6.4 NOISE AND VIBRATION

As described in detail below impacts of the Modified Project to noise and vibration are expected to be less than or equal to those of the Approved Project and will remain less than significant.

6.4.1 Summary of Project Changes Related to Noise and Vibration

Under the Modified Project, changes to the Approved Project with respect to noise and vibration would include:

- replacement of SunCatchers with PV technology;
- relocation of main services complex;
- relocation of on-site substation;
- implementation of different construction methods relating to installation of fixed tilt or PV Tracker Blocks;
- reduction of construction traffic activity;
- reduction of operation and maintenance vehicular traffic volumes; and
- reduction in length of main transmission line.

These changes have been studied with respect to potential alterations in the noise and vibration impact. Noise and vibration impacts from the Modified Project would be equal to or less than impacts associated with the Approved Project.

6.4.2 Changes in Environmental Impacts

The following sections describe environmental impact changes from the Modified Project compared to the Approved Project. Noise impacts relating to occupational noise are not included in this Amendment because there would be no change anticipated from the Commission Decision. Noise associated with the operation of the PV technology would create substantially less noise than operation of SunCatchers.

6.4.2.1 Construction Noise

The Commission Decision identified significant noise impacts from construction of the Approved Project at two sensitive receptors, SR1, which is approximately 1,200 feet from the nearest Project boundary, and SR2, which is approximately 7,800 feet from the nearest Project boundary (Commission Decision, Noise and Vibration p. 1). The

Commission Decision identified construction noise levels of up to 74 decibel (dBA) *Leq*[9] at SR1 and 62 dBA *Leq* at SR2. The Commission Decision identified Conditions NOISE-1, NOISE-2 and NOISE-6 to mitigate construction noise impacts to these sensitive receptors (Commission Decision, Noise and Vibration pp. 2-3 9-13). Condition NOISE-6 also addresses the Approved Project's potential vibration impacts during construction.

The Commission Decision found a less-than-significant 1-dBA *Leq* noise increase from Approved Project operations at SR1 and a significant 11-dBA *Leq* noise increase from operations at SR2 (Commission Decision, Noise and Vibration p. 4). The Commission Decision imposed Condition NOISE-4 to mitigate this impact (Commission Decision, Noise and Vibration pp. 10-12).

As described in greater detail below, the Modified Project would reduce construction noise impacts to sensitive receptors because the Modified Project would require less noisy construction equipment than the Approved Project, primarily due to the replacement of SunCatchers with PV modules. The Modified Project would also reduce operations noise impacts to sensitive receptors because PV are less noisy to operate than the SunCatchers.

6.4.2.1.1 PV Technology Installation

During construction, PV installation would occur near the Modified Project boundary. For purposes of this noise assessment, PV technology installation per crew is expected to proceed at the site at a rate of roughly 4 MW (approximately equivalent to 20 Acres) per month. Table 6.4-1 presents the list of construction equipment anticipated for a single PV technology installation crew.

TABLE 6.4-1
PV TECHNOLOGY INSTALLATION CONSTRUCTION EQUIPMENT

Construction Equipment[1]	Horse Power[1]	Sound Pressure Level at 1 meter (dBA)[2]	Number of Equipment[1]
Hydraulic Vibrating Post Driver	175	112	1
Flatbed Truck	250	114	2
Stickboom Crane	175	112	2
Trencher	50	107	1
Compactor	120	111	1
Large Backhoe with Mower Attachment	120	111	1

[9] *Leq* is a symbol that represents "Equivalent Continuous Noise Level".

Skid-steer loader (Bobcat)	50	107	1
Backhoe	120	111	1
Front End Loader	250	114	2
Dump Truck	250	114	1
Water Truck	450	116	1

Acronym:
dBA = decibel
Notes:
[1]Calico Solar, LLC, 2011.
[2]Beranek 1992, Section 18.5.

Based on the information provided in Table 6.4-1, Table 6.4-2 compares predicted construction noise levels included in the Commission Decision (Noise Table 3) with those anticipated from PV technology installation. As a worst-case scenario, it is assumed that up to three crews would be operating (during normally allowable daytime construction hours) adjacent to each other along a Modified Project boundary location that is closest to a noise-sensitive receiver. Two additional crews may be active as well, but the assumption is that they would be located at other site areas and at least a mile distant from the aforesaid maximum of three adjacent crews.

TABLE 6.4-2
PV INSTALLATION CONSTRUCTION NOISE LEVELS

Noise Sensitive Receiver	Highest Construction Noise Levels in Commission Decision	PV Installation Noise Levels
SR1	74 dBA Leq	67 dBA Leq
SR2	62 dBA Leq	61 dBA Leq

Acronyms/Abbreviations:
dBA – decibel
Leq - symbol that represents "Equivalent Continuous Noise Level".
PV - photovoltaic
Note:
PV Installation noise calculation is included in Appendix F. PV Installation Noise Levels are based on three adjacent crews operating simultaneously.

As presented in Table 6.4-2, installation of PV technology nearest to a noise sensitive receiver (SR1 or SR2) is expected to cause levels of construction noise lower than those presented in the Commission Decision for a "block" of SunCatchers at the same location.

The Modified Project may require nighttime PV technology installation activity. If this occurs, Condition NOISE-6 in the Commission Decision would apply at some locations. NOISE-6 allows for nighttime construction only after one of the three following

requirements has been met: consent from owners of SR 1 and SR2, determination by the CPM that noise would not exceed the nighttime ambient noise levels at SR1 and SR2 by more than 5 dBA, or construction expected to increase nighttime ambient levels at SR1 and SR2 by more than 5 dBA that does not continue longer than 5 consecutive nights. At SR1, if one crew of equipment (and associated personnel), as shown in Table 6.4-1, operates at the nearest Project boundary, the noise level at SR1 would be 62 dBA, which is less than the nighttime ambient noise level (63 dBA) indicated in Noise Table 1 in the Commission Decision. Therefore, no significant noise impact is expected at SR1 for nighttime PV installation. Prior to conducting nighttime construction at a boundary location nearest to SR2, the Modified Project would comply with Condition NOISE-6 because the nighttime ambient noise level is significantly lower (38 dBA) than that of SR1.

6.4.2.1.2 Other Construction

"Other construction" includes construction activities for the Modified Project (e.g., assembly of PV Tracker Block elements, roadway construction, substation construction, etc.) apart from the previously discussed installation of PV technology, with an assumed geographic acoustical center located at the main services complex, throughout the course of the construction schedule for the Modified Project. Under the Modified Project, the main services complex would be relocated to the Phase 1 area, south of the railroad. Table 6.4-3 provides a comparison of distances from SR1/SR2 to the main services complex for the two cases under consideration.

TABLE 6.4-3
DISTANCE COMPARISON FROM MSC TO NOISE SENSITIVE RECEIVERS

Noise Sensitive Receiver	Approved Project	Modified Project
SR1	22,600 feet	15,500 feet
SR2	16,700 feet	20,700 feet

The roster of construction equipment for the Approved Project has also been updated to reflect the requirements of the Modified Project; the updated roster is provided in Appendix F. Although the main services complex is expected to be closer to SR1 than before, due to this updated construction equipment roster, the expected noise level range associated with "other construction" is not expected to be greater than that analyzed in the Commission Decision. Table 6.4-4 provides this comparison.

TABLE 6.4-4
OTHER CONSTRUCTION NOISE LEVELS

Noise Sensitive Receiver	Approved Project	Modified Project
SR1	48-55 dBA	49-52 dBA
SR2	51-58 dBA	47-50 dBA

Acronym:
dBA = decibel

6.4.2.1.3 Construction Traffic

Modified Project construction traffic includes worker trips and delivery trucks. Table 6.4-5 compares construction traffic trip generation between the Approved Project and the Modified Project.

TABLE 6.4-5
PROJECT CONSTRUCTION PEAK DAILY ROUND TRIPS

Vehicle Type	Approved Project	Modified Project
Workers	1462	714
Delivery Trucks	274	108

Due to the decrease in traffic volume from that presented in the Approved Project, and because planned construction traffic routes have not significantly changed, predicted Construction Traffic noise is not expected to increase under the Modified Project.

6.4.2.2 Operational Noise

The following sections provide an overview of noise that would be generated during operation of the Modified Project by operation of the PV fixed tilt or tracker Blocks, by traffic, and by power transmission lines.

6.4.2.2.1 PV Inverter Blocks

Modified Project operational noise levels at SR1 and SR2 are expected to change from the Approved Project. Noise sources assessed for the Approved Project were SunCatchers and transformers at the on-site substation. The Modified Project would

replace SunCatchers with PV fixed tilt or tracker block systems and the on-site substation would be relocated south of the railroad, to the eastern side of the Phase 1 boundary. The anticipated primary noise sources associated with the PV technology are inverter pads and the single-axis tracking system motors if trackers are selected. Approximately 282 inverter pads would be built throughout the Modified Project site. Each inverter pad consists of one 2,500 kVA transformer and four 500 kW inverters. Table 6.4-6 presents sound power levels associated with all operation noise sources included in the model, which are considered to operate only during daytime hours.

TABLE 6.4-6
NOISE MODEL SOUND LEVEL PARAMETERS

Project Component	Type of Source	Sound Power Level (PWL) at Octave Band Center Frequency (Hz)									Overall Unweighted PWL (linear)	Overall A-Weighted PWL	Acoustic Height (feet)
		31.5	63	125	250	500	1,000	2,000	4,000	8,000			
167 MVA Transformer at Substation[2]	Point	79	85	87	82	82	76	71	66	59	91	82	23
2500 kVA Transformer at an Inverter Station	Area	72	78	80	75	75	69	64	59	52	84	75	9
500 kW Inverter[3]	Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	71	9
3 HP Tracker Motor[4]	Area	68	69	70	70	70	80	70	60	50	82	81	5

Notes:
Sound levels presented in this table are for an individual unit or component. Aggregate sound levels for the area sources in the model were calculated based on the quantity of each component within the identified area.

[2]2008 AFC Table 5.12-6.
[3]Noise level indicated for 500kW Inverter is Sound Pressure Level at 1 meter.
[4]One tracker motor per 250kW of PVs. A total of 2252 tracker motors (i.e., equal to 563MW divided by 250kW) are included in the model.

Hz = hertz
HP = horse power
kVA = kilovolt ampere
MVA = megavolt ampere
PWL = power level
n/a = not available

The methodology described in the Approved Project's record was utilized to assess operational noise impacts. Table 6.4-7 compares predicted operational noise levels from the Commission Decision with those expected from the Modified Project.

TABLE 6.4-7
PREDICTED OPERATIONAL NOISE LEVELS

Noise Sensitive Receiver	Closest Distance to Noise Sensitive Receivers	Daytime Ambient Noise Levels[2]	Operational Noise Levels in Commission Decision[2]	Operational Noise Levels Modified Project
SR1	4,200 feet	65 dBA Leq	57 dBA Leq	<45 dBA Leq

SR2	7,800 feet	41 dBA Leq	52 dBA Leq	48 dBA Leq

As presented in Table 6.4-7, predicted Modified Project operation noise levels at SR1 and SR2 would be less than predicted noise levels reported in the Commission Decision. In addition, the newly predicted operation noise levels due to the Modified Project at SR1 are expected to be lower than ambient levels. The predicted operation noise levels due to the Modified Project at SR2 are not anticipated to cause an increase more than 7 dBA over the current ambient noise level. Therefore, no operation noise impacts are anticipated for the Modified Project.

6.4.2.2.2 Traffic Noise

Project operation-related traffic includes employee trips, delivery trucks, and visitors. Table 6.4-8 compares the Approved Project and Modified Project operations trip generation.

TABLE 6.4-8
PROJECT OPERATIONS PEAK DAILY ROUND TRIPS

Vehicle Type	Approved Project	Modified Project
Employees	256	30
Deliveries	36	12
Visitors	20	20

Note: Delivery trucks in the table were adjusted into Passenger Car Equivalent (3 PCE) vehicles, consistent with "Medium Truck" at 45 miles per hour (California Department of Transportation, TeNS, 1998, Table N-3340.2).

Table 6.4-8 demonstrates that no increase in predicted off-site operations traffic noise due to the Modified Project is anticipated because all categories of vehicle trips would be either unchanged or reduced.

6.4.2.3 Power Transmission Line

The Modified Project relocates the on-site substation to the eastern end of Phase 1, adjacent to the existing Pisgah Substation. Due to the relocation, the length of the main transmission line is reduced within the Modified Project boundary. However, the main transmission line between the Modified Project boundary and Pisgah Substation would remain the same as in the Approved Project. Therefore, no increase in power transmission line noise from the Approved Project to the Modified Project is anticipated.

6.4.3 Changes in Cumulative Environmental Impacts

In the Commission Decision, the Commission concluded that the Approved Project would not have a cumulatively considerable effect on noise impacts in the vicinity of the site. As described in Section 1.4.1, no new reasonably foreseeable future actions beyond those presented in the Commission Decision have been identified. Incremental impacts on noise from the Modified Project are expected to be reduced and therefore, no increase in cumulative impacts from the Modified Project is anticipated.

6.4.4 Changes in LORS Conformance and Other Permits

The Commission Decision concluded that the Approved Project was consistent with all applicable LORS. Additional LORS beyond those identified in the Commission Decision have not been identified. Therefore, the Modified Project would conform to all applicable LORS.

6.4.5 Changes in Proposed Mitigation

Since no increase in predicted noise or noise impact is expected to occur under the Modified Project, no mitigation measures beyond those that may already appear in the Conditions are expected.

6.4.6 Changes in Conditions of Certification

The only modifications to the Conditions of Certification is that **NOISE-4** and **NOISE-5** should be deleted as they are no longer necessary with the elimination of the SunCatcher technology.