BEACON SOLAR ENERGY PROJECT

Supplemental Response to CEC Data Requests Set 1
Docket No. 08-AFC-2

DOCKET
08-AFC-2
DATE AUG 18 2008
RECD. AUG 19 2008

Submitted by:

Beacon Solar, LLC

Submitted to:

California Energy Commission

August 18, 2008

Prepared by:

ENSR | AECOM

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An extension to submittal of responses to Data Requests 4, 5 and 6 was requested on July 7, 2008 to allow for more time to determine if the transmission line route (Option 2) which required construction of a new substation could be dropped from further analysis. Although Option 1 is still considered the more likely option, Beacon Solar does not yet know if Option 2 can be dropped, so the information requested is being provided at this time. In addition, a revised response to Data Request 12 is being provided in consideration of changes requested during the July 22, 2008 CEC workshop for the Beacon Solar Energy Project (BSEP).

Data Request 4:

[For construction and operation of the new substation], please describe the construction equipment necessary and the duration of construction.

Response:

Construction of the substation would occur over a 12-month period. The anticipated construction equipment and onsite motor vehicles are provided in the following table.

Construction Equipment and Onsite Motor Vehicles Anticipated for Substation Construction

Equipment Type	Horsepower	Number	Duration Onsite (months)
CAT backhoe 450 e	124	2	6
CAT hydraulic excavator 308D CR	318	2	5
CAT track D7R series-2	240	1	2
Multi terrain loader skid steer 287C	57	2	9
CAT wheel Grader 160M with GPS	213	1	3
Walk behind trencher	30	1	2
Cable Puller	385	1	3
3/4 Pick-Up Ford F-250	350	4	10
Forklift CAT 3054E	120	1	10
Pole Digger International 4700	210	1	3
Crane 150 Ton	330	1	1
Water Truck	200	1	5
Manlift JLG 1350SJP	87	2	10

Data Request 5:

[For construction and operation of the new substation], please quantify the expected criteria pollutant emissions from the construction equipment identified in Soils Data Request 45.

Response:

Calculations of criteria pollutant emissions during construction of the substation are provided in tables in Attachment DR-5. Maximum daily and annual onsite emissions are summarized in the following table.

Maximum Onsite Substation Construction Emissions

Time Period	CO	VOC	NOx	SOx	PM10	PM2.5
Daily (lb/day)	22.7	6.2	53.5	0.1	41.3	11.1
Annual (tpy)	2.0	0.5	4.4	<0.05	4.0	1.0

Data Request 6:

Please quantify and show the calculations of the sulfur hexafluoride greenhouse gas release estimates from the substation switching equipment for the case in which the new substation would be required.

Response:

Each of three circuit breakers would contain 160 pounds of sulfur hexafluoride (SF_6) for a total of 480 pounds of SF_6.

Emissions from leakage of SF_6 from the circuit breakers are calculated by multiplying the amount of SF_6 by the leak rate.

The SF_6 leakage rate from operating equipment is guaranteed not to exceed 0.5 percent per year, although actual leakage rates using current equipment design is expected to be less than half that level. At the guaranteed maximum leak rate of 0.5 percent, this corresponds to 2.4 pounds per year of SF_6 emissions (480 pounds SF_6 x 0.5 percent per year / 100), or 26 metric tons per year of carbon dioxide equivalent (CO_2e) emissions (2.4 pounds per year SF_6 / 2,204 pounds per metric ton x 23,900 metric tons CO_2e per metric ton SF_6). At the more probable actual leak rate of 0.2 percent, emissions would be less than 1 pound per year of

SF_6, or approximately 10.4 metric tons per year CO_2e, or 312 metric tons CO_2e emissions over the 30-year switchyard lifetime.

Data Request 12:

Please describe at what wind speeds construction scraping and grading would be suspended due to the inability to adequately control fugitive dust emissions. Staff would very likely recommend a permit condition that would require such a suspension of grading in order to adequately control fugitive dust emissions.

Revised Response:

We do not propose suspending scraping and grading when the wind speed exceeds a pre-determined value since, depending on the type of construction activity, we may be able to effectively control dust even in relatively high winds. Instead, we propose to suspend scraping and grading when additional watering does not prevent (1) visible plumes from coming within 100 feet upwind of any regularly occupied structures not owned by the project owner or (2) visible plumes being transported off the project site.

These criteria are consistent with criteria in other siting cases. These cases also included an additional criterion for visible dust plumes 200 feet beyond the centerline of the construction of linear facilities. However, since this Data Request relates specifically to site preparation for the BSEP solar field, the criterion for construction of linear facilities is not applicable.

Attachment DR- 45

Criteria Pollutant Emissions Tables

Table 1
Construction Equipment Exhaust Emission Factors

Equipment Type	Horsepower	Fuel	ARB Off-Road Model Category	CO (lb/hr)[a]	VOC (lb/hr)[a]	NO_X (lb/hr)[a]	SO_X (lb/hr)[a]	PM10 (lb/hr)[a]	PM2.5 (lb/hr)[b]
CAT back hoe 450 e	124	Diesel	Tractors/Loaders/Backhoes	0.588	0.130	1.038	0.001	0.060	0.055
CAT hydrolic excavator 308D CR	318	Diesel	Excavators	0.660	0.207	2.063	0.002	0.075	0.069
CAT track D7R series-2	240	Diesel	Crawler Tractors	0.605	0.215	2.050	0.002	0.083	0.076
Multi terrain loader skid steer 287C	57	Diesel	Skid Steer Loaders	0.285	0.068	0.447	0.001	0.039	0.036
CAT wheel Grader 160M with GPS	213	Diesel	Graders	0.519	0.186	1.900	0.002	0.070	0.065
Walk behind trencher	30	Diesel	Trenchers	0.446	0.193	0.366	0.000	0.042	0.039
Cable Puller	385	Diesel	Other Construction Equipment	0.653	0.181	2.120	0.002	0.072	0.066
Forklift CAT 3054E	120	Diesel	Forklift	0.328	0.078	0.644	0.001	0.035	0.032
Pole Digger International 4700	210	Diesel	Bore/Drill Rigs	0.348	0.100	1.309	0.002	0.039	0.036
Crane 150 Ton	330	Diesel	Cranes	0.716	0.191	1.876	0.002	0.073	0.067
Manlift JLG 1350SJP	87	Diesel	Aerial Lifts	0.254	0.077	0.482	0.000	0.039	0.036

[a] From AFC Air Quality Appendix spreadsheets

[b] Diesel PM2.5 emission factor [lb/hr] = PM10 emission factor [lb/hr] x PM2.5 fraction of PM10

PM2.5 Fraction of PM10 in Diesel Engine Exhaust = from Appendix A, Final–Methodology to Calculate Particulate Matter (PM) 2.5

PM2.5 Fraction of PM10 in Gasoline Engine Exhaust = and PM 2.5 Significance Thresholds, SCAQMD, October 2006

Emissions [pounds per day] = Emission factor [pounds per hour] x Number pieces of equipment x Operating time for each piece [hours per day]

Table 2-A
2009 Motor Vehicle Emission Factors

Vehicle Type	Vehicle Class	Emission Factors							
		CO (lb/mi)	VOC (lb/mi)	NO_x (lb/mi)	SO_x (lb/mi)	Exh. PM10 (lb/mi)	Fug. PM10 (lb/mi)	Exh. PM2.5 (lb/mi)	Fug. PM2.5 (lb/mi)
On-Site Water Truck	HHDT-DSL	0.01214	0.00295	0.03890	0.00004	0.00154	0.73855	0.00142	0.15659
On-Site 3/4 Ton Pick-Up, Ford	LDT2-CAT	0.01175	0.00087	0.00171	0.00000	0.00006	0.73844	0.00006	0.15656
Off-Site Steel Delivery Trucks	HHDT-DSL	0.01214	0.00295	0.03890	0.00004	0.00154	0.00097	0.00142	0.00019
Off-Site Concrete Trucks	HHDT-DSL	0.01214	0.00295	0.03890	0.00004	0.00154	0.00097	0.00142	0.00019
Off-Site Equipment Delivery Trucks	HHDT-DSL	0.01214	0.00295	0.03890	0.00004	0.00154	0.00097	0.00142	0.00019
Off-Site Construction Worker Commute	LDT1-CAT	0.01721	0.00126	0.00167	0.00000	0.00003	0.00088	0.00003	0.00016
Off-Site Materials Delivery Trucks	HHDT-DSL	0.01214	0.00295	0.03890	0.00004	0.00154	0.00097	0.00142	0.00019

Note: The emission factors, except fugitive emissions from entrained road dust, were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model and dividing calculated daily emissions by daily vehicle-miles-traveled.

Welding trucks, fuel/lube trucks and flatbed trucks are assumed to be Medium-Duty Catalyst Equipped Vehicles.

Pickup trucks and construction worker commuting vehicles are assumed to be Light-Duty Trucks 1.

All other vehicles are assumed to be heavy heavy-duty diesel vehicles.

All the emission factors account for the emissions from start, running and idling exhaust. In addition, the VOC emission factors take into account diurnal, hot soak, running and resting emissions, and fugitive PM10 and PM2.5 emission factors take into account tire and brake wear and entrained paved or unpaved road dust, except for water trucks. Entrained unpaved road dust emissions from water trucks are assumed to be zero, because water trucks will be equipped with front spray bars, which will eliminate entrained dust emissions.

Emissions [pounds/day] = Emission factor [pounds/mile] x Vehicle miles traveled [miles/day]

Table 2-B
Motor Vehicle Entrained Paved Road PM10 Emission Factors

Vehicle Type	On-Road Average Vehicle Weight (tons)[a]	Road Type	Silt Loading (g/m2)[b]	PM10 Emission Factor (lb/mi)[c]	PM2.5 Emission Factor (lb/mi)[d]
Off-Site Steel Delivery Trucks	2.4	Collector	0.035	0.0008	0.0001
Off-Site Concrete Trucks	2.4	Collector	0.035	0.0008	0.0001
Off-Site Equipment Delivery Trucks	2.4	Collector	0.035	0.0008	0.0001
Off-Site Construction Worker Commute	2.4	Collector	0.035	0.0008	0.0001
Off-Site Materials Delivery Trucks	2.4	Collector	0.035	0.0008	0.0001

[a] Average on-road vehicle weight in Kern County from ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997)

[b] From ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997)

[c] Emission factor [g/mi] = 7.26 (Silt Loading/2)$^{0.65}$ (Weight/3)$^{1.5}$,
from ARB Emission Inventory Methodology 7.9, Entrained Paved Road Dust (1997)

[d] PM2.5 emission factor [lb/hr] = PM10 emission factor [lb/hr] x PM2.5 fraction of PM10

PM2.5 Fraction of PM10 in Paved Road Dust = 0.169 from Appendix A, Final–Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds, SCAQMD, October 2006

Emissions [pounds/day] = Emission factor [pounds/mile] x Vehicle miles traveled [miles/day]

Table 3-A
Substation Construction Equipment and Motor Vehicle Numbers

Equipment/Vehicle Type	Horsepower	Fuel	Hours or Miles/Day	Monthly Number											
				Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment															
CAT back hoe 450 e	124	Diesel	5	2	2	2	2	2	2	0	0	0	0	0	0
CAT hydrolic excavator 308D CR	318	Diesel	5	2	2	2	2	2	0	0	0	0	0	0	0
CAT track D7R series-2	240	Diesel	5	1	1	0	0	0	0	0	0	0	0	0	0
Multi terrain loader skid steer 287C	57	Diesel	5	0	0	2	2	2	2	2	2	2	0	2	2
CAT wheel Grader 160M with GPS	213	Diesel	5	0	0	0	0	1	1	1	0	0	0	0	0
Walk behind trencher	30	Diesel	5	0	0	0	0	0	0	1	0	0	1	0	0
Cable Puller	385	Diesel	5	0	0	0	0	0	0	1	1	1	0	0	0
Forklift CAT 3054E	120	Diesel	5	1	1	1	1	1	1	1	1	1	1	0	0
Pole Digger International 4700	210	Diesel	5	0	0	0	0	0	0	0	1	1	1	0	0
Crane 150 Ton	330	Diesel	5	0	0	0	0	0	1	0	0	0	0	0	0
Manlift JLG 1350SJP	87	Diesel	5	2	2	2	2	2	2	2	2	2	2	0	0
Motor Vehicles															
On-site Vehicles															
On-Site Water Truck	N/A	Diesel	10	1	1	1	1	1	0	0	0	0	0	0	0
On-Site 3/4 Ton Pick-Up, Ford	N/A	Diesel	10	4	4	4	4	4	4	4	4	4	4	0	0
Off-Site Vehicles															
Off-Site Steel Delivery Trucks	N/A	Diesel	40	37	0	0	0	0	0	0	0	0	0	0	0
Off-Site Concrete Trucks	N/A	Diesel	40	0	15	15	15	0	0	0	0	0	0	0	0
Off-Site Equipment Delivery Trucks	N/A	Diesel	40	0	0	11	0	0	0	0	0	0	0	0	0
Off-Site Construction Worker Commute	N/A	Gasoline	60	8	10	50	17	23	13	24	16	6	12	12	10
Off-Site Materials Delivery Trucks	N/A	Diesel	40	8	8	8	8	8	8	8	8	8	8	8	8

Table 3-B
Substation Construction Monthly Construction Equipment and Motor Vehicle Use

Equipment/Vehicle Type	Horsepower	Fuel	Monthly Operating Hours or Miles[a]											
			Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment														
CAT back hoe 450 e	124	Diesel	220	220	220	220	220	220	0	0	0	0	0	0
CAT hydrolic excavator 308D CR	318	Diesel	220	220	220	220	220	0	0	0	0	0	0	0
CAT track D7R series-2	240	Diesel	110	110	0	0	0	0	0	0	0	0	0	0
Multi terrain loader skid steer 287C	57	Diesel	0	0	220	220	220	220	220	220	220	0	220	220
CAT wheel Grader 160M with GPS	213	Diesel	0	0	0	0	110	110	110	0	0	0	0	0
Walk behind trencher	30	Diesel	0	0	0	0	0	0	110	0	0	110	0	0
Cable Puller	385	Diesel	0	0	0	0	0	0	110	110	110	0	0	0
Forklift CAT 3054E	120	Diesel	110	110	110	110	110	110	110	110	110	110	0	0
Pole Digger International 4700	210	Diesel	0	0	0	0	0	0	0	110	110	110	0	0
Crane 150 Ton	330	Diesel	0	0	0	0	0	110	0	0	0	0	0	0
Manlift JLG 1350SJP	87	Diesel	220	220	220	220	220	220	220	220	220	220	0	0
Motor Vehicles														
On-site Vehicles														
On-Site Water Truck	N/A	Diesel	220	220	220	220	220	0	0	0	0	0	0	0
On-Site 3/4 Ton Pick-Up, Ford	N/A	Diesel	880	880	880	880	880	880	880	880	880	880	0	0
Off-Site Vehicles														
Off-Site Steel Delivery Trucks	N/A	Diesel	1,480	0	0	0	0	0	0	0	0	0	0	0
Off-Site Concrete Trucks	N/A	Diesel	0	600	600	600	0	0	0	0	0	0	0	0
Off-Site Equipment Delivery Trucks	N/A	Diesel	0	0	440	0	0	0	0	0	0	0	0	0
Off-Site Construction Worker Commute	N/A	Gasoline	10,560	13,200	66,000	22,440	30,360	17,160	31,680	21,120	7,920	15,840	15,840	13,200
Off-Site Materials Delivery Trucks	N/A	Diesel	320	320	320	320	320	320	320	320	320	320	320	320

a Based on 22 working days per month

Table 3-C
Substation Construction Monthly Construction Equipment and Motor Vehicle CO Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Monthly Emissions (lb/month)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment													
CAT back hoe 450 e	0.5885	129.5	129.5	129.5	129.5	129.5	129.5	0.0	0.0	0.0	0.0	0.0	0.0
CAT hydrolic excavator 308D CR	0.6596	145.1	145.1	145.1	145.1	145.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAT track D7R series-2	0.6045	66.5	66.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Multi terrain loader skid steer 287C	0.2849	0.0	0.0	62.7	62.7	62.7	62.7	62.7	62.7	62.7	0.0	62.7	62.7
CAT wheel Grader 160M with GPS	0.5194	0.0	0.0	0.0	0.0	57.1	57.1	57.1	0.0	0.0	0.0	0.0	0.0
Walk behind trencher	0.4458	0.0	0.0	0.0	0.0	0.0	0.0	49.0	0.0	0.0	49.0	0.0	0.0
Cable Puller	0.6529	0.0	0.0	0.0	0.0	0.0	0.0	71.8	71.8	71.8	0.0	0.0	0.0
Forklift CAT 3054E	0.3276	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	0.0	0.0
Pole Digger International 4700	0.3475	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.2	38.2	38.2	0.0	0.0
Crane 150 Ton	0.7164	0.0	0.0	0.0	0.0	0.0	78.8	0.0	0.0	0.0	0.0	0.0	0.0
Manlift JLG 1350SJP	0.2540	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	0.0	0.0
Motor Vehicles													
On-site Vehicles													
On-Site Water Truck	0.0121	2.7	2.7	2.7	2.7	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.0117	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0121	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0121	0.0	7.3	7.3	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0121	0.0	0.0	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0172	181.7	227.2	1,135.9	386.2	522.5	295.3	545.2	363.5	136.3	272.6	272.6	227.2
Off-Site Materials Delivery Trucks	0.0121	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Construction Equipment Total		**433.0**	**433.0**	**429.2**	**429.2**	**486.3**	**420.0**	**332.6**	**264.6**	**264.6**	**179.2**	**62.7**	**62.7**
On-Site Motor Vehicle Total		**13.0**	**13.0**	**13.0**	**13.0**	**13.0**	**10.3**	**10.3**	**10.3**	**10.3**	**10.3**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**203.6**	**238.3**	**1,152.4**	**397.4**	**526.4**	**299.2**	**549.1**	**367.4**	**140.2**	**276.5**	**276.5**	**231.1**

Note Totals may not match sum of individual values because of rounding.

Table 3-D
Substation Construction Monthly Construction Equipment and Motor Vehicle VOC Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Monthly Emissions (lb/month)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment													
CAT back hoe 450 e	0.1302	28.7	28.7	28.7	28.7	28.7	28.7	0.0	0.0	0.0	0.0	0.0	0.0
CAT hydrolic excavator 308D CR	0.2070	45.5	45.5	45.5	45.5	45.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAT track D7R series-2	0.2152	23.7	23.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Multi terrain loader skid steer 287C	0.0676	0.0	0.0	14.9	14.9	14.9	14.9	14.9	14.9	14.9	0.0	14.9	14.9
CAT wheel Grader 160M with GPS	0.1856	0.0	0.0	0.0	0.0	20.4	20.4	20.4	0.0	0.0	0.0	0.0	0.0
Walk behind trencher	0.1927	0.0	0.0	0.0	0.0	0.0	0.0	21.2	0.0	0.0	21.2	0.0	0.0
Cable Puller	0.1813	0.0	0.0	0.0	0.0	0.0	0.0	19.9	19.9	19.9	0.0	0.0	0.0
Forklift CAT 3054E	0.0778	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	0.0	0.0
Pole Digger International 4700	0.0997	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.0	11.0	11.0	0.0	0.0
Crane 150 Ton	0.1912	0.0	0.0	0.0	0.0	0.0	21.0	0.0	0.0	0.0	0.0	0.0	0.0
Manlift JLG 1350SJP	0.0772	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	0.0	0.0
Motor Vehicles													
On-site Vehicles													
On-Site Water Truck	0.0030	0.6	0.6	0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.0009	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0030	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0030	0.0	1.8	1.8	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0030	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0013	13.3	16.6	82.8	28.2	38.1	21.5	39.8	26.5	9.9	19.9	19.9	16.6
Off-Site Materials Delivery Trucks	0.0030	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Construction Equipment Total		**123.4**	**123.4**	**114.6**	**114.6**	**135.0**	**110.5**	**102.0**	**71.3**	**71.3**	**57.7**	**14.9**	**14.9**
On-Site Motor Vehicle Total		**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**18.6**	**19.3**	**86.9**	**30.9**	**39.1**	**22.5**	**40.7**	**27.5**	**10.9**	**20.8**	**20.8**	**17.5**

Note: Totals may not match sum of individual values because of rounding.

Table 3-E
Substation Construction Monthly Construction Equipment and Motor Vehicle NOx Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Monthly Emissions (lb/month)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment													
CAT back hoe 450 e	1.0375	228.3	228.3	228.3	228.3	228.3	228.3	0.0	0.0	0.0	0.0	0.0	0.0
CAT hydrolic excavator 308D CR	2.0634	454.0	454.0	454.0	454.0	454.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAT track D7R series-2	2.0496	225.5	225.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Multi terrain loader skid steer 287C	0.4466	0.0	0.0	98.2	98.2	98.2	98.2	98.2	98.2	98.2	0.0	98.2	98.2
CAT wheel Grader 160M with GPS	1.8997	0.0	0.0	0.0	0.0	209.0	209.0	209.0	0.0	0.0	0.0	0.0	0.0
Walk behind trencher	0.3663	0.0	0.0	0.0	0.0	0.0	0.0	40.3	0.0	0.0	40.3	0.0	0.0
Cable Puller	2.1202	0.0	0.0	0.0	0.0	0.0	0.0	233.2	233.2	233.2	0.0	0.0	0.0
Forklift CAT 3054E	0.6438	70.8	70.8	70.8	70.8	70.8	70.8	70.8	70.8	70.8	70.8	0.0	0.0
Pole Digger International 4700	1.3088	0.0	0.0	0.0	0.0	0.0	0.0	0.0	144.0	144.0	144.0	0.0	0.0
Crane 150 Ton	1.8761	0.0	0.0	0.0	0.0	0.0	206.4	0.0	0.0	0.0	0.0	0.0	0.0
Manlift JLG 1350SJP	0.4815	105.9	105.9	105.9	105.9	105.9	105.9	105.9	105.9	105.9	105.9	0.0	0.0
Motor Vehicles													
On-site Vehicles													
On-Site Water Truck	0.0389	8.6	8.6	8.6	8.6	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.0017	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0389	57.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0389	0.0	23.3	23.3	23.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0389	0.0	0.0	17.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0017	17.7	22.1	110.5	37.6	50.8	28.7	53.0	35.3	13.3	26.5	26.5	22.1
Off-Site Materials Delivery Trucks	0.0389	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4
Construction Equipment Total		**1,084.4**	**1,084.4**	**957.2**	**957.2**	**1,166.2**	**918.6**	**757.5**	**652.2**	**652.2**	**361.0**	**98.2**	**98.2**
On-Site Motor Vehicle Total		**10.1**	**10.1**	**10.1**	**10.1**	**10.1**	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**87.7**	**57.9**	**163.4**	**73.3**	**63.3**	**41.2**	**65.5**	**47.8**	**25.7**	**39.0**	**39.0**	**34.5**

Note: Totals may not match sum of individual values because of rounding

Table 3-F
Substation Construction Monthly Construction Equipment and Motor Vehicle SOx Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Monthly Emissions (lb/month)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment													
CAT back hoe 450 e	0.0011	0.3	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0
CAT hydrolic excavator 308D CR	0.0023	0.5	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAT track D7R series-2	0.0019	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Multi terrain loader skid steer 287C	0.0005	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1
CAT wheel Grader 160M with GPS	0.0019	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Walk behind trencher	0.0004	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Puller	0.0025	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.0	0.0	0.0
Forklift CAT 3054E	0.0007	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
Pole Digger International 4700	0.0021	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.0	0.0
Crane 150 Ton	0.0018	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Manlift JLG 1350SJP	0.0004	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
Motor Vehicles													
On-site Vehicles													
On-Site Water Truck	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0000	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Materials Delivery Trucks	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Equipment Total		**1.1**	**1.1**	**1.0**	**1.0**	**1.2**	**0.9**	**0.8**	**0.8**	**0.8**	**0.4**	**0.1**	**0.1**
On-Site Motor Vehicle Total		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**0.1**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Note: Totals may not match sum of individual values because of rounding.

Table 3-G
Substation Construction Monthly Construction Equipment and Motor Vehicle Exhaust PM10 Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Monthly Emissions (lb/month)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment													
CAT back hoe 450 e	0.0595	13.1	13.1	13.1	13.1	13.1	13.1	0.0	0.0	0.0	0.0	0.0	0.0
CAT hydrolic excavator 308D CR	0.0754	16.6	16.6	16.6	16.6	16.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAT track D7R series-2	0.0831	9.1	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Multi terrain loader skid steer 287C	0.0387	0.0	0.0	8.5	8.5	8.5	8.5	8.5	8.5	8.5	0.0	8.5	8.5
CAT wheel Grader 160M with GPS	0.0705	0.0	0.0	0.0	0.0	7.8	7.8	7.8	0.0	0.0	0.0	0.0	0.0
Walk behind trencher	0.0421	0.0	0.0	0.0	0.0	0.0	0.0	4.6	0.0	0.0	4.6	0.0	0.0
Cable Puller	0.0721	0.0	0.0	0.0	0.0	0.0	0.0	7.9	7.9	7.9	0.0	0.0	0.0
Forklift CAT 3054E	0.0345	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	0.0	0.0
Pole Digger International 4700	0.0395	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	4.3	4.3	0.0	0.0
Crane 150 Ton	0.0727	0.0	0.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0
Manlift JLG 1350SJP	0.0386	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	0.0	0.0
Motor Vehicles													
On-site Vehicles													
On-Site Water Truck	0.0015	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.0001	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0015	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0015	0.0	0.9	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0015	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0000	0.3	0.4	1.8	0.6	0.8	0.5	0.9	0.6	0.2	0.4	0.4	0.4
Off-Site Materials Delivery Trucks	0.0015	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Construction Equipment Total		**51.1**	**51.1**	**50.5**	**50.5**	**58.2**	**49.6**	**41.1**	**33.1**	**33.1**	**21.3**	**8.5**	**8.5**
On-Site Motor Vehicle Total		**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**3.1**	**1.8**	**3.9**	**2.0**	**1.3**	**1.0**	**1.4**	**1.1**	**0.7**	**0.9**	**0.9**	**0.9**

Note Totals may not match sum of individual values because of rounding.

Table 3-H
Substation Construction Monthly Construction Equipment and Motor Vehicle Exhaust PM2.5 Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Monthly Emissions (lb/month)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment													
CAT back hoe 450 e	0.0548	12.1	12.1	12.1	12.1	12.1	12.1	0.0	0.0	0.0	0.0	0.0	0.0
CAT hydrolic excavator 308D CR	0.0693	15.3	15.3	15.3	15.3	15.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAT track D7R series-2	0.0764	8.4	8.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Multi terrain loader skid steer 287C	0.0356	0.0	0.0	7.8	7.8	7.8	7.8	7.8	7.8	7.8	0.0	7.8	7.8
CAT wheel Grader 160M with GPS	0.0648	0.0	0.0	0.0	0.0	7.1	7.1	7.1	0.0	0.0	0.0	0.0	0.0
Walk behind trencher	0.0387	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0	4.3	0.0	0.0
Cable Puller	0.0663	0.0	0.0	0.0	0.0	0.0	0.0	7.3	7.3	7.3	0.0	0.0	0.0
Forklift CAT 3054E	0.0318	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	0.0	0.0
Pole Digger International 4700	0.0363	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	4.0	4.0	0.0	0.0
Crane 150 Ton	0.0669	0.0	0.0	0.0	0.0	0.0	7.4	0.0	0.0	0.0	0.0	0.0	0.0
Manlift JLG 1350SJP	0.0355	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	0.0	0.0
Motor Vehicles													
On-site Vehicles													
On-Site Water Truck	0.0014	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.0001	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0014	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0014	0.0	0.8	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0014	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0000	0.3	0.3	1.7	0.6	0.8	0.4	0.8	0.5	0.2	0.4	0.4	0.3
Off-Site Materials Delivery Trucks	0.0014	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Construction Equipment Total		**47.0**	**47.0**	**46.4**	**46.4**	**53.6**	**45.7**	**37.8**	**30.4**	**30.4**	**19.6**	**7.8**	**7.8**
On-Site Motor Vehicle Total		**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**2.8**	**1.6**	**3.6**	**1.9**	**1.2**	**0.9**	**1.3**	**1.0**	**0.7**	**0.9**	**0.9**	**0.8**

Note: Totals may not match sum of individual values because of rounding.

Table 3-I
Substation Construction Monthly Motor Vehicle Fugitive PM10 Emissions

Vehicle Type	Emission Factor (lb/mile)	Monthly Emissions (lb/month)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
On-site Vehicles													
On-Site Water Truck	0.7385	162.5	162.5	162.5	162.5	162.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.7384	649.8	649.8	649.8	649.8	649.8	649.8	649.8	649.8	649.8	649.8	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0010	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0010	0.0	0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0010	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0009	9.3	11.6	58.2	19.8	26.8	15.1	27.9	18.6	7.0	14.0	14.0	11.6
Off-Site Materials Delivery Trucks	0.0010	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
On-Site Motor Vehicle Total		**812.3**	**812.3**	**812.3**	**812.3**	**812.3**	**649.8**	**649.8**	**649.8**	**649.8**	**649.8**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**11.1**	**12.5**	**59.5**	**20.7**	**27.1**	**15.4**	**28.2**	**18.9**	**7.3**	**14.3**	**14.3**	**11.9**

Note: Totals may not match sum of individual values because of rounding

On-site vehicle travel is on unpaved surfaces and offsite travel is on paved roads

Table 3-J
Substation Construction Monthly Motor Vehicle Fugitive PM2.5 Emissions

Vehicle Type	Emission Factor (lb/mile)	Monthly Emissions (lb/month)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
On-site Vehicles													
On-Site Water Truck	0.1566	34.4	34.4	34.4	34.4	34.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.1566	137.8	137.8	137.8	137.8	137.8	137.8	137.8	137.8	137.8	137.8	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0002	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0002	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0002	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0002	1.7	2.1	10.5	3.6	4.8	2.7	5.0	3.3	1.3	2.5	2.5	2.1
Off-Site Materials Delivery Trucks	0.0002	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
On-Site Motor Vehicle Total		**172.2**	**172.2**	**172.2**	**172.2**	**172.2**	**137.8**	**137.8**	**137.8**	**137.8**	**137.8**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**2.0**	**2.3**	**10.7**	**3.7**	**4.9**	**2.8**	**5.1**	**3.4**	**1.3**	**2.6**	**2.6**	**2.2**

Note: Totals may not match sum of individual values because of rounding

On-site vehicle travel is on unpaved surfaces and offsite travel is on paved roads

Table 3-K
Substation Construction Monthly Fugitive PM10 and PM2.5 Activities

Activity	Units	Quantity per Month											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Excavation	Cu. Yd.	5,000	0	0	0	0	0	0	0	0	0	0	0
Storage Pile Wind Erosion	Acres-Days	0	0	0	0	0	0	0	0	0	0	0	0
Bulldozing,Scraping and Grading	Hours	110	110	0	0	110	110	110	0	0	0	0	0

Table 3-L
Substation Construction Monthly Fugitive PM10 Emissions

Activity	Emission Factor	Monthly Emissions (lb/month)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Excavation	9.94E-04	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Pile Wind Erosion	2.93	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bulldozing,Scraping and Grading	0.348	38.2	38.2	0.0	0.0	38.2	38.2	38.2	0.0	0.0	0.0	0.0	0.0
Total		**43.2**	**38.2**	**0.0**	**0.0**	**38.2**	**38.2**	**38.2**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Note: Totals may not match sum of individual values because of rounding.

Table 3-M
Substation Construction Monthly Fugitive PM2.5 Emissions

Activity	Emission Factor	Monthly Emissions (lb/month)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Excavation	2.07E-04	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Pile Wind Erosion	0.61	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bulldozing,Scraping and Grading	0.157	17.2	17.2	0.0	0.0	17.2	17.2	17.2	0.0	0.0	0.0	0.0	0.0
Total		**18.3**	**17.2**	**0.0**	**0.0**	**17.2**	**17.2**	**17.2**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Note: Totals may not match sum of individual values because of rounding.

Table 4-A
Substation Construction Equipment and Motor Vehicle Numbers

Equipment/Vehicle Type	Horsepower	Fuel	Hours or Miles/Hour	Monthly Number											
				Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment															
CAT back hoe 450 e	124	Diesel	1	2	2	2	2	2	2	0	0	0	0	0	0
CAT hydrolic excavator 308D CR	318	Diesel	1	2	2	2	2	2	0	0	0	0	0	0	0
CAT track D7R series-2	240	Diesel	1	1	1	0	0	0	0	0	0	0	0	0	0
Multi terrain loader skid steer 287C	57	Diesel	1	0	0	2	2	2	2	2	2	2	0	2	2
CAT wheel Grader 160M with GPS	213	Diesel	1	0	0	0	0	1	1	1	0	0	0	0	0
Walk behind trencher	30	Diesel	1	0	0	0	0	0	0	1	0	0	1	0	0
Cable Puller	385	Diesel	1	0	0	0	0	0	0	1	1	1	0	0	0
Forklift CAT 3054E	120	Diesel	1	1	1	1	1	1	1	1	1	1	1	0	0
Pole Digger International 4700	210	Diesel	1	0	0	0	0	0	0	0	1	1	1	0	0
Crane 150 Ton	330	Diesel	1	0	0	0	0	0	1	0	0	0	0	0	0
Manlift JLG 1350SJP	87	Diesel	1	2	2	2	2	2	2	2	2	2	2	0	0
Motor Vehicles															
On-site Vehicles															
On-Site Water Truck	N/A	Diesel	5	1	1	1	1	1	0	0	0	0	0	0	0
On-Site 3/4 Ton Pick-Up, Ford	N/A	Diesel	5	4	4	4	4	4	4	4	4	4	4	0	0
Off-Site Vehicles															
Off-Site Steel Delivery Trucks	N/A	Diesel	20	1	0	0	0	0	0	0	0	0	0	0	0
Off-Site Concrete Trucks	N/A	Diesel	20	0	1	1	1	0	0	0	0	0	0	0	0
Off-Site Equipment Delivery Trucks	N/A	Diesel	20	0	0	1	0	0	0	0	0	0	0	0	0
Off-Site Construction Worker Commute	N/A	Gasoline	30	8	10	50	17	23	13	24	16	6	12	12	10
Off-Site Materials Delivery Trucks	N/A	Diesel	20	1	1	1	1	1	1	1	1	1	1	1	1

Table 4-B
Substation Construction Hourly Construction Equipment and Motor Vehicle Use

Equipment/Vehicle Type	Horsepower	Fuel	Hourly Operating Hours or Miles[a]											
			Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment														
CAT back hoe 450 e	124	Diesel	2	2	2	2	2	2	0	0	0	0	0	0
CAT hydrolic excavator 308D CR	318	Diesel	2	2	2	2	2	0	0	0	0	0	0	0
CAT track D7R series-2	240	Diesel	1	1	0	0	0	0	0	0	0	0	0	0
Multi terrain loader skid steer 287C	57	Diesel	0	0	2	2	2	2	2	2	0	2	2	
CAT wheel Grader 160M with GPS	213	Diesel	0	0	0	0	1	1	1	0	0	0	0	0
Walk behind trencher	30	Diesel	0	0	0	0	0	0	1	0	0	1	0	0
Cable Puller	385	Diesel	0	0	0	0	0	0	1	1	1	0	0	0
Forklift CAT 3054E	120	Diesel	1	1	1	1	1	1	1	1	1	1	0	0
Pole Digger International 4700	210	Diesel	0	0	0	0	0	0	0	1	1	1	0	0
Crane 150 Ton	330	Diesel	0	0	0	0	0	1	0	0	0	0	0	0
Manlift JLG 1350SJP	87	Diesel	2	2	2	2	2	2	2	2	2	2	0	0
Motor Vehicles														
On-site Vehicles														
On-Site Water Truck	N/A	Diesel	5	5	5	5	5	0	0	0	0	0	0	0
On-Site 3/4 Ton Pick-Up, Ford	N/A	Diesel	20	20	20	20	20	20	20	20	20	20	0	0
Off-Site Vehicles														
Off-Site Steel Delivery Trucks	N/A	Diesel	20	0	0	0	0	0	0	0	0	0	0	0
Off-Site Concrete Trucks	N/A	Diesel	0	20	20	20	0	0	0	0	0	0	0	0
Off-Site Equipment Delivery Trucks	N/A	Diesel	0	0	20	0	0	0	0	0	0	0	0	0
Off-Site Construction Worker Commute	N/A	Gasoline	240	300	1,500	510	690	390	720	480	180	360	360	300
Off-Site Materials Delivery Trucks	N/A	Diesel	20	20	20	20	20	20	20	20	20	20	20	20

Table 4-C
Substation Construction Hourly Construction Equipment and Motor Vehicle CO Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Hourly Emissions (lb/hr)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment													
CAT back hoe 450 e	0.5885	1.2	1.2	1.2	1.2	1.2	1.2	0.0	0.0	0.0	0.0	0.0	0.0
CAT hydrolic excavator 308D CR	0.6596	1.3	1.3	1.3	1.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAT track D7R series-2	0.6045	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Multi terrain loader skid steer 287C	0.2849	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.0	0.6	0.6
CAT wheel Grader 160M with GPS	0.5194	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0
Walk behind trencher	0.4458	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.0
Cable Puller	0.6529	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.7	0.0	0.0	0.0
Forklift CAT 3054E	0.3276	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.0	0.0
Pole Digger International 4700	0.3475	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.0	0.0
Crane 150 Ton	0.7164	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Manlift JLG 1350SJP	0.2540	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0	0.0
Motor Vehicles													
On-site Vehicles													
On-Site Water Truck	0.0121	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.0117	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0121	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0121	0.0	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0121	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0172	4.1	5.2	25.8	8.8	11.9	6.7	12.4	8.3	3.1	6.2	6.2	5.2
Off-Site Materials Delivery Trucks	0.0121	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Construction Equipment Total		**3.9**	**3.9**	**3.9**	**3.9**	**4.4**	**3.8**	**3.0**	**2.4**	**2.4**	**1.6**	**0.6**	**0.6**
On-Site Motor Vehicle Total		**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**4.6**	**5.6**	**26.5**	**9.3**	**12.1**	**7.0**	**12.6**	**8.5**	**3.3**	**6.4**	**6.4**	**5.4**

Table 4-D
Substation Construction Hourly Construction Equipment and Motor Vehicle VOC Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Hourly Emissions (lb/hr)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment													
CAT back hoe 450 e	0.1302	0.3	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0
CAT hydrolic excavator 308D CR	0.2070	0.4	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAT track D7R series-2	0.2152	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Multi terrain loader skid steer 287C	0.0676	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1
CAT wheel Grader 160M with GPS	0.1856	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Walk behind trencher	0.1927	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0
Cable Puller	0.1813	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.0	0.0	0.0
Forklift CAT 3054E	0.0778	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
Pole Digger International 4700	0.0997	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0
Crane 150 Ton	0.1912	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Manlift JLG 1350SJP	0.0772	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.0
Motor Vehicles													
On-site Vehicles													
On-Site Water Truck	0.0030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.0009	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0030	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0030	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0030	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0013	0.3	0.4	1.9	0.6	0.9	0.5	0.9	0.6	0.2	0.5	0.5	0.4
Off-Site Materials Delivery Trucks	0.0030	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Construction Equipment Total		**1.1**	**1.1**	**1.0**	**1.0**	**1.2**	**1.0**	**0.9**	**0.6**	**0.6**	**0.5**	**0.1**	**0.1**
On-Site Motor Vehicle Total		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**0.4**	**0.5**	**2.1**	**0.8**	**0.9**	**0.5**	**1.0**	**0.7**	**0.3**	**0.5**	**0.5**	**0.4**

Table 4-E
Substation Construction Hourly Construction Equipment and Motor Vehicle NOx Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Hourly Emissions (lb/hr)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment													
CAT back hoe 450 e	1.0375	2.1	2.1	2.1	2.1	2.1	2.1	0.0	0.0	0.0	0.0	0.0	0.0
CAT hydrolic excavator 308D CR	2.0634	4.1	4.1	4.1	4.1	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAT track D7R series-2	2.0496	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Multi terrain loader skid steer 287C	0.4466	0.0	0.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.0	0.9	0.9
CAT wheel Grader 160M with GPS	1.8997	0.0	0.0	0.0	0.0	1.9	1.9	1.9	0.0	0.0	0.0	0.0	0.0
Walk behind trencher	0.3663	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.0
Cable Puller	2.1202	0.0	0.0	0.0	0.0	0.0	0.0	2.1	2.1	2.1	0.0	0.0	0.0
Forklift CAT 3054E	0.6438	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.0	0.0
Pole Digger International 4700	1.3088	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.3	1.3	0.0	0.0
Crane 150 Ton	1.8761	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0
Manlift JLG 1350SJP	0.4815	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0
Motor Vehicles													
On-site Vehicles													
On-Site Water Truck	0.0389	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.0017	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0389	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0389	0.0	0.8	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0389	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0017	0.4	0.5	2.5	0.9	1.2	0.7	1.2	0.8	0.3	0.6	0.6	0.5
Off-Site Materials Delivery Trucks	0.0389	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Construction Equipment Total		**9.9**	**9.9**	**8.7**	**8.7**	**10.6**	**8.4**	**6.9**	**5.9**	**5.9**	**3.3**	**0.9**	**0.9**
On-Site Motor Vehicle Total		**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**2.0**	**2.1**	**4.8**	**2.4**	**1.9**	**1.4**	**2.0**	**1.6**	**1.1**	**1.4**	**1.4**	**1.3**

Table 4-F
Substation Construction Hourly Construction Equipment and Motor Vehicle SOx Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Hourly Emissions (lb/hr)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment													
CAT back hoe 450 e	0.0011	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAT hydrolic excavator 308D CR	0.0023	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAT track D7R series-2	0.0019	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Multi terrain loader skid steer 287C	0.0005	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAT wheel Grader 160M with GPS	0.0019	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walk behind trencher	0.0004	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Puller	0.0025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Forklift CAT 3054E	0.0007	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pole Digger International 4700	0.0021	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crane 150 Ton	0.0018	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manlift JLG 1350SJP	0.0004	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles													
On-site Vehicles													
On-Site Water Truck	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Materials Delivery Trucks	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Equipment Total		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
On-Site Motor Vehicle Total		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Note: Totals may not match sum of individual values because of rounding.

Table 4-G
Substation Construction Hourly Construction Equipment and Motor Vehicle Exhaust PM10 Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Hourly Emissions (lb/hr)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment													
CAT back hoe 450 e	0.0595	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
CAT hydrolic excavator 308D CR	0.0754	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAT track D7R series-2	0.0831	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Multi terrain loader skid steer 287C	0.0387	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1
CAT wheel Grader 160M with GPS	0.0705	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Walk behind trencher	0.0421	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Puller	0.0721	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0
Forklift CAT 3054E	0.0345	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pole Digger International 4700	0.0395	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crane 150 Ton	0.0727	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Manlift JLG 1350SJP	0.0386	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
Motor Vehicles													
On-site Vehicles													
On-Site Water Truck	0.0015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.0001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Materials Delivery Trucks	0.0015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Equipment Total		**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.4**	**0.3**	**0.3**	**0.2**	**0.1**	**0.1**
On-Site Motor Vehicle Total		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Note: Totals may not match sum of individual values because of rounding

Table 4-H
Substation Construction Hourly Construction Equipment and Motor Vehicle Exhaust PM2.5 Emissions

Equipment/Vehicle Type	Emission Factor (lb/hr or lb/mile)	Hourly Emissions (lb/hr)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Construction Equipment													
CAT back hoe 450 e	0.0548	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
CAT hydrolic excavator 308D CR	0.0693	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAT track D7R series-2	0.0764	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Multi terrain loader skid steer 287C	0.0356	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1
CAT wheel Grader 160M with GPS	0.0648	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Walk behind trencher	0.0387	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Puller	0.0663	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0
Forklift CAT 3054E	0.0318	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pole Digger International 4700	0.0363	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crane 150 Ton	0.0669	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Manlift JLG 1350SJP	0.0355	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
Motor Vehicles													
On-site Vehicles													
On-Site Water Truck	0.0014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.0001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Materials Delivery Trucks	0.0014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Equipment Total		**0.4**	**0.4**	**0.4**	**0.4**	**0.5**	**0.4**	**0.3**	**0.3**	**0.3**	**0.2**	**0.1**	**0.1**
On-Site Motor Vehicle Total		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**0.1**	**0.1**	**0.1**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Note. Totals may not match sum of individual values because of rounding.

Table 4-I
Substation Construction Hourly Motor Vehicle Fugitive PM10 Emissions

Vehicle Type	Emission Factor (lb/mile)	Hourly Emissions (lb/hr)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
On-site Vehicles													
On-Site Water Truck	0.7385	3.7	3.7	3.7	3.7	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.7384	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0009	0.2	0.3	1.3	0.4	0.6	0.3	0.6	0.4	0.2	0.3	0.3	0.3
Off-Site Materials Delivery Trucks	0.0010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site Motor Vehicle Total		**18.5**	**18.5**	**18.5**	**18.5**	**18.5**	**14.8**	**14.8**	**14.8**	**14.8**	**14.8**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**0.3**	**0.3**	**1.4**	**0.5**	**0.6**	**0.4**	**0.7**	**0.4**	**0.2**	**0.3**	**0.3**	**0.3**

Note: Totals may not match sum of individual values because of rounding.

Table 4-J
Substation Construction Hourly Motor Vehicle Fugitive PM2.5 Emissions

Vehicle Type	Emission Factor (lb/mile)	Hourly Emissions (lb/hr)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
On-site Vehicles													
On-Site Water Truck	0.1566	0.8	0.8	0.8	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site 3/4 Ton Pick-Up, Ford	0.1566	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	0.0	0.0
Off-Site Vehicles													
Off-Site Steel Delivery Trucks	0.0002	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Concrete Trucks	0.0002	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Equipment Delivery Trucks	0.0002	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Off-Site Construction Worker Commute	0.0002	0.0	0.0	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0
Off-Site Materials Delivery Trucks	0.0002	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site Motor Vehicle Total		**3.9**	**3.9**	**3.9**	**3.9**	**3.9**	**3.1**	**3.1**	**3.1**	**3.1**	**3.1**	**0.0**	**0.0**
Off-Site Motor Vehicle Total		**0.0**	**0.1**	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0**	**0.1**	**0.1**	**0.1**

Note: Totals may not match sum of individual values because of rounding.

Table 4-K
Substation Construction Hourly Fugitive PM10 and PM2.5 Activities

Activity	Units	Quantity per Hour											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Excavation	Cu. Yd.	23	0	0	0	0	0	0	0	0	0	0	0
Storage Pile Wind Erosion	Acres-Hours	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bulldozing,Scraping and Grading	Hours	1	1	0	0	1	1	1	0	0	0	0	0

Table 4-L
Substation Construction Hourly Fugitive PM10 Emissions

Activity	Emission Factor	Hourly Emissions (lb/hr)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Excavation	9.94E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Pile Wind Erosion	2.93	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bulldozing,Scraping and Grading	0.348	0.3	0.3	0.0	0.0	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0
Total		**0.4**	**0.3**	**0.0**	**0.0**	**0.3**	**0.3**	**0.3**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Note: Totals may not match sum of individual values because of rounding.

Table 4-M
Substation Construction Hourly Fugitive PM2.5 Emissions

Activity	Emission Factor	Hourly Emissions (lb/hr)											
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Excavation	2.07E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Pile Wind Erosion	0.61	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bulldozing,Scraping and Grading	0.157	0.2	0.2	0.0	0.0	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0
Total		**0.2**	**0.2**	**0.0**	**0.0**	**0.2**	**0.2**	**0.2**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Note: Totals may not match sum of individual values because of rounding.

Table 5-A
Substation Construction CO Emissions Summary

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
12-Month Running Emissions (ton/year)[a]												
On-Site												
Equipment	1.9	1.7	1.5	1.3	1.0	0.8	0.6	0.4	0.3	0.2	0.1	0.0
Motor Vehicles	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site Total	**2.0**	**1.7**	**1.5**	**1.3**	**1.1**	**0.8**	**0.6**	**0.4**	**0.3**	**0.2**	**0.1**	**0.0**
Off-Site Motor Vehicles	**2.3**	**2.2**	**2.1**	**1.5**	**1.3**	**1.1**	**0.9**	**0.6**	**0.5**	**0.4**	**0.3**	**0.1**
12-Month Total	**4.3**	**4.0**	**3.6**	**2.8**	**2.4**	**1.9**	**1.5**	**1.1**	**0.8**	**0.5**	**0.3**	**0.1**
Maximum On-Site 12-Month Total (ton/year)	**2.0**											
Maximum 12-Month Total (ton/year)	**4.3**											
Monthly Emissions (lb/month)												
On-Site												
Equipment	433.0	433.0	429.2	429.2	486.3	420.0	332.6	264.6	264.6	179.2	62.7	62.7
Motor Vehicles	13.0	13.0	13.0	13.0	13.0	10.3	10.3	10.3	10.3	10.3	0.0	0.0
On-Site Total	**446.0**	**446.0**	**442.2**	**442.2**	**499.3**	**430.3**	**342.9**	**275.0**	**275.0**	**189.5**	**62.7**	**62.7**
Off-Site Motor Vehicles	**203.6**	**238.3**	**1,152.4**	**397.4**	**526.4**	**299.2**	**549.1**	**367.4**	**140.2**	**276.5**	**276.5**	**231.1**
Monthly Total	**649.6**	**684.4**	**1,594.6**	**839.6**	**1,025.7**	**729.5**	**892.0**	**642.4**	**415.2**	**466.0**	**339.2**	**293.7**
Maximum On-Site Monthly Total (lb/month)	**499.3**											
Maximum Monthly Total (lb/month)	**1,594.6**											
Daily Emissions (lb/day)[b]												
On-Site												
Equipment	19.7	19.7	19.5	19.5	22.1	19.1	15.1	12.0	12.0	8.1	2.8	2.8
Motor Vehicles	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.0	0.0
On-Site Total	**20.3**	**20.3**	**20.1**	**20.1**	**22.7**	**19.6**	**15.6**	**12.5**	**12.5**	**8.6**	**2.8**	**2.8**
Off-Site Motor Vehicles	**9.3**	**10.8**	**52.4**	**18.1**	**23.9**	**13.6**	**25.0**	**16.7**	**6.4**	**12.6**	**12.6**	**10.5**
Daily Total	**29.5**	**31.1**	**72.5**	**38.2**	**46.6**	**33.2**	**40.5**	**29.2**	**18.9**	**21.2**	**15.4**	**13.4**
Maximum On-Site Daily Total (lb/day)	**22.7**											
Maximum Off-Site Daily Total (lb/day)	**52.4**											
Maximum Daily Total (lb/day)	**72.5**											
Hourly Emissions (lb/hour)[c]												
On-Site												
Equipment	3.9	3.9	3.9	3.9	4.4	3.8	3.0	2.4	2.4	1.6	0.6	0.6
Motor Vehicles	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.0	0.0
On-Site Total	**4.2**	**4.2**	**4.2**	**4.2**	**4.7**	**4.1**	**3.3**	**2.6**	**2.6**	**1.9**	**0.6**	**0.6**
Off-Site Motor Vehicles	**4.6**	**5.6**	**26.5**	**9.3**	**12.1**	**7.0**	**12.6**	**8.5**	**3.3**	**6.4**	**6.4**	**5.4**
Hourly Total	**8.8**	**9.9**	**30.7**	**13.5**	**16.8**	**11.0**	**15.9**	**11.1**	**6.0**	**8.3**	**7.0**	**6.0**
Maximum On-Site Hourly Total (lb/hour)	**4.7**											
Maximum Hourly Total (lb/hour)	**30.7**											

[a] The value for each month is the total for that month and the next 11 months

[b] Daily emissions = Monthly emissions / 22 working days/month

[c] Hourly emissions are based on simultaneous operation of all emission sources

Table 5-B
Substation Construction Maximum On-Site CO Emissions Summary

Source	Hourly (lb/hr)	Daily (lb/day)	Annual (ton/yr)
Equipment[a]	4.4	22.1	1.9
Motor Vehicles[a]	0.3	0.6	0.1
Maximum On-Site Total	**4.7**	**22.7**	**2.0**

[a] Emissions from source during period with maximum on-site total emissions

Table 5-C
Substation Construction VOC Emissions Summary

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
12-Month Running Emissions (ton/year)[a]												
On-Site												
Equipment	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.0	0.0	0.0
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site Total	**0.5**	**0.5**	**0.4**	**0.3**	**0.3**	**0.2**	**0.2**	**0.1**	**0.1**	**0.0**	**0.0**	**0.0**
Off-Site Motor Vehicles	**0.2**	**0.2**	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
12-Month Total	**0.7**	**0.6**	**0.6**	**0.5**	**0.4**	**0.3**	**0.2**	**0.2**	**0.1**	**0.1**	**0.0**	**0.0**
Maximum On-Site 12-Month Total (ton/year)	**0.5**											
Maximum 12-Month Total (ton/year)	**0.7**											
Monthly Emissions (lb/month)												
On-Site												
Equipment	123.4	123.4	114.6	114.6	135.0	110.5	102.0	71.3	71.3	57.7	14.9	14.9
Motor Vehicles	1.4	1.4	1.4	1.4	1.4	0.8	0.8	0.8	0.8	0.8	0.0	0.0
On-Site Total	**124.8**	**124.8**	**116.0**	**116.0**	**136.4**	**111.3**	**102.7**	**72.1**	**72.1**	**58.5**	**14.9**	**14.9**
Off-Site Motor Vehicles	**18.6**	**19.3**	**86.9**	**30.9**	**39.1**	**22.5**	**40.7**	**27.5**	**10.9**	**20.8**	**20.8**	**17.5**
Monthly Total	**143.4**	**144.1**	**202.9**	**146.9**	**175.5**	**133.8**	**143.4**	**99.5**	**83.0**	**79.3**	**35.7**	**32.4**
Maximum On-Site Monthly Total (lb/month)	**136.4**											
Maximum Monthly Total (lb/month)	**202.9**											
Daily Emissions (lb/day)[b]												
On-Site												
Equipment	5.6	5.6	5.2	5.2	6.1	5.0	4.6	3.2	3.2	2.6	0.7	0.7
Motor Vehicles	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site Total	**5.7**	**5.7**	**5.3**	**5.3**	**6.2**	**5.1**	**4.7**	**3.3**	**3.3**	**2.7**	**0.7**	**0.7**
Off-Site Motor Vehicles	**0.8**	**0.9**	**3.9**	**1.4**	**1.8**	**1.0**	**1.9**	**1.2**	**0.5**	**0.9**	**0.9**	**0.8**
Daily Total	**6.5**	**6.6**	**9.2**	**6.7**	**8.0**	**6.1**	**6.5**	**4.5**	**3.8**	**3.6**	**1.6**	**1.5**
Maximum On-Site Daily Total (lb/day)	**6.2**											
Maximum Off-Site Daily Total (lb/day)	**3.9**											
Maximum Daily Total (lb/day)	**9.2**											
Hourly Emissions (lb/hour)[c]												
On-Site												
Equipment	1.1	1.1	1.0	1.0	1.2	1.0	0.9	0.6	0.6	0.5	0.1	0.1
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site Total	**1.2**	**1.2**	**1.1**	**1.1**	**1.3**	**1.0**	**0.9**	**0.7**	**0.7**	**0.5**	**0.1**	**0.1**
Off-Site Motor Vehicles	**0.4**	**0.5**	**2.1**	**0.8**	**0.9**	**0.5**	**1.0**	**0.7**	**0.3**	**0.5**	**0.5**	**0.4**
Hourly Total	**1.6**	**1.6**	**3.1**	**1.8**	**2.2**	**1.6**	**1.9**	**1.3**	**1.0**	**1.1**	**0.6**	**0.6**
Maximum On-Site Hourly Total (lb/hour)	**1.3**											
Maximum Hourly Total (lb/hour)	**3.1**											

[a] The value for each month is the total for that month and the next 11 months

[b] Daily emissions = Monthly emissions / 22 working days/month

[c] Hourly emissions are based on simultaneous operation of all emission sources

Table 5-D
Substation Construction Maximum On-Site VOC Emissions Summary

Source	Hourly (lb/hr)	Daily (lb/day)	Annual (ton/yr)
Equipment[a]	1.2	6.1	0.5
Motor Vehicles[a]	0.0	0.1	0.0
Maximum On-Site Total	**1.3**	**6.2**	**0.5**

[a] Emissions from source during period with maximum on-site total emissions

Table 5-E
Substation Construction NOx Emissions Summary

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
12-Month Running Emissions (ton/year)[a]												
On-Site												
Equipment	4.4	3.9	3.3	2.8	2.4	1.8	1.3	0.9	0.6	0.3	0.1	0.0
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site Total	4.4	3.9	3.3	2.8	2.4	1.8	1.3	0.9	0.6	0.3	0.1	0.0
Off-Site Motor Vehicles	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0
12-Month Total	4.8	4.2	3.6	3.1	2.5	1.9	1.4	1.0	0.7	0.3	0.1	0.1
Maximum On-Site 12-Month Total (ton/year)	4.4											
Maximum 12-Month Total (ton/year)	4.8											
Monthly Emissions (lb/month)												
On-Site												
Equipment	1,084.4	1,084.4	957.2	957.2	1,166.2	918.6	757.5	652.2	652.2	361.0	98.2	98.2
Motor Vehicles	10.1	10.1	10.1	10.1	10.1	1.5	1.5	1.5	1.5	1.5	0.0	0.0
On-Site Total	1,094.5	1,094.5	967.3	967.3	1,176.2	920.1	759.0	653.7	653.7	362.5	98.2	98.2
Off-Site Motor Vehicles	87.7	57.9	163.4	73.3	63.3	41.2	65.5	47.8	25.7	39.0	39.0	34.5
Monthly Total	1,182.2	1,152.4	1,130.6	1,040.6	1,239.5	961.3	824.5	701.5	679.4	401.5	137.2	132.8
Maximum On-Site Monthly Total (lb/month)	1,176.2											
Maximum Monthly Total (lb/month)	1,239.5											
Daily Emissions (lb/day)[b]												
On-Site												
Equipment	49.3	49.3	43.5	43.5	53.0	41.8	34.4	29.6	29.6	16.4	4.5	4.5
Motor Vehicles	0.5	0.5	0.5	0.5	0.5	0.1	0.1	0.1	0.1	0.1	0.0	0.0
On-Site Total	49.7	49.7	44.0	44.0	53.5	41.8	34.5	29.7	29.7	16.5	4.5	4.5
Off-Site Motor Vehicles	4.0	2.6	7.4	3.3	2.9	1.9	3.0	2.2	1.2	1.8	1.8	1.6
Daily Total	53.7	52.4	51.4	47.3	56.3	43.7	37.5	31.9	30.9	18.2	6.2	6.0
Maximum On-Site Daily Total (lb/day)	53.5											
Maximum Off-Site Daily Total (lb/day)	7.4											
Maximum Daily Total (lb/day)	56.3											
Hourly Emissions (lb/hour)[c]												
On-Site												
Equipment	9.9	9.9	8.7	8.7	10.6	8.4	6.9	5.9	5.9	3.3	0.9	0.9
Motor Vehicles	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site Total	10.1	10.1	8.9	8.9	10.8	8.4	6.9	6.0	6.0	3.3	0.9	0.9
Off-Site Motor Vehicles	2.0	2.1	4.8	2.4	1.9	1.4	2.0	1.6	1.1	1.4	1.4	1.3
Hourly Total	12.0	12.1	13.8	11.3	12.8	9.8	8.9	7.5	7.0	4.7	2.3	2.2
Maximum On-Site Hourly Total (lb/hour)	10.8											
Maximum Hourly Total (lb/hour)	13.8											

[a] The value for each month is the total for that month and the next 11 months

[b] Daily emissions = Monthly emissions / 22 working days/month

[c] Hourly emissions are based on simultaneous operation of all emission sources

Table 5-F
Substation Construction Maximum On-Site NOx Emissions Summary

Source	Hourly (lb/hr)	Daily (lb/day)	Annual (ton/yr)
Equipment[a]	10.6	53.0	4.4
Motor Vehicles[a]	0.2	0.5	0.0
Maximum On-Site Total	10.8	53.5	4.4

[a] Emissions from source during period with maximum on-site total emissions

Table 5-G
Substation Construction SOx Emissions Summary

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
12-Month Running Emissions (ton/year)[a]												
On-Site												
Equipment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site Total	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Off-Site Motor Vehicles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
12-Month Total	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Maximum On-Site 12-Month Total (ton/year)	**0.0**											
Maximum 12-Month Total (ton/year)	**0.0**											
Monthly Emissions (lb/month)												
On-Site												
Equipment	1.1	1.1	1.0	1.0	1.2	0.9	0.8	0.8	0.8	0.4	0.1	0.1
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site Total	**1.1**	**1.1**	**1.0**	**1.0**	**1.3**	**0.9**	**0.8**	**0.8**	**0.8**	**0.4**	**0.1**	**0.1**
Off-Site Motor Vehicles	**0.1**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Monthly Total	**1.2**	**1.2**	**1.1**	**1.1**	**1.3**	**1.0**	**0.8**	**0.8**	**0.8**	**0.5**	**0.1**	**0.1**
Maximum On-Site Monthly Total (lb/month)	**1.3**											
Maximum Monthly Total (lb/month)	**1.3**											
Daily Emissions (lb/day)[b]												
On-Site												
Equipment	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site Total	**0.1**	**0.1**	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Off-Site Motor Vehicles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Daily Total	**0.1**	**0.1**	**0.1**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Maximum On-Site Daily Total (lb/day)	**0.1**											
Maximum Off-Site Daily Total (lb/day)	**0.0**											
Maximum Daily Total (lb/day)	**0.1**											
Hourly Emissions (lb/hour)[c]												
On-Site												
Equipment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-Site Total	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Off-Site Motor Vehicles	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Hourly Total	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Maximum On-Site Hourly Total (lb/hour)	**0.0**											
Maximum Hourly Total (lb/hour)	**0.0**											

[a] The value for each month is the total for that month and the next 11 months

[b] Daily emissions = Monthly emissions / 22 working days/month

[c] Hourly emissions are based on simultaneous operation of all emission sources

Table 5-H
Substation Construction Maximum On-Site SOx Emissions Summary

Source	Hourly (lb/hr)	Daily (lb/day)	Annual (ton/yr)
Equipment[a]	0.0	0.1	0.0
Motor Vehicles[a]	0.0	0.0	0.0
Maximum On-Site Total	**0.0**	**0.1**	**0.0**

[a] Emissions from source during period with maximum on-site total emissions

Table 5-I
Substation Construction PM10 Emissions Summary

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
12-Month Running Emissions (ton/year)[a]												
On-Site												
Equipment	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Motor Vehicle Exhaust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fugitive	3.8	3.3	2.9	2.5	2.1	1.7	1.3	1.0	0.6	0.3	0.0	0.0
On-Site Total	**4.0**	**3.5**	**3.1**	**2.6**	**2.2**	**1.8**	**1.4**	**1.0**	**0.7**	**0.3**	**0.0**	**0.0**
Off-Site Motor Vehicle Exhaust and Fugitive	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
12-Month Total	**4.1**	**3.7**	**3.2**	**2.7**	**2.3**	**1.8**	**1.4**	**1.1**	**0.7**	**0.4**	**0.0**	**0.0**
Maximum On-Site 12-Month Total (ton/year)	**4.0**											
Maximum 12-Month Total (ton/year)	**4.1**											
Monthly Emissions (lb/month)												
On-Site												
Equipment	51.1	51.1	50.5	50.5	58.2	49.6	41.1	33.1	33.1	21.3	8.5	8.5
Motor Vehicle Exhaust	0.4	0.4	0.4	0.4	0.4	0.1	0.1	0.1	0.1	0.1	0.0	0.0
Fugitive	855.5	850.6	812.3	812.3	850.6	688.1	688.1	649.8	649.8	649.8	0.0	0.0
On-Site Total	**907.0**	**902.1**	**863.2**	**863.2**	**909.2**	**737.8**	**729.2**	**683.0**	**683.0**	**671.2**	**8.5**	**8.5**
Off-Site Motor Vehicle Exhaust and Fugitive	**14.1**	**14.3**	**63.4**	**22.7**	**28.4**	**16.4**	**29.6**	**20.0**	**8.0**	**15.2**	**15.2**	**12.8**
Monthly Total	**921.1**	**916.4**	**926.6**	**885.9**	**937.6**	**754.2**	**758.9**	**703.0**	**691.0**	**686.4**	**23.7**	**21.3**
Maximum On-Site Monthly Total (lb/month)	**909.2**											
Maximum Monthly Total (lb/month)	**937.6**											
Daily Emissions (lb/day)[b]												
On-Site												
Equipment	2.3	2.3	2.3	2.3	2.6	2.3	1.9	1.5	1.5	1.0	0.4	0.4
Motor Vehicle Exhaust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fugitive	38.9	38.7	36.9	36.9	38.7	31.3	31.3	29.5	29.5	29.5	0.0	0.0
On-Site Total	**41.2**	**41.0**	**39.2**	**39.2**	**41.3**	**33.5**	**33.1**	**31.0**	**31.0**	**30.5**	**0.4**	**0.4**
Off-Site Motor Vehicle Exhaust and Fugitive	**0.6**	**0.7**	**2.9**	**1.0**	**1.3**	**0.7**	**1.3**	**0.9**	**0.4**	**0.7**	**0.7**	**0.6**
Daily Total	**41.9**	**41.7**	**42.1**	**40.3**	**42.6**	**34.3**	**34.5**	**32.0**	**31.4**	**31.2**	**1.1**	**1.0**
Maximum On-Site Daily Total (lb/day)	**41.3**											
Maximum Off-Site Daily Total (lb/day)	**2.9**											
Maximum Daily Total (lb/day)	**42.6**											
Hourly Emissions (lb/hour)[c]												
On-Site												
Equipment	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.3	0.3	0.2	0.1	0.1
Motor Vehicle Exhaust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fugitive	18.8	18.8	18.5	18.5	18.8	15.1	15.1	14.8	14.8	14.8	0.0	0.0
On-Site Total	**19.3**	**19.3**	**18.9**	**18.9**	**19.3**	**15.6**	**15.5**	**15.1**	**15.1**	**15.0**	**0.1**	**0.1**
Off-Site Motor Vehicle Exhaust and Fugitive	**0.3**	**0.4**	**1.5**	**0.6**	**0.7**	**0.4**	**0.7**	**0.5**	**0.2**	**0.4**	**0.4**	**0.3**
Hourly Total	**19.6**	**19.7**	**20.4**	**19.5**	**20.0**	**16.0**	**16.2**	**15.6**	**15.3**	**15.3**	**0.5**	**0.4**
Maximum On-Site Hourly Total (lb/hour)	**19.3**											
Maximum Hourly Total (lb/hour)	**20.4**											

[a] The value for each month is the total for that month and the next 11 months

[b] Daily emissions = Monthly emissions / 22 working days/month

[c] Hourly emissions are based on simultaneous operation of all emission sources

Table 5-J
Substation Construction Maximum On-Site PM10 Emissions Summary

Source	Hourly (lb/hr)	Daily (lb/day)	Annual (ton/yr)
Equipment[a]	0.5	2.6	0.2
Motor Vehicle Exhaust[a]	0.0	0.0	0.0
Fugitive[a]	18.8	38.7	3.8
Maximum On-Site Total	**19.3**	**41.3**	**4.0**

Table 5-K
Substation Construction PM2.5 Emissions Summary

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
12-Month Running Emissions (ton/year)[a]												
On-Site												
Equipment	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Motor Vehicle Exhaust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fugitive	0.8	0.7	0.6	0.5	0.5	0.4	0.3	0.2	0.1	0.1	0.0	0.0
On-Site Total	**1.0**	**0.9**	**0.8**	**0.7**	**0.6**	**0.5**	**0.4**	**0.3**	**0.2**	**0.1**	**0.0**	**0.0**
Off-Site Motor Vehicle Exhaust and Fugitive	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
12-Month Total	**1.1**	**0.9**	**0.8**	**0.7**	**0.6**	**0.5**	**0.4**	**0.3**	**0.2**	**0.1**	**0.0**	**0.0**
Maximum On-Site 12-Month Total (ton/year)	**1.0**											
Maximum 12-Month Total (ton/year)	**1.1**											
Monthly Emissions (lb/month)												
On-Site												
Equipment	47.0	47.0	46.4	46.4	53.6	45.7	37.8	30.4	30.4	19.6	7.8	7.8
Motor Vehicle Exhaust	0.4	0.4	0.4	0.4	0.4	0.1	0.1	0.1	0.1	0.1	0.0	0.0
Fugitive	190.5	189.4	172.2	172.2	189.4	155.0	155.0	137.8	137.8	137.8	0.0	0.0
On-Site Total	**237.9**	**236.8**	**219.0**	**219.0**	**243.4**	**200.7**	**192.9**	**168.2**	**168.2**	**157.4**	**7.8**	**7.8**
Off-Site Motor Vehicle Exhaust and Fugitive	**4.8**	**3.9**	**14.3**	**5.6**	**6.1**	**3.7**	**6.4**	**4.4**	**2.0**	**3.4**	**3.4**	**2.9**
Monthly Total	**242.7**	**240.7**	**233.4**	**224.6**	**249.5**	**204.4**	**199.2**	**172.7**	**170.2**	**160.8**	**11.3**	**10.8**
Maximum On-Site Monthly Total (lb/month)	**243.4**											
Maximum Monthly Total (lb/month)	**249.5**											
Daily Emissions (lb/day)[b]												
On-Site												
Equipment	2.1	2.1	2.1	2.1	2.4	2.1	1.7	1.4	1.4	0.9	0.4	0.4
Motor Vehicle Exhaust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fugitive	8.7	8.6	7.8	7.8	8.6	7.0	7.0	6.3	6.3	6.3	0.0	0.0
On-Site Total	**10.8**	**10.8**	**10.0**	**10.0**	**11.1**	**9.1**	**8.8**	**7.6**	**7.6**	**7.2**	**0.4**	**0.4**
Off-Site Motor Vehicle Exhaust and Fugitive	**0.2**	**0.2**	**0.7**	**0.3**	**0.3**	**0.2**	**0.3**	**0.2**	**0.1**	**0.2**	**0.2**	**0.1**
Daily Total	**11.0**	**10.9**	**10.6**	**10.2**	**11.3**	**9.3**	**9.1**	**7.8**	**7.7**	**7.3**	**0.5**	**0.5**
Maximum On-Site Daily Total (lb/day)	**11.1**											
Maximum Off-Site Daily Total (lb/day)	**0.7**											
Maximum Daily Total (lb/day)	**11.3**											
Hourly Emissions (lb/hour)[c]												
On-Site												
Equipment	0.4	0.4	0.4	0.4	0.5	0.4	0.3	0.3	0.3	0.2	0.1	0.1
Motor Vehicle Exhaust	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fugitive	4.1	4.1	3.9	3.9	4.1	3.3	3.3	3.1	3.1	3.1	0.0	0.0
On-Site Total	**4.5**	**4.5**	**4.3**	**4.3**	**4.6**	**3.7**	**3.6**	**3.4**	**3.4**	**3.3**	**0.1**	**0.1**
Off-Site Motor Vehicle Exhaust and Fugitive	**0.1**	**0.1**	**0.4**	**0.2**	**0.2**	**0.1**	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**
Hourly Total	**4.6**	**4.6**	**4.7**	**4.5**	**4.7**	**3.8**	**3.8**	**3.5**	**3.5**	**3.4**	**0.2**	**0.2**
Maximum On-Site Hourly Total (lb/hour)	**4.6**											
Maximum Hourly Total (lb/hour)	**4.7**											

[a] The value for each month is the total for that month and the next 11 months

[b] Daily emissions = Monthly emissions / 22 working days/month

[c] Hourly emissions are based on simultaneous operation of all emission sources

Table 5-L
Substation Construction Maximum On-Site PM2.5 Emissions Summary

Source	Hourly (lb/hr)	Daily (lb/day)	Annual (ton/yr)
Equipment[a]	0.5	2.4	0.2
Motor Vehicle Exhaust[a]	0.0	0.0	0.0
Fugitive[a]	4.1	8.6	0.8
Maximum On-Site Total	**4.6**	**11.1**	**1.0**

[a] Emissions from source during period with maximum on-site total emissions

Technical Area: Biological Resources **Supplemental Response Date: August 18, 2008**

Following are supplemental responses to some of the Biological Resources Data Request responses submitted on July 16, 2008. This supplement includes revisions to the responses to Data Request 18, and clarifications to the Data Requests 17 and 20 responses, in addition to a revision to the Data Request 44 response as it pertains to the rerouted wash (see also supplemental response under Soils). To facilitate review and understanding of the changes, we have provided a summary of the reasons for the revisions and clarifications below.

Data Requests 17 and 44: Revisions were made to the Mitigation Plan included as Attachment 8 to the Streambed Alteration Agreement (SAA) application package referred to in the response as Data Request 17. No revision to the original response of Data Request 17 was necessary. The revision to the Mitigation Plan is intended to clarify the design of the rerouted wash and ensure consistency with the drainage study documents. Similarly, revisions were made to the response to Data Request 44, which describes the rerouted wash engineering design and drainage characteristics. The revisions clarify the proposed mitigation design; the channel is now designed to include a soft bottom low-flow channel that is approximately 60 feet wide and 1.5 feet deep in all areas of the rerouted wash except for the initial redirection of Pine Tree Creek into the rerouted wash (Turn #1) and the 90 degree bend (Turn #2). Rock/riprap will be used in these two Turns of the low-flow channel to control runoff velocities and minimize erosion and scour in the channel. In addition, the outer slopes of the main channel will remain natural (no rock riprap) with the exception of Turn #1, Turn #2, and several pinch points where the slopes of the rerouted wash will be lined with riprap.

Revisions to the Mitigation Plan are summarized in the supplemental response to Data Request 17. The revised response to Data Request 44 is included in the supplemental responses under Soils. The revised Mitigation Plan is also included as Attachment DR-17 to the supplemental data responses. In addition, both the revised Mitigation Plan and the response to Data Request 44 have also been forwarded to Julie Means, California Department of Fish and Game, as revisions to the reflective attachments (Attachments 8 and 6, respectively) to the SAA application package.

Data Request 18: The response provided to Data Request 18 includes a summary of proposed mitigation for the Mohave ground squirrel (MGS) and the desert tortoise (DT). The mitigation numbers provided in the text of the response for potential impacts within the Plant Site boundary were inaccurate (they incorrectly reflected numbers related to acreage of vegetative cover as opposed to carrying capacity-based acreage). Consistent with the rationale for the proposed mitigation contained in the response, the resulting mitigation requirement for the MGS and DT is 20 acres. The revised text is included in the supplemental response.

Data Request 20: No revisions were made to the response to Data Request 20; however, clarifications are provided to address questions received during the public meeting held on July 22, 2008 through additional information provided as a supplemental response.

Data Request 17:

Please describe how the newly-created channel would eventually replicate the functions and wildlife values of a natural desert wash. This analysis should include a conceptual revegetation plan, a discussion of how the new channel could recreate natural soil characteristics (biological soil crust, permeability), microtopography (microcatchments for moisture, seeds), hydrology, and geomorphology.

Supplemental Response:

The response to Data Request 17 included reference to the SAA application package and its associated appendices including the Mitigation Plan and the Drainage Study. No changes to the data request response were made; however, revisions to the Mitigation Plan (Attachment DR-17) are summarized below.

General Change

A change was made in four locations in the Mitigation Plan to clarify that the onsite seeding would cover 4.8 acres (as opposed to 2.4 acres) to be consistent with the 2:1 onsite mitigation ratio for 2.4 acres of impact to vegetated habitat that would result in 4.8 acres of mitigation.

Chapter 2, Proposed Mitigation Approach (Section 2.1, Paragraph 3, page 7)

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 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), and a proposed 10-foot buffer on either side that is expected to have a mixture of native riparian species and upland species which improves the function of the mitigation site (total width of 80 feet), the unlined mitigation area (no riprap) would be approximately 10,315 feet long to accomplish the 18.4 acres of mitigation.

Chapter 2, Proposed Mitigation Approach (Section 2.1, page 8)

The proposed mitigation for permanent Project impacts includes the designation of 18.4 acres of the rerouted wash (within the central portion of the channel bottom, between toe-of-slopes of channel banks, where riprap is not necessary for erosion control) as the mitigation area.

Chapter 2, Proposed Mitigation Approach (Section 2.2, Paragraph 3, page 9)

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, while using riprap where necessary to maintain erosion protection in highly vulnerable locations (Figure 2).

Chapter 4, Maintenance and Monitoring Program (Section 4.2, Erosion Control, page 14)

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, with the exception of the slopes at pinch points where the rerouted wash is close to the developed solar field.

Data Request 18:

Please provide information on the location and characteristics of lands proposed for compensatory mitigation, the associated enhancement and endowment costs, and the long-term monitoring plan for these compensation lands. The discussion of offsite compensation habitat should reflect close coordination with the CDFG and USFWS.

Revised Response:

Location and characteristics of lands proposed for compensatory mitigation.

While the BSEP team has begun identifying the location and characteristics of lands that could be used for compensatory mitigation, the acquisition of compensation lands is dependent upon all parties agreeing upon the number of acres that need to be acquired, since that can affect availability and cost. Nevertheless, the Project has initially identified the region to the east of the Project area as a potential focus for acquisition of lands proposed for compensatory mitigation, in the general vicinity west of the Desert Tortoise Natural Area (DTNA). This particular region was selected as the target for potential acquisition due to several factors, including the potential for lands to support the same suite of high-profile special status species (e.g., desert tortoise, Mohave ground squirrel, and western burrowing owl), that are present on or adjacent to the BSEP. Based on preliminary discussions with Jun Lee of the Desert Tortoise Preserve Committee (DTPC), potential compensation lands that are suitable for all three species are located on the west side of the DTNA. To the extent that land cannot be acquired in this particular area due to availability or cost, other areas as similar as possible to the area surrounding the DTNA will be pursued.

The ultimate goal is to acquire compensatory lands that would offset the loss of the biological values associated with construction and operation of the BSEP that cannot be completely addressed onsite. As potential compensatory lands are identified, the BSEP team would coordinate closely with the CEC, CDFG and USFWS to obtain consensus that the targeted lands are suitable. As part of the process leading up to the acquisition of compensation lands, a Property Analysis Record (PAR), or a PAR-like analysis, will be conducted. The PAR models the anticipated costs associated with the acquisition of land, as well as management expenses, while accounting for escalation in costs associated with inflation. The PAR would analyze the characteristics of a target property, and the associated costs required to manage the Site (e.g., fencing, habitat enhancement, monitoring, etc.). The end result of the PAR model would be an accurate estimate of the long-term endowment costs that would be required to fully implement all compensation measures. The funding associated with the PAR is addressed in the response to Data Request 25.

The BSEP team has begun a focused effort to identify suitable compensation lands for acquisition, and has prepared an approach to identify the amount of compensation acreage required to adequately offset the effects of the Project on the desert tortoise and Mohave ground squirrel. It is anticipated that the compensation lands identified for desert tortoise and Mohave ground squirrel also would be suitable to compensate for impacts to the western burrowing owl. Table DR-18, below, is an update of Table 5.3-10 from the AFC that shows compensation acres for the area within the Plant Site boundary and the area west of the Plant Site boundary where the transmission line would be constructed. This table shows that when these two areas are added together, habitat acquisition to compensate for impacts to the Mohave ground squirrel, desert tortoise, and western burrowing owl for the entire project would require the acquisition of 30 acres (under Transmission Option 1), and up to 31.6 acres (under Transmission Option 2). Based upon review of potential burrowing owl impacts and mitigation requirements (Response to Data Request 20), 20 acres would provide the necessary mitigation area for potential impacts to two pairs of burrowing owls. It should be noted that the mitigation for burrowing owls is based on the documented presence of two owls during the 2007 surveys (none were observed during the 2008 surveys), which represents a correction to the information presented in the AFC, where three burrowing owls were originally reported within the Plant Site boundary. The correct number of burrowing owls documented within the Plant Site is two, as shown on AFC Figure 5.3-8, Sheets 7 and 9.

Compensation for Potential Impacts within Plant Site Boundary

The compensation approach is as follows: There are 369.2 acres of Fallow Agricultural-Disturbed Atriplex Scrub and 60.3 acres of Mojave Desert Wash Scrub within the Plant Site boundary, for a total of 429.5 acres of vegetated cover that is not deemed to be suitable habitat for MGS or the DT but has a low potential to be occupied by transient Mohave ground squirrels and desert tortoises. Given the poor quality of this vegetative cover for the species and the limited amount of suitable adjoining habitat from which animals might disperse, a

generous estimate of the number of Mohave ground squirrels and desert tortoises that might be temporarily present within the Plant Site boundary during the life of the Project, primarily during the construction phase prior to installation of tortoise-proof exclusion fencing, would be two of each species. The habitat that could most likely attract these species is the approximately 80 acres of Mojave Creosote Bush Scrub outside the Plant Site boundary to the west of the Fallow Agricultural-Disturbed Atriplex Scrub (see AFC Figure 5.3-3, Sheet 6). Desert tortoise surveys and observations indicate a very low density of animals in this area outside the Plant Site boundary. Mohave ground squirrel population studies suggest that 80 acres of medium quality habitat might support 3 to 4 individuals.

Table DR-18. Beacon Solar Energy Project: Anticipated Mitigation for Potential Impacts to Special Status Wildlife Species.

Listed Species	Total Impact[1]	Total Mitigation Acreage
Within Plant Site Boundary		
Desert Tortoise	Up to 2 transients	20
Mohave Ground Squirrel	Up to 2 transients	20
Western Burrowing Owl	2 pairs	20
Total Within Plant Site Boundary		*20*[2]
Transmission Line Corridor West of Plant Site Boundary (see AFC Section 5.3.3.1 for details)		
With Transmission Line Option 1		
Desert Tortoise	5.0 acres	5.0 (1:1 ratio)
Mohave Ground Squirrel	5.0 acres	10.0 (2:1 ratio)
Total West of Plant Site Boundary (with Transmission Line Option 1)		*10.0*
With Transmission Line Option 2		
Desert Tortoise	5.8 acres	5.8 (1:1 ratio)
Mohave Ground Squirrel	5.8 acres	11.6 (2:1 ratio)
Total West of Plant Site Boundary (with Transmission Line Option 2)		*11.6*
Grand Total Project (with Transmission Option 1)		**30**[2]
Grand Total Project (with Transmission Option 2)		**31.6**[2]

[1] The temporary impacts are considered permanent in this desert ecosystem.
[2] Acreage values assume compensation lands can be acquired that are simultaneously suitable for all three species. If 20 acres of land cannot be located that would accommodate all three species, Beacon understands that 20 acres must be identified to support each species.

Mohave Ground Squirrel. Long-term research in the Coso region during the current decade indicates that study sites of 25 hectares (62 acres) support about six adult Mohave ground squirrels on average. This suggests Mohave ground squirrel densities in good quality, protected habitat could approximate 10 adult animals per 100 acres. Habitat in the vicinity of the DTNA that is subject to Off-Highway Vehicle use and livestock grazing would support lower densities, perhaps six animals per 100 acres. If this land were purchased for conservation and managed by fencing to improve habitat quality, carrying capacity should increase by about 1/3 or by two animals per 100 acres. Additional conservation measures to enhance the habitat quality of compensation land could increase the carrying capacity by another two animals per 100 acres. Therefore, conserved lands in the vicinity of the DTNA would be expected to support approximately 10 animals per 100 acres (or two animals per 20 acres). Thus, acquisition and improvement of 20 acres of habitat could compensate for the possible incidental take of two transient Mohave ground squirrels on 429.5 acres of degraded *Atriplex* scrub and desert wash scrub vegetation in the Plant Site boundary.

Desert Tortoise. In terms of the desert tortoise, the most recent published data of population density estimates of the species within the DTNA are approximately 25 individuals per square kilometer in 1992 (or 25 desert tortoises per 247.11 acres, equivalent to approximately one desert tortoise per 10 acres) (Berry 1997). The purchase, protection, and enhancement of desert tortoise habitat in the vicinity of the DTNA would be anticipated to support the species at similar densities. Therefore, the acquisition of 20 acres of high-quality habitat suitable for the desert tortoise would be expected to provide habitat for a minimum of four animals, which would adequately compensate for the loss of highly degraded vegetative cover within the Plant Site boundary that would only provide transient use by a tortoise, primarily prior to installation of exclusionary fencing at the start of construction.

Although the development within the Plant Site boundary would result in the loss of disturbed and degraded lands that have a low potential for occasional use by transient Mohave ground squirrel and desert tortoise, the loss would be offset by the acquisition and conservation of high-quality habitat for these species that would provide for the long-term maintenance of a greater number of individuals of both species.

Compensation for Potential Impacts to the Area West of Plant Site Boundary

Per Section 5.3.4.1 of the AFC, BSEP impacts outside of the Plant Site boundary, associated with the transmission line facilities to the west of the Plant Site boundary, would require Mohave ground squirrel and desert tortoise compensation through the acquisition of up to an additional 10 acres (under Transmission Option 1), and up to 11.6 acres (under Transmission Option 2) of habitat suitable for both species.

Enhancement and endowment costs.

Beacon Solar, LLC (Beacon) will pay permanent per-acre endowment fees, the amount of which will be determined by conducting a Property Analysis Record (PAR) or PAR-like analysis for the type of Compensation Lands likely to be purchased as mitigation. Beacon will also work with CEC, CDFG, and USFWS to determine an appropriate enhancement fee for fencing, surveys, and habitat restoration of the lands.

Based on the expected compensation acres presented above, Beacon has used the following estimates to calculate the amount of financial security that it would provide prior to initiation of project construction to ensure adequate funding for acquisition enhancement and endowment of compensation lands:

1. Land acquisition costs for compensation lands, calculated at $5,000/acre for 30 acres (31.6 acres if Option 2 is adopted): $150,000; or $158,000 (if Option 2 is adopted)

2. Costs of enhancing compensation lands, calculated at $250/acre for 30 acres (31.6 acres if Option 2 is adopted): $7,500; or $7,900 (if Option 2 is adopted)

3. Costs of establishing an endowment for long-term management of compensation lands, calculated at $1,350/acre for 30 acres (31.6 acres if Option 2 is adopted): $40,500 or $42,660 (if Option 2 is adopted)

The estimate for the per acre cost of land acquisition is based on preliminary discussions with June Lee of the DTPC. Enhancement and endowment estimates are based on costs associated with similar compensation acquisitions in the region.

Long term monitoring plan for compensatory mitigation lands.

Upon completion of compensatory lands acquisition, Beacon, or an acceptable 3rd party such as the Desert Tortoise Preserve Committee, will prepare a Mitigation Land Acquisition report that will discuss the habitat characteristics of the parcel(s) of land, and how they meet the requirements of the desert tortoise, Mohave ground squirrel, and western burrowing owl. The report would be submitted to the CEC, CDFG, and USFWS.

Annual monitoring reports will be prepared addressing the habitat enhancement and conservancy of the mitigation lands acquired to compensate for impacts to covered species. The reports will be prepared by the entity or organization to which Beacon assigns the compensation lands. That entity will be responsible for conducting the habitat enhancement (which may include habitat restoration, construction and maintenance of protective fencing, etc.), habitat monitoring, and annual reporting. The report will address the level of success of the habitat enhancement, and any suggestions for devising or implementing adaptive

management strategies to improve the long-term viability of the covered species associated with the acquired lands. The annual report will be submitted to Beacon, CEC, CDFG and USFWS at the end of each calendar year, for no less than five years.

Data Request 20:

Please provide a more comprehensive and detailed burrowing owl avoidance and mitigation plan which reflects site-specific conditions at the project area, and which provides enough information to evaluate its potential for success. This plan should reflect close coordination with CDFG and USFWS.

Supplemental Response:

1. Successful Translocation of Burrowing Owls

Beacon Solar proposes the passive relocation of burrowing owls to habitat in the vicinity of the project area on lands currently owned by FPL Energy located west of SR-14.

The Applicant's consultant, EDAW, has been successful in passively translocating burrowing owls to artificial burrows during a previous project. For the Johnson Canyon Open Space Preserve Vernal Pool and Quino Checkerspot Butterfly Habitat Restoration Site (established as mitigation for SR-125 South Toll Road) in the Otay Mesa region of San Diego, CA, 21 artificial burrows were created in approximately 5 acres of habitat. These burrows were created with the assistance of Pete Bloom and CDFG biologist Dave Mayer. The area surrounding the 5 acres provides approximately 52 acres of nonnative grassland. It should be noted that adjacent owls recolonized these artificial burrows without active relocation. In the February through July 2007 season, 8 to 9 owls (3 pairs with 4 young) occupied the burrows on Johnson Canyon site. Signs of nesting activity were observed in the spring and juveniles were observed later in the season. In 2008, two pairs of burrowing owls with two clutches (of 5 and 3 young) were observed. Coyote predation was observed to be deterred by mesh wires used in the design of the burrows. All of the artificial burrows at the Johnson Canyon site show evidence of use (two to three burrows are used for cover etc. and one for nesting) and eleven pairs of owls were observed last year. The burrow design includes chicken-wire to prevent coyotes from digging into burrows and perching opportunities (cactus) with each burrow. Burrows were designed to be deep to provide micro-climate stability and protection from predators.

The proposed plan for the Beacon Solar Energy Project is to install artificial burrows in the translocation area (west of SR-14) prior to any impacts occurring onsite to determine if the burrowing owls onsite will move into these areas. This will help with the determination as to whether or not onsite translocation of owls will be successful. Success criteria will include evidence of use of the artificial burrows by burrowing owls, and artificial burrows being used as

nest sites by burrowing owls. After the initiation of passive relocation, monitoring of the translocation sites will be provided for up to 5 years. The details regarding the adaptive management efforts to optimize the success of the translocation will be presented in the Biological Resources Mitigation Implementation Monitoring Plan (BRMIMP) at a later date.

In addition, 20 acres will be provided at an offsite conservation area to provide habitat for two pairs. The most intensively used areas of nesting burrowing owls is within a 600 meter radius of nest sites and a 20 acre conservation site would provide enough habitat for two pairs of burrowing owls (Pete Bloom, personal communication, 2008).

2. Mitigation Acreage for Burrowing Owls

There are currently no data to support Burrowing Owl Consortium Guidelines for the minimum amount of acreage to support a pair of burrowing owls. Pete Bloom, a wildlife biologist with considerable experience with burrowing owls, was consulted regarding an acreage amount that would support two pairs of burrowing owls in the area and Pete suggested that two pairs would require 20 acres.

3. Cumulative Impacts Assessment for Burrowing Owls

Maintaining 20 acres of burrowing owl habitat would benefit burrowing owl conservation long term. While the Site currently provides suitable burrowing owl habitat, the vegetation in this area is too dense to support burrowing owls without the mechanical removal of shrub species. A conservation area managed for burrowing owls is preferable to an unmanaged area that currently supports burrowing owls but will become unsuitable for the species over time. The combination of passive relocation of burrowing owls to adjacent suitable, offsite habitat to the west of SR-14, and the conservation of 20 acres of suitable habitat within the region, the Beacon Solar Energy Project will provide nesting and foraging area for burrowing owls within the region and will provide the owls currently within the Plant Site boundary the ability to disperse to suitable habitat within the region.

One of the points raised by CEC staff is that the Project Site may provide foraging habitat for offsite owls. Owls and sign were found at higher densities outside the Plant Site, indicating that the Plant Site is of less importance than the surrounding areas. Protocol surveys, utilizing standard 100 percent coverage transects, were conducted for the Plant Site, resulting in the documentation of two burrowing owls utilizing three active burrows. Surveys of the CEC 1-mile buffer area, which were conducted with fewer transects, resulted in the documentation of three burrowing owls and four active burrows. If the Plant Site is a preferred forage area, it would be expected that the densities of owls would have been higher during surveys within the Plant Site than at surrounding areas within the zone of influence. According to Pete Bloom, the most intensively used area is within 600 meters (0.4 mile) of a nesting site; therefore, it is unlikely that nesting owls in the region are utilizing the Plant Site as a key foraging area. In

addition, in terms of long-term conservation, without human intervention here, the Site will become unsuitable for the species.

Attachment DR-17

Revisions to Mitigation Plan

BEACON SOLAR ENERGY PROJECT
MITIGATION PLAN
FOR
IMPACTS TO JURISDICTIONAL WATERS OF THE STATE OF CALIFORNIA
KERN COUNTY, CALIFORNIA

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CHAPTER 1
INTRODUCTION

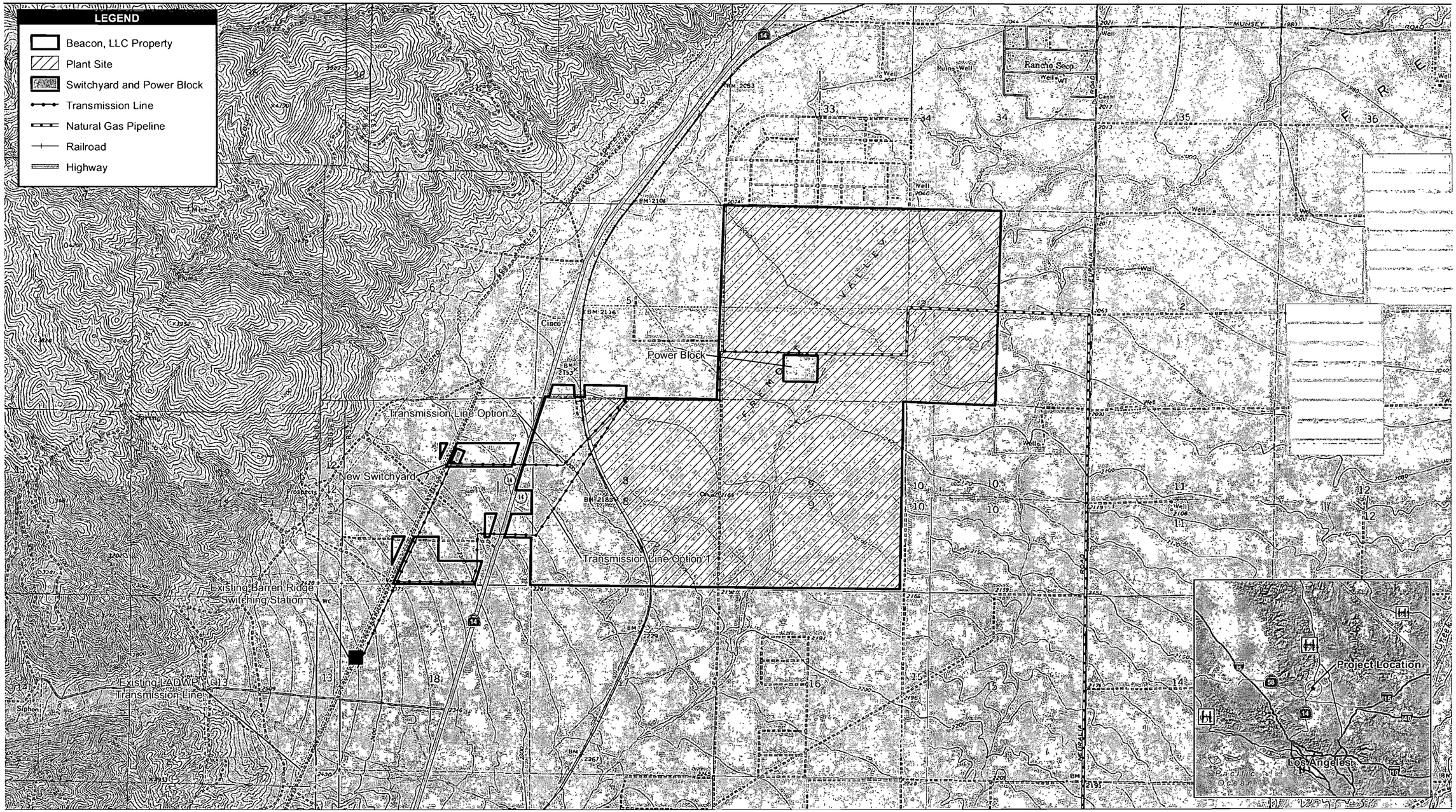
1.1 PROJECT BACKGROUND

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.



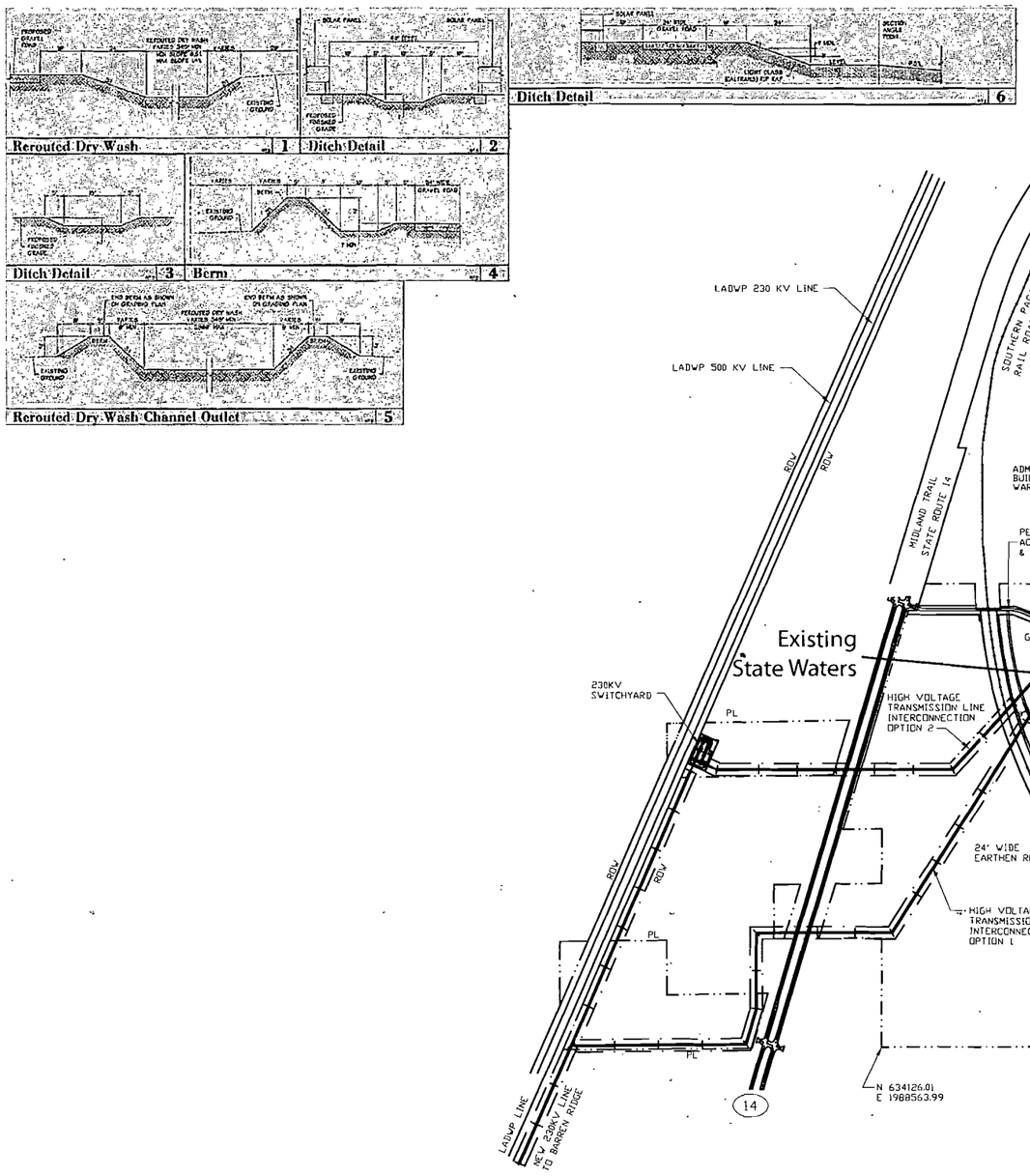
Source: TetraTech 2007; Kern County 2007; USGS 2007; WorleyParsons 2007

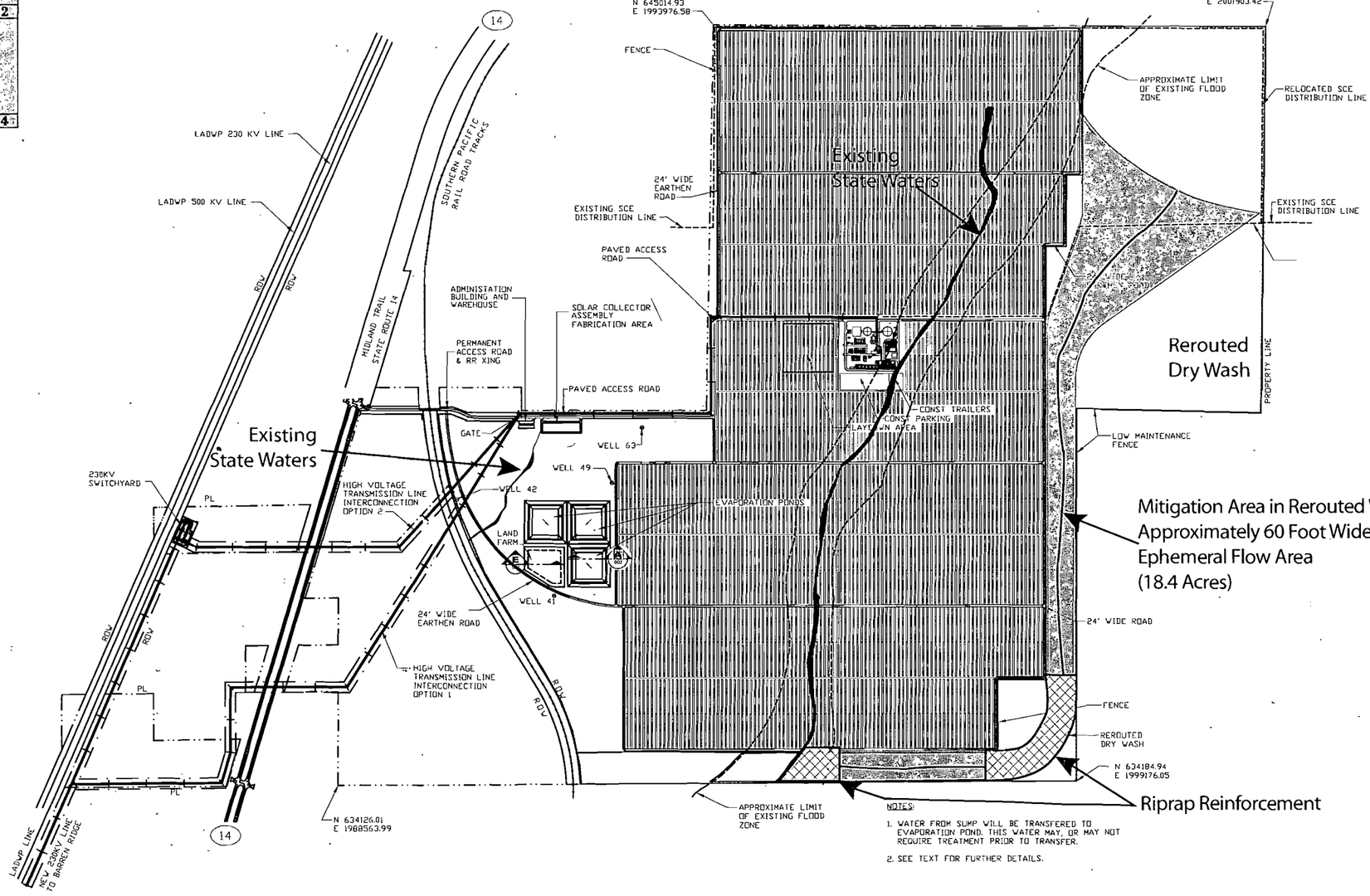
2,750 1,375 0 2,750 Feet

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

Figure 1
Property Boundary and Plant Site

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).

Rerouted Pine Tree Creek Wash

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 only exception to this is at the first turn (Turn 1) where the wash is initially redirected. The side slopes at Turn 1 will be 2:1 to accommodate anticipated flows and hydraulic energy. 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 SAA 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 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), and a proposed 10-foot buffer on either side that is expected to have a mixture of native riparian species and upland species which improves the function of the mitigation site (total width of 80 feet), the unlined mitigation area (no riprap) would be approximately 10,315 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, where riprap is not necessary for erosion control) 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 4.8 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, while using riprap where necessary to maintain erosion protection in highly vulnerable locations (Figure 2). 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 4.8 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 4.8 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 4.8 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, with the exception of the slopes at pinch points where the rerouted wash is close to the developed solar field. 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

California Invasive Pest Council (CAL-IPC), 2006. The CAL-IPC List of Exotic Pest Plants of Greatest Ecological Concern in California.

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U.S. Army Corps of Engineers (USACE), 2007. Review and Synopsis of Natural and Human Controls on Fluvial Channel Processes in the Arid West. September.

U.S. Army Corps of Engineers (USACE), 2008. Department of Army Jurisdictional Determination Letter (February 5, 2008).

Technical Area: Cultural Resources **Supplemental Response Date: August 18, 2008**

An extension request was filed on July 7, 2008 to provide responses for Data Requests 30 and 32 by late-September. This supplemental data response provides interim results of the excavation work underway. In addition, a response is provided for Data Request 34 and supplemental information in response to questions raised during the July 22, 2008 CEC workshop is provided for Data Request 35. Specifically, at the workshop CEC staff requested additional information regarding specific cultural resources in Last Chance Canyon and Jawbone Canyon, as well as resources that may be present in Red Rock Canyon State Park.

Data Request 30:

To enable staff to complete its review of the project's potential to affect California Register-eligible prehistoric site components, please provide the results of the excavation program agreed to on February 28, 2008 (February 28, 2008 Report of Conversation, TN 46670).

Interim Response:

The CEC requested that further testing be conducted at six (8 – 13) of the sites identified during baseline surveys and the field phase of this testing is in progress. No subsurface deposit was encountered at Site 10. To date, mechanical excavations have identified an intact hearth at Site 9 and Site 12, as well as two hearths at Site 11. Charcoal is present in most of the features. Excavations have yet to be completed at Site 8 and Site 13.

Data Request 32:

To enable staff to compete its review of the project's potential to affect California Register-eligible historic site components, please provide the results of the excavation program agreed upon February 28, 2008.

Interim Response:

See Response to Data Request 30, above.

Data Request 34:

Please provide a discussion of the historical geomorphology of the project site to better evidence a consideration of the potential there for buried archaeological deposits. The discussion should describe the development of the alluvial landforms and the lake bed deposits on which the project area is proposed with a focus on the character of local

depositional regimes since the Late Pleistocene era. The basis for the discussion should be data on the geomorphology, sedimentology, pedology, and stratigraphy of the project area or the near vicinity. The source of these data may be a combination, as necessary, of extant literature or primary field research.

Response:

A discussion of the historical geomorphology of the project site has been prepared by Kleinfelder and is provided as Attachment DR-34.

Data Request 35:

Please provide a discussion, on the basis of extant literature and Native American informants, of known traditional use areas such as rock art sites, shrines, or gathering places that are in sight of the project and that may be subject to the project's visual intrusion. If no such areas exist in sight of the project, please provide a discussion to that effect.

Supplemental/Revised Response:

To date no traditional use areas within sight of the Project are known. The Native American Heritage Commission file search did not identify any sacred sites in the vicinity of the project. Known potentially visually sensitive resources in the region include sites in the canyons of the southern Sierras. These include sites in Last Chance Canyon over 10 miles northeast of the Project. Last Chance Canyon National Register District (#72000225) includes mostly prehistoric archaeological sites, but also historic period and Native American sites. In Jawbone Canyon, approximately 7 miles north, there are also a number of important sites, including at Dove Spring. Several sites with rock art are located in the area (CA-KER-2542, 2556, -2981, -2982, as well as P-15-7205, -7381, and -7382). These resources are west of the first line of foothills/ridges of the southern Sierra Nevada. These topographic features effectively block the view of the Project area from these resources.

Carrie Bemis, Environmental Scientist at Red Rock Canyon State Park was contacted on July 31, 2008 regarding cultural resources that might be of visual concern. According to the web site for the Red Rock Canyon State Park, the area historically was once home to the Kawaiisu Indians, who left petroglyphs in the El Paso Mountains and other evidence of their inhabitation. A gash situated at the western edge of the El Paso mountain range was on the Native American trade route for thousands of years. During the early 1870s, the colorful rock formations in the park served as landmarks for 20-mule team freight wagons that stopped for water. About 1850, it was used by the survivors of the famous Death Valley trek including members of the Arcane and Bennett families along with some of the Illinois Jayhawkers. The

park now protects significant paleontology sites and the remains of 1890s-era mining operations, and has been the site for a number of movies.

Based on the discussions with Ms. Bemis, no cultural resources issues related to visual impacts have been identified to date. As shown in BSEP AFC Figures 5.15-10 a-c and 5.15-11 a-c, the Project is visible from the Red Rock Canyon area, but because of the distance involved it is not intrusive. Contact reports are provided in Attachment DR-35. If visual concerns are subsequently identified for a specific resource at Red Rock Canyon State Park, this information will be provided to CEC staff.

Attachment DR-34

Desktop Geomorphic Study of the Beacon Solar Energy Project Site and Vicinity, Kern County

KLEINFELDER
Bright People. Right Solutions.

1220 Research Drive
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August 15, 2008
Project No. 86405

Mr. Geoffrey Baxter, PE
Project Manager
WorleyParsons
2330 East Bidwell Street, Suite 150
Folsom, California 95630

Subject: **Desktop Geomorphic Study of the Beacon Solar Energy Project Site and Vicinity, Kern County, California**

Dear Mr. Baxter:

Kleinfelder West, Inc. (Kleinfelder) is pleased to present this letter report summarizing our geomorphic study of the subject site and vicinity. The project site is located within the Fremont Valley in an unincorporated area of eastern Kern County, California.

It is our understanding that during its review of the Beacon Solar Energy Project, the CEC requested additional information regarding the potential for buried archeological deposits. Specifically, they requested a discussion on the area's alluvial and pluvial depositional environments and associated landforms since the latest Pleistocene, or approximately the past 12,000 years. The purpose of this geomorphic study is to provide the information requested by the CEC. In doing so, we have provided a summary the sedimentary deposition, geomorphology, and a short discussion of the Garlock fault and its contribution in the development of Fremont Valley, including the project site and vicinity.

In general, most of the project site and vicinity are covered with alluvial fan deposits that are younger than 12,000 years. We have estimated these deposits to be approximately 9.6 to 15.4 meters deep. However this depth will most likely vary across the project site and surrounding area. These alluvial fan deposits also provide the potential for buried archeological deposits.

We appreciate the opportunity to be of service on this project. If you have any questions, comments, or require additional inform contact our office.

Respectfully submitted,

KLEINFELDER WEST, INC.

FR Robert E. Lemmer, PG, CEG
Senior Geologist

Reviewed By:

Richard F. Escandon, PG, CEG
Principal Geologist

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INTRODUCTION

The project site is located in Fremont Valley in the eastern part of Kern County, California. A description of the project site and its exact location in Fremont Valley can be found in previous site-specific reports (see Beacon Solar, LLC, 2008; Kleinfelder, 2007 and 2008b). Fremont Valley is a slightly elongated, northeast-trending valley, which extends approximately from the towns of Mojave (near the southwest terminus) to Randsburg. The valley is bounded by the El Paso and Tehachapi Mountains on the northwest and Rand Mountains on the southeast. The Garlock fault coincides with boundary between the mountains and Fremont Valley. The Garlock fault zone extends for 260 kilometers (160 miles) from the San Andreas fault to the southern end of Death Valley, and forms the northern boundary of the Mojave Desert (Davis and Burchfiel, 1973). Movement along the Garlock fault is left-lateral, that is, the Sierra Nevada Mountains are moving westward relative to the Mojave Desert. The total lateral displacement is reported to be 48-64 kilometers (29-39 miles).

The northern half of Fremont Valley (also known as Cantil Valley), which includes the project site, has several splays [collectively referred to as the east and west strands in our reports (2008a and 2007)] of the Garlock Fault Zone mapped crossing it. A gravity survey conducted by the U.S. Geological Survey (Mabey, 1960) found Cantil Valley to be a deep structural trough with the bedrock contact approximately 3.2 kilometers deep. A seismic reflection study by Louie and Qin (1991) verified the results of Mabey (1960). Cantil Valley has been described as a classic pull-apart basin by Aydin and Nur (1982) where the slip on the east and west Garlock fault strands causes the area between them to down-drop, creating a structural trough which receives sediments from the surrounding mountains. Although movement on the Garlock fault strands is mostly lateral, some vertical slip is occurring. Lateral slip on the Garlock fault zone in the Cantil Valley area has been estimated to be 6-8 mm/yr (Dawson et al., 2008 and 2003; McGill et al., 2003; McGill and Rockwell, 1998; Pampeyan et al., 1988; Carter, 1987 and 1980; LaViolette, et al., 1980), and the vertical slip has been approximately 0.8 mm/yr over the past 5 million years. Slip estimates by Dawson et al. (2003) were based on the occurrence of at least five seismic events over the past 7,000 years determined from radiocarbon dating. McGill et al. (2003) also use radiocarbon dating to constrain 4 seismic events for the past 7,200 years.

Drainage divides to the south/southeast and northeast effectively close off Fremont Valley, directing all drainage internally towards the lowest elevation in the valley at Koehn Lake (approximate elevation 1,940 feet). Koehn Lake is located in Cantil Valley and is a dry lake (playa) except when infrequent rainstorms cause flooding in the valley (Holzer and Clark, 1993; Dibblee, Jr., 1952; Thompson, 1929). The age of Koehn Lake is not known, although it is believed that it dried up about 8,700 years ago along with the other perennial water bodies in the Mojave Desert (Wells et al., 2003). The areal extent of Koehn Lake is not known, however, aerial photographs which pre-date area agriculture (older than 1950) show lake bed deposits extending onto the northern portion of the project site, as do geology maps of the area (Amoroso and Miller, 2006;

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Smith, 1964; Jennings et al., 1962; and Dibblee, Jr., 1952). In fact, the left curve (towards the west) of the railroad near Cinco was most likely made to avoid the soft, unsupportive lake deposits. Also, test wells drilled on the project site (Thompson, 1929) and at Koehn Lake (Dockter, 1979) encountered clayey, lake deposits of Pleistocene age to at least 500 feet deep.

SURFICIAL GEOLOGY AND GEOMORPHOLOGY

Since at least the latest Pleistocene (~12,000 years ago) the three most dominant processes controlling sediment deposition in Fremont Valley and the smaller Cantil Valley are, movement along the Garlock fault, erosion/weathering of exposed earth material and bedrock, and climate. As the Cantil Valley down drops along the Garlock fault, weathered material will be transported during rainfall events and deposited as alluvial fans on the valley slopes and floor. Generally, the coarser sediments (boulders) of the fan deposits are deposited closer to the mountain front, while the finer, sand, silt and clay particles are deposited further out on the valley floor. This process has been repeated enough times that the entire valley is blanketed with unconsolidated sediments up to 3.2 kilometers thick. In some locations, the surfaces of the fans are altered by eolian processes, which may deflate some surfaces and develop low sand dunes in others. In the project area, it has been reported by others that the portions subject to agricultural disturbance exhibit deflation. In less disturbed areas the eolian deposits are generally limited to small coppice dunes stabilized by vegetation.

Determining the age of alluvial fan deposits is important in understanding the geological history of the valley. Unfortunately, many times the age of an alluvial fan deposit cannot be determined using absolute methods (i.e., radiocarbon, thermoluminescence, etc.). Therefore, relative dating techniques must be used to estimate its age. The ages of the valley's alluvial fan deposits can be derived from several characteristics based on a widely applicable model for soil development in arid locations and by comparison with other Mojave Desert sites. The following description of the model is brief and describes alteration of geomorphic features after deposition ceases (Stoffer, 2004). Channels dissect and erode the feature and sheetwash moves fine material into small channels, smoothing out the microtopography. Desert pavements develop on the smoothed surfaces and soils form in response to weathering of the stable surface and eolian influx. Desert varnish builds on surface clasts. As the surface becomes deeply dissected, side-slopes along incised channels expand, and the original fan surface begins to erode. Ultimately, the entire landform becomes so eroded that the original form is difficult to discern. This evolution of depositional features allows for the relative dating of deposits.

Amoroso and Miller (2006) mapped the adjoining quadrangle including the very eastern part of the area of this study. They used the following to determine the relative ages of the features and their underlying deposits by: 1) in-filling of bar and swale microtopography (Ritter, 1987), 2) depth and pattern of incision of channels that erode into the landform, 3) degree of flatness or roundness of interfluves, 4) grain-size and

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weathering of surface clasts (McFadden et al., 1989), 5) degree of soil development (McFadden and others, 1989; Reheis and others, 1989), 6) degree of development of interlocking desert pavement, and 7) degree of desert varnish cover of surface clasts (McFadden et al., 1989).

Extrapolating the mapping of Amoroso and Miller (2006) onto the project site and utilizing the above relative dating techniques, as well as those by Miller and Valin (2007) and Yount et al. (1994) for nearby locations, we have determined the relative ages of the area's alluvial fan and playa deposits.

Table 1
Geomorphic Surface Relative Age

Surface	Age Range (yrs.)	Description and Location
A	0 – 8,700	Paleo-lake deposits, approximately 1-mile wide extending across the northern 20% of the site and over to Koehn Lake. Most of the deposit has been farmed.
B	1,000 – 8,000	Alluvial fan deposits covering most of the site (80%) and vicinity south and north of Surface A. The deposit is incised with drainage channels floored with alluvium that is less than 1,000 years old.
C	20,000 – 180,000	Older alluvial fan deposits which have been uplifted. Deeply incised with channels floored with alluvium. These deposits are generally located east of the project site and longitude 117.55°.
D	15,000 – 19,000	Older alluvial fan deposits found near the head of the fan and mountain front west of Highway 14. These deposits are generally uplifted above younger alluvial deposits.

DISCUSSION

Table 1 shows that Surface B and the younger alluvium filling the incised drainages on Surface D have the potential for buried archaeological deposits since the last 12,000 years to be present. Surface A is not considered because a paleo-lake is an unlikely place to find archeological deposits. And Surface C is too old.

Unfortunately, Table 1 only provides an estimate of the relative age of surface of the geomorphic deposits, listed as Surfaces B and D. However, the depth to the Holocene/latest Pleistocene boundary (~12,000 years ago) can be crudely estimated from previous work in the area. Dawson et al. (2003) exposed alluvial fan deposits 7,000 years old in their 9-meter deep trenches, located just north of Koehn Lake. And if one assumes a constant rate of deposition at this site, 15.4-meter deep trench would expose 12,000 years of alluvial deposits. Another way to estimate the depth would be to multiply the rate of vertical movement along the Garlock fault times 12,000 years. And assuming a constant rate of deposition the depth to the Holocene/latest Pleistocene boundary would be approximately 9.6 meters in the Cantil Valley. Kleinfelder (2008a) excavated shallow trenches to 5 feet deep into Surface B. All of our trenches exposed

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younger alluvial fan deposits, estimated to be 1,000-8,000 years old when subjected to the relative age dating techniques used by Amoroso and Miller (2006).

CONCLUSION

Surface B (from Table 1 above) and the younger alluvium filling the incised drainages on Surface D have the potential for buried archeological deposits since the last 12,000 years. Although the depth to the Holocene/latest Pleistocene boundary (~12,000 years ago) is not precisely known, we have crudely estimated it to be approximately 9.6 to 15.4 meters deep. This depth will vary across the project site and surrounding area. We are certain that the Holocene/latest Pleistocene boundary is greater than 5 feet in the northern part of the project site because our trenches only exposed Surface B deposits. Within the channels incised into Surface B the depth to Holocene/latest Pleistocene boundary should be less than the range provided above.

LIMIATIONS

The conclusions submitted in this report are based, in part, upon review of available published information; our previous work on the site; and past experience. The purpose of our study is to provide a discussion of landforms in the project area as a basis for further evaluation by others of the potential for buried archeological deposits. The nature and extent of variants from described conditions may not become evident until detailed geologic studies of the site are performed or during construction. If variations then appear evident, it will be necessary to reevaluate the conclusions of this report.

In the event of any change in the assumed nature of the proposed project, the conclusions contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report modified or verified in writing. This report is issued with the understanding that it is the responsibility of the Client or their representatives, to ensure that the information and recommendations contained in this report are called to the attention of architects and engineers for the project.

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Attachment DR-35

Contact Reports

EDAW | AECOM

1420 Kettner Boulevard, Suite 500
San Diego, California 92101
Phone 619.233.1454
Fax 619.233.0952

DISTRIBUTION:

Contact Report Form

EDAW Contact: Matt Tennyson
Date: 07/31/2008 **Project No.:** 08080001 (Beacon Solar)

CONTACT INFORMATION

Individual Contacted: Carrie Bemis
Agency/Organization/ Address: Environmental Scientist, Red Rock Canyon State Park **Phone No.:** 661.816.8650

ITEMS DISCUSSED

Called at 11:37 – No answer, left message indicating that EDAW is working in the area and wanted to discuss potential visual impacts the project may have. Left name and phone number.

11:42 –Carrie Bemis called back indicating that Red Rock Canyon SP would want to comment on potential impacts. She is also concerned about the Desert Tortoise and would like to have a copy of any biological reports EDAW has about the habitat. Ms. Bemis also indicated that Russ Bingman (Environmental Coordinator) should be sent a copy of the map to discuss potential impacts of the solar farm. Ms. Bemis said she will send an e-mail with appropriate contact information for herself and Mr. Bingman.

FOLLOW UP

Tennyson, Matt

From: Bemis, Carrie [CBEMI@parks.ca.gov]
Sent: Thursday, July 31, 2008 3:09 PM
To: Tennyson, Matt
Cc: Dingman, Russ
Subject: comments Red Rock solar project

Hi Matt,

Thank you for your phone call today and the information about the upcoming solar project near Red Rock Canyon State Park. We are interested in this project and welcome the opportunity to learn more and offer comments. Please include both Russ Dingman, District Environmental Coordinator, and me on your mailing and email lists.

Russ Dingman
Environmental Coordinator
CA State Parks, Tehachapi District
43779 15th Street West
Lancaster, CA 93534
661-726-1672
rdingman@parks.ca.gov

Thanks also for your offer to send a map and biological resources review. I look forward to hearing from you.

Carrie Bemis
Environmental Scientist
CA State Parks, Tehachapi District
43779 15th Street West
Lancaster, CA 93534
661-816-8650
cbemi@parks.ca.gov

Tennyson, Matt

From: Tennyson, Matt
Sent: Monday, August 04, 2008 1:40 PM
To: 'CBEMI@parks.ca.gov'; 'rdingman@parks.ca.gov'
Cc: Apple, Rebecca
Subject: Beacon Solar Project Map
Attachments: Figure 2 Archaeological Survey Area.pdf

Carrie and Russ,

I've attached a copy of the Beacon Solar project area map for your review. As I stated in our conversation last week, we would like to know if Red Rock Canyon State Park has any comment or questions about potential visual impacts the project may have on the park.

I have also contacted our biology division so that they can address quesions you have about the desert tortoise.

If there is anything else I can be of assistance with, please let me know.

Thanks,

Matt Tennyson
Archaeologist
matt.tennyson@edaw.com

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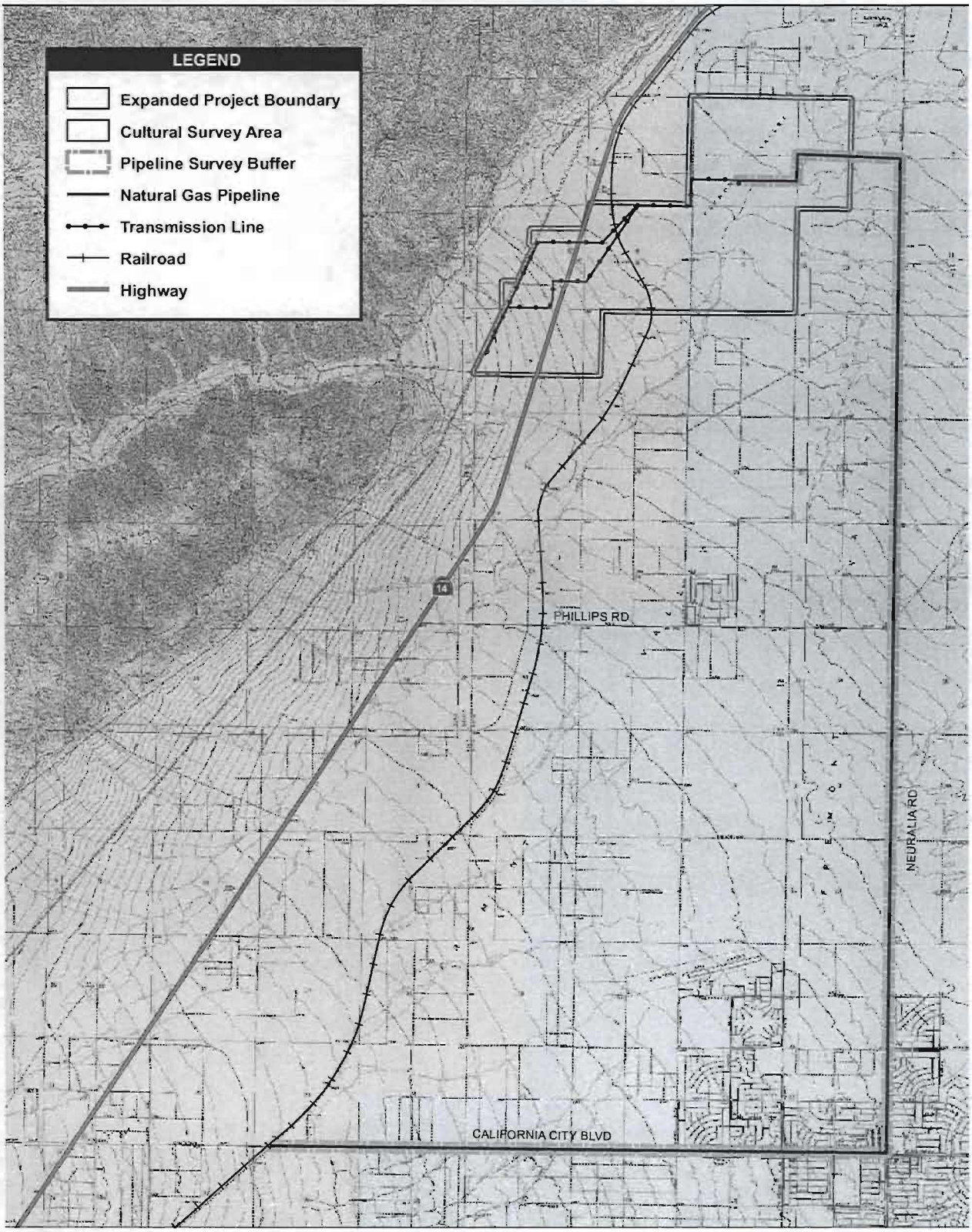

Source: California City North (1973), California City South (1973), Cantil (1973), Cinco (1994), and Mojave NE (1994), Sanborn (1973) Calif., USGS 7 5' Series Quadrangles

7,500 3,750 0 7,500 Feet

Scale: 1:90,000; 1 inch = 7,500 feet

Figure 2
Survey Area

Path: P:\2008\08080001 FPLE Proj Beacon Solar\5GIS\MXD\Cultural\Figures\Archaeological Resources\Figure 2 Survey Area.mxd, 03/05/08, KochertE

Tennyson, Matt

From: Tennyson, Matt

Sent: Monday, August 04, 2008 2:15 PM

To: 'CBEMI@parks.ca.gov'; 'rdingman@parks.ca.gov'

Subject: Biological Information for Beacon Solar Project

Carrie and Russ,

I spoke with the Senior Biologist, Lyndon Quon, for the Beacon Solar Project. He informed me that EDAW is coordinating with the CDFG, USFWS, and CEC to develop appropriate avoidance, minimization, and compensation/mitigation for anticipated impacts to marginal desert tortoise habitat associated with the Plant Site, as well as a very small (approximately 5 to 6 acres) of tortoise habitat along proposed transmission line options. All biological information is availiabe on the CEC's website http://www.energy.ca.gov/sitingcases/beacon/index.html.

Thanks,
Matt

Matt Tennyson
Archaeologist
matt.tennyson@edaw.com

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As discussed in the supplemental responses for the Biological Resources Data Requests, these revisions and supplemental data are provided in response to the CEC Staff comments received during the CEC workshop on July 22, 2008. These changes focused on three areas related to Data Requests 44 and 45:

- Revisions to the rerouted wash to be consistent with the Streambed Alteration Agreement application package provided in conjunction with the Biological Resources Data Request;
- Inclusion of a dissipation structure for the rerouted wash; and
- Correction of an error in the Conceptual Grading Plan

The Conceptual Grading Plan submitted with the July 16, 2008 submittal in response to Data Request 45.b shows the existing ground contours and proposed contours. In addition to the proposed contours, grade tags at the corners and points of interest have been added. Moreover, in order to simplify review, an additional sheet (Sheet C2) has been added 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. On Sheet C2 the cut/fill numbers in the southeast corner of the project site have been corrected based on comments from the July 22, 2008 CEC workshop.

Data Request 44:

Please provide design information showing this configuration is suitable for the anticipated flows. Please discuss other alternate alignments that were considered.

Revised Response:

Revisions to the original data response have been <u>underlined.</u> Calculations are located in Attachment DR-44.

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 Attachment DR-45). 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 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 Appendix L.1 of the BSEP AFC). 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 1.5 ft deep by 60 ft wide trapezoidal channel with 4:1 side slopes will be constructed in the main channel to carry low flows (maximum capacity of 340 cfs at a slope of 0.5%) through the site.

Except for the two turns, the low flow channel will be constructed in a straight alignment. Where the low flow channel is unlined, it is anticipated that over time the channel will meander within the main channel banks to duplicate the existing conditions. However, at Turns #1 and #2, the low flow channel will be lined with rip rap to help minimize erosion.

A subsurface rock keyway will be constructed in locations shown on sheets C3 through C7 to help contain the low flow channel within the main channel banks. Over time the low flow channel will meander within the main channel floor, and without the keyway, should the low flow channel come in contact with the left or right bank of the main channel, it may undermine the 3:1 bank. The subsurface rock keyway will act as a guide to contain the low flow channel within the main channel.

At the upstream end of the Project, the outside edge slope of the primary (main) channel where the flows are confined will be constructed at a 2:1 and lined with Light Class (Caltrans Standard Specification Section 72) rock. A 5 ft high berm will be constructed above the 8-foot deep main channel, creating a total channel depth of 13 ft. This additional depth of channel will help turn the water at the bend while keeping it within the constructed channel.

The rerouted dry wash will slope from a minimum of 0.5% to a maximum of 1.38%. The channel's Manning roughness coefficient 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 0.038 was assumed for the rerouted dry wash (Pine Tree Creek). This will allow for a stone/weed 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. Where the sides of the main channel and low flow channel are lined with rock the Manning's "n" is assumed to be 0.045.

ALIGNMENT AND FREEBOARD

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

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

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

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 the purpose of this report, five channel section locations were analyzed in the rerouted dry wash. We assumed that the depth of flow for these channels 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

RESULTS

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	Free-board (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	5.7 FT	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	7.84 FT	1.57 FT	1.4 FT	9.79 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 7.84 ft. The maximum freeboard is 1.57 ft (0.2 x 7.84 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 9.79 ft (6.82ft + 1.4 ft+ 1.57ft). 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, including the low flow 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 6.02 feet with a velocity of approximately 8.8 fps. The flow is subcritical.

The low flow channel is unlined and will meander over time. A subsurface rock keyway will be constructed at the bank to the left and right of the channel.

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%	6.02 FT	7.21 FT	1.44 FT	7.5 FT	8 FT

The minimum freeboard required by Kern County's requirements is 0.5 ft or 0.2 x Specific Energy, whichever is greater. The Specific Energy in straight #1 is 7.21 ft. The freeboard is 1.44 ft (0.2 x 7.21 ft>0.5 ft). The minimum required channel depth is 7.5 ft (6.02 ft + 1.44 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 = 376 ft

Radius of channel centerline = 1143 ft (Kern County Minimum Radius 1128 ft [3 x 376 ft])

Velocity at entrance to curve = 10.18 fps

Soil Conservation Service (SCS) formula for Trapezoidal Channel during Subcritical Flow: E = Maximum height of water surface in feet above depth "d"= 0.98 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%	5.18 FT	5.29 FT	1.06 FT	0.98 FT	7.22 FT	8 FT

The minimum freeboard required by Kern County's requirements is 0.5 ft or 0.2 x Specific Energy, whichever is greater. The Specific Energy in turn #2 is 5.29 ft. The freeboard is 1.06 ft (0.2 x 5.29 ft>0.5 ft).

The water surface at the outside edge of Turn #2 is approximately 6.16 ft. The minimum required channel depth is 7.22 ft (6.16 ft + 1.06 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.

The inside and outside banks of the main channel and low flow channel are lined with rip rap.

STRAIGHT #2

The depth of flow for Straight #2 at a slope of 1.38% is 4.38 feet, with a velocity of approximately 12.0 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	5.12 FT	1.02 FT	6.14 FT	8 FT

The minimum freeboard required by Kern County's requirements is 0.5 ft or 0.2 x Specific Energy, whichever is greater. The Specific Energy in Straight #2 is 5.12 ft. The freeboard is 1.02 ft (0.2 x 5.12 ft>0.5 ft). The minimum required channel depth is 5.4 ft (4.38 ft + 1.02 ft). The minimum designed channel depth at Straight #2 is 8 ft. The water in Straight #2 will remain within the designed channel.

The low flow channel is unlined and will meander over time. A subsurface rock keyway will be constructed at the bank to the left and right of the 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.

As the low flow channel approaches the concrete outlet structure it will gradually transition from a 60 ft wide channel to a 400 ft wide channel. In addition to widening, the depth of the channel will be transition from 1.5 ft in depth to 0 ft in depth. The low flow channel will end at the concrete outlet structure.

At the end of the low flow channel a concrete flow spreading structure will be constructed to help return the channelized flow back to sheet flow. The concrete structure will consist of 2 ft high by 15 ft wide blocks set at 15 ft spacing. The blocks will be placed along the 2055 contour. The openings between the blocks will allow low flows to pass through them, slowing and dissipating energy at the same time. Below the concrete outlet structure there is approximately 3000 ft of desert conditions before the flows leave the project property limits. Within this location erosion control will primarily consist of revegetation of natural plants. As the flows spread out from channelized flow to sheet flow, water velocity will decrease from 12 fps (Straight #2) to 5.2 fps (Outlet).

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.

Due to the high water velocities (8.2 to 12 fps) as indicated below, the channel may require additional erosion control measures and materials. Erosion control materials include, but are not limited to, rock rip rap, natural fiber matting, straw wattles, gravel bags, and reseeding. Per Figure 2 – *"Size of stone that will resist displacement for various velocities and side slopes"* in Appendix D of the Conceptual Drainage Study (Appendix L.1 of the BSEP AFC), 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 as shown on Sheets C3 and C4 shall be placed along the channel floor and up the channel sides to estimated freeboard depth.

By minimizing the amount of rip rap along the straight sections of the main channel, erosion may occur gradually over time along the channel banks. The Project owner shall establish a maintenance and review program which will make periodic inspections of the channel and correct any areas where the solar facility infrastructure or offsite property could be damaged if repairs are not made. The Project owner should make allowances in future maintenance budgets to provide for these needs.

Data Request 45:

Please provide plans or maps that clearly show:

a. the existing (predevelopment) site conditions;
b. the conceptual grading plan that identifies all cut and fill areas;
c. the sequence of grading from initial clearing and grubbing to final grade;
    1) which areas of the sire will be developed first, according to the above sequencing;
    2) how long each 15-acre section will take to be graded;
d. whether complex area, such as Pine Tree Creek, will require more extensive cutting and filling and more overall time for grading;
e. the construction phase erosion control measures proposed to mitigate erosion/sedimentation hazards; and
f. the post construction drainage plan.

Revised Response:

Revised diagrams only are provided in Attachment DR-45. See below for a list of revisions made to these diagrams (*Revisions to the original data response are underlined)*:

1) Site Plan, FPLS-0-SK-111-002-001, REV H
    a. Items revised:
        i. Evaporation Pond Location
        ii. Admin Building Location
        iii. Biotreatment Unit Location
        iv. Added Debris and Organic Handling Areas
2) Existing Conditions Site Plan, FPLS-0-SK-111-002-000, REV A. (in response to Data Request 45.a.)
3) Conceptual Grading Plan Sheet C1-C7 REV B
    a. Items revised:

i. Revised low flow wash within re-routed wash.
ii. Revised details for low flow wash
iii. Added concrete flow spreading structure.

a. See "Existing Conditions Site Plan" submitted in July 16 data response

b. Please see Attachment DR-45 "Conceptual Grading Plan".

c. A typical grading sequence is as follows:

- Pre-water area(s) in consideration
- Clearing and grubbing the area(s) per the recommendations of the geotechnical engineer.
- Staking of the site per proposed grading plans
- Scarify and re-compact per geotechnical recommendations at all fill areas.
- Cut areas where needed per proposed grading plans and spread the soil onto the fill areas
- Water and re-compact
- In area of cut, once the desired elevation is achieved, scarify and re-compact.

1) It is anticipated that grading development will be performed generally in a north to south pattern. Excavation of the drainage channel will occur so that it can be completed, and made functional in order to re-route the drainage pattern from the site in the early stages of the grading activity.
2) The estimated "cut" volume is 5,160,000 cubic yards. Assuming that the "cut" occurs over one half of the site (one half cut, one half fill), and the depth of cut is somewhat uniform, there will be approximately 67,000 cubic yards of material to cut in each 15 acre area. Grading of these areas will take between 2 and 3 days.

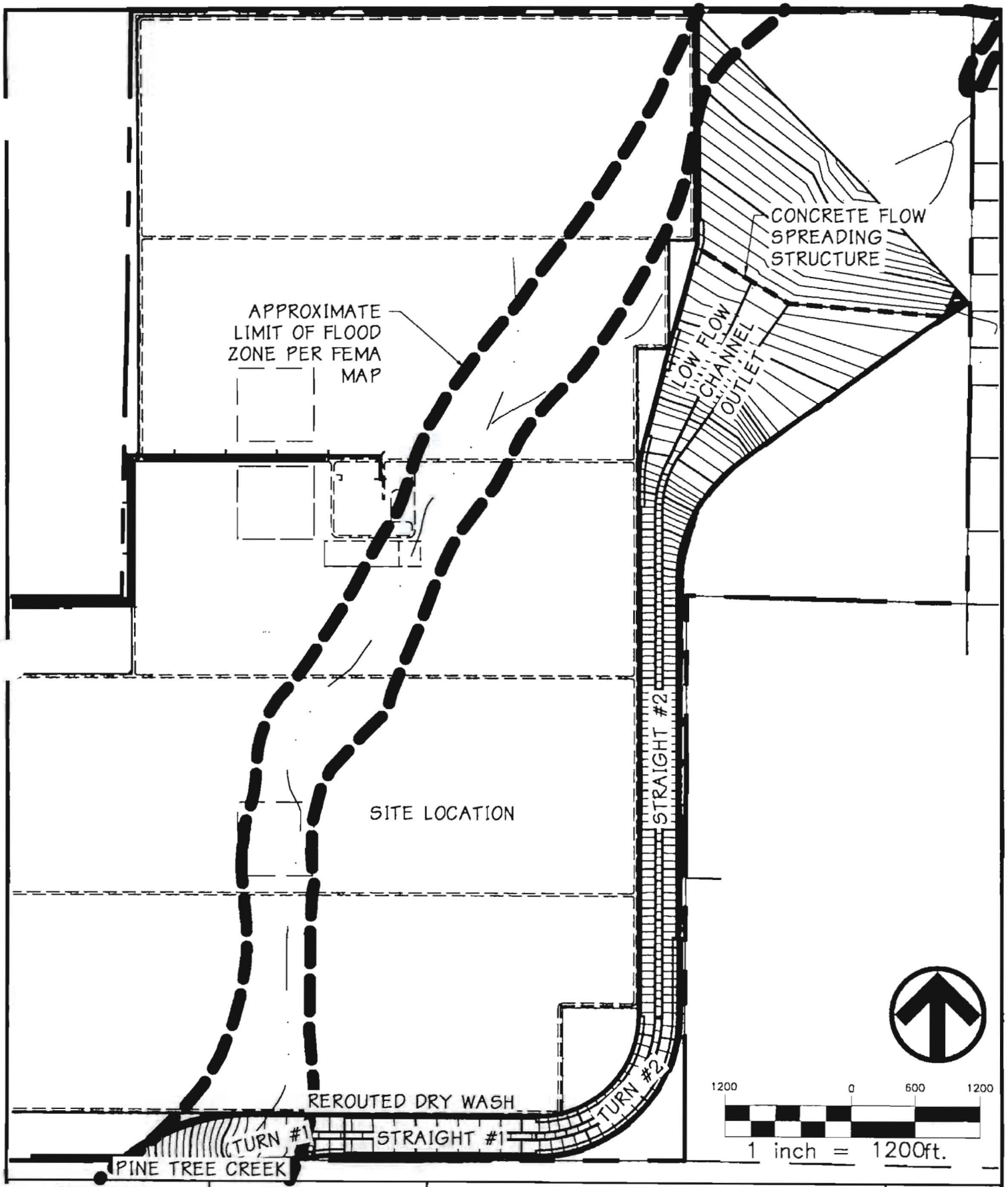
d. The geometry of the re-routed Pine Tree Creek will allow for similar earthmoving productions as the plant site. Additional time will be required after grading operations for finish grading of the channel and placement of the rock.

e. Erosion control will be generally accomplished by the installation of mat liners (where needed), hydro seeding with native vegetation, and cobbles to dissipate velocity and to protect the edges of the channel at strategic locations. Also, the use of straw bales and silt fences will be utilized during construction. Please see Appendix L.2 of the AFC for a more detailed description of the BMP's to be implemented during construction.

Please see Attachment DR-45, particularly the "Conceptual Cut/Fill Map".

Attachment DR-44

Calculations



6199-01-07	08/13/2008

CARLTON Engineering Inc.

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BEACON SOLAR ENERGY PROJECT

Kern County, California

Site Map

FIGURE **1**

Trapezoidal Channel 1.0%- Turn #1 - 1600 ft Entrance

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.0100	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	1600	ft
Discharge	20000	ft^3/s

Results

Normal Depth	2.22	ft
Flow Area	3566.62	ft^2
Wetted Perimeter	1611.99	ft
Top Width	1611.11	ft
Critical Depth	1.69	ft
Critical Slope	0.02480	ft/ft
Velocity	5.61	ft/s
Velocity Head	0.49	ft
Specific Energy	2.71	ft
Froude Number	0.66	
Flow Type	Subcritical	
Normal Depth	2.22	ft
Critical Depth	1.69	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.02480	ft/ft

Trapezoidal Channel - 0.5% Turn #1 - 345 ft Exit

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.0050	ft/ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	345	ft
Discharge	20000	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

Input Data

Channel Slope	0.00500	ft/ft
Discharge	20000	ft^3/s

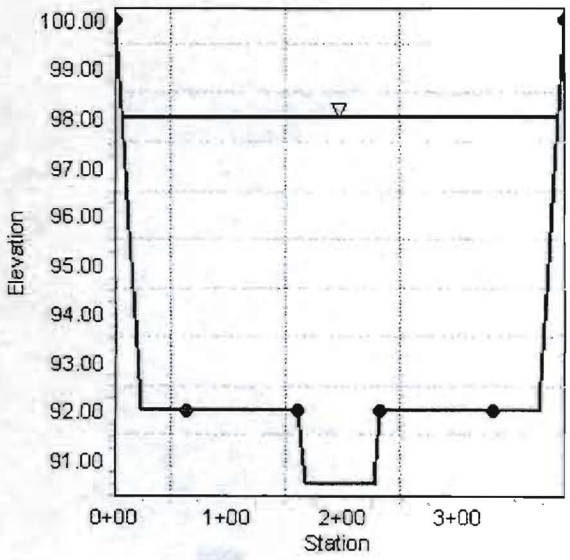
Section Definitions

Station (ft)	Elevation (ft)
0+00	100.00
0+24	92.00
0+64	92.00
1+61	92.00
1+67	90.50
2+27	90.50
2+33	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)	0.038
(0+64, 92.00)	(1+61, 92.00)	0.038
(1+61, 92.00)	(2+33, 92.00)	0.045
(2+33, 92.00)	(3+29, 92.00)	0.038
(3+29, 92.00)	(3+93, 100.00)	0.038

Normal Depth	6.02 ft (Measured from Main Channel Bottom- 92.0 ft)	
Elevation Range	90.50 to 100.00 ft	
Flow Area	2283.54	ft^2
Wetted Perimeter	383.43	ft
Velocity	8.76	ft/s
Specific Energy	7.21 ft (Measured from Main Channel Bottom- 92.0 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 ft³/s

Section Definitions

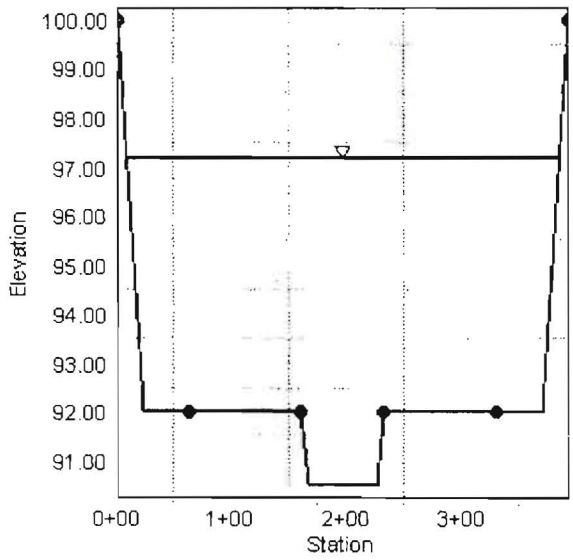
Station-(ft)	Elevation (ft)
0+00	100.00
0+24	92.00
0+64	92.00
1+61	92.00
1+67	90.50
2+27	90.50
2+33	92.00
3+29	92.00
3+69	92.00
3+93	100.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 100.00)	(0+64, 92.00)	0.045
(0+64, 92.00)	(1+61, 92.00)	0.038
(1+61, 92.00)	(2+33, 92.00)	0.045
(2+33, 92.00)	(3+29, 92.00)	0.038
(3+29, 92.00)	(3+93, 100.00)	0.045

Results

Normal Depth	5.18 ft (Measured from Main Channel Bottom- 92.0 ft)
Elevation Range	90.50 to 100.00 ft
Flow Area	1965.59 ft²
Wetted Perimeter	378.11 ft
Velocity	10.18 ft/s
Specific Energy	5.29 ft (Measured from Main Channel Bottom- 92.0 ft)



Trapezoidal Channel 1.38% - Straight #2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth
Channel Slope	0.01380 ft/ft
Discharge	20,000 ft³/s

Section Definitions

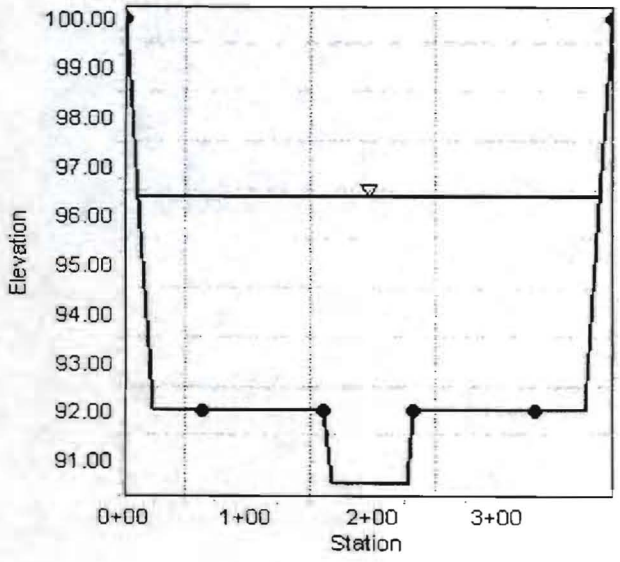
Station (ft)	Elevation (ft)
0+00	100.00
0+24	92.00
0+64	92.00
1+61	92.00
1+67	90.50
2+27	90.50
2+33	92.00
3+29	92.00
3+69	92.00
3+93	100.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 100.00)	(0+64, 92.00)	0.038
(0+64, 92.00)	(1+61, 92.00)	0.038
(1+61, 92.00)	(2+33, 92.00)	0.045
(2+33, 92.00)	(3+29, 92.00)	0.038
(3+29, 92.00)	(3+93, 100.00)	0.038

Results

Normal Depth	4.38 ft (Measured from Main Channel Bottom- 92.0 ft)
Elevation Range	90.50 to 100.00 ft
Flow Area	1666.53 ft²
Wetted Perimeter	373.05 ft
Velocity	12.0 ft/s
Specific Energy	5.12 ft (Measured from Main Channel Bottom- 92.0 ft)



Outlet Trapezoidal Channel - 1% At 2055 Contour

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

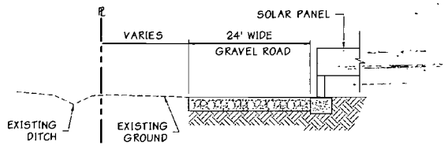
Roughness Coefficient	0.038	
Channel Slope	0.0100	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	2500	ft
Discharge	20000	ft^3/s

Results

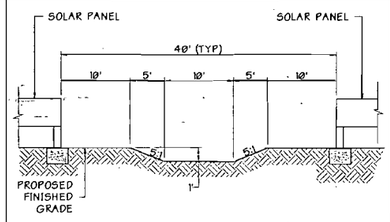
Normal Depth	1.54	ft
Flow Area	3847.68	ft^2
Wetted Perimeter	2509.72	ft
Top Width	2509.22	ft
Critical Depth	1.26	ft
Critical Slope	0.01951	ft/ft
Velocity	5.20	ft/s
Velocity Head	0.42	ft
Specific Energy	1.96	ft
Froude Number	0.74	
Flow Type	Subcritical	

Attachment DR-45

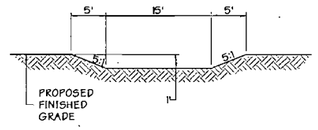
Conceptual Grading Plan (C1)
Conceptual Cut/Fill Map (C2)
Channel Grading Plan (C3)
Channel Grading Plan (C4)
Channel Sections (C5)
Channel Sections (C6)
Channel Sections (C7)



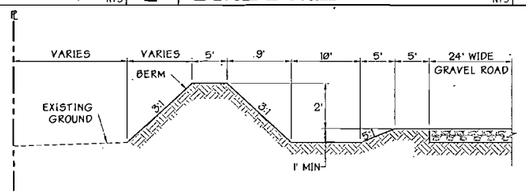
Ditch Detail NTS **1**



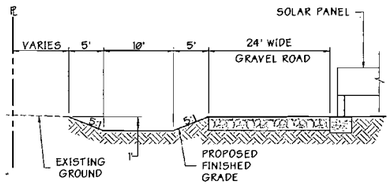
Ditch Detail NTS **2**



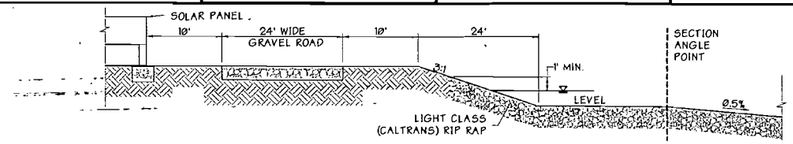
Ditch Detail NTS **3**



Berm NTS **4**



Ditch Detail NTS **5**



Ditch Detail NTS **6**

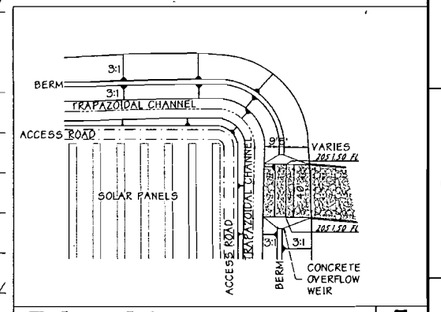
DATE	CUT (YARDS)	FILL (YARDS)	TOTAL (YARDS)
01-16-2008	5,160,000	4,830,000	330,000 CUT *

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

1 inch = 600 ft.

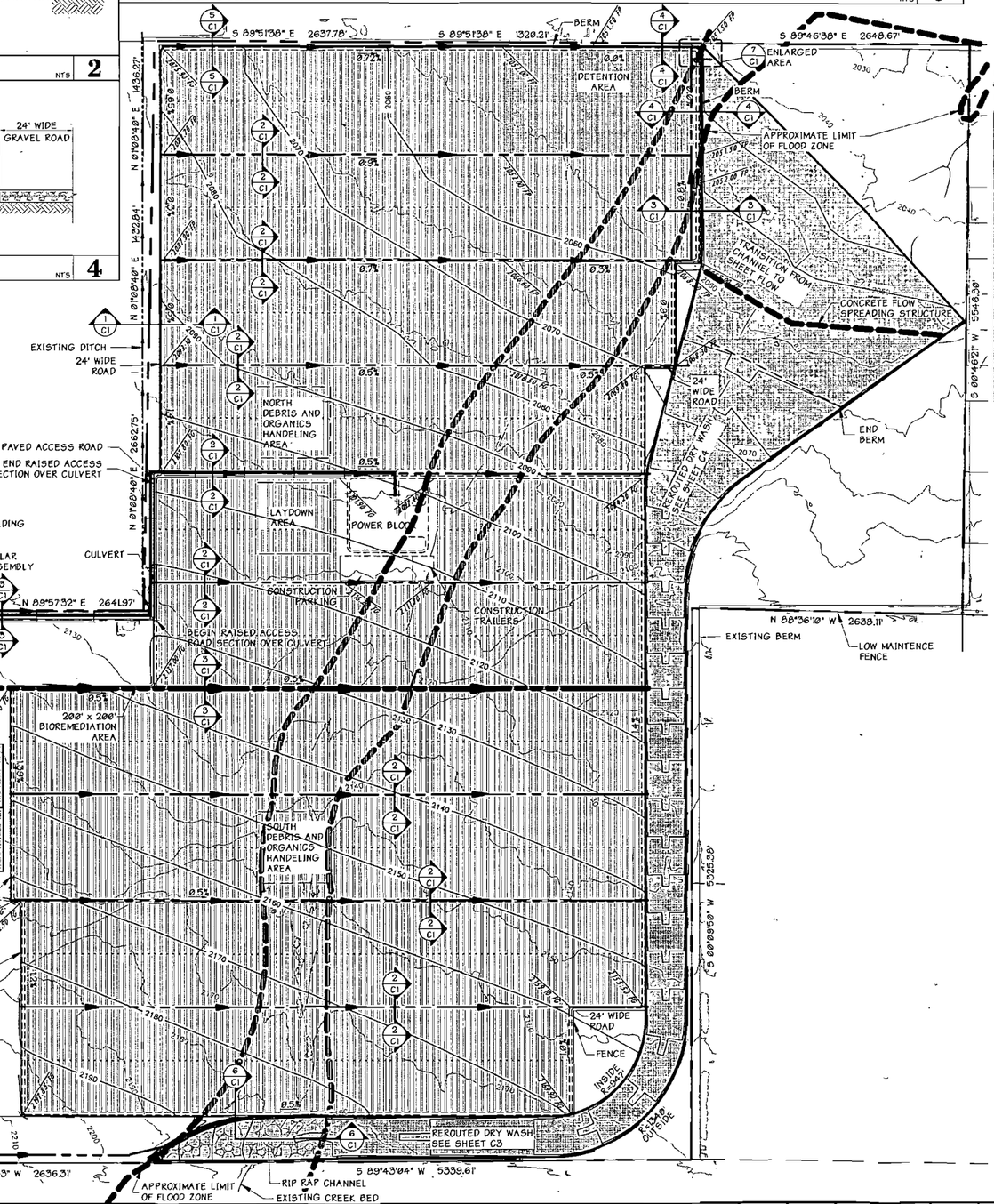
General Notes

1. ALL SLOPES ARE 3:1 UNLESS OTHERWISE SHOWN



Enlarged Area NTS **7**

WORKING DRAWING DATE 08/13/2008 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 DATE JOB NO.

REAL DESIGN SOLUTIONS FOR THE BUILT ENVIRONMENT

CARLTON Engineering Inc.
3883 Pinecrest Road, Sample Springs, CA 95682
Voice 530.677.7515 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

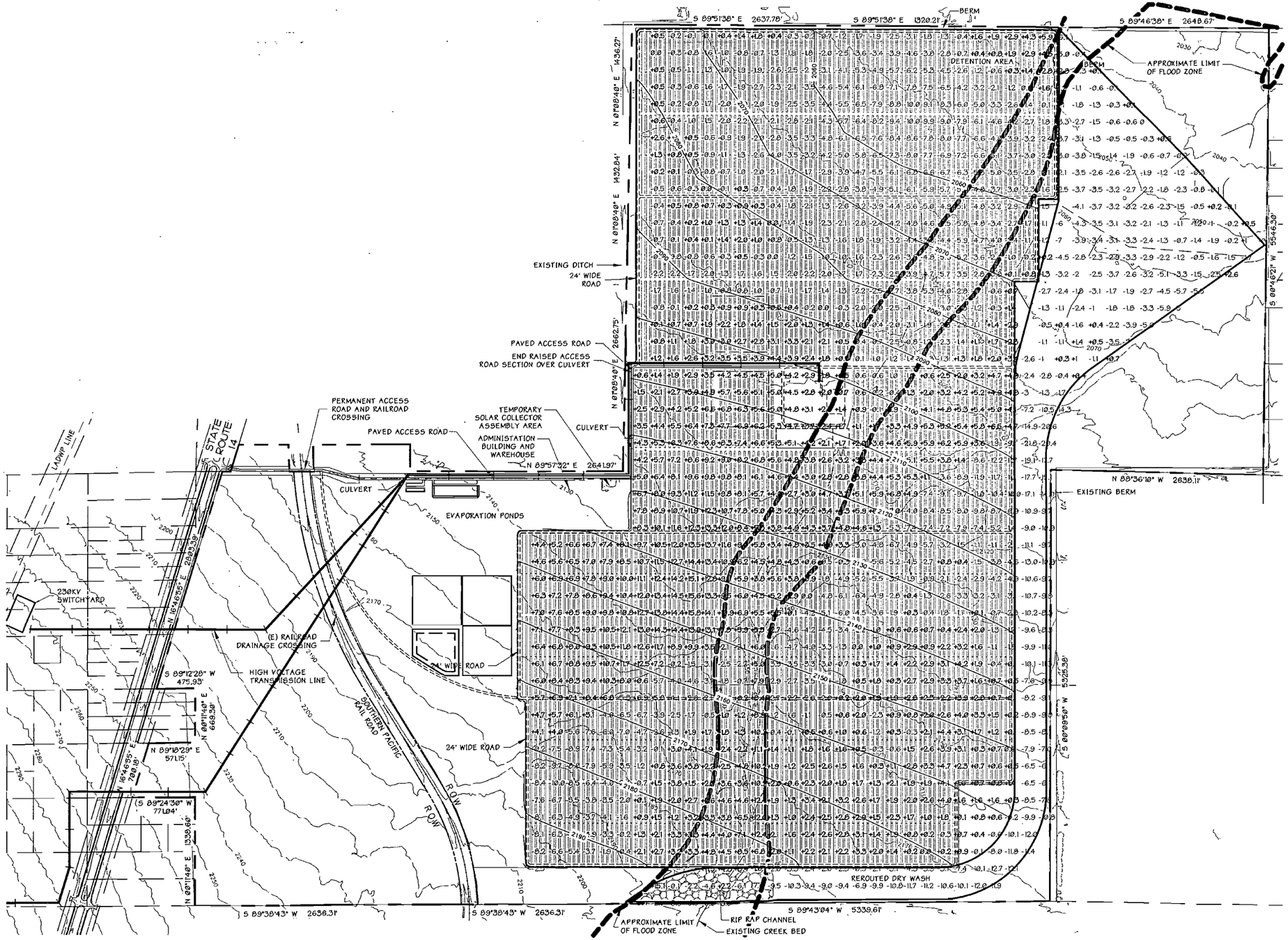
SCALE 1" = 600' DRAWING SIZE ARCH D (24" x 36")

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 CIVL STRUC

13-Aug-2008 3:15pm pmckenna Z:\Worley Parsons\51XX-01-07 FPLE Project Beacon\Drgs\c1\v1923_C1



1 inch = 600 ft.

Cut/Fill Legend

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

WORKING DRAWING DATE 08/13/2008 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 CARLTON SOLUTIONS FOR THE BUILT ENVIRONMENT

CARLTON Engineering Inc.

5883 Pentecost Road, Shingle Springs, CA 95682
Voice: 530.677.7515 Fax: 530.677.6645

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

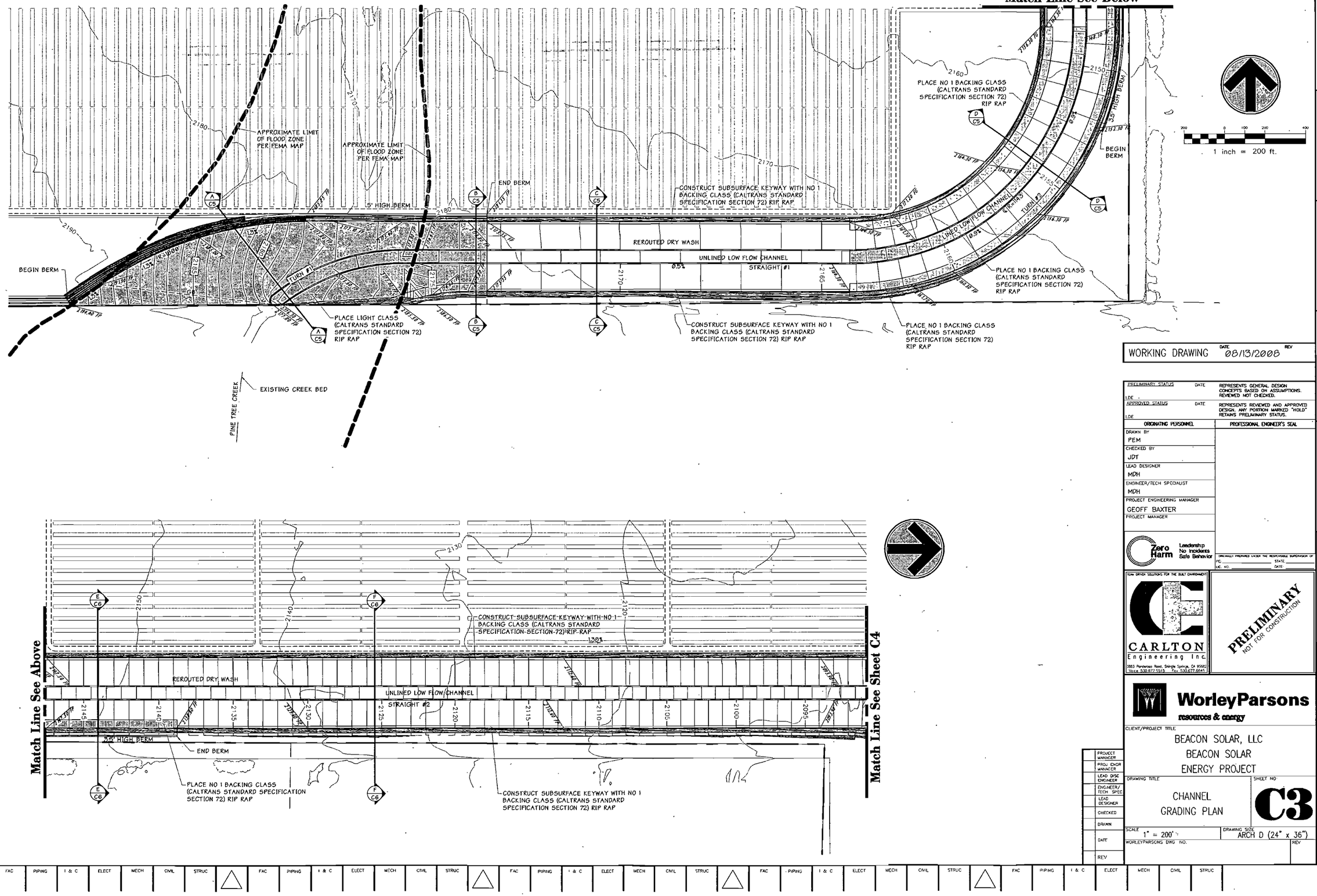
SCALE: 1" = 600' DRAWING SIZE: ARCH D (24" x 36")

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

13Aug2008 3:11pm pmdarling Z:\Worley Parsons\8192-01-07 FNLE Project Beacon\Drafts\81901_C2



WORKING DRAWING DATE 08/13/2008 REV

PRELIMINARY STATUS I.DE	DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
APPROVED STATUS I.DE	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:

FLOW 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

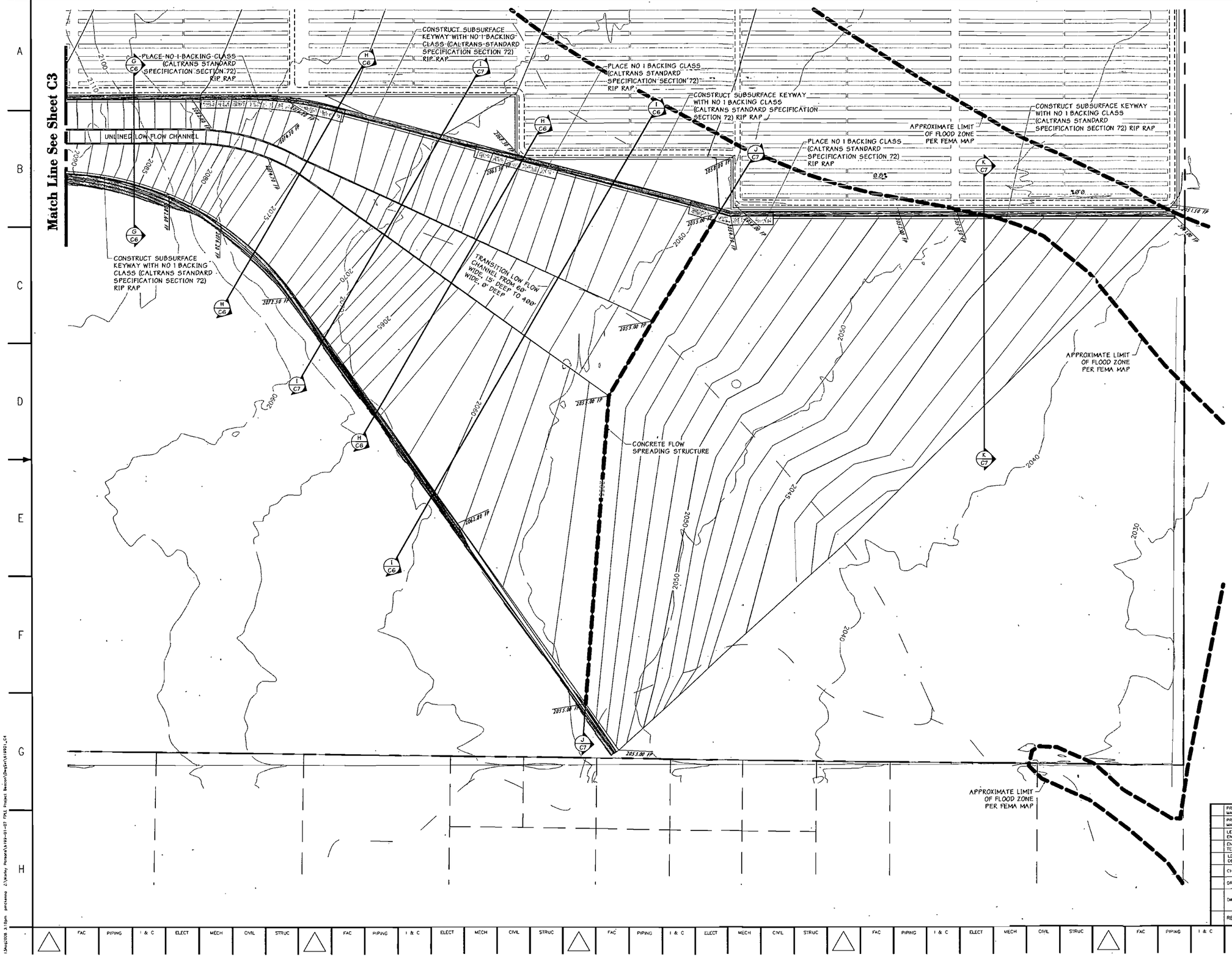
CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR ENERGY PROJECT

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

DRAWING TITLE: CHANNEL GRADING PLAN
SHEET NO: C3
SCALE: 1" = 200'
DRAWING SIZE: ARCH D (24" x 36")
WORLEYPARSONS DWG NO.
REV

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

13-Aug-2008 2:29pm jpeckens J:\Worley Parsons\V1999-01-07 EPLE Project Beacon\Dwgs\s1(1920)_C3



WORKING DRAWING DATE 08/13/2008 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 Pancreras 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
CHANNEL GRADING PLAN

SHEET NO: C4

SCALE 1" = 200'

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

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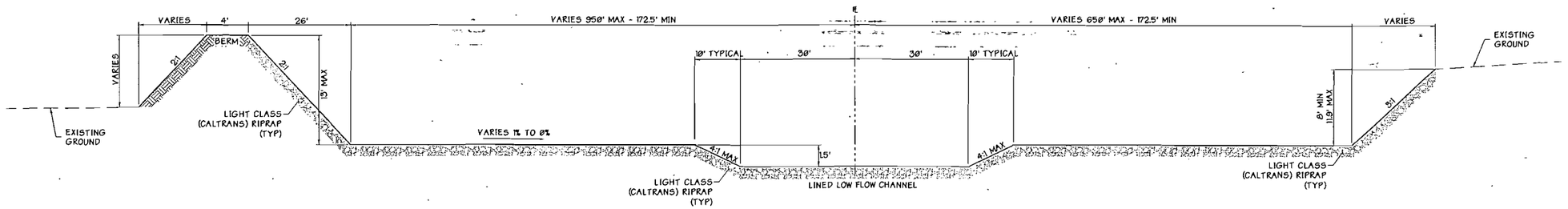
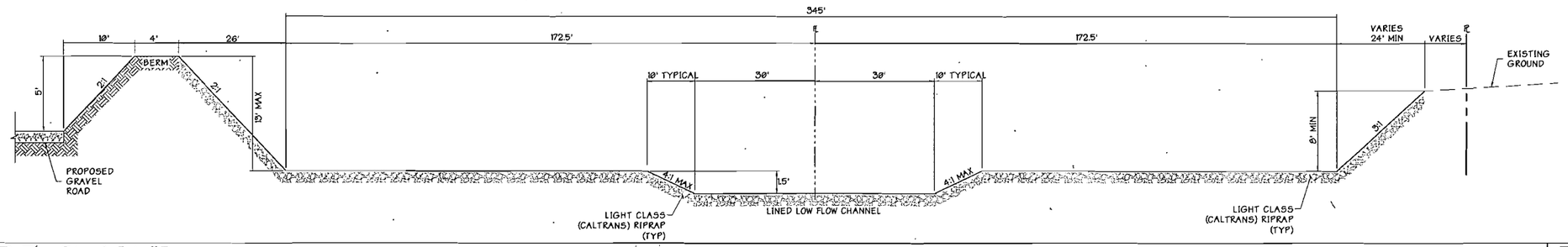


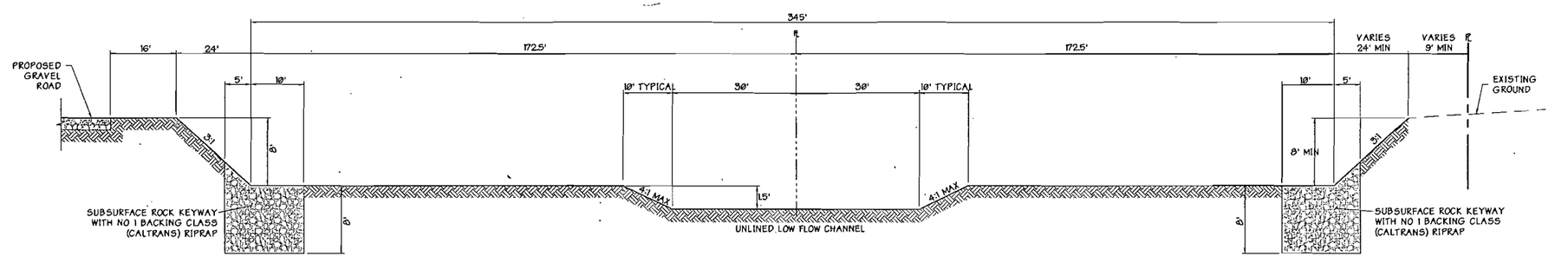
Section A-A - Turn #1

NTS **A**



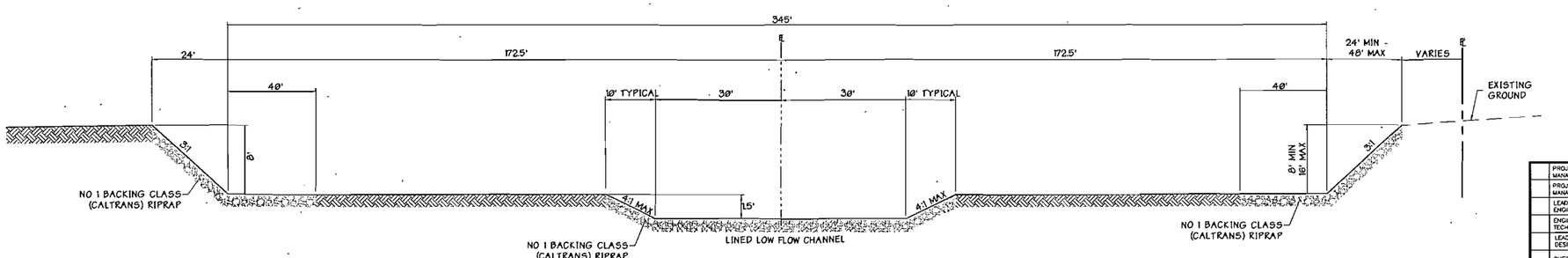
Section B-B - Straight #1

NTS **B**



Section C-C - Straight #1

NTS **C**



Section D-D - Turn #2

NTS **D**

WORKING DRAWING — DATE 08/13/2008 — 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 Pundersea 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: CHANNEL SECTIONS

SHEET NO. C5

SCALE: 1" = 600'

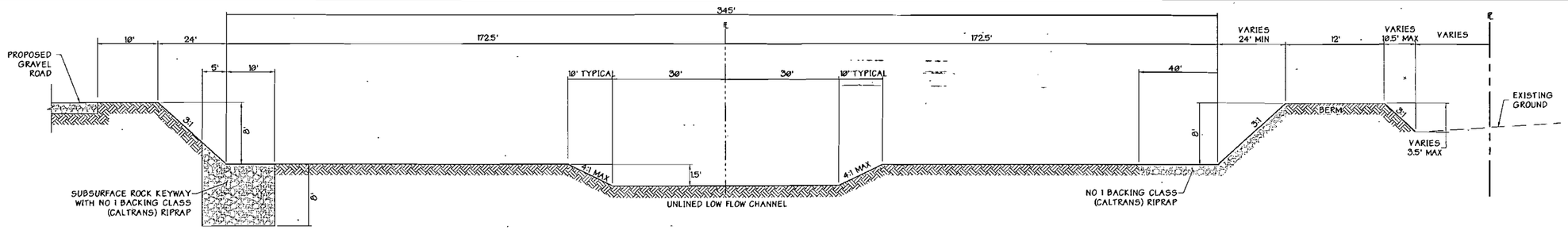
DRAWING SIZE: ARCH D (24" x 36")

WORLEYPARSONS DWG. NO.

REV

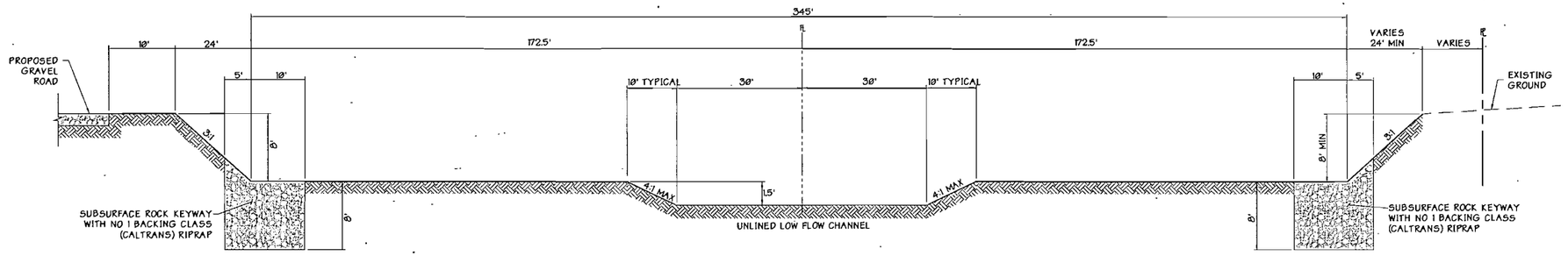
PROJECT MANAGER
PROJ ENGR MANAGER
LEAD DISC ENGINEER
ENGINEER/TECH. SPEC
LEAD DESIGNER
CHECKED
DRAWN
DATE
REV

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



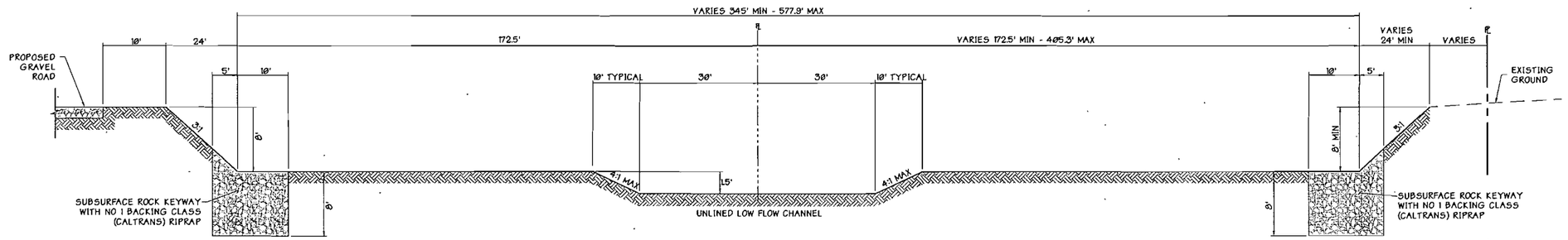
Section E-E

NTS **E**



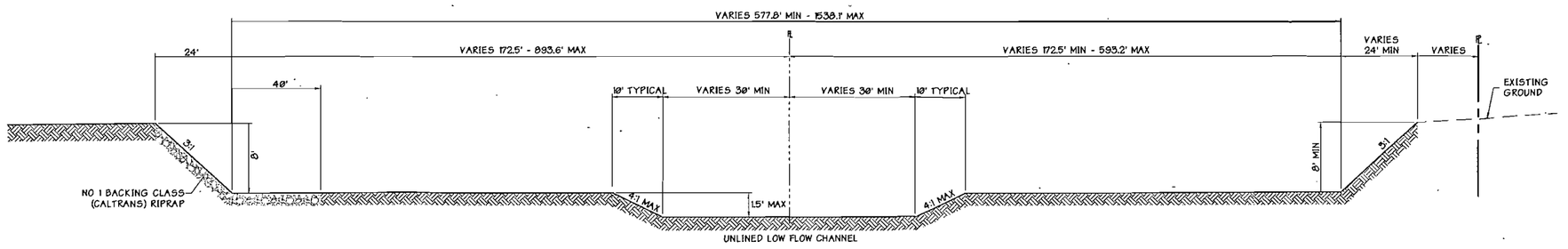
Section F-F

NTS **F**



Section G-G

NTS **G**



Section H-H

NTS **H**

WORKING DRAWING — DATE 08/13/2008 — 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.
3683 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: CHANNEL SECTIONS

SHEET NO: C6

SCALE: 1" = 600'

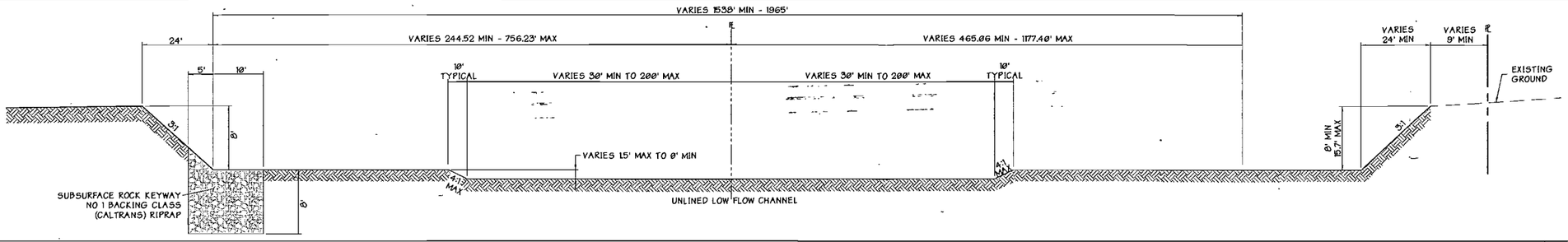
DRAWING SIZE: ARCH D (24" x 36")

WORLEYPARSONS DWG. NO.

REV

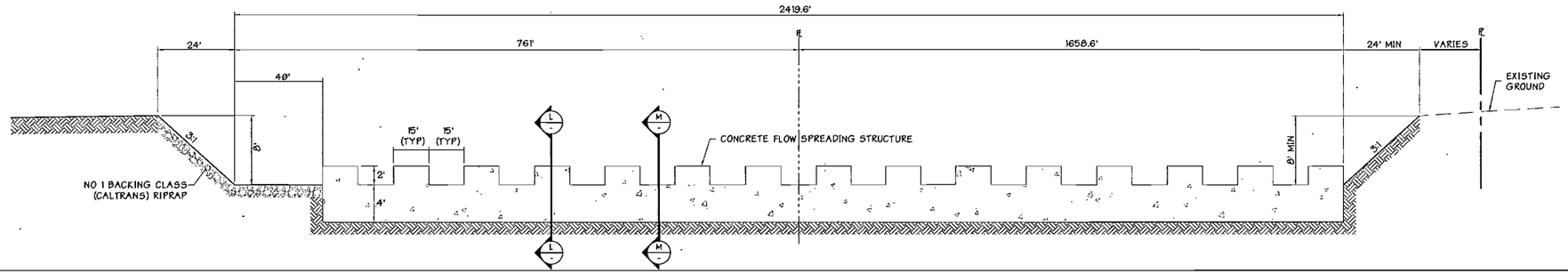
PROJECT MANAGER	
PROJ ENGR MANAGER	
LEAD DISC ENGINEER	
ENGINEER/ TECH SPEC	
LEAD DESIGNER	
CHECKED	
DRAWN	
DATE	
REV	

FAC PIPING I & C ELECT MECH CIVIL STRUC



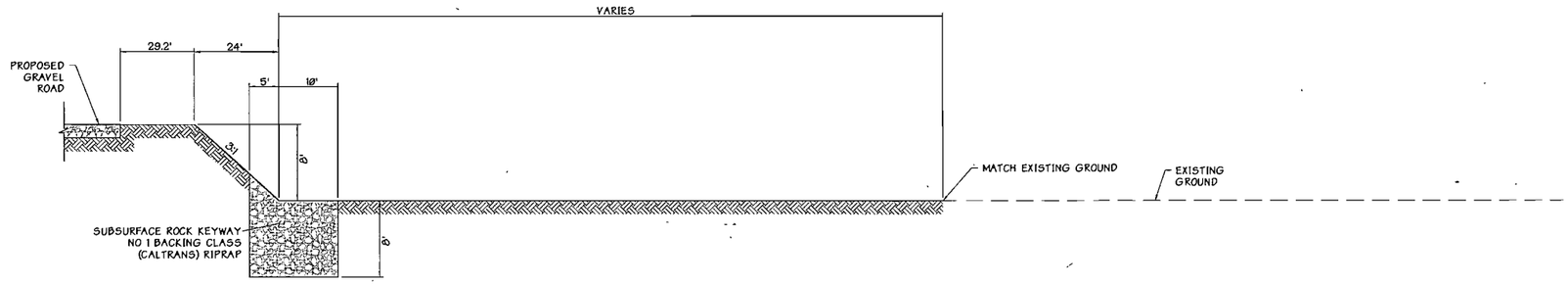
Section I-I

NTS **I**



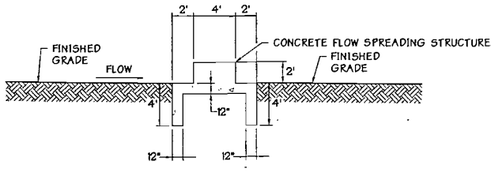
Section J-J

NTS **J**



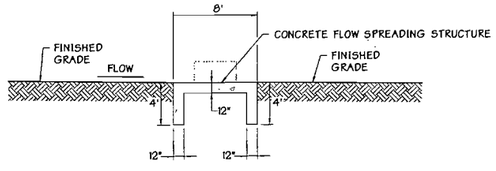
Section K-K

NTS **K**



Section L-L Concrete Flow Spreading Structure

NTS **L**



Section M-M Concrete Flow Spreading Structure

NTS **M**

WORKING DRAWING DATE 08/13/2008 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: CHANNEL SECTIONS

SHEET NO: C7

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

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA

APPLICATION FOR CERTIFICATION FOR THE BEACON SOLAR ENERGY PROJECT	DOCKET NO. 08-AFC-2

PROOF OF SERVICE
(Revised 8/18/08)

INSTRUCTIONS: All parties shall either (1) send an original signed document plus 12 copies or (2) mail one original signed copy AND e-mail the document to the address for the docket as shown below, AND (3) all parties shall also send a printed or electronic copy of the document, which includes a proof of service declaration to each of the individuals on the proof of service list shown below:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 08-AFC-2
1516 Ninth Street, MS-14
Sacramento, CA 95814-5512
docket@energy.state.ca.us

Steve Schauer, Executive Director Solar Business Development 700 Universe Blvd. Juno Beach, FL 33408 Steve.schauer@fpl.com Mike Argentine FPL Energy, LLC 1465 Oak Hill Way Roseville, CA 95661 Michael.argentine@fpl.com	Kenneth Stein, J.D. Duane McCloud Bill Narvaez Meg Russell FPL Energy, LLC 700 Universe Blvd., MS JES/JB Juno Beach, FL 33408 Kenneth.stein@fpl.com Guillermo.narvaez@fpl.com Duane.mccloud@fpl.com Meg.russell@fpl.com
Jane Luckhardt, Esq. Downey Brand, LLP 555 Capitol Mall, 10th Floor Sacramento, CA 95814 jluckhardt@downeybrand.com	Sara Head, Vice President ENSR Corporation 1220 Avenida Acaso Camarillo, CA 93012 shead@ensr.aecom.com
Geoffrey R. Baxter, P.E. – Project Manager Worley Parsons 2330 E. Bidwell Street, Suite 150 Folsom, CA 95630 Geoffrey.baxter@worleyparsons.com	CA Independent System Operator P.O. Box 639014 Folsom, CA 95763-9014 e-recipient@caiso.com

Tanya A. Gulesserian Marc D. Joseph Adams, Broadwell, Joseph & Cardozo 601 Gateway Blvd., Suite 1000 So. San Francisco, CA 94080 tgulesserian@adams.broadwell.com	
Karen Douglas Commissioner & Presiding Member kldougla@energy.state.ca.us	Jeffrey D. Byron, Associate Member jbyron@energy.state.ca.us
Kenneth Celli, Hearing Officer kcelli@energy.state.ca.us	Jared Babula, Staff Counsel jbabula@energy.state.ca.us
Shaelyn Strattan, Project Manager mstratta@energy.state.ca.us	Public Adviser pao@energy.state.ca.us

DECLARATION OF SERVICE

I, Lois Navarrot, declare that on August 19, 2008, I deposited copies of the attached **Supplemental Response to CEC Data Requests Set 1** in the United States mail at Sacramento, California with first-class postage thereon fully prepaid and addressed to those identified on the Proof of Service list above.

OR

Transmission via electronic mail was consistent with the requirements of the California Code of Regulations, title 20, sections 1209, 1209.5 and 1210. All electronic copies were sent to all those identified on the Proof of Service list above.

I declare under penalty of perjury that the foregoing is true and correct.

Lois Navarrot