June 15, 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: Duncan Road Solar Construction Management Plan & Trip Generation Analysis

RGP Planning & Development Services has prepared this trip generation analysis and construction management plan for the proposed Duncan Road Solar project. The project is located in the community of Phelan, 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 Duncan Road Solar project is a 3.2-megawatt solar photovoltaic energy generation facility proposed on two parcels totaling 26 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 Duncan Road, a paved two-lane roadway located on the southern edge of the project site, and Sheep Creek Road, a paved two-lane roadway 0.5 mile to the east. Sheep Creek Road provides access to Highway 18, a State highway located 2.5 miles to the north. Access to the project would be from Duncan Road. The project vicinity generally consists of vacant land and large-lot single family residences, with a Union Pacific Railroad line forming the site's northern boundary. The site location is depicted in Figure 1 (Vicinity Map).

CONSTRUCTION MANAGEMENT PLAN

Construction Phasing

A construction period of slightly over 3 months is planned. Construction would include two phases: Phase 1, Site Preparation (1.25 months) and Phase 2, PV System Installation (2 months). Phase 1 includes grubbing, limited amounts of grading, and placement of fencing and onsite access roads (aggregate base). Phase 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 vehicles will enter and exit the site directly from Duncan Road. From Duncan Road, vehicles may travel eastward to the Victorville-Hesperia area, or travel west to Sheep Creek Road. Sheep Creek Road leads north to Highway 18, which provides access to the Palmdale-Lancaster area, and south to Highway 138 (via Phelan Road and Beekley Road), which provides access to Interstate 15 and San Bernardino. For planning purposes, it is assumed 30 percent of vehicles would use Duncan Road, 30 percent Highway 18, and 40 percent Highway 138.

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.

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 Phase 1; this increases to 55 workers daily during Phase 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 38 roundtrips per day during Phase 1 and 21 roundtrips per day during Phase 2.

Pursuant to the above assumptions, and as detailed in the attached Construction Trip Generation Analysis, it is estimated that a maximum of 65 PCE trips would occur during each of the AM and PM peak hours during Phase 1, and 78 PCE trips would occur during each of the peak hours during Phase 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):

- **Duncan Road.** Duncan Road is a paved two-lane undivided roadway, identified as a Major Arterial 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 78 vehicles would represent 2 percent of the 3,200 vphpl capacity of Duncan Road. Due to the rural nature of the community, Duncan Road does not carry significant traffic; the County's most recent count showed 1,081 average daily trips (ADTs) for the segment east of Sheep Creek Road. Duncan Road will not see significant impacts as a result of project construction traffic.
- **Sheep Creek Road.** Sheep Creek Road is a paved two-lane undivided roadway, identified as a Major Highway in the Phelan/Pinon Hills Community Plan Circulation Map. Based on a capacity of 1,600 vphpl, the addition of peak-hour construction traffic of 78 vehicles would represent 2 percent of the 3,200 vphpl capacity of Sheep Creek Road. Due to the rural nature of the community, Sheep Creek Road does not carry significant traffic; the County's most recent count showed 1,898 average daily trips (ADTs) for the segment south of Highway 18. Sheep Creek Road will not see significant impacts as a result of project construction traffic.
- **Highway 18.** Highway 18 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 18 show peak-hour traffic at the Los Angeles/San Bernardino County line (the nearest traffic count location) at 560 vehicles. Thus, Highway 18 currently has a peak-hour volume/capacity ratio of 0.175. Volume/capacity ratios below 0.34 equate to Level of Service "A." The addition of 78 vehicles during a single hour would increase the volume/capacity ratio to 0.199, meaning the roadway will continue to operate with free-flowing traffic and a Level of Service "A" during the construction period.
- **Highway 138.** Highway 138 at its intersection with Sheep Creek Road is a four-lane undivided highway. Based on a capacity of 1,600 vphpl, this highway has a total capacity of 6,400 vehicles per hour. Caltrans traffic counts for Highway 138 at Sheep Creek Road show peak-hour traffic to be 1,150 vehicles. Thus, Highway 138 currently has a peak-hour volume/capacity ratio of 0.179. 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 0.192, meaning the roadway will continue to operate with free-flowing traffic and a Level of Service "A" during the 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,
RGP Planning & Development Services

Rafik Albert, AICP, LEED AP
Associate

Steven Baine, PE

Duncan Road Solar Trip Generation Analysis
Phelan, California

			Construction Vehicles				Vehicle Trip Generation							PCE Trip Generation						
								AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour		
		Duration	Quantity	Roundtrips	Type	PCE	ADT	in	out	total	in	out	total	ADT	in	out	total	in	out	total
Phase 1	**Site Preparation**																			
	Workers[1]		10	1	Passenger	1	20	10	0	10	0	10	10	20	10	0	10	0	10	10
	Flat Bed Truck		4	1	Large Truck	2.5	8	4	0	4	0	4	4	20	10	0	10	0	10	10
	Freight Truck	30 work days (1.25 months)	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
	TOTAL						*96*	*26*	*6*	*32*	*6*	*26*	*32*	*210*	*50*	*15*	***65***	*15*	*50*	***65***
Phase 2	**PV System Installation**																			
	Workers[1]		28	1	Passenger	1	55	28	0	28	0	28	28	55	28	0	28	0	28	28
	Ready Mix Truck	50 work days (2 months)	4	1	Large Truck	2.5	8	4	0	4	0	4	4	20	10	0	10	0	10	10
	Freight Truck		10	1	Large Truck	2.5	20	10	0	10	0	10	10	50	25	0	25	0	25	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
	TOTAL						97	*47*	*1*	*48*	*1*	*47*	*48*	*160*	*76*	*3*	***78***	*3*	*76*	***78***

[1] 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.

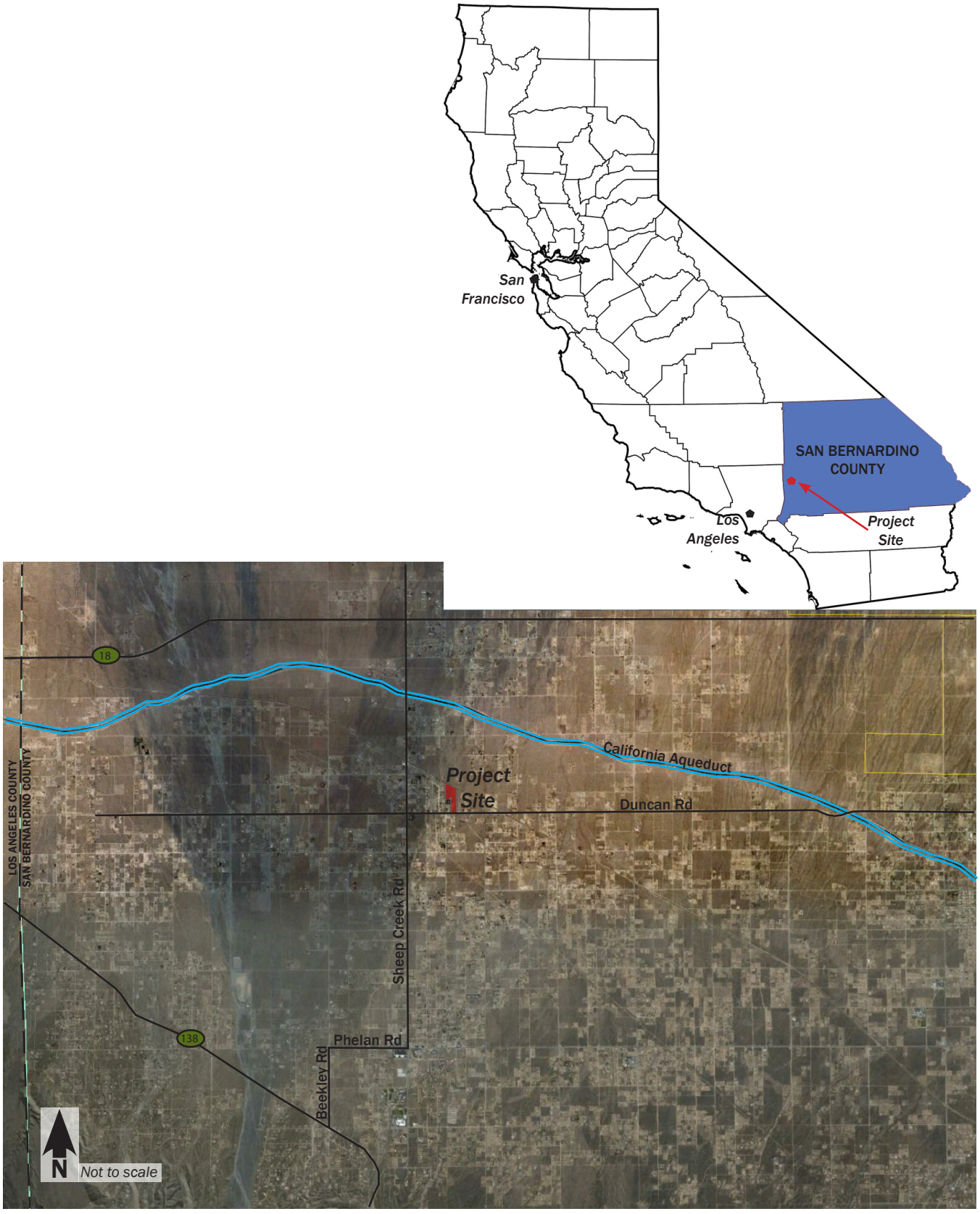

Figure 1
Vicinity Map

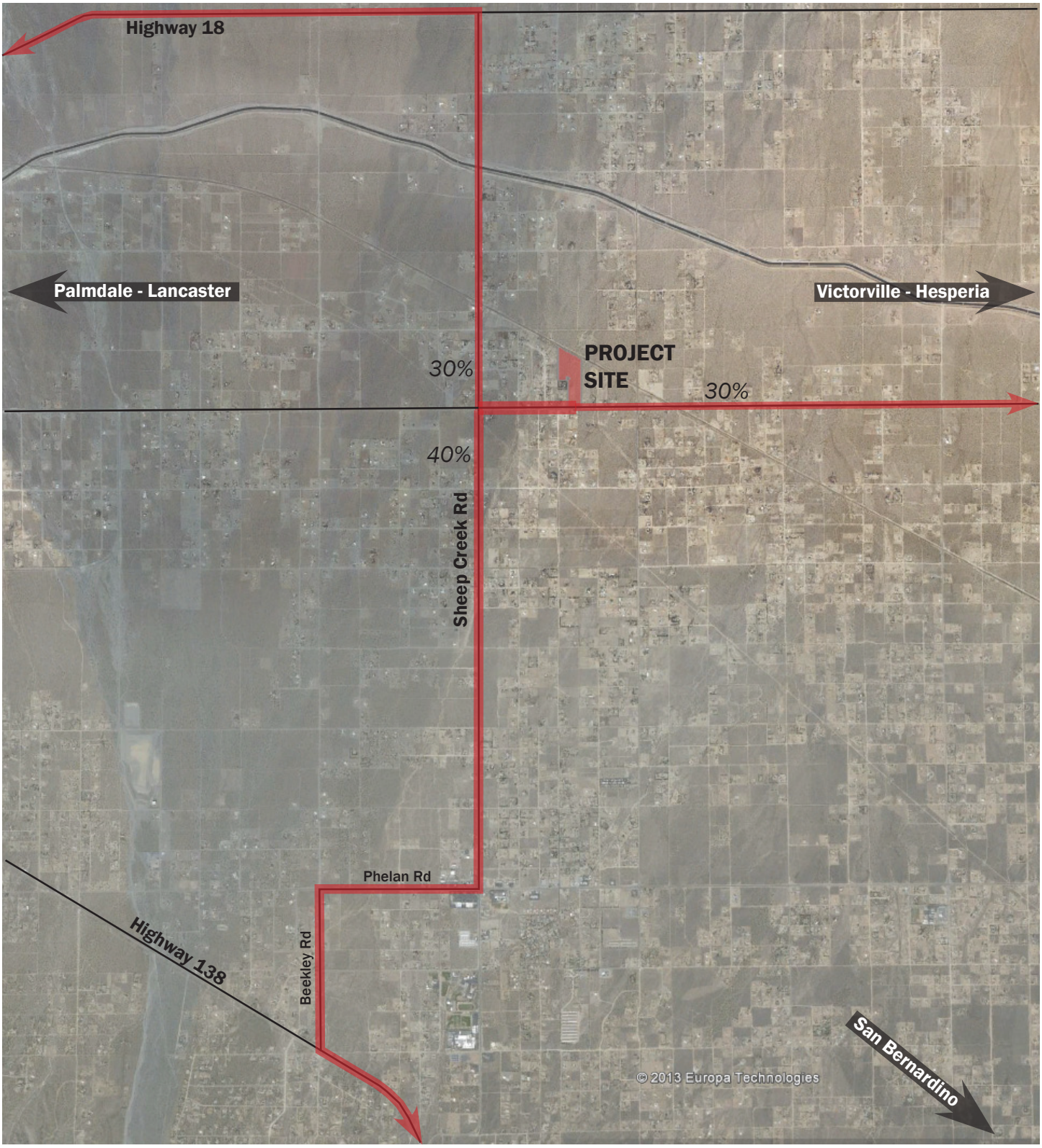

Figure 2

Construction Vehicle Routes

Duncan Road Solar
Construction Management Plan & Trip Generation Analysis