ATTACHMENT I

Acoustic Assessment Report

Goose Prairie Solar Project
Acoustic Assessment Report

Prepared for:

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Acronyms and abbreviations

μPa	microPascal
Applicant	OER WA Solar 1, LLC
BPA	Bonneville Power Administration
CRP	Conservation Reserve Program
dB	decibel
dBA	A-weighted decibel
dBL	linear decibel
EDNA	Environmental Designation for Noise Abatement
EFSEC	Energy Facility Site Evaluation Council
EPA	United States Environmental Protection Agency
Facility	Goose Prairie Solar Project
FHWA	Federal Highway Administration
Hz	hertz
ISO	International Organization for Standardization
L_{dn}	day-night average sound level
L_{eq}	equivalent sound level
L_{max}	maximum sound level
L_P	sound pressure level
L_w	sound power level
kV	kilovolt
MW	megawatt
NSR	noise sensitive receptor
POI	point of interconnection
SR-24	State Route 24
Tetra Tech	Tetra Tech, Inc.
WAC	Washington Administrative Code

1.0 Introduction

OER WA Solar 1, LLC (the Applicant) proposes to construct and operate the Goose Prairie Solar Project (the Facility), an 80-megawatt (MW) solar photovoltaic project with an optional battery storage system capable of storing up to 80 MW of energy located in Yakima County, Washington. The Facility will be located approximately 8 miles east of the city of Moxee along Washington State Route 24 (SR-24), also known as Hanford Road, between its intersections with Morris Lane and Desmaris Cutoff. The Facility will consist of solar arrays and associated infrastructure including solar field of photovoltaic panels, inverters with integrated transformers, optional battery storage and an on-site substation. The Facility is currently designed to utilize lithium-ion battery energy technology; however, pending commercial interest, the Facility could be designed to utilize flow battery technology. Lithium-ion battery technology would be distributed throughout the Facility Area while the flow battery technology would be installed in a centralized location within the Facility Area. The Facility will have one point of interconnection (POI) with the electric grid with the Bonneville Power Administration's (BPA) Midway to Moxee 115-kilovolt (kV) transmission line, which bisects the Facility.

Tetra Tech, Inc. (Tetra Tech) has prepared this acoustic assessment for the Facility, evaluating potential sound impacts relative to the applicable noise regulations prescribed in the Washington Administrative Code (WAC). The existing ambient acoustic environment was characterized based on land use, population density, and proximity to major roadways. An acoustic modeling analysis was conducted simulating sound produced during both construction and operation. Operational sound sources consisted primarily of the inverters, step-up transformers, battery storage, and transformer at the on-site substation. Modeled sound levels from Facility operation were evaluated against the WAC noise regulations. The overall objectives of this assessment were to: 1) identify Facility sound sources and estimate sound propagation characteristics; 2) computer-simulate sound levels using internationally accepted calculation standards; and 3) confirm that the Facility will operate in compliance with the applicable noise regulations. Acoustic modeling results demonstrate that the Facility will successfully comply with all applicable WAC noise regulations at the closest property lines and nearby noise sensitive receptors (NSRs; i.e., residences).

1.1 Facility Area

The Facility will be located across a portion of eight parcels which together constitute the "Facility Parcels." Three of the parcels are owned by the Estate of Willamae G Meacham and together are known herein as the "Meacham Property," and the other five parcels are owned by S. Martinez Livestock, Inc. and together are known herein as the "Martinez Property". The Applicant has entered into long-term land leases with the landowners for adequate acreage to accommodate the Facility. All the parcels in the Facility area are zoned agricultural (AG). In Yakima County, "power generating facilities" are a Type 3 use in the AG zoning district and may be authorized subject to the approval of a conditional use permit.

The Meacham Property is currently in the Conservation Reserve Program (CRP) which is set to expire on 9/30/2022. The habitat type within the portion that will be utilized for the Facility is mainly CRP with a small component of Pasture Mixed Environs and the vegetation consists primarily of non-native species such as downy brome, crested wheat, Russian thistle, mustard species, and others. There is no current agricultural use, though a portion of the area was previously used for row crops. No existing buildings are present on the Meacham Property.

The Martinez Property has two distinct areas: four of the parcels may be used for solar facilities and one parcel may be utilized for an aerial easement for the interconnection tie-line depending on the final design of the interconnection with BPA. The area that may be utilized for solar facilities has a historic and current use of grazing and has habitat types categorized as a mix of Eastside Grasslands, Shrub-steppe and Pasture Mixed Environs with predominantly native vegetation including sagebrush and wheatgrass; much of the shrub-steppe area is degraded in its quality due to heavy grazing. The area which may be utilized for an aerial easement is currently planted with an orchard. BPA's Midway-to-Moxee 115-kV transmission line, which the Facility directly relies on, crosses the Martinez Property. A few agricultural buildings exist on the Martinez Property, but none are within the Facility Area Extent.

Figure 1 provides an overview of the Facility Area and provides the locations of nearby residences, which are considered NSRs.

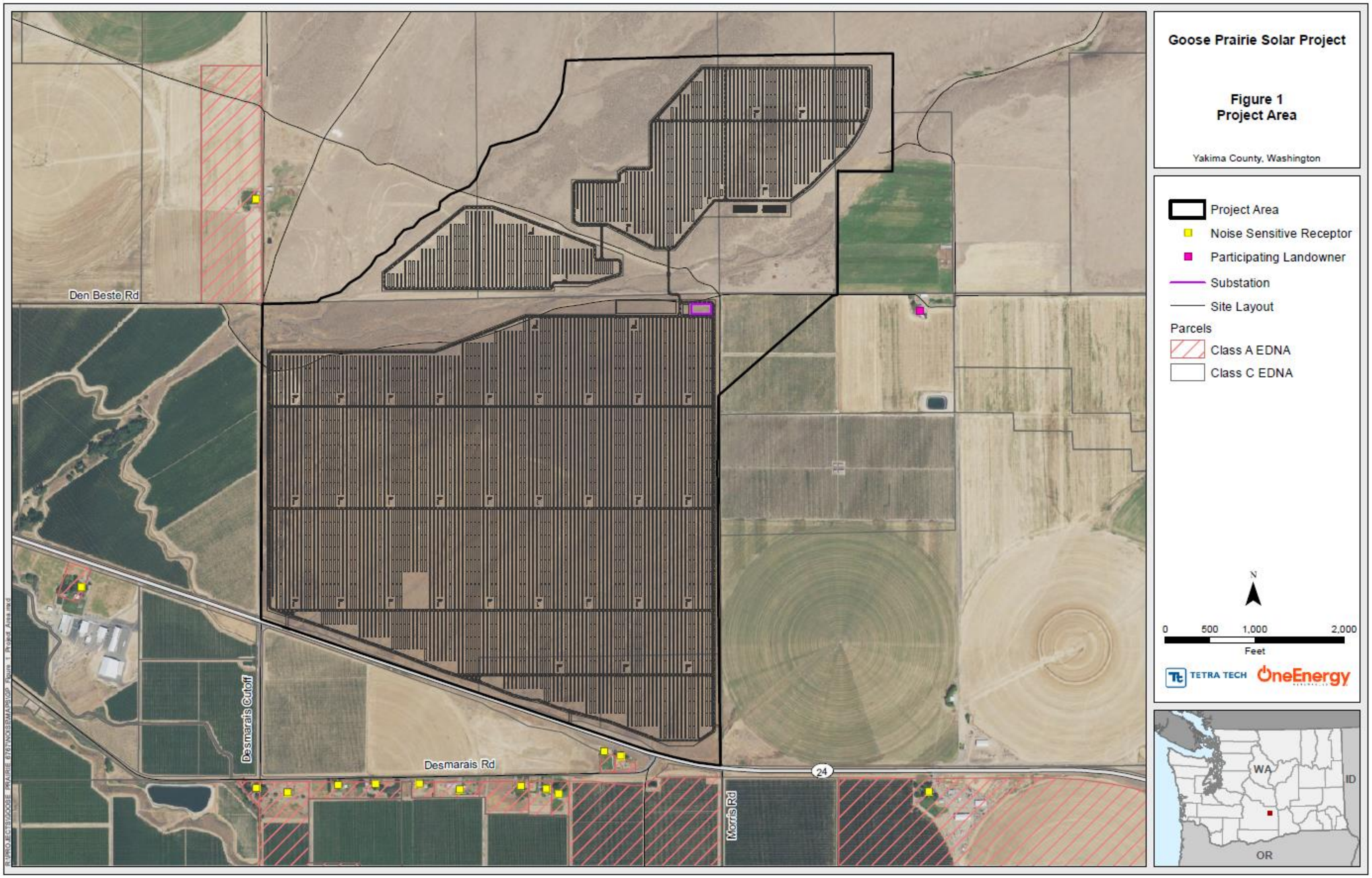

Figure 1. Facility Area Extent

1.2 Acoustic Metrics and Terminology

All sounds originate with a source, whether it is a human voice, motor vehicles on a roadway, or a combustion turbine. Energy is required to produce sound and this sound energy is transmitted through the air in the form of sound waves – tiny, quick oscillations of pressure just above and just below atmospheric pressure. These oscillations, or sound pressures, impinge on the ear, creating the sound we hear. A sound source is defined by a sound power level (L_W), which is independent of any external factors. By definition, sound power is the rate at which acoustical energy is radiated outward and is expressed in units of watts.

A source sound power level cannot be measured directly. It is calculated from measurements of sound intensity or sound pressure at a given distance from the source outside the acoustic and geometric near- field. A sound pressure level (L_P) is a measure of the sound wave fluctuation at a given receiver location and can be obtained through the use of a microphone or calculated from information about the source sound power level and the surrounding environment. The sound pressure level in decibels (dB) is the logarithm of the ratio of the sound pressure of the source to the reference sound pressure of 20 microPascals (μPa), multiplied by 20.1. The range of sound pressures that can be detected by a person with normal hearing is very wide, ranging from about 20 μPa for very faint sounds at the threshold of hearing, to nearly 10 million μPa for extremely loud sounds such as a jet during take-off at a distance of 300 feet.

Broadband sound includes sound energy summed across the entire audible frequency spectrum. In addition to broadband sound pressure levels, analysis of the various frequency components of the sound spectrum can be completed to determine tonal characteristics. The unit of frequency is hertz (Hz), measuring the cycles per second of the sound pressure waves. Typically, the frequency analysis examines 11 octave bands ranging from 16 Hz (low) to 16,000 Hz (high). Since the human ear does not perceive every frequency with equal loudness, spectrally-varying sounds are often adjusted with a weighting filter. The A-weighted filter is applied to compensate for the frequency response of the human auditory system and is represented in A-weighted decibels (dBA).

Sound can be measured, modeled, and presented in various formats, with the most common metric being the equivalent sound level (L_{eq}). The L_{eq} has been shown to provide both an effective and uniform method for comparing time-varying sound levels and is widely used in acoustic assessments in the State of Washington. Estimates of noise sources and outdoor acoustic environments, and the comparison of relative loudness are presented in Table 1. Table 2 presents additional reference information on terminology used in the report.

Table 1. Sound Pressure Levels and Relative Loudness of Typical Noise Sources and Acoustic Environments

Noise Source or Activity	Sound Level (dBA)	Subjective Impression
Vacuum cleaner (10 feet)	70	Moderate
Passenger car at 65 miles per hour (25 feet)	65	
Large store air-conditioning unit (20 feet)	60	
Light auto traffic (100 feet)	50	Quiet
Quiet rural residential area with no activity	45	
Bedroom or quiet living room; Bird calls	40	Faint
Typical wilderness area	35	
Quiet library, soft whisper (15 feet)	30	Very quiet
Wilderness with no wind or animal activity	25	Extremely quiet
High-quality recording studio	20	
Acoustic test chamber	10	Just audible
	0	Threshold of hearing

Adapted from: Kurze and Beranek (1988) and EPA (1971a)

Table 2. Acoustic Terms and Definitions

Term	Definition
Noise	Typically defined as unwanted sound. This word adds the subjective response of humans to the physical phenomenon of sound. It is commonly used when negative effects on people are known to occur.
Sound Pressure Level (LP)	Pressure fluctuations in a medium. Sound pressure is measured in dB referenced to 20 μPa, the approximate threshold of human perception to sound at 1,000 Hz.
Sound Power Level (LW)	The total acoustic power of a noise source measured in dB referenced to picowatts (one trillionth of a watt). Noise specifications are provided by equipment manufacturers as sound power as it is independent of the environment in which it is located. A sound level meter does not directly measure sound power.
Equivalent Sound Level (L_{eq})	The L_{eq} is the continuous equivalent sound level, defined as the single sound pressure level that, if constant over the stated measurement period, would contain the same sound energy as the actual monitored sound that is fluctuating in level over the measurement period.
A-Weighted Decibel (dBA)	Environmental sound is typically composed of acoustic energy across all frequencies. To compensate for the auditory frequency response of the human ear, an A-weighting filter is commonly used for describing environmental sound levels. Sound levels that are A-weighted are presented as dBA in this report.
Unweighted Decibels (dBL)	Unweighted sound levels are referred to as linear. Linear decibels are used to determine a sound's tonality and to engineer solutions to reduce or control noise as techniques are different for low and high frequency noise. Sound levels that are linear are presented as dBL in this report.
Propagation and Attenuation	Propagation is the decrease in amplitude of an acoustic signal due to geometric spreading losses with increased distance from the source. Additional sound attenuation factors include air absorption, terrain effects, sound interaction with the ground, diffraction of sound around objects and topographical features, foliage, and meteorological conditions including wind velocity, temperature, humidity, and atmospheric conditions.

1.3 Noise Regulations and Guidelines

1.3.1 Federal Regulations

There are no federal noise regulations applicable to the Facility.

1.3.2 Washington Administrative Code State Regulations

Environmental noise limits have been established by the Washington Administrative Code (WAC 173-60). WAC 173-60 establishes limits on sounds crossing property boundaries based on the Environmental Designation for Noise Abatement (EDNA) of the sound source and the receiving properties.

- Class A EDNA – Lands where people reside and sleep. They typically include residential property; multiple family living accommodations; recreational facilities with overnight accommodations such as camps, parks, camping facilities, and resorts; and community service facilities including orphanages, homes for the aged, hospitals, and health and correctional facilities.
- Class B EDNA – Lands involving uses requiring protection against noise interference with speech. These typically will include commercial living accommodations; commercial dining establishments; motor vehicle services; retail services; banks and office buildings; recreation and entertainment property not used for human habitation such as theaters, stadiums, fairgrounds, and amusement parks; and community service facilities not used for human habitation (e.g., educational, religious, governmental, cultural and recreational facilities).
- Class C EDNA –Lands involving economic activities of a nature that noise levels higher than those experienced in other areas are normally to be anticipated. Typical Class A EDNA uses generally are not permitted in such areas. Typically, Class C EDNA include storage, warehouse, and distribution facilities; industrial property used for the production and fabrication of durable and nondurable man-made goods; and agricultural and silvicultural property used for the production of crops, wood products, or livestock.

Land use that is considered agricultural is defined as Class C receiving properties. Conversely, agricultural properties where their principal use is for residential purposes with no clearly visible farming or ranching activities, are identified as Class A receiving properties. The WAC does maintain flexibility for interpretation in the classification of the appropriate EDNA on both the State and local level. For example, the Washington Energy Facility Site Evaluation Council (EFSEC) in previous siting decisions has identified and defined different land use types within single contiguous properties, dissecting properties into separate EDNAs. For instance, on a single contiguous property, residences, structures and immediate yards were classified as Class A receivers, whereas agricultural portions of the land surrounding the residences, structures and immediate yards were considered Class C receivers. Between the hours of 10:00 p.m. and 7:00 a.m.

the noise limitations are reduced by 10 dBA for receiving property within Class A EDNAs. WAC 173.60.050 exempts temporary construction noise from the State noise limits.

The noise level limits by EDNA classifications are presented in Table 3. The WAC allows these limits to be exceeded for certain periods of time: 5 dBA for no more than 15 minutes in any hour, 10 dBA for no more than 5 minutes of any hour, and 15 dBA for no more than 1.5 minutes of any hour and are commonly presented as L_n statistical sound levels as well as maximum sound levels (L_{max}) as shown in Table 4.

Table 3. Washington State Environmental Noise Limits

EDNA of Source Property	EDNA of Receiving Property		
	Class A Land Day/Night	**Class B Land**	**Class C Land**
Class A Land	**55/45**	57	60
Class B Land	**57/47**	60	65
Class C Land	**60/50**	65	70

Source: WAC 173-60-040.

Table 4. L_n Environmental Noise Limits for Class C Sources

EDNA of Source Property	Statistical Sound Level Limits			
	LN_{25}	$LN_{8.3}$	$LN_{2.5}$	L_{MAX}
Class A Land	**60/50**	**65/55**	**70/60**	**75/65**
Class B Land	65	70	75	80
Class C Land	70	75	80	85

Source: WAC 173-60-040 (b) and (c).

Table 4 shows a maximum noise limit of 60 dBA for a Class C noise source and a Class A receiving property, which is subject to a further reduction of 10 dBA during nighttime hours. The WAC regulatory limits are absolute and independent of the existing acoustic environment; therefore, a baseline noise survey is not requisite to determine conformance.

1.3.3 Yakima County Code

Chapter 6.28 of the Yakima County Code provides language pertaining to public disturbance and nuisance noise; however, no numerical decibel limits are given. There are no quantitative county noise regulations applicable to the Facility.

2.0 Existing Sound Environment

The degree of audibility of a new or modified sound source is dependent in a large part upon the relative level of the ambient noise. A wide range of noise settings occurs within the Facility Area Extent. Variations in acoustic environment are due in part to existing land uses, population density, and proximity to transportation corridors. Elevated existing ambient sound levels in the region occur near major transportation corridors such as interstate highways and in areas with higher population densities. Several nearby rural airstrips and airports, including the Yakima Air Terminal, also contribute to ambient noise levels in both surrounding urban and rural areas. Portions of the communities traversed by the proposed transmission lines are open land or rural in nature, and will have comparatively lower ambient sound levels, possibly 30 dBA or less during nighttime. Principal contributors to the existing acoustic environment likely include motor vehicle traffic, mobile farming equipment, farming activities such as plowing and irrigation, all-terrain vehicles, local roadways, rail movements, periodic aircraft flyovers, and natural sounds such as birds, insects, and leaf or vegetation rustle during elevated wind conditions. Diurnal effects result in sound levels that are typically quieter during the night than during the daytime, except during periods when evening and nighttime insect noise dominates in warmer seasons.

The analysis area is inclusive of all areas that could be potentially affected by construction or operational noise resulting from the Facility. The analysis area for noise around the Facility was defined as the area bounded by a perimeter extending approximately 1 mile from its fence line. In the absence of ambient measurement data, the existing sound level environment in the vicinity of Facility was estimated with a method published by the Federal Highway Administration (FHWA) in its Transit Noise and Vibration Impact Assessment (FHWA 2006). This document presents the general assessment of existing noise exposure based on the population density per square mile and proximity to area sound sources such as roadways and rail lines. The proposed Facility is 8 miles east of the city of Moxee, which has a population density of 1,751.4 per square mile according to the U.S. Census Bureau (2020); however, the population per square mile in blocks within 1 mile of Facility is much less. In addition, the Facility is located in close proximity to Washington State Route 24 (SR-24), with the closest fence line within approximately 150 feet of that thoroughfare. Table 5 indicates the estimated baseline sound levels based on population density and distance to SR-24 for daytime, evening, and nighttime L_{eq} as well as the day-night average sound level (L_{dn}). The L_{dn} is the average equivalent sound level over a 24-hour period, with a penalty added for noise during the nighttime hours of 10:00 p.m. – 7:00 a.m. During the nighttime period, 10 dB is added to reflect the impact of the noise

Table 5. Estimated Baseline Sound Levels in Proximity to Goose Prairie Solar

Average Sound Level (dBA)	L_{eq} (Day)	L_{eq} (Evening)	L_{eq} (Night)	L_{dn}
	40-55	35-50	30-45	40-55

3.0 Facility Construction

Construction of the Facility is expected to be typical of other solar power generating facilities in terms of schedule, equipment, and activities. Construction is anticipated to occur over approximately 9 months and would require a variety of equipment and vehicles.

3.1 Noise Calculation Methodology

Acoustic emission levels for activities associated with Facility construction were based upon typical ranges of energy equivalent noise levels at construction sites, as documented by the United States Environmental Protection Agency (EPA; 1971b) and the EPA's "Construction Noise Control Technology Initiatives" (EPA 1980). The EPA methodology distinguishes between type of construction and construction stage. Using those energy equivalent noise levels as input to a basic propagation model, construction noise levels were calculated at a series of set reference distances.

The basic model assumed spherical wave divergence from a point source located at the closest point of the Facility site. Furthermore, the model conservatively assumed that all pieces of construction equipment associated with an activity would operate simultaneously for the duration of that activity. An additional level of conservatism was built into the construction noise model by excluding potential shielding effects due to intervening structures and buildings along the propagation path from the site to receiver locations.

3.2 Projected Noise Levels During Construction

Table 6 summarizes the projected noise levels due to Facility construction, organized into the following work stages: demolition, site preparation and grading, trenching and road construction, equipment installation, and commissioning. Periodically, sound levels may be higher or lower than those presented in Table 6; however, the overall sound levels should generally be lower due to excess attenuation and the trend toward quieter construction equipment in the intervening decades since the EPA data were developed.

The construction of the Facility may cause short-term, but unavoidable, noise impacts that could be loud enough at times to temporarily interfere with speech communication outdoors and indoors with windows open. Noise levels resulting from the construction activities would vary significantly depending on several factors such as the type and age of equipment, specific equipment manufacturer and model, the operations being performed, and the overall condition of the equipment and exhaust system mufflers.

Facility construction would generally occur during the day, Monday through Friday. Furthermore, all reasonable efforts would be made to minimize the impact of noise resulting from construction activities including implementation of standard noise reduction measures. Due to the infrequent nature of loud construction activities at the site, the limited hours of construction and the implementation of noise mitigation measures, the temporary increase in noise due to construction is considered to be a less than significant impact.

Table 6. Projected Construction Noise Levels by Phase

Phase No.	Construction Phase	Construction Equipment	Usage Factor %	Maximum (L_{max}) Equipment Noise Level at 50 ft	Composite L_{eq} Noise Level				
					100 ft	200 ft	500 ft	1,000 ft	2,000 ft
1	Demolition	(1) Excavators (168 horsepower [hp]) (1) Tractors/Loaders/Backhoes (108 hp) (1) Rough Terrain Forklifts (93 hp) (1) Dump Truck	57 55 60 40	88	80	72	61	53	45
2	Site Preparation and Grading	(2) Graders (174 hp) (1) Rubber Tired Loaders (164 hp) (1) Scrapers (313 hp) (2) Water Trucks (189 hp) (2) Generator Sets	57 59 72 50 74	90	82	74	63	55	47
3	Trenching and Road Construction	(5) Excavators (168 hp) (2) Graders (174 hp) (2) Water Trucks (189 hp) (1) Trencher (63 hp) (2) Rubber Tired Loaders (164 hp) (2) Generator Sets	57 57 50 75 54 74	90	82	74	63	55	47
4	Equipment Installation	(1) Crane (399 hp) (1) Concrete Batch Plant (5) Forklifts (145 hp) (8) Pile drivers (15) Pickup Trucks/ATVs (2) Water Trucks (189 hp) (2) Generator Sets	43 15 30 20 40 50 74	86	78	70	59	51	43
5	Commissioning	(5) Pickup Trucks/ATVs	40	51	43	35	24	16	8

3.3 Construction Noise Mitigation

Since construction equipment operates intermittently, and the types of machines in use at the Facility site change with the stage of construction, noise emitted during construction would be mobile and highly variable, making it challenging to control. The construction management protocols would include the following noise mitigation measures to minimize noise impacts:

- Maintain all construction tools and equipment in good operating order according to manufacturers' specifications;
- Limit use of major excavating and earth-moving machinery to daytime hours;
- To the extent practicable, schedule construction activity during normal working hours on weekdays when higher sound levels are typically present and are found acceptable. Some limited activities, such as concrete pours, would be required to occur continuously until completion;
- Equip any internal combustion engine used for any purpose on the job or related to the job with a properly operating muffler that is free from rust, holes, and leaks;
- For construction devices that utilize internal combustion engines, ensure the engine's housing doors are kept closed, and install noise-insulating material mounted on the engine housing consistent with manufacturers' guidelines, if possible;
- Limit possible evening shift work to low noise activities such as welding, wire pulling, and other similar activities, together with appropriate material handling equipment; and
- Utilize a complaint resolution procedure to address any noise complaints received from residents.

4.0 Operational Noise

This section describes the model used for the assessment, input assumptions used to calculate noise levels due to the Facility's normal operation, a conceptual noise mitigation strategy, and the results of the noise impact analysis.

4.1 Noise Prediction Model

The Cadna-A® (Computer-Aided Noise Abatement) computer noise model was used to calculate sound pressure levels from the operation of the Facility equipment in the vicinity of the Facility site. An industry standard, Cadna-A® was developed by DataKustik GmbH to provide an estimate of sound levels at distances from sources of known emission. It is used by acousticians and acoustic engineers due to the capability to accurately describe noise emission and propagation from complex facilities consisting of various equipment types like the Facility and in most cases, yields conservative results of operational noise levels in the surrounding community.

The outdoor noise propagation model is based on the International Organization for Standardization (ISO) 9613, Part 2: "Attenuation of Sound during Propagation Outdoors" (1996). The method described in this standard calculates sound attenuation under weather conditions that are favorable for sound propagation, such as for downwind propagation or atmospheric inversion, conditions which are typically considered worst-case. The calculation of sound propagation from source to receiver locations consists of full octave band sound frequency algorithms, which incorporate the following physical effects:

- Geometric spreading wave divergence;
- Reflection from surfaces;
- Atmospheric absorption at 10 degrees Celsius and 70 percent relative humidity;
- Screening by topography and obstacles;
- The effects of terrain features including relative elevations of noise sources;
- Sound power levels from stationary and mobile sources;
- The locations of noise-sensitive land use types;
- Intervening objects including buildings and barrier walls, to the extent included in the design;
- Ground effects due to areas of pavement and unpaved ground;
- Sound power at multiple frequencies;
- Source directivity factors;
- Multiple noise sources and source type (point, area, and/or line); and
- Averaging predicted sound levels over a given time.

Cadna-A allows for three basic types of sound sources to be introduced into the model: point, line, and area sources. Each noise-radiating element was modeled based on its noise emission pattern. Larger dimensional sources such as the transformers and inverters were modeled as area sources.

Off-site topography was obtained using the publicly available United States Geological Survey digital elevation data. A default ground attenuation factor of 0.5 was assumed for off-site sound propagation over acoustically “mixed” ground. A conservative ground attenuation factor of 0.25 for a reflective surface was assumed onsite.

The output from Cadna-A includes tabular sound level results at selected receiver locations and colored noise contour maps (isopleths) that show areas of equal and similar sound levels.

4.2 Input to the Noise Prediction Model

The Facility’s general arrangement was reviewed and directly imported into the acoustic model so that on-site equipment could be easily identified, buildings and structures could be added, and sound emission data could be assigned to sources as appropriate. The primary noise sources during operations are the inverters, their integrated step-up transformers, battery energy storage system (BESS) units, and substation transformers. Electronic noise from inverters can be audible but is often reduced by a combination of shielding, noise cancellation, filtering, and noise suppression. The BESS will either be included as a consolidated area in the northeastern portion of the Facility Area or in distributed units throughout the solar array. Both options for battery storage and their associated sound emissions, including contributions from cooling, were considered in the acoustic analysis.

Substations have switching, protection, and control equipment, as well as a main power transformer, which generate the sound generally described as a low humming. There are three chief noise sources associated with a transformer: core noise, load noise, and noise generated by the operation of the cooling equipment. The core is the principal noise source and does not vary significantly with electrical load. The load noise is primarily caused by the load current in the transformer’s conducting coils (or windings) and consequently the main frequency of this sound is twice the supply frequency: 120 Hz for 60 Hz transformers. The cooling equipment (fans and pumps) may also be an important noise component, depending on fan design. During air forced cooling method, cooling fan noise is produced in addition to the core noise. The resulting audible sound is a combination of hum and the broadband fan noise. Breaker noise is a sound event of very short duration, expected to occur only a few times throughout the year. Just as horsepower ratings designate the power capacity of an electric motor, a transformer’s megavolt amperes rating indicates its maximum power output capacity.

Reference sound power levels input to Cadna-A were provided by equipment manufacturers, based on information contained in reference documents or developed using empirical methods. The source levels used in the predictive modeling are based on estimated sound power levels that are generally deemed to be conservative. The projected operational noise levels are based on Applicant-supplied sound power level data for the major sources of equipment. Table 7 summarizes the equipment sound power level data used as inputs to the acoustic modeling analysis. For the purpose of the analysis, it was assumed that all equipment would operate consistently during both daytime and nighttime periods.

Table 7. Modeled Octave Band Sound Power Level for Major Pieces of Facility Equipment

Sound Source	Sound Power Level (L_W) by Octave Band Frequency dBL									Broadband Level
	31.5	63	125	250	500	1k	2k	4k	8k	dBA
Integrated Inverter/Transformer	78	86	93	94	93	90	85	78	71	99
BESS	54	64	71	77	80	79	78	73	64	85
Substation Transformer	63	83	95	97	103	100	96	91	82	106

4.3 Noise Prediction Model Results

Broadband (dBA) sound pressure levels were calculated for expected normal Facility operation assuming that all components identified previously are operating continuously and concurrently at the representative manufacturer-rated sound power level. It is expected that all sound-producing equipment would operate during both daytime and nighttime periods. After calculation, the sound energy was then summed to determine the equivalent continuous A-weighted downwind sound pressure level at a point of reception. Sound contour plots displaying broadband (dBA) sound levels presented as color-coded isopleths are provided in Figures 2 and 3 for potential 24-hour operation. Figure 2 displays operational sound levels assuming centralized BESS while Figure 3 displays operational sound levels assuming distributed BESS. The sound contours are graphical representations of the cumulative noise associated with full operation of the equipment and show how operational noise would be distributed over the surrounding area of the Facility site. The contour lines shown are analogous to elevation contours on a topographic map (i.e., the sound contours are continuous lines of equal noise level around some source, or sources, of sound).

Table 8 shows the projected exterior sound levels resulting from full, normal operation of the Facility during both daytime and nighttime hours, at all nearby NSRs using both centralized and distributed BESS. The Facility is located on Class C land while the adjacent properties consist of a mix of both Class A land, which has a daytime limit of 60 dBA and nighttime limit of 50 dBA, and Class C land, which has a daytime and nighttime limit of 70 dBA. The Project successfully demonstrates compliance with the applicable 50 dBA nighttime limit at NSRs (i.e., residential structures), using either BESS option. In addition, compliance was evaluated at the property lines closest to the Facility Area Extent. As displayed in Figures 2 and 3, the Facility is expected to successfully comply with the applicable WAC regulatory limits at the closest property lines as well.

Table 8. Acoustic Modeling Results Summary

NSR ID	Status	UTM Coordinates (meters) NAD83 UTM Zone 10		Received Sound Level (dBA)	
		Easting	Northing	Centralized BESS	Distributed BESS
1	Non-participant	712709	5154029	32	32
2	Participant	713090	5157167	42	41
3	Participant	710818	5157477	40	40
4	Non-participant	710267	5156137	38	38
5	Non-participant	712549	5154011	32	32
6	Non-participant	712119	5155621	43	43
7	Non-participant	712062	5155635	45	45
8	Non-participant	712625	5153988	32	32
9	Non-participant	711914	5155486	41	42
10	Non-participant	711870	5155502	42	42
11	Non-participant	711784	5155507	42	42
12	Non-participant	711439	5155505	40	40
13	Non-participant	711289	5155499	40	40
14	Non-participant	712761	5154003	32	32
15	Non-participant	711161	5155492	40	40
16	Non-participant	710991	5155462	39	39
17	Non-participant	710883	5155472	39	39
18	Non-participant	713172	5155534	34	34
19	Non-participant	712280	5155071	38	38
20	Non-participant	711577	5155491	41	41
21	Non-participant	711480	5153842	32	32
22	Non-participant	712966	5153997	32	32
23	Non-participant	714139	5155448	30	30
24	Non-participant	714216	5155578	29	29
25	Non-participant	713187	5154040	31	31
26	Non-participant	713369	5153873	31	31
27	Non-participant	713506	5153881	30	30
28	Non-participant	713946	5154008	29	29

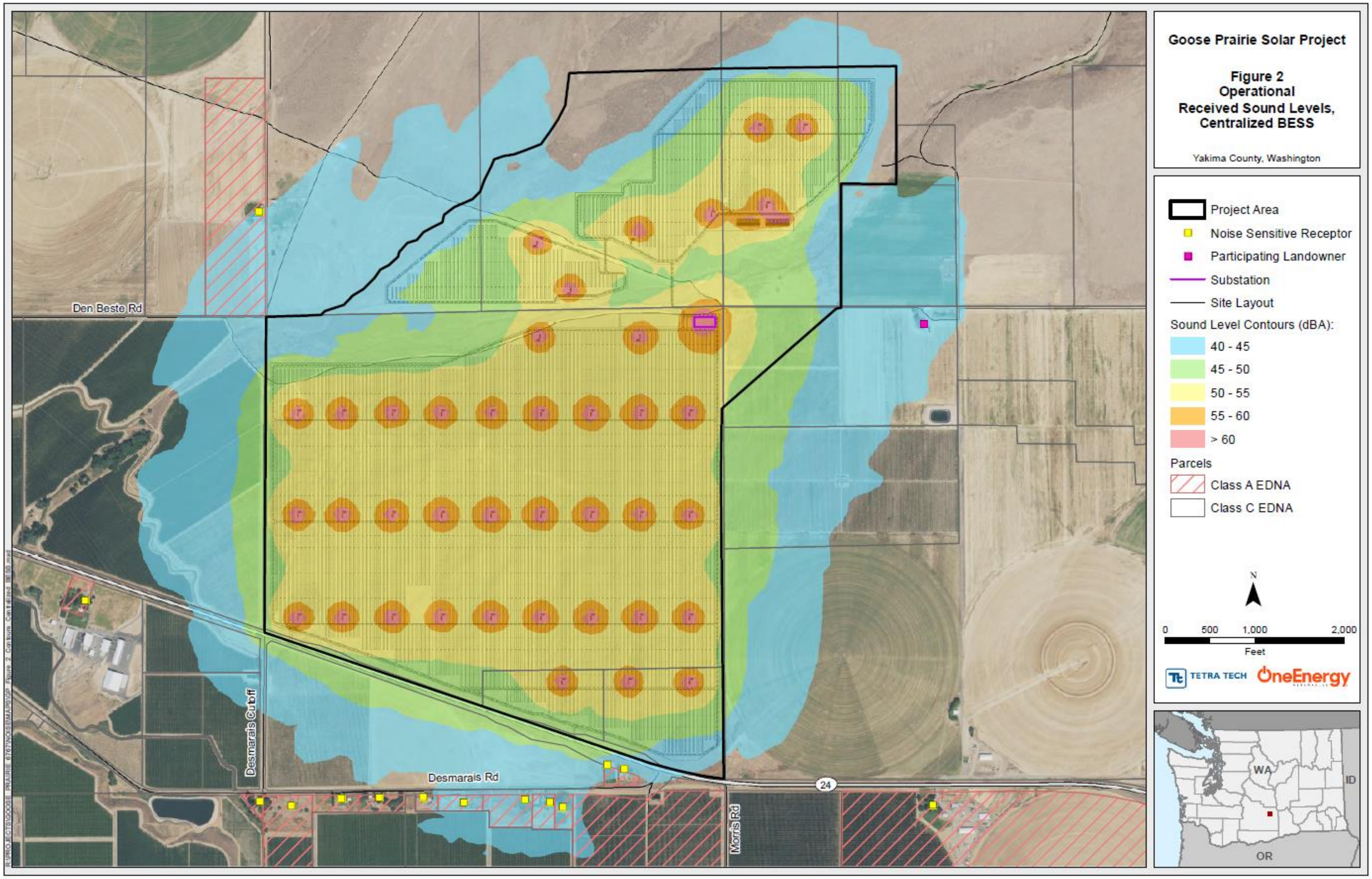

Figure 2. Operational Received Sound Levels, Centralized BESS

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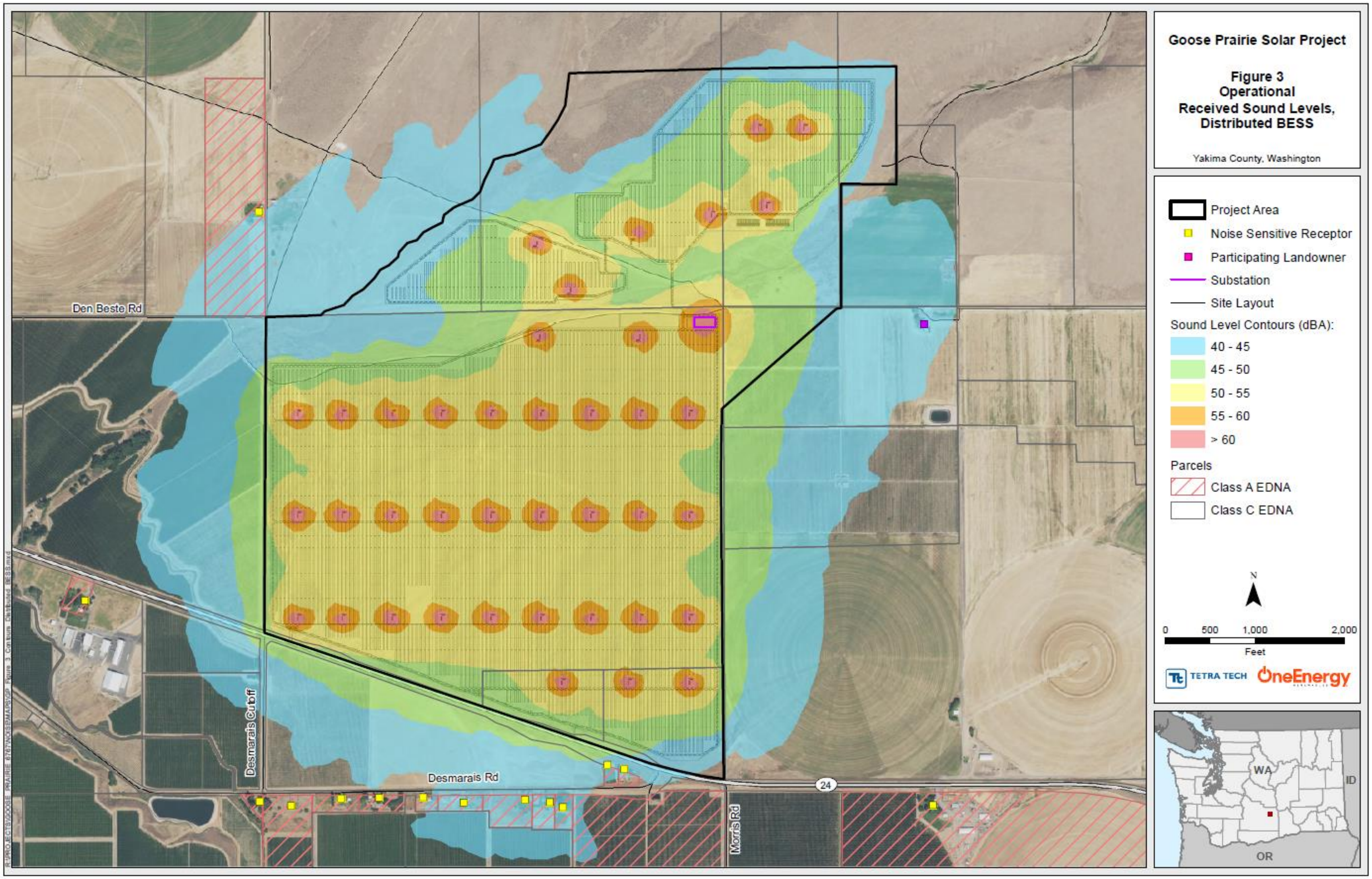

Figure 3. Operational Received Sound Levels, Distributed BESS

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5.0 Conclusion

Tetra Tech completed a detailed acoustic assessment of the Facility, proposed in Yakima County, Washington. The assessment included an evaluation of potential Facility sound level impacts during construction and operation phases. The Applicant is considering implementing a BESS for the Facility in both centralized and distributed configurations.

The construction noise assessment indicated that construction noise would be periodically audible at off-site locations; however, that noise would be temporary and minimized to the extent practicable through implementation of best management practices and noise mitigation measures as identified in Section 3.3. Traffic noise generated during construction onsite and offsite would also add to overall sound levels but would be intermittent and short-term.

Operational sound levels were modeled and evaluated at nearby NSRs and property lines. Anticipated Facility sound sources consist of the collector substation main power transformer, integrated inverter/transformers, and BESS units. Incorporating a number of conservative assumptions, acoustic modeling results indicate that received sound levels resulting from Facility operations using either BESS option would comply with the applicable WAC 173-6050 dBA daytime and nighttime limits at nearby NSRs and property lines. All NSRs would be at or below the applicable 50 dBA nighttime limit, which is similar to the sound level expected by “light auto traffic at 100 feet” as described in Table 1. In addition, sound generated from existing sound sources in the Facility Area such as traffic on SR-24 and/or the operation of agricultural equipment would be expected to be relatively higher than Facility operations. Overall, sound emissions associated with the Project are expected to remain at a low level, consistent with other solar energy facilities of similar size and design.

6.0 References

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