres) to receive seed and will create a map depicting the seeding locations and dates.

- Seed will be spread evenly and raked into the top 0.25 inch of soil.

CHAPTER 4
MAINTENANCE AND MONITORING PROGRAM

The maintenance and monitoring program would occur for a minimum of five years after implementation of the rerouted wash contour grading and seeding is complete.

4.1 RESPONSIBLE PARTIES

Beacon Solar will be responsible for implementation of this mitigation plan. Beacon Solar will retain a qualified project biologist (i.e., restoration ecologist) with over three years of successful experience monitoring and reporting for native habitat mitigation programs.

4.2 MAINTENANCE OBLIGATIONS

The primary components of maintenance will include control of problematic invasive nonnative plants (and trash) and erosion control. The degree of maintenance effort is contingent on meeting expectations and standards of the mitigation program, such that weed control and erosion control may be needed more frequently during certain periods. However, as a guideline, weed control and erosion control maintenance visits would occur not less than twice annually.

Invasive Weed Control and Trash Removal

Invasive nonnative (weed) species will be eradicated wherever they occur in or adjacent to (i.e., within 10 feet) the 18.4-acre mitigation site. Colonization of a site by nonnative plants is most likely to occur in the periods after disturbance (e.g., after the rerouted wash is graded and newly established). The proposed initial control for five years after the rerouted channel is established will enhance the function of the wash by maintaining positive conditions for natural flow regimes and by removing competing nonnative plants and providing substrate for native plants to regenerate naturally. In addition, this nonnative plant control onsite will reduce weed propagules that that would otherwise be transported downstream.

Nonnative plants can be divided between problematic invasive weed species that can outcompete native plants and benign nonnatives that are common in desert washes and tend not to outcompete native plants. Weed control will only focus on the designated problematic invasive weed species. For the purposes of this mitigation project, problematic invasive weeds that require control include those species listed as causing a “moderate” or “high” treat to California wildlands (CAL-IPC, 2006).

Species meeting that definition that have been documented in the Project vicinity include tamarisk (*Tamarix ramosissima*), Sahara mustard (*Brassica tournefortii*), red brome (*Bromus madritensis* ssp. *rubens)*, and London rocket–hedge mustard (*Sisymbrium* sp.). Additional nonnative species included on the CAL-IPC list as "moderate" or "high" threats that may be subsequently identified onsite would be added to the list of species to be controlled.

The following weed control measures will be followed:

- Invasive weeds will be controlled by herbicide spraying or hand-pulling. The weeds will be controlled prior to seed set to reduce competition with the native plants.
- Herbicide use will be conducted by workers trained in native and invasive weed plant identification. Care will be taken when spraying herbicides to avoid native plant species.
- Herbicide will not be applied during periods of precipitation or on windy days.
- If herbicide is sprayed when standing water is present, a non-water soluble herbicide will be used such as Rodeo ® or Aquamaster ®.
- The workers will also have received annual training in herbicide use and safety. The supervisor of the workers will possess a Qualified Applicators Certificate and/or License. Recommendations for herbicide use will be written by a licensed Pest Control Advisor and submitted to the County Agricultural Advisor.
- All weed debris will be collected and properly disposed of offsite.

Erosion Control

Erosion control will be performed as necessary within and adjacent to the mitigation area. Natural scouring and aggregation in the wash are part of the natural successional processes. Highly erodible areas such as the sweeping turns in the rerouted wash will be reinforced with riprap. Since the slope of the upper banks will be mild (3:1 or less), it is not necessary to include riprap along the straight portions of the upper banks. Small size riprap (approximately 12") or cobble is proposed for the low flow channel of the stream. Erosion concerns for the Project focus on those situations where infrastructure (access roads, fencing, etc.), solar facilities, or offsite property could be damaged or compromised if repairs are not made. Any identified erosion problems will be addressed in a timely manner. Erosion control materials include, but are not limited to, natural fiber matting, rock or riprap, straw wattles, vegetation bundles, gravel bags, gully repair, collection/retrieval of sediment, and seeding. Weed-free fiber matting and rice straw or other certified weed-free materials will be used.

Erosion control installation will accommodate wildlife such as the desert tortoise and burrowing owl. No erosion control method will inhibit the passage of wildlife species across the site and will ensure proper crossing routes through the wash.

4.3 MONITORING, SUCCESS STANDARDS, AND REPORTING ACTIVITIES

Monitoring and reporting activities will focus on documenting the status of the mitigation site at different stages of the scheduled five-year program relative to project expectations and success standards.

The primary standards for the mitigation area within the rerouted wash are focused on native vegetation cover and maintaining problematic nonnative species below certain thresholds for five years. A goal of the Project mitigation is to create physical conditions that promote natural successional processes and native plant recruitment onsite and therefore attain 26 percent cover (4.8 acres) at the end of five years. However, because of the ephemeral and unpredictable nature of desert environments, native plant recruits and establishment rates can be highly variable. If after five years the desired cover is not attained, additional monitoring may be required until the 26 percent cover condition is met. The five-year success standards are listed below in Table 3.

Table 3
Success Standards for Rerouted Wash 18.4-Acre Mitigation Area

Milestone	Success Standards[1,2]	Remedial Measures
Year One	Maintain cover of problematic nonnative species <10 percent; Attain 2 percent average native plant cover	Adjust methods, timing, and level of effort as necessary to reduce nonnative cover below threshold.
Year Two	Maintain cover of problematic nonnative species <5 percent; Attain 8 percent average native plant cover	Same as above
Year Three	Maintain cover of problematic nonnative species <5 percent; Attain 14 percent average native plant cover	Same as above
Year Four	Maintain cover of problematic nonnative species <2 percent; Attain 20 percent average native plant cover	Same as above
Year Five	Maintain cover of problematic nonnative species <2 percent; Attain 26 percent average native plant cover	Same as above

[1] Problematic nonnative species for this plan are defined as nonnative species that pose a “moderate” or “high” threat to California wildlands as defined by CAL-IPC (2006).
[2] Extended maintenance and monitoring may be warranted beyond five years if success standards are not achieved on schedule.

Monitoring

Beacon Solar will retain a qualified restoration ecologist to perform monitoring in the mitigation area for a minimum of five years after installation. As a guideline, the restoration ecologist will inspect the mitigation site a minimum of twice a year. Monitoring will focus on percent cover of native species and the presence of any problematic nonnative plant species and natural recruitment of native plants and habitat onsite. In addition, any other mitigation site issues of concern (e.g., erosion or trash) will also be documented during monitoring. An important feature of this monitoring is to coordinate with the maintenance contractor to exchange information, provide feedback, and agree on priority maintenance items focused on weed control and erosion control.

If native plants and habitat establish in the rerouted wash mitigation area, the restoration ecologist will document this establishment by mapping the habitat polygons on an aerial-based map and/or the scattered native plant cover percentage will be estimated to determine the overall native habitat area. The drainage will be divided into monitoring segments and cover will be estimated in each section resulting in an overall cover average for the site with the ultimate goal of 26 percent average cover after five years (4.8 acres is equal to 26 percent of the 18.4-acre mitigation site). .

In an arid environment, It is difficult to determine how quickly a mitigation site can regenerate. Native plant species growth is slow and varies greatly with environmental conditions such as drought, heat, and wind; at the opposite extreme, intermittent flooding can remove vegetation during one significant event. Therefore, no specific native vegetation cover criteria were outlined in Table 3 above. However, the goal of the mitigation effort is to attain plant cover over at least 4.8 acres of the entire drainage. This equates to 26 percent of the entire mitigation area (18.4 acres) and a 2:1 ratio of the vegetated impact area (2.4 acres). If, by the end of five years, this goal is not met, the Project biologist will then make a determination whether further action is warranted. If the site is a healthy ecosystem overall and is showing signs of vegetative and ecological regeneration, then the biologist may deem the mitigation effort a success at that time. If however, the biologist determines that the mitigation effort is not progressing at a productive rate, then continued monitoring will be required.

Reporting

On behalf of Beacon Solar, the Project's restoration ecologist will prepare brief memoranda to document completion of mitigation installation and also during any postinstallation monitoring visits. The memoranda will review site conditions and any potential problems and corrective measures. The Project's restoration ecologist will also prepare five succinct annual reports, which will review the monitoring results, progress of the mitigation relative to maintaining nonnative cover below specified standards, and any recommended remedial measures. The

annual reports will include photographs from permanent viewpoints and documentation of potential native plant recruitment—establishment onsite. On behalf of Beacon Solar, the annual reports will be submitted to CDFG.

CHAPTER 5
COMPLETION OF MITIGATION

5.1 NOTIFICATION OF COMPLETION

Once the final nonnative cover success standards have been achieved after five years, the Project's restoration ecologist will contact CDFG on behalf of Beacon Solar and request confirmation the mitigation requirements have been met. Once CDFG concurs the requirements of the mitigation program have been met, maintenance, monitoring, and reporting will be discontinued.

CHAPTER 6
REFERENCES

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