

# ENVIRONMENT | PLANNING | DEVELOPMENT SOLUTIONS, INC.

November 27, 2013

Mr. Christopher Conner  
Senior Planner  
San Bernardino County Land Use Services Department  
Planning Division  
385 North Arrowhead Avenue, First Floor  
San Bernardino, Calif. 92415

Dear Mr. Conner:

## **Re: Pinon Hills Solar Construction Management Plan & Trip Generation Analysis**

EPD Solutions has prepared this trip generation analysis and construction management plan for the proposed Pinon Hills Solar project. The project is located in the community of Pinon Hills, in unincorporated San Bernardino County. This estimate has been prepared using the information provided by the project applicant and by reviewing trip generation analyses for similar projects in California.

### **SUMMARY PROJECT DESCRIPTION**

The Pinon Hills Solar project is a 2.6-megawatt solar photovoltaic energy generation facility proposed on two parcels totaling 20 acres. The project would cover about 15 acres of the parcels. The project would be developed in two phases. At the option of the applicant, the site may be developed with only one of the two phases (1.3 megawatts on 7.5 acres).

Project facilities would include solar panels, inverters, switchgear, and local distribution powerlines. No permanent administrative or operations and maintenance structures are proposed. During operations, project operations would be automated and unmanned. Occasional visits to the project by maintenance and security personnel would be required to complete repairs, clean equipment, and monitor the site.

The major roadways in the project vicinity are Highway 138, a State highway located ¼ mile south of the project site, and Highway 18, a State highway located 3 miles to the north. Access to the project would be from Mono Road, which connects to Oasis Road ¼ mile east of the site. Oasis Road is paved southward to Highway 138 and northward to Highway 18. Mono Road is paved about half the distance to the project site, with about 600 feet being unimproved. The project vicinity generally consists of vacant land and large-lot single family residences. The project site, which is owned by the Snowline Joint

Unified School District, is adjacent to Pinon Hills Elementary School. The site location is depicted in Figure 1 (Vicinity Map).

## **CONSTRUCTION MANAGEMENT PLAN**

### ***Construction Phasing***

A 3-month construction period is planned for each phase. The two phases (if both are developed) would be built sequentially, so there would be no overlap in construction. Construction for each phase would include two stages: Stage 1, Site Preparation (1 month) and Stage 2, PV System Installation (2 months). Stage 1 includes grubbing, limited amounts of grading, and placement of fencing and onsite access roads (aggregate base). Stage 2 includes placement and assembly of solar panels, installation of other electrical components (e.g., conduits and inverters), and the erection of distribution lines.

### ***Construction Routes***

Routes to be used by construction vehicles are mapped on Figure 2 (Construction Vehicle Routes). All project construction vehicles would access Highway 138 and Highway 18 via Mono Road and Oasis Road. For planning purposes, it is assumed 80 percent of vehicles would use Highway 138 and 20 percent would use Highway 18, which is further from the site. On Highway 138, most vehicles would travel east towards Interstate 15 and San Bernardino, while a smaller number would travel west towards Palmdale and Lancaster. Trucks using Highway 18 would primarily be traveling to the Victorville-Hesperia area.

### ***Construction Truck and Other Vehicular Trips***

This analysis of construction trips is based on the number of workers, the materials required to construct the facility, and the types of equipment used. Detailed calculations are provided in the attached trip generation table. Construction would occur during daylight hours. Peak travel times for worker vehicles accessing the site will likely coincide with peak morning and evening commute periods (7:00 am to 9:00 am and 4:00 pm to 6:00 pm, respectively), while truck trips would be more distributed during the day.

Due to the project site's location adjacent to Pinon Hills Elementary School, coordination will occur with school administration to avoid overlap between construction vehicle trips and school start and end times. Construction traffic controls will be applied as necessary to minimize conflicts.

Large trucks use more roadway capacity than passenger vehicles due to their larger size and reduced maneuverability. To account for their increased demands on roadways, passenger car equivalent (PCE) factors are used. A PCE of 2.5 is applied to all large trucks accessing the site (meaning each truck is counted as equivalent to 2.5 smaller vehicles).

Up to 20 workers would arrive at the project site daily during Stage 1; this increases to 40 workers daily during Stage 2. Some workers would be based in nearby areas such as Pinon Hills and Phelan; however, due to the small residential populations in these communities, many employees would arrive from more distant areas such as Victorville, Hesperia, and San Bernardino. Carpooling is likely to occur, particularly for workers coming from distant locations. A conservative occupancy rate of 2.0 workers per vehicle is assumed.

Other vehicles required during construction include flat bed trucks, freight trucks, gravel end dump trucks, equipment transports, and service trucks. Based on calculations provided by the project construction contractor, large trucks would make an average of 37 roundtrips per day during Stage 1 and 18 roundtrips per day during Stage 2.

Pursuant to the above assumptions, and as detailed in the attached Construction Trip Generation Analysis, it is estimated that a maximum of 63 PCE trips would occur during each of the AM and PM peak hours during Stage 1, and 53 PCE trips would occur during each of the peak hours during Stage 2. This conservatively assumes that a substantial portion of the truck trips occur during peak hours, rather than being more evenly distributed throughout the day.

The impacts of projected construction-period traffic on local roadways are described below. This analysis takes a worst-case scenario where all construction vehicles use the same roadway (i.e., 100 percent of the peak-hour trips occur on each roadway):

- **Mono Road.** Mono Road is a local street with negligible traffic. The street is currently only used to provide access to Pinon Hills Elementary School. The addition of 98 PCE trips during each of the peak hours for a period of up to 2 months (construction Stage 1 for each of Phase 1 and 2) will have a de minimis impact on roadway operations. Traffic levels would be lower during the remaining (Stage 2) construction period.
- **Oasis Road.** Oasis Road is a two-lane undivided roadway, identified as a Secondary Highway in the Phelan/Pinon Hills Community Plan Circulation Map. Based on a capacity of 1,600 vehicles per hour per lane (vphpl), the addition of peak-hour construction traffic of 63 vehicles would represent 2 percent of the 3,200 vphpl capacity of Oasis Road. Due to the rural nature of the community, Oasis Road does not carry significant traffic; the County's most recent count showed 2,466 average daily trips (ADTs) for the segment north of Highway 138. Oasis Road will not see significant impacts as a result of project construction traffic.
- **Highway 138.** Highway 138 is a two-lane undivided highway. Based on a capacity of 1,600 vphpl, this highway has a total capacity of 3,200 vehicles per hour. Caltrans traffic counts for Highway 138 show peak-hour traffic at the Los Angeles/San Bernardino County line (less than ½ mile west of the site) at 770 vehicles. Thus, Highway 138 currently has a peak-hour volume/capacity ratio of 0.241. Volume/capacity ratios below 0.34 equate to Level of Service "A." The addition of 63 vehicles during a single hour would increase the volume/capacity ratio

to 0.260, meaning the roadway will continue to operate with free-flowing traffic and a Level of Service "A" during the maximum 2-month Stage 1 construction period. Traffic levels would be lower during the remaining (Stage 2) construction period.

### **OPERATIONAL TRIP GENERATION**

Operations and maintenance requirements associated with the project would be minimal. No permanent staff will be based at the project site. Cleaning of solar panels may occur twice annually, and would require a small work crew (fewer than 10 workers) and a small number of light trucks. Additionally, security personnel would visit the site regularly (generally, once every one to two days). Security visits would include one or two security personnel traveling in a single passenger car or light truck. Work crews and security staff are expected to travel to the site from nearby communities.

Heavy equipment will not be required during normal project operations. Solar panels and associated equipment have an operating life of several decades; replacement of large components will be rare. Based on these factors, operational traffic associated with the project would be negligible.

The San Bernardino County Congestion Management Plan (CMP) requires preparation of a Traffic Impact Analysis when operational-period traffic project is anticipated to generate over 250 two-way peak hour trips, or 50 two-way peak hour trips on a segment of CMP arterial highway or State highway. The project would produce less than 1 trip per day during operations. Therefore, none of the applicable thresholds are exceeded and preparation of a Traffic Impact Analysis is not required.

Please contact me with any questions you may have on this trip generation analysis and construction management plan.

Respectfully submitted,  
**EPD Solutions**

A handwritten signature in black ink, appearing to read 'Rafik Albert', with a stylized flourish at the end.

Rafik Albert, AICP, LEED AP  
Senior Associate

Steven Baine, PE

**Pinon Hills Solar Construction Trip Generation Analysis  
Pinon Hills, California**

	Duration	Construction Vehicles				Vehicle Trip Generation									PCE Trip Generation								
		Quantity	Roundtrips	Type	PCE	ADT	AM Peak Hour			PM Peak Hour			ADT	AM Peak Hour			PM Peak Hour						
							in	out	total	in	out	total		in	out	total	in	out	total				
<b>Stage 1</b>	<b>Site Preparation</b>																						
	Workers <sup>1</sup>	40 work days max.	10	1	Passenger	1	20	10	0	10	0	10	10	20	10	0	10	0	10	10			
	Flat Bed Truck	(20 work days for each Phase)	3	1	Large Truck	2.5	6	3	0	3	0	3	3	15	8	0	8	0	8	8			
	Freight Truck		2	1	Large Truck	2.5	4	2	0	2	0	2	2	10	5	0	5	0	5	5			
	Gravel End Dump Truck		5	5	Large Truck	2.5	50	5	5	10	5	5	10	125	13	13	25	13	13	25			
	Equipment Transport Truck		4	1	Large Truck	2.5	8	4	0	4	0	4	4	20	10	0	10	0	10	10			
	Service Truck		1	3	Large Truck	2.5	6	1	1	2	1	1	2	15	3	3	5	3	3	5			
	<b>TOTAL</b>						<b>94</b>	<b>25</b>	<b>6</b>	<b>31</b>	<b>6</b>	<b>25</b>	<b>31</b>	<b>205</b>	<b>48</b>	<b>15</b>	<b>63</b>	<b>15</b>	<b>48</b>	<b>63</b>			
<b>Stage 2</b>	<b>PV System Installation</b>																						
	Workers <sup>1</sup>	80 work days max.	20	1	Passenger	1	40	10	0	10	0	10	10	40	10	0	10	0	10	10			
	Ready Mix Truck	(40 work days for each Phase)	3	1	Large Truck	2.5	6	3	0	3	0	3	3	15	8	0	8	0	8	8			
	Freight Truck		8	1	Large Truck	2.5	16	8	0	8	0	8	8	40	20	0	20	0	20	20			
	Equipment Transport Truck		4	1	Large Truck	2.5	8	4	0	4	0	4	4	20	10	0	10	0	10	10			
	Service Truck		1	3	Large Truck	2.5	6	1	1	2	1	1	2	15	3	3	5	3	3	5			
	<b>TOTAL</b>						<b>76</b>	<b>26</b>	<b>1</b>	<b>27</b>	<b>1</b>	<b>26</b>	<b>27</b>	<b>130</b>	<b>50</b>	<b>3</b>	<b>53</b>	<b>3</b>	<b>50</b>	<b>53</b>			

<sup>1</sup> Assumed occupancy of 2.0 workers per vehicle  
PCE = passenger car equivalent. A large truck has a PCE of 2.5; all other vehicles have a PCE of 1.

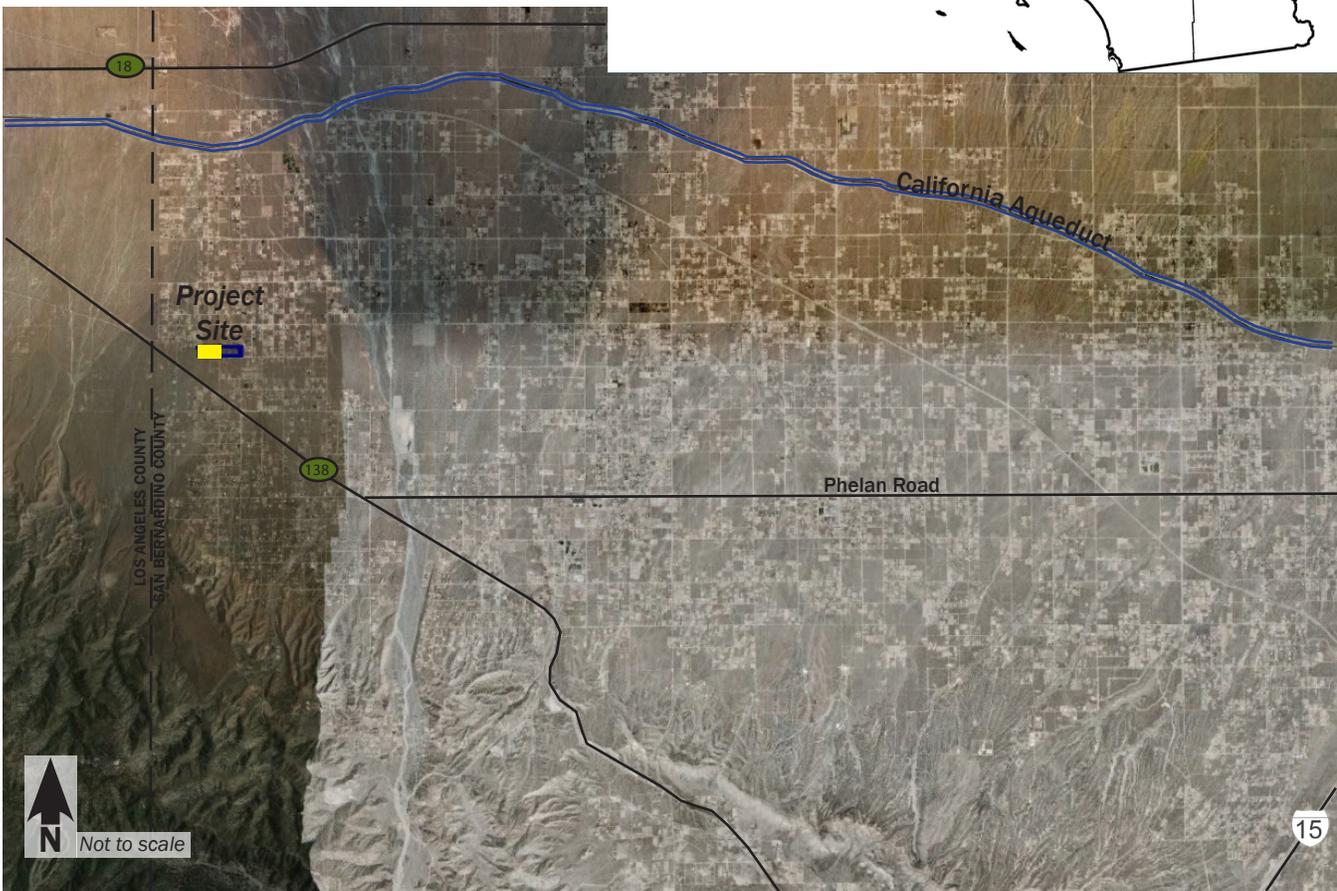


Figure 1  
**Vicinity Map**

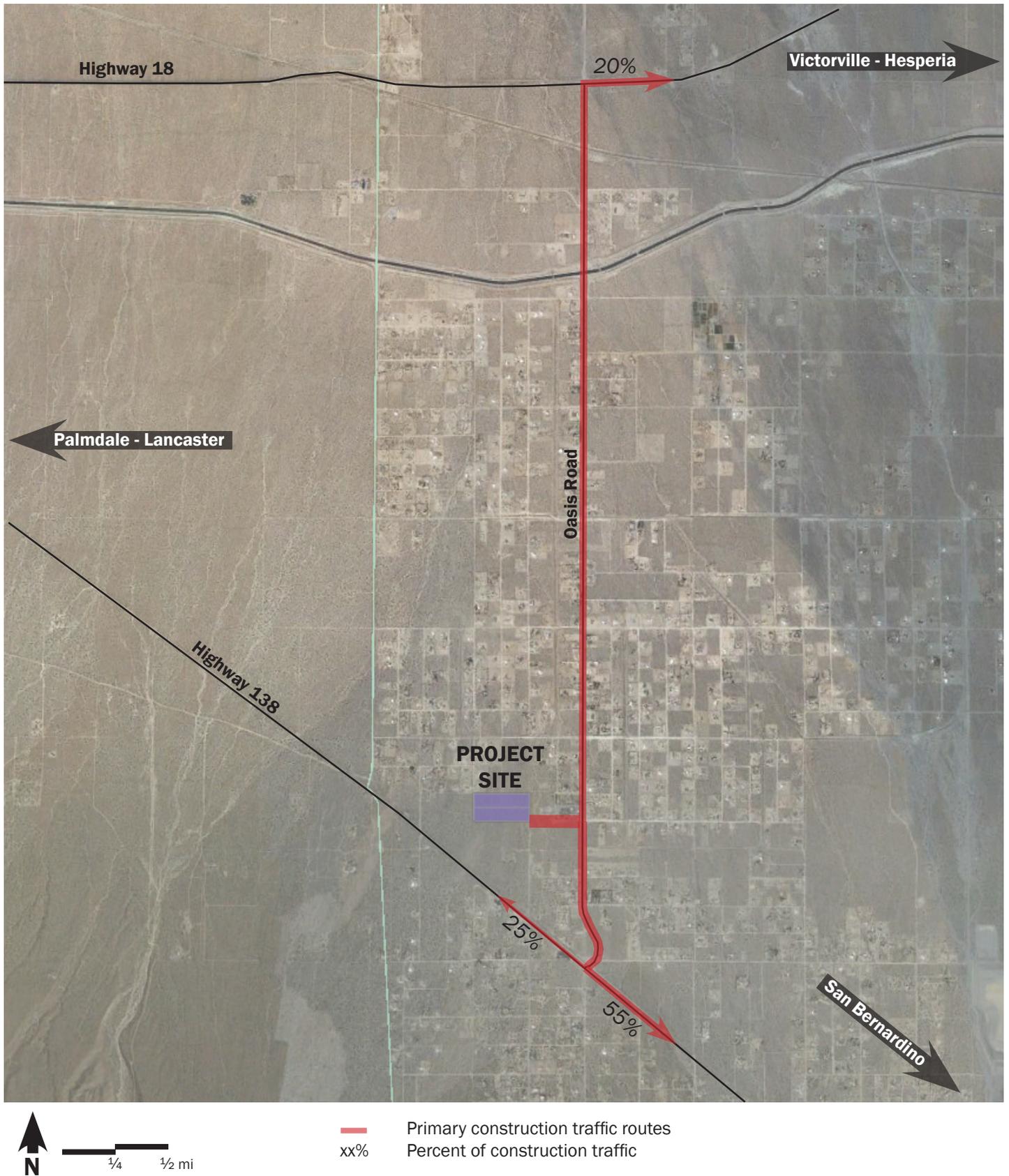


Figure 2  
**Construction Vehicle Routes**