Appendix J
Traffic

ORD MOUNTAIN SOLAR AND ENERGY STORAGE PROJECT
ENVIRONMENTAL IMPACT REPORT

Trip Generation Analysis
Ord Mountain Solar Energy Project

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SEPTEMBER 2017

Printed on 30% post-consumer recycled material.

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1 INTRODUCTION

This report provides a Trip Generation Analysis for the construction and operation of the NextEra Ord Mountain Solar and Energy Project (Project) proposed to inter-connect with the Southern California Edison (SCE) electrical transmission network via the proposed Calcite Substation. The Project is located east of SR-247, north of Haynes Road and west of Meridian Road, approximately 8 miles north of Lucerne Valley, in unincorporated San Bernardino County. Additionally, this report also provides a trip generation summary for the Calcite Substation located across the Ord Mountain Solar Energy Project on the west and east sides of SR-247, directly north of Haynes Road, in the County of San Bernardino.

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2 PROJECT DESCRIPTION

NextEra Ord Mountain Solar LLC proposes to construct and operate the Project on approximately 484 acres to produce approximately 160,000 megawatt-hours of renewable energy annually. The proposed solar and energy storage project would be a 60-Megawatt alternating current photovoltaic solar energy facility with associated on-site substation, inverters, fencing, roads, and a supervisory control and data acquisition system. The proposed solar and energy storage project would include a 4-hour energy storage system and a 220-kilovolt overhead generation tie line which would extend approximately 0.6 mile southwest to SCE's proposed Calcite Substation, in close proximity to the existing high-voltage transmission corridor.

Figure 1 illustrates the location of the proposed Project site and the Calcite Substation. The major roadway existing in the Project vicinity is State Route 247 (SR-247, also known as Barstow Road) in the north-south direction, which provides the main regional access. Fern Road, Haynes Road and Meridian Road are other roadways in the vicinity of the Project. The Project access road would be 24 feet wide, and would connect to SR-247 (Barstow Road). The proposed Project access would require the construction of approximately 1,200 feet of new road. The proposed Project access is approximately 1,200 feet north of Haynes Road and approximately 2,500 feet north of the Fern Road and SR-247 intersection. Figure 2 illustrates the Site Plan and the access road for the Project.

The Project is anticipated to be built over a period of 10-months. It is anticipated that the work would be completed in 8- to 10-hour shifts, with a total of five shifts per week (Monday–Friday). Additional work on weekends or overtime would occur only as necessary to meet scheduled milestones or to accelerate project completion.

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3 TRIP GENERATION

The following discussion is broken into trip generation from construction, and trip generation from long-term operation of the project. Construction-related trip generation for the proposed Project is primarily based on the number of construction employees as well as the quantity of construction and delivery-related truck estimate provided in the Ord Mountain Solar Energy Project Initial Study, May 2017 and from reviews of similar solar energy projects located in the San Bernardino County.

3.1 Construction

According to the Ord Mountain Solar Energy Project Initial Study, May 2017, the maximum number of daily construction employees would be approximately 250 with an average of 150 daily workers. Appendix A provides details on the Project's construction duration, equipment and workers by activity.

Based on the Traffic Generation Analysis of Joshua Tree Solar Farm, and other similar solar energy projects located in San Bernardino County, a rate of 2 average daily trips (ADTs) is assumed per construction employee. With regard to trucks delivering construction materials, 2 ADTs are also assigned per truck (one inbound trip and one outbound trip) to estimate trip generation of the Project during the construction phase. It is likely that car-pooling among employees would occur; therefore, an occupancy factor of 1.25 is utilized in calculating the trip generation of construction employees. In addition to the 250 maximum daily workers traveling to the site, it is estimated that there would be up to 19 delivery trucks per day at peak construction activity, with an average of 13 delivery trucks per day.

One of the concerns associated with construction traffic is the additional congestion that can be caused by introducing large over-sized trucks onto the roadway network. To address this effect, a factor called the passenger car equivalent (PCE) was developed, and represents the number of passenger cars displaced by each truck in the traffic stream under mixed flow conditions. PCE factor ranges from 2 to 3 based on the number of axles in the truck. A PCE factor of 2.5 has been utilized to convert truck trips into equivalent car trips for the Project construction trip generation analysis.

In order to present a worst-case scenario, the Trip Generation Analysis is provided for the maximum number of workers and trucks that would travel to and from the Project site during the construction phase. As mentioned previously, it is anticipated that the work would be completed in 8- to 10-hour shifts, with a total of five shifts per week (Monday–Friday). The AM and the PM peak hour generally occurs between 7:00 – 9:00 am and 4:00 – 6:00 pm, respectively, while the

shift hours of the employees may vary between 8 – 10 hours. To estimate the maximum peak hour traffic, the peak hour trip generation rate is based on the assumption that all the construction employees (a total of 250 employees, estimated to be 200 using an occupancy factor of 1.25) would access the Project site during the AM peak hour, and would leave during the PM peak hour.

As shown in Table 1, and based upon the above assumptions (2 daily trips per construction employee for 200 construction employees), the construction employees would be estimated to generate 400 average daily trips (ADT), with 200 trips during the AM peak hour and 200 trips during the PM peak hour.

It is anticipated that the construction and delivery related truck trips would be evenly distributed throughout the day; therefore, about 10% of the total daily truck trips were assumed to be generated during the AM peak hour and 10% were assumed to be generated during the PM peak hour. As shown in Table 1, the construction and delivery trucks would generate 95 ADT, with 10 trips during the AM peak hour and 10 trips during the PM peak hour.

As summarized in Table 1, the proposed Project would generate a maximum of 495 ADT, with 210 AM peak hour trips and 210 PM peak hour trips, during its 10-month construction period.

Table 1
Trip Generation Summary for Ord Mountain Solar Energy Project

Trip Generation Rates									
			AM Peak Hour			PM Peak Hour		
Land Use	*Daily Trip Rate*	*Factors*	*% of Daily*	*% In*	*% Out*	*% of Daily*	*% In*	*% Out*
Construction employees	2	1.25 (Occ.) [1]	50%	100%	0%	50%	0%	100%
Trucks	2	2.5 (PCE) [2]	10%	50%	50%	10%	50%	50%

Trip Generation										
					AM Peak Hour			PM Peak Hour		
Land Use	*Total No. of Units*	*Using Factors*	*Unit*	*Daily Trips*	*Total*	*In*	*Out*	*Total*	*In*	*Out*
Construction employees	250	200	persons	400	200	200	0	200	0	200
Trucks	19	47.5	trucks	95	10	5	5	10	5	5
			Total	**495**	**210**	**205**	**5**	**210**	**5**	**205**

[1] an occupancy factor of 1.25 is used to estimate the number of construction employees that would carpool to the site;
[2] Passenger Car Equivalency factor of 2.5 is utilized to convert truck trips to passenger car trips

3.2 Operation

The proposed solar and energy project component would be unmanned and no operation and maintenance building would be constructed. The operations would be monitored remotely and periodic inspections and maintenance activities would occur. Therefore, it is assumed that the project would have 1 to 2 employees on site for system inspections 1 to 2 times per month. In addition, 2 to 6 employees would be required on site for troubleshooting and maintenance requirements, approximately 1 to 2 times per month. Also, 1 employee may be on-site during the night for security. During operations, solar panel washing is expected to occur one to four times per year and approximately 10 workers may assist in the panel cleaning. Panel washing for a project of this size would require 15 days to complete per wash cycle. Off-site delivery of water for cleaning would not be required because a water source is located on site.

With the exception of the security employee, operations workers are expected to access the Project site during the AM and PM peak hours, generating a maximum of 36 ADT (a total of 18 workers, assuming 2 trips per worker per day), if panel washing was being performed during routine maintenance and inspections. As mentioned, the trip generation related to periodic inspections and maintenance activities would occur occasionally throughout the year however, it would be nominal and not considered to have an adverse impact on the roadway segment of SR-247 near the project.

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4 CONSTRUCTION ROUTE

All construction related traffic would access the Project via the access road that connects to SR-247. It is assumed that 50 percent of the construction traffic would travel north on SR-247 from the Lucerne Valley area and turn right onto the Project site via the access road. The remaining 50 percent of the traffic would be expected to travel south along SR-247 from the City of Barstow and turn left onto the Project site via the access road. SR-247 is a two-lane highway and does not have a separate left-turn lane for construction traffic. Even though this segment of SR-247 does not have a high volume of daily traffic, appropriate traffic controls such as signage and flagmen would be required to facilitate left-turns into the Project site, especially for trucks. Figure 3 illustrates the proposed Project Construction Traffic Route for construction employees and trucks.

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5 ROADWAY OPERATING CHARACTERISTICS

As stated in the Caltrans Guide for the Preparation of Traffic Impact Studies, December 2002, the level of service (LOS) for operating State highway facilities is based upon measures of effectiveness. These MOEs describe the measures best suited for analyzing State highway facilities (i.e., freeway segments, signalized intersections, on- or off-ramps, etc.). Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on State highway facilities; however, Caltrans acknowledges that this may not always be feasible and if an existing State highway facility is operating at less than the appropriate target LOS, the existing MOE should be maintained.

SR-247 is a two-lane undivided conventional highway that begins at its junction with SR-62 in the Town of Yucca Valley serving as a connector between SR-62 and I-15 in the City of Barstow. Per Caltrans Transportation Concept Report, no capacity increasing or major operational improvements are needed to maintain the target LOS D on SR-247 through the year 2035.

2015 Traffic Volumes on California State Highways, published by Division of Traffic Operations were used to obtain the two-way peak hour traffic on SR-247 near the Project. A comparison of the year 2015 over 2014 annual traffic volumes showed that there was a growth of 2.64% in the vehicle miles of travel on California highways. Therefore, a growth factor of 2.64% per year for a period of 2 years was used to estimate the 2017 two-way peak hour traffic on SR-247 in the immediate vicinity of the Project. The segment of SR-247, just north and south of Haynes Road, shows existing two-way peak hour traffic of 190 vehicles for the year 2015. Using the growth factor described above, a two-way peak hour traffic of 200 vehicles was estimated for the year 2017 along this segment of SR-247.

Based on the Highway Capacity Manual, 2010, the capacity of a two-lane highway under base conditions is 1,700 vehicles per hour in one direction, with a maximum of 3,200 vehicles per hour in two directions.

As shown in Table 2 per volume to capacity ratio analysis, the segment of SR-247 operates at LOS A during existing peak hour traffic conditions. It is assumed that 50 percent of the Project's construction traffic would travel north on SR-247 turn right onto the Project site via the access road and 50 percent of the traffic would travel south along SR-247 and turn left onto the Project site via the access road. With the addition of Project's construction traffic, the volume to capacity ratio increases by 0.04; however, the roadway segment of SR-247 would continue to operate at LOS A under existing 2017 with Project conditions.

Table 2
Level of Service (Peak Hour) during Project Construction

Roadway Segment	2017 Traffic	2017 v/c	2017 LOS	Project Construction Traffic	2017 Traffic with Project Construction Traffic	2017 with Project v/c	2017 with Project LOS
SR-247 – north of Haynes Rd	200	0.06	A	105	305	0.10	A
SR-247 – south of Haynes Rd	200	0.06	A	105	305	0.10	A

v/c = Volume to Capacity Ratio
LOS = Level of Service

6 CALCITE SUBSTATION TRIP GENERATION SUMMARY

SCE proposes to construct and operate the Calcite Substation project on approximately 13 acres to facilitate the connections of renewable energy generation to the SCE electrical grid. The proposed Calcite Substation project would be located on an approximately 75-acre parcel of land that extends on the west and east sides of SR-247, directly north of Haynes Road and across the proposed Project site, in the County of San Bernardino (See Figure 1). The Calcite Substation access road would be 24 feet wide. This road would connect to SR-247 (Barstow Road) and would require the improvement of approximately 1,100 feet of the existing Haynes Road and the establishment of approximately 800 feet of new road.

The Calcite Substation and associated transmission and telecommunications connections are anticipated to be constructed over a period of approximately 10 months. SCE estimates approximately 257 construction employees would be required to construct the proposed Calcite Substation project with up to 90 on-site during peak days where activities overlap. In addition to the 90 maximum daily construction employees (a total of 90 employees, estimated to be 72 using an occupancy factor of 1.25) traveling to the site there would be up to 19 truck trips per day at peak construction activity. Utilizing similar assumptions for trip rates as for the proposed Project in Table 1, trip generation for the Calcite Substation has been summarized in Table 3. As shown in Table 3, the Calcite Substation is estimated to generate a total of 239 ADT, with 82 AM peak hour trips and 82 PM peak hour trips, during its 10 month construction period

Table 3
Trip Generation Summary for Calcite Substation

Trip Generation Rates									
			AM Peak Hour			PM Peak Hour		
Land Use	*Daily*	*Factors*	*% of Daily*	*% In*	*% Out*	*% of Daily*	*% In*	*% Out*
Construction employees	2	1.25 (Occ.)[1]	50%	100%	0%	50%	0%	100%
Trucks	2	2.5 (PCE)[2]	10%	50%	50%	10%	50%	50%

Trip Generation										
					AM Peak Hour			PM Peak Hour		
Land Use	*Total No. of Units*	*Using Factors*	*Unit*	*Daily Trips*	*Total*	*In*	*Out*	*Total*	*In*	*Out*
Construction employees	90	72	persons	144	72	72	0	72	0	72
Trucks	19	47.5	trucks	95	10	5	5	10	5	5
			Total	**239**	**82**	**77**	**5**	**82**	**5**	**77**

[1] an occupancy factor of 1.25 is used to estimate the number of construction employees that would carpool to the site;
[2] Passenger Car Equivalency factor of 2.5 is utilized to convert truck trips to passenger car trips

The proposed Calcite Substation would be unstaffed, and electrical equipment within the substation would be remotely monitored and controlled by an automated system. SCE personnel would typically visit for electrical switching and routine maintenance purposes. Routine maintenance would include equipment testing, monitoring and repair. Inspection and maintenance activities would occur at least once per year and on an as-needed basis, therefore it is anticipated that the daily and peak hour trip generation for these activities would be insignificant.

As shown in Table 4 per volume to capacity ratio analysis, the segment of SR-247 operates at LOS A during existing peak hour traffic conditions. With the addition of Calcite Substation construction traffic, the volume to capacity ratio increases by 0.02. With the addition of both Project and Calcite Substation construction traffic, the volume to capacity ratio increases by 0.05; however, the roadway segment of SR-247 would continue to operate at LOS A under existing 2017 with Calcite Substation as well as under existing 2017 with Project plus Calcite Substation conditions.

Table 4
Level of Service (Peak hour) during Project plus Calcite Substation Construction

Roadway Segment	2017 Traffic	2017 v/c - LOS	Calcite Substation Construc-tion Traffic	2017 Traffic plus Calcite Substation Construction Traffic	2017 plus Calcite Substation Construction Traffic v/c - LOS	2017 Traffic with Project plus Calcite Substation Construction Traffic	2017 with Project plus Calcite Substation v/c -LOS
SR-247 – north of Haynes Rd	200	0.06 - A	41	241	0.08 - A	346	0.11 - A
SR-247 – south of Haynes Rd	200	0.06 - A	41	241	0.08 - A	346	0.11 - A

v/c = Volume to Capacity Ratio
LOS = Level of Service

7 CONCLUSION

The Trip Generation Analysis for the NextEra Ord Mountain Solar Energy Project provides an estimate of the daily and peak hour trip generation for the construction and operation of the proposed Project.

As shown in the analysis, the proposed Project would generate a maximum of 495 ADT, with 210 AM peak hour trips and 210 PM peak hour trips, during its 10-month construction period. The Project is not anticipated to generate a significant number of daily and peak hour trips once the construction is complete. A maximum trip generation of 36 ADT is estimated, a few times per year, during coinciding periodic inspections and maintenance activities that would include panel washing.

As shown in the volume to capacity analysis, the segment of SR-247 in the vicinity of the proposed Project would continue to operate at LOS A under existing and existing with Project construction traffic conditions.

Although no significant traffic impacts have been identified in the Trip Generation Analysis of the proposed Project, there would be a need for management of construction traffic during the 10-month period. Some traffic control measures that could be implemented to minimize any potential traffic delays on SR-247 during the AM and PM peak hours are as follows:

1. Use of appropriate traffic controls (i.e., flagmen, signage, barriers, etc.) during construction activities;
2. Stagger construction work shifts to reduce AM and PM peak hour traffic to and from the proposed Project;
3. Encourage carpooling among construction employees;
4. Establish flexible working hours outside of peak hours; and
5. Schedule truck deliveries during off peak hours.

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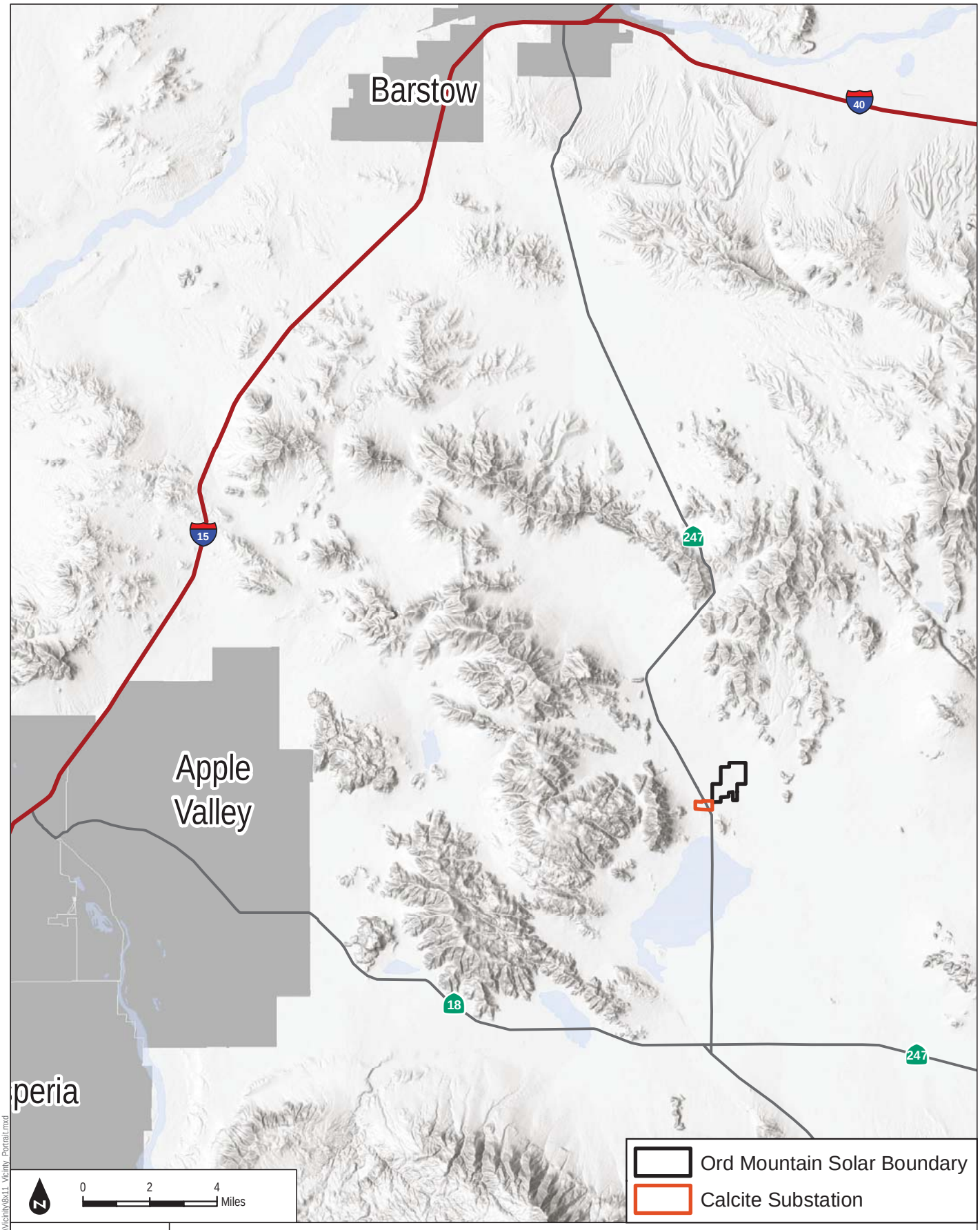

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FIGURE 1

Project Location and Vicinity Map

Ord Mountain Solar Energy Project

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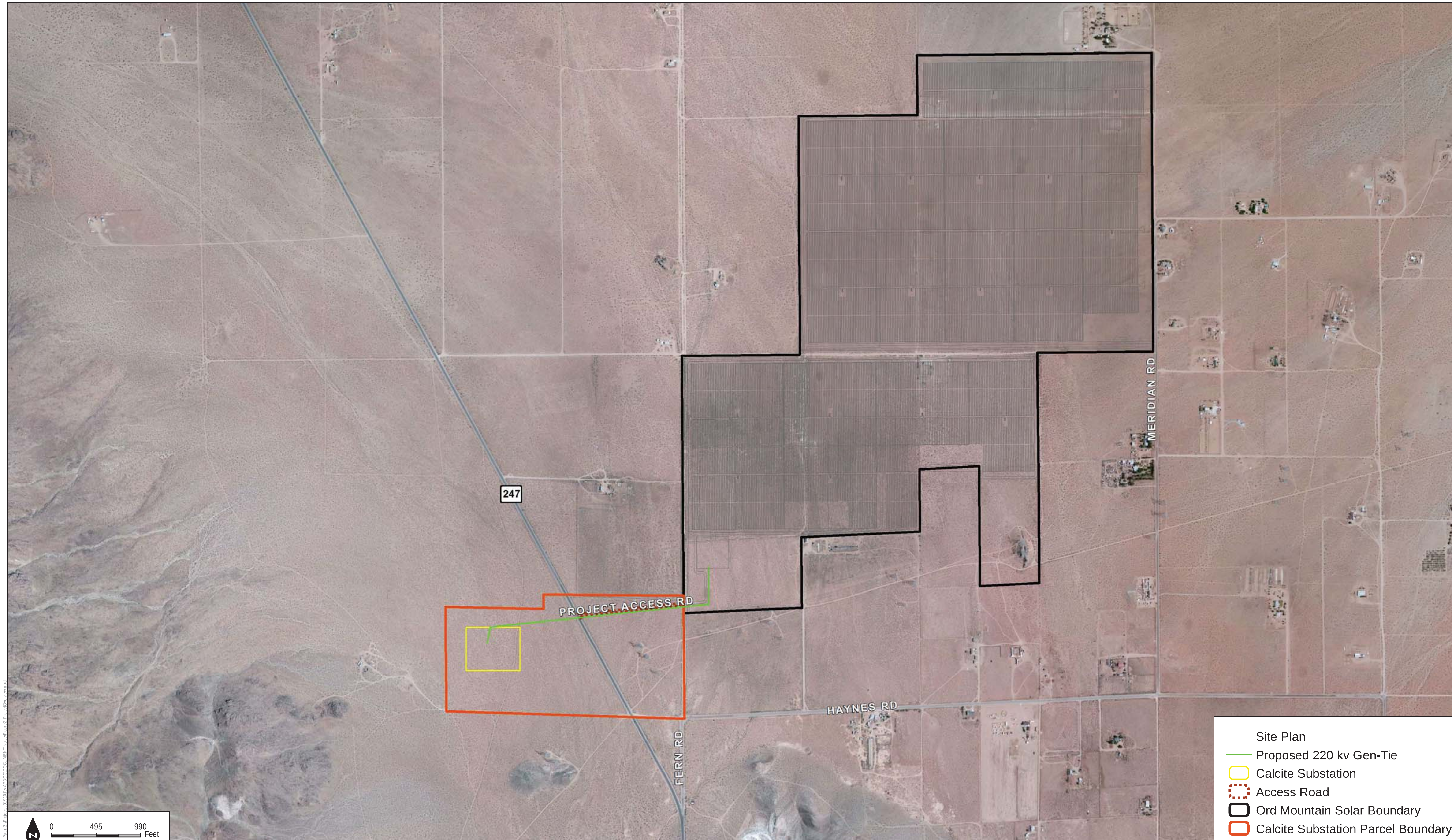

SOURCE: Bing Imagery, 2015; SWCA.

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FIGURE 2

Site Plan

Ord Mountain Solar and Energy Storage Project

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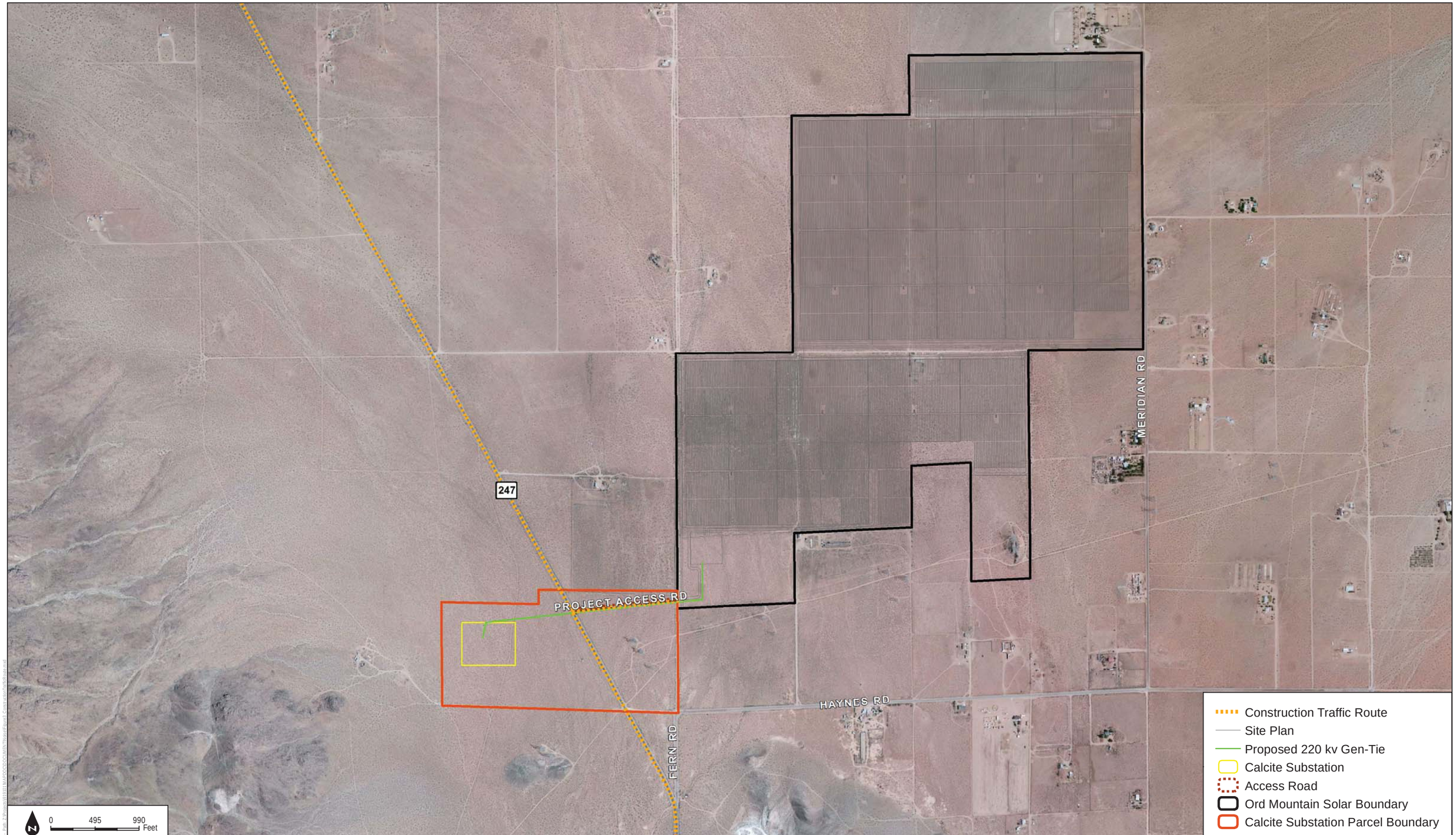

SOURCE: Bing Imagery, 2017; SWCA.

FIGURE 3

Project Construction Traffic Route

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Ord Mountain Solar and Energy Storage Project

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